NATIONAL INSTITUTE FOR PHARMACEUTICAL RESEARCH AND DEVELOPMENT (NIPRD), ABUJA, NIGERIA



COMPENDUM OF RESEARCH PUBLICATIONS (2010 - 2018)





FEDERAL MINISTRY OF HEALTH



THE COMPENDIUM OF RESEARCH PUBLICATIONS OF THE NATIONAL INSTITUTE FOR PHARMACEUTICAL RESEARCH AND DEVELOPMENT IDU ABUJA-NIGERIA (2010- 2018)

Compiled and Edited By

Adeola Jegede Simeon Ugwuona Grace Ugbabe Moses Njoku Bola Muspaha Bulus Adzu Martins Emeje Karniyus Gamaniel.

January, 2018 (Second Edition)

Published by NIPRD © 2018 All rights reserved. NIPRD Compendium of Research Publications (2010 - 2018)

TABLE OF CONTENTS

-	-	-	-	-	-	-	-	i
C C	-	-	-	-	-	-	-	iii
S	-	-	-	-	-	-	-	iii
-	-	-	-	-	-	-	-	iv
-	-	-	-	-	-	-	-	iv
ire	-	-	-	-	-	-	-	vi
-	-	-	-	-	-	-	-	vii
EO	-	-	-	-	-	-	-	viii
Head P	lanning	, Monito	oring an	d Evalu	ation	-	-	ix
<u>ONS</u>								
(Pub. (001 - 028	8)	-	-	-	-	-	01
(Pub. (029 - 072	2)	-	-	-	-	-	22
(Pub. (073 - 113	3)	-	-	-	-	-	53
(Pub. 1	114 - 14())	-	-	-	-	-	81
(Pub. 1	141 - 164	4)	-	-	-	-	-	99
(Pub. 1	165 - 186	8)	-	-	-	-	-	114
(Pub. 1	189-21.	3)	-	-	-	-	-	129
(Pub. 2	214 - 24.	3)	-	-	-	-	-	145
	- s s - ne - EO Head P (Pub. 0 (Pub. 0 (Pub. 0 (Pub. 1 (Pub. 1 (Pub. 1 (Pub. 1))		$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\frac{1}{2} - \frac{1}{2} - \frac{1}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

OBJECTIVES OF THE WORK

The publication, compendium of research publications from the National Institute for Pharmaceutical Research and Development (NIPRD), Abuja Nigeria (Second Edition), was undertaken in order to once again contribute to the global scientific knowledge platform by putting together an index of all scientific publications emanating from the various research activities of Research Fellows in the Institute from 2010 to 2018. This effort is more relevant now that we live a knowledge driven world. The publication is also an attestation to the various efforts of the Research Fellows of the Institute as well as the extent of collaboration with other national and international Scientists. It is a means of verification of the research out put of the Institute and also confirms the continued zeal and determination of NIPRD's Management's to ensure that the Institute continues to plays its role in generating current research data and information relevant to the health and economic development of the country.

It is aimed that this publication will be a ready- made reference material for direction and redirection of research efforts in the Institute and the country at large leading to more collaborative researches. The work will be useful to researchers, students and those in authority in the various Ministries, Department and Agencies (MDAs). This edition contains abstracts of the publications as stated in the maiden edition.

ARRANGEMENT OF ENTRIES

Entries made in this compendium are arranged alphabetically and presented in the American Psychological Association (APA) style using the first listed name of the author of the published article as retrieved from several reference sources used or as submitted to the editorial crew. This arrangement was also presented sequentially year by year. Efforts were made to avoid repetitive entries by using the principal (first listed) author as the main entry in the document. Titles of journals were given as presented in the sources used for the work.

Where names of first listed author appeared with initials before a given full name (e.g. K.S. Gamaniel), arrangement in the compendium is transcribed as Gamaniel, K.S. This is then followed by names of other co-authors of the article in the format originally given. Attempt was made to start all entries with surnames of authors throughout the entry except for cases which could not be determined.

Publications that are listed contain: (a) names of staff members currently serving in the National Institute for Pharmaceutical Research and Development, Abuja. (b) Names of staff who once served in NIPRD and (c) Names of staff elsewhere who work in collaboration with the NIPRD staff on a research project.

NIPRD IN BRIEF

Our Vision:

To build a center of excellence for R & D of phytomedicines, pharmaceuticals and biological products for the service of mankind.

Our Mission:

To apply appropriate modern science and technology resources to stimulate local raw materials production through effective collaboration with the industry and other experts within and outside Nigeria; develop herbal medicines to pilot stage for local entrepreneurs/manufacturers; develop quality standards of herbal and orthodox drugs for purpose of control and regulation; provide quality assurance service on all drugs used for healthcare delivery in Nigeria; provide safety data and essential information on herbal and other drugs that are used in Nigeria and make Nigeria self-sufficient in the production of its essential drugs in a way that would guarantee the overall health of Nigerians.

BACKGROUND

In Nigeria, the need for the advancement of indigenous pharmaceutical research and development (R&D) in order to enhance development and commercialization of pharmaceutical raw materials, drugs and biological products has long been recognized. Therefore in 1987, the Federal Government approved the establishment of the **National Institute for Pharmaceutical Research and Development, NIPRD** as a parastatal under the Federal Ministry of Science and Technology. This approval was based on the recommendation of the Pharmaceutical Society of Nigeria (PSN). The Institute was established under the Science and Technology Act of 1980 with the primary objective of developing drugs, biological products and pharmaceutical raw materials from indigenous resources. The PSN and the Pharmaceutical Manufacturer's Group of the Manufacturers Association of Nigeria (PMG-MAN) made financial contributions toward the take–off of the institution. The Institute is governed by a board of governors with representatives from the PSN, PMG-MAN, Traditional Medicine Practitioners, Federal Ministry of Health and the Federal Ministry of Science and Technology. The chief executive of the institution serves as the secretary to the board.

The foremost activity of the institute following its establishment was the organization of an international Workshop on **Strategies and Priorities for Indigenous Pharmaceutical Research and Development** in October 1989. The proceedings of the workshop was published in 1991 but before then, the institute had embarked on the documentation of medicinal and aromatic plants within the Federal Capital Territory of Nigeria. The data collated during the ethno-botanical survey was useful in the compilation of a National Compendium of Medicinal and Aromatic plants in Nigeria.



The Institute has a group of highly trained manpower with the Researchers staff holding Ph.Ds and many others with M.Sc degree in their respective fields of study. The Research Fellows actively publish in peer reviewed scientific journals and are always in attendance at national and international meetings and conferences. As a result, the institute is well known in the field of medicinal plant research. NIPRD was awarded and designated the ANDI Centre of Excellence for Phytomedicines Research and Development among 32 other institutions across Africa as a testament to its leading efforts in research and development activities The Institute was also designated as the West African hub for ANDi for initiation, coordination, conduct and dissemination of results of Health Research in the sub region.

ORGANIZATIONAL STRUCTURE OF THE INSTITUTE

There are five technical, two non-technical departments and other service units of the institute.

Technical Departments

- 1. Medicinal Plants Research and Traditional Medicine (MPR & TM) Dept.
- 2. Medicinal Chemistry and Quality Control (MCQC) Dept.
- 3. Microbiology, Human Virology and Biotechnology (MBT) Dept.
- 4. Pharmacology and Toxicology (P & T) Dept.
- 5. Pharmaceutical Technology and Raw Materials Development (PT & RMD) Dept.

Non-technical Departments

- 6. Administration and Supplies Department
- 7. Accounts and Finance Department
- 8. Office of the DG/CEO for over all coordicnation of Instuitutes acticvities. It comprises of the following units: Library, ICT, Planning Monitoring and Evaluation, Clinic, Legal, Procurment, Servicom, Consultancy, Audit and Public Relations.

FUNCTIONS OF THE INSTITUTE

The functions performed by the institute include the following:

- Undertake research and development activities on drugs, biological products including vaccines and pharmaceutical raw materials from indigenous natural resources and by synthesis using appropriate science and technology methodologies.
- Conduct appropriate investigations and consequent applications in the areas of evaluation, preservation, purification, standardization, safety and rational utilization of traditional medicine.
- Develop methodologies for quality assessment of biological products, orthodox and herbal medicines including their raw materials
- Serve as reference center for research work on the biopharmaceutics, pharmacokinetics, storage and stability of imported and locally manufactured drugs and biological products
- Conduct research and development work into pharmaceutical biotechnology, nutrition, cosmetics and environmental science for improved quality of life and the conservation of medicinal and aromatic plants
- Establish and operate a quality assurance laboratory for pharmaceutical raw materials and products
- Promote and sponsor staff development through training courses, workshops and fellowship within and outside the country
- Promote and sponsor the local development and production of drugs, vaccines, pharmaceutical machinery, devices and accessories
- Promote the pilot production unit of the institute into a limited liability business venture
- Transfer pharmaceutical products and machinery technologies to private sector industries and render consultancy and extension services to such and other organizations
- Establish and maintain relevant laboratories, clinics, medicinal plants gardens in strategic ecological zones of Nigeria as may be necessary for the performance of the functions
- Compile and publish relevant data resulting from the performance of the functions of the institute
- Sponsor such national and international conferences, workshops and symposia as may be considered appropriate
- Patent and register new products and processes with appropriate national bodies, international organizations and selected countries
- Enter into commercial and other appropriate agreements with relevant national and multinational corporations regarding the marketing and utilization of the institute's products and services
- Liaise with higher institutions, government organizations, multinational bodies and other relevant establishments within and outside Nigeria in the pursuance of the mandate of the institute
- Establish and develop drug information system, collate and synthesize relevant research information for drug manufacturing industries and research centers.

FOREWORD

The publication of the NIPRD Compendium of research publications is another in the series of documentation systems that have was pioneered in the Institute by the Planning, Monitoring and Evaluation Unit. The information contained there in is to serve as a tool for initiation of new research or modification of on going ones. It is to track the various researches studies conducted in the Institute. With the compendium, duplication of research effort should be checked and valuable time and resources saved as stated in the maiden edition. This is in view of scarce and competing resources.

The compendium brings to fall the various research discipline available in the Institute and the reach of the collaborative networks of the Scientists. This is an attestation that staff commitment and capacity is one the greatest resource of the Institute. I have no doubt in my mind the capacity of our Scientists to continue to contribute their quota to development of this country. I am proud of NIPRD Scientists as evidenced by this number and quality of their publications while thanking the Planning, Monitoring and Evaluation Unit for once again making this a reality. It is a document that will continue to highlight and promote the ideals and spirit of research in the Institute. I recommend it as a tool to the National Assembly, our Supervisory Ministry and other relevant Ministries, Universities, other Research Institutions, Students (undergraduate and post graduate) and other key plays in Pharmaceutical Sciences and other areas of research.

Prof. Karniyus S. Gamaniel, OON, FAS, FPSN, FNAPharm, FPCPharm. Director General/Chief Executive, NIPRD, Abuja-Nigeria.

ACKNOWLEDGEMENT

The National Institute for Pharmaceutical Research and Development over the years had developed various tools and systems to initiate, conduct and disseminate its research activities and result. This publication is another way of effective documentation and dissemination of its research out put of the Institute. The dissemination of research findings to relevant stakeholders for utilization is as important as the conduct of the research itself and this is a key component relevant to our national development. The initials efforts made to compile the maiden edition is worthy of note and an improvement led to this publication.

In compiling this edition, credit goes to the resilient NIPRD Research Fellows for brazing all odds to continue to conduct Pharmaceutical research of international standards and publish despite numerous challenges. This publication is kudos to them all as their contribution to the global scientific knowledge platform is worthy of note. My sincere appreciation also goes to Prof K.S. Gamaniel (outgoing Director General / Chief Executive Officer) for improving the research documentation and culture in the Institute. Research coordination focusing on results by the Research and Development Committee of NIPRD, Heads of various technical Departments and support from grant awarding organisations like, IHVN, NIAID/NIH, World Bank STEP B project, America Cancer Society, RMRDC, ANDi, etc. had ensured that NIPRD Scientists were always "burning the mid night candle"as evidenced by the various research articles contained in this compendium.

In producing this edition the efforts of the Heads of Technical Departments in facilitating submissions from their various departments is appreciated. The dedication and efficiency of the staff of Planning, Monitoring and Evaluation Unit in conjunction with Library, Information and Documentation Units in the Office of the DG is also acknowledged. It is my belief that this publication will serve as a good advocacy tool for the showcasing the potential of NIPRD to continue to contribute to the health and economic development of Nigeria. Thank you all

Jegede, Ibikunle Adeola Head, Planning Monitoring and Evaluation, Office of the Director General/CEO.

LIST OF PUBLICATIONS

YEAR 2017

001 Adeola Jegede*, Jemilat Ibrahim, Henry Egharevba , Grace Ugbabe, Ibrahim Muazam , Yemisi Kunle, and Karniyus Gamaniel.

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

Investigation of the Knowledge of Traditional Medicine Policy by Traditional Medicine Practitioners. A Pilot Study

Abstract

Aim: The effective implementation of traditional medicine policy has been recommended by the World Health Organisation as a way of addressing some of the challenges facing Traditional Medicine practise in many countries. This study was aimed at investigating the knowledge of Traditional Medicine Practioners in Nassarawa State, about Nigeria's Traditional Medicine Policy and other issues of concern towards provision of evidence based information to support the promotion of the traditional medicine practise and its integration into national health care delivery system.

Study Methodology, Place and Duration: Pre - tested study questionnaire and consent forms were employed. Familiarization visits to the selected study sites to introduce the study to the community to have their buy in and understand their cultural norms carried out. Administration of questionnaire, data collation and analysis were later done. The study was conducted at Lafia and Keffi, both in Nasarawa state in June 2013.

Results: The result indicated 38% of respondents were aware of the existence of the Traditional Medicine Policy document while 59% were not. 43% of those aware did not know the content of the policy, while 57% had a faint idea of what the policy was about. On adverse drug reaction, 58% of respondents got feedback from their patients while 38% did not with only 17% of the TMPs referred patients with adverse drug reaction to hospital. However, none of the TMPs reported the reactions to the national regulatory agency with 70% not registering their products with the regulatory agency as required by the policy. Many areas of the policy requiring attention of the TMPs were not been implemented.

Conclusion: There is need for greater awareness of the existence of the policy for improved implementations while the document which is due for review needs the input of the practitioners during the review process.

Keywords: Traditional medicine; traditional medicine policy; adverse drug reaction; evidence based information; Nigeria.

Corresponding author: E-mail: adeolajegede@yahoo.com;

01

002 Abayomi M. Ajayi¹, Olufunmilayo M. Ologe², Benneth Ben-Azu³, Samuel E. Okhale⁴, Bulus Adzu⁵ and Olusegun G. Ademowo³.

¹Department of Pharmacology and Therapeutics, College of Medicine, University of Ibadan, Ibadan, Nigeria

²Department of Pharmacology and Therapeutics, College of Medicine, University

of Ibadan, Ibadan, Nigeria; and Department of Pharmacology and Therapeutics, Faculty of Basic Medical Sciences, University of Ilorin, Ilorin, Kwara State, Nigeria

³Department of Pharmacology and Therapeutics, College of Medicine, University of Ibadan, Ibadan, Nigeria

⁴Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

⁵Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Ocimum gratissimum Linn. Leaf extract inhibits free radical generation and suppressed inflammation in carrageenan-induced inflammation models in rats. J Basic Clin Physiol Pharmacol. 2017 Nov 27; 28(6):531-541.

Abstract

Background: Ocimum gratissimum leaf is used in managing rheumatism and other inflammatory conditions. In this study, we investigated the antioxidant and anti-inflammatory effects of phenolic extract obtained by sequential methanol extraction of O. gratissimum leaves (MEOg). Methods: The methanol extract (MEOg) was obtained after sequential maceration (n-hexane, chloroform and methanol) of dried O. gratissimum leaves. The fingerprint of the extract was obtained using a highperformance liquid chromatrographic method. In vitro effects were tested by 1,1-Diphenyl-2-picrylhydrazyl (DPPH), nitric oxide (NO) free radical scavenging, lipoxygenase, and xanthine oxidase inhibitory assays. MEOg was studied for anti-inflammatory activity in carrageenan-induced paw edema and air pouch inflammation in rats. Results: HPLC fingerprint of the extract shows the presence of caffeic acid, rutin, ferulic acid, apigenin, and quercetin. Antioxidant activity of MEOg revealed an IC50 value in DPPH (31.5±0.03 µg/mL) and NO assay (201.6±0.01 µg/mL), respectively. The extract demonstrated strong xanthine oxidase inhibitory and weak antilipoxygenase activities. MEOg (100 mg/kg) significantly inhibited carrageenan-induced paw edema by 43.2%. Furthermore, MEOg (50 and 100 mg/kg) significantly reduced exudate volume, leucocyte count, neutrophil infiltration, $TNF-\alpha$, nitrites, myeloperoxidase, and malondialdehyde in carrageenan-induced air pouch inflammation. MEOg also elevated the glutathione levels in the inflammatory exudates.

Conclusions: MEOg shows potential therapeutic benefits in slowing down inflammation and oxidative stress in chronic diseases, such as arthritis.

Keywords: anti-inflammatory; antioxidant; apigenin; carrageenan; phenolic; xanthine oxidase

02

003 Adamu A.¹*, Y. A. Iyaka², J. T. Mathew², A. Inobeme³ and H. O. Egharevba¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu, P.M.B. 21, Abuja, Nigeria. ²Department of Chemistry, Federal University of Technology, Minna, P.M.B. 65, Niger State,

Department of Chemistry, Federal University of Technology, Minna, P.M.B. 65, Niger State, Nigeria.

³Department of Chemistry, Edo University, Iyamho, P.M.B. 11, Edo State, Nigeria.

Assessment of Some Heavy Metal Contamination and analysis of Physicochemical Parameters of Surface Soil within the Vicinity of Minna Railway Station, Niger State, Nigeria. *Journal of Applied Life Sciences International 10(1): 1-9, 2017; Article no.JALSI.28671 ISSN: 2394-1103SCIENCEDOMAIN international* www.sciencedomain.org

Abstract

The main aim of this study is to determine the levels of soil pollution with heavy metals in the vicinity of a railway station in Minna, Niger state, Nigeria. In this study, 15 soil samples were collected at a depth of 0-15 cm from the vicinity of Minna railway station, Niger State, Nigeria, and analyzed at the chemistry department, Federal University of Technology Minna, Nigeria between May 2009 and November, 2009. The soil samples were acid digested using a mixture of three acids namely, perchloric acid, nitric acid and sulphuric acid in the ratio 2:10:1. The heavy metal (Cu, Zn, Pb) levels in the digested soils were analysed using Atomic Absorption Spectrophotometer. The soil pH was determined by glass electrode pH meter using soil water suspension (1:1). Particle sizedistribution was determined using hydrometer method. The pH of the soil samples generally ranged from moderately acidic pH (5.54) to neutral pH (7.01). The particles size distribution ranged from 3.04% to 12.48%, 5.28% to 38.56% and 54.40% to 88.40% for clay, silt and sand respectively. The concentrations of the investigated heavy metals ranged from 18.01 mg/kg to 467.50 mg/kg, 54.47 mg/kg to 417.14 mg/kg, and 3.85 mg/kg to 106.78 mg/kg for copper, zinc and lead respectively. There is a significant correlation among the analyzed heavy metals; hence the metals may have the same or similar source of input. Heavy metals pollution indices reveal that various sites within the railway station are moderately polluted with copper, zinc and lead according to USEPA and Nigeria DRP guideline for soil quality. Furthermore, I-geo index reveals that the sites are either unpolluted (grade 0) or moderately polluted (grade 1) by copper, zinc and lead. Similarly contamination factor indicates that the sites are moderately contaminated. However, the PLI result reveals that sites R1, R4, R5, R6 and R9 are polluted with copper, zinc and lead, while the other sites are not polluted. Although railway operation has not been previously reported as a major source of heavy metals pollution, this study however suggests that railway operation could be responsible for moderate heavy metal contamination of soil in railway stations or immediate vicinity.

Keywords: Heavy metal; railway; soil; plant; environment; pollution.

004 Adamu A.¹*, I. F. Oibiokpa², D. Musa² and A. Inobeme³

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Industrial Layout, Idu, Abuja, Nigeria. ²Department of Biochemistry, Federal University of Technology, Minna, Niger State, Nigeria. ³Department of Chemistry, Edo University, Iyamho, Edo State, Nigeria

Phytochemical Constituents and Antimicrobial Activity of Some Medicinal Plants Used for Treating Skin Diseases in Bosso Local Government, Niger State, Nigeria. Journal of Complementary and Alternative Medical Research 2017. 3(3): 1-9, 2017; Article no.JOCAMR.35036 ISSN: 2456-6276

Abstract:

Traditional medicine practitioners TMPs have developed means of treating skin and soft tissue infections by using plant extract. In this study, four medicinal plants which are used for treating skin diseases were analysed, to determine their phytochemical constituents and antimicrobial activity. Extraction and phytochemical screening was done using standard analytical procedures. The antimicrobial assay was carried out using agar well diffusion method. Methanol extract of Mitrarcapus villosus, Psidium guajava, Senna spectabilis and Anogeisus leocarpus containedtannins, phenols, cardiac glycosides, flavonoids, saponins, stereoids and terpenoids. However, anthraquinones was present in only Psidium guajava. Phlobatanins was absent in only Senna spectabilis, alkaloids was absent in only Mitrarcapus villosus. All the plant extracts demonstrated antimicrobial activity against Candida albican, Salmonella typhii, Bacillus subtillis, Staphylococcus aureus, Pseudomonas aeruginosa and E. coli. Although Senna spectabilis extract shows no antimicrobial activity against E. coli. The extracts of Mitrarcapus villosus showed the highest activity against Candida albican (26.00 mm), Salmonella typhii (32.00 mm) and E. coli (15.00 mm) while Anogeisus leocarpus showed the highest activity against Staphylococcus aureus (18.00 mm) and Pseudomonas aeruginosa (18.00 mm). Extracts of Psidium guajava was also found to have the highest activity against B. subtilis (37.00 mm). In conclusion, the antimicrobial activity of Psidium guajava and Mitrarcapus villosus was comparable to standard drugs. All the plant contained important phytochemicals of therapeutic significance and also possessed antimicrobial activity.

Keywords: Phytochemicals; antimicrobial; skin; disease; plant.

005 Akuodor, G. C.¹, Aban, L. K.², Nku, C. O.³, Aja, D. O. J.¹, Ezeunala, M. N.⁴, Ajoku, G. A.⁵ and Nwobodo, N. N.¹

¹ Department of Pharmacology and Therapeutics, Faculty of Medicine, Ebonyi State University, Abakaliki, Nigeria.

² Department of Pharmacology, Faculty of Basic Medical Sciences, College of Medical Sciences, University of Calabar, Calabar, Nigeria.

³ Department of Physiology, Faculty of Basic Medical Sciences, College of Medical Sciences, University of Calabar, Nigeria.

⁴ Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

⁵ Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical research and Development, Abuja, Nigeria.



Haematological and biochemical changes after exposure to *Maerua crassifolia* ethanol leaf extract in rats. *Journal of Applied pharmaceutical science 2017 7(6) 136-140*

Abstract

This study was carried out to determine the safety profile of *Maerua crassifolia* by conducting the acute and subacute toxicological assay of its ethanol leaf extract in rats. The animals were treated daily with the leaf extract at doses of 100, 200 and 400 mg/kg orally for 14 and 28 days. Rats used as control were given distilled water and all rats weighed every 7 days. After the test, haematological and biochemical parameters as well as their relative organs weight were determined. There were no significant changes in body weight of treated animals compared to control in both studies. In the acute toxicity test, the extract did not cause any signs of toxicity or produce mortality in rats. Subacute results showed that oral administration of the leaf extract did not significantly (p<0.05 affect their food consumption, haematological and biochemical parameters and relative organs weight. Findings in this study showed that *Maerua crassifolia* is endowed with the potential beneficial effects as immune booster and protecting the liver and kidney systems.

Key words: Maerua crassifolia; Leaf extract; Haematological; Biochemical; organ weight; rats

006 Anyebe, S. N.¹, Y. E. Apeji¹ and O. J. Olayemi².

¹Department of Pharmaceutics and Pharmaceutical Microbiology, Ahmadu Bello University, Zaria. ²Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja

The suspending properties of *Cissus rubiginosa* fruit mucilage in paracetamol suspension formulation. *Nigerian Journal of Pharmaceutical Research*, 2017; 13 (1): 19-25

Abstract

Materials with suspending properties like mucilage have been obtained from natural sources and used to stabilize liquid formulations containing poorly dispersible solids. The aim of this study was to evaluate the suspending properties of *Cissus rubiginosa* fruit mucilage (CRM) in paracetamol oral suspension. Paracetamol suspensions containing 0.5, 1.0, 1.5 and 2.0 %w/v CRM were prepared and compared with suspensions formulated with same concentrations of compound tragacanth (CT). The sedimentation volume, ease of re-dispersibility, effect of shear rate on viscosity, flow rate and drug release pattern were studied as assessment parameters. Characterization studies of the suspensions revealed that there was a corresponding increase in the viscosity of the suspension with increase in the concentration of the gum. Paracetamol suspension having CRM had significantly higher viscosity (p < 0.05) compared to those containing CT. The viscosities of all suspensions decreased with increase in shear rate. There was decrease in flow rate as the viscosity of the suspension increased. Paracetamol suspensions containing CRM were easily re-dispersible with minimum agitation at concentration less than 1.0 %. Drug release from the suspension containing 0.5 % CRM was rapid while release from suspension containing higher concentrations of CRM occurred at a later time, eliciting a delay in drug release. This study has been able to elucidate the ability of Cissus rubiginosa fruit mucilage to act as a suspending agent in pharmaceutical suspensions.

Keywords: Cissus rubiginosa mucilage, compound tragacanth powder, Suspension, Suspending agents



NIPRD Compendium of Research Publications (2010 - 2018)

007 Apeji¹Y.E., D. Aluga¹, O.J. Olayemi², C. Opareche³, S.N. Anyebe¹, M.J. Gamlen³ and A.R. Oyi¹.

¹Department of Pharmaceutics and Pharmaceutical Microbiology, Ahmadu Bello University, Zaria. ²Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja ³Gamlen tableting Ltd, Biocity, Nottingham, UK

Comparative analysis of co-processsed starches prepared by three different methods. *British Journal of Pharmacy, 2017; 10:5920*

Abstract

Co-processing is currently of interest in the generation of high-functionality excipients for tablet formulation. In the present study, comparative analysis of the powder and tableting properties of three co-processed starches prepared by three different methods was carried out. The co-processed excipients consisting of maize starch (90 %), acacia gum (7.5 %) and colloidal silicon dioxide (2.5 %) were prepared by co-dispersion (SAS-CD), co-fusion (SAS-CF) and co-granulation (SAS-CG). Powder properties of each co-processed excipient were characterized by measuring particle size, flow indices, particle density, dilution potential and lubricant sensitivity ratio. Heckel and Walker models were used to evaluate the compaction behavior of the three co-processed starches. Tablets were produced with paracetamol as the model drug by direct compression on an eccentric Tablet Press fitted with 12 mm flat-faced punches and compressed at 216 MPa. The tablets were stored at room temperature for 24 h prior to evaluation. The results revealed that co-granulated co-processed excipient (SAS-CG) gave relatively better properties in terms of flow, compressibility, dilution potential, deformation, disintegration, crushing strength and friability. This study has shown that the method of co-processing influences the powder and tableting properties of the co-processed excipient.

Keywords: co-processing, excipient, direct compression, tablets

008 Ayuba Samali¹, Halima Zubairu Lawal¹*, and Gevevieve, Ofozor²

¹ Department of Medicinal Chemistry and Quality Control (MC & QC), National Institute for Pharmaceutical Research and Development (NIPRD), Federal Ministry of Health, Idu Industrial Area, Abuja Nigeria

² Department of Biochemistry, Federal University of Technology Minna, Niger State, Nigeria

Assessment of Level of Toxic Heavy Metal (Pb) in Local and Foreign Brands of Lipsticks in FCT, Abuja, Nigeria. *Bayero Journal of Pure and Applied Sciences 2017, 10(1): 318–322.*

Abstract

This study determined toxic heavy metal concentration in Local and Foreign brands of lipsticks sold in FCT, Abuja Nigeria. The study analyzed twenty (20) samples of lipsticks comprising of ten (10) Local and ten (10) Foreign brands for Lead using flame atomic absorption spectrophotometric (FAAS) method. The mean concentration range of Lead in both the Local and the Foreign lipstick samples and their estimated daily intake by average users are 22-714.70 μ g/g and 74.9-47927 μ g/g with the estimated daily intake by the average users as 1.056-34.305 μ g/g (Local samples) and 3.595 – 2300.496 μ g/g. (Foreign), while the estimated daily intake by high users are 3.828 – 124.358 μ g/g



(Local) and $13.023 - 8339.298 \ \mu g/g$ (Foreign). The estimated concentration of Lead ingested daily intake in the Local and the Foreign samples indicated 20% and 70% of the samples were not safe for the average users. While the ingested daily intake in the Local and the Foreign samples indicated 50% and 90% of the samples were also not safe for high users as compared to WHO limit (20 μ g/g) for Lead specified in cosmetic. Thus, continuous usage of these lipsticks can increase rate of exposure of the body system to Lead related disease conditions such as cancer which is known to be detrimental.

Keywords: Lipstick, Lead, AAS, Health hazard

009 Edwin-Wosu N.L., Jemilat Aliyu Ibrahim, Harry Blessing And E. Ette Ette

The Ecological Dynamics and Trajectories of Bioactive Compounds in Plants of the Genus -Anthocliesta Found In Parts of Niger Delta Ecological Zone, Nigeria. GLOBAL JOURNAL OF PURE AND APPLIED SCIENCES VOL. 23, 2017:5-19 ISSN1118-0579 www.globaljournalseries.com, Email: info@globaljournalseries.com. DOI: https://dx.doi.org/10.4314/gjpas.v23i1.2

Abstract

Several studies have revealed the botany of Anthocliesta species found in parts of Niger Delta, which include the species ecodiversity, various lines of taxonomic studies, ethnomedicine, ethnobotany, etc. However, records have not shown the dynamic trajectories of bioactive phytochemicals in relation to ecological niche adaptation and geographical location among the species. This informed the present research with the aim of assessing in qualitative terms the bioactive presence and dynamics in various parts of the species under their ecological preference. Determination of secondary metabolites in leaves, stem and root of four species of Anthocleista from four States in the Niger Delta ecological region of Nigeria was carried out using standard methods. Result revealed seven bioactive compounds with anthraquinone totally absent from all the species in the four locations. The seven bioactive compounds were apparently more in the leaves than other parts of the plants. Among the four locations alkaloid, triterpene, glycoside, carbohydrate, flavonoid and tannin were high in foliar parts with saponin in moderate level in the stem part of the plants in Akwa-Ibom State. Similarly a high bioactive level was recorded in foliar parts in Cross River and Rivers States despite the moderate level of flavonoid and tannin in Cross River and alkaloid, carbohydrate and flavonoid in Rivers State. The Bayelsa State study location recorded moderate level in all bioactive compounds in various parts of the plants with exception of high level saponin in leaf and stem of all the plants. This study reveals that distribution of natural products (secondary metabolites) varies greatly among plant species, individual plants, organs and tissues, during development and maturation, seasonal fluctuations and variation in geographical location.

Keywords: Bioactive compound, trajectories, Anthocleista, species ecodiversity, Niger Delta.

07

010 Emeje Martins, Isimi Christianah, Izuka Amaka, Olayemi Olubunmi

Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

Effects of some channelling agents on the compaction properties of the mixed stem bark extracts of *Anogeissus leiocarpus* and *Prosopis Africana*. *Journal of Herbal Drugs, 2017; 8(1): 9 - 14.*

Abstract

The hot water extract of a mixture of Anogeissus leiocarpus and Prosopis africana is widely used in the northern part of Nigeria for the treatment and management of asthma. Since investigations of its pharmacological activities already justify its use, and the need for standardization of herbal medicine and develop appropriate dosage forms has continued to grow, the purpose of this study was to evaluate the effects of some common channelling agents (sodium bicarbonate, calcium carbonate and sodium lauryl sulphate) on the compaction properties of the mixed stem bark extracts of Anogeissus leiocarpus and Prosopis africana. Granules of the mixed extracts (AA1) were produced using the wet granulation method of massing and screening. The micromeritics and flow properties of the extracts as well as the effects of the three common additives were studied, while the compaction properties of the extract formulated alone and in the presence of these additives were interrogated using the Heckel equation. Our results showed that, all the formulations containing the channelling agents exhibited poor flow. Granules prepared using sodium bicarbonate (NaHCO₃) exhibited plastic deformation during consolidation, those formulated using calcium carbonate (CaCO3) showed initial fragmentation before consolidation by plastic deformation and those formulated using sodium lauryl sulphate consolidated essentially by plastic deformation. Inclusion of additives modified the compressibility profiles of the formulations. Tensile strength of the formulations containing NaHCO3 and sodium lauryl sulphate (SLS) were observed to be concentration dependent while those containing CaCO3 showed no appreciable increase in tensile strength with increased pressure. Generally, formulations containing 5% of the additives gave the highest tensile strength, however, those containing CaCO3 were found to be higher than the other two formulations.

Keywords: *Micromeritic properties, Compaction properties, Tablets, Anogeissus leiocarpus, Prosopis Africana*

011 Ezeani Chinelo¹, Ifeoma Ezenyi², Theophine Okoye¹, Charles Okoli¹

¹Department of Pharmacology & Toxicology, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka 410001, Enugu State, Nigeria. ²Department of Pharmacology and Toxicology, NIPRD, Abuja, Nigeria

Ocimum basilicum extract exhibits antidiabetic effects via inhibition of hepatic glucose mobilization and carbohydrate metabolizing enzymes. Journal of Intercultural Ethnopharmacology 2017, 6(1): 22-28.

Abstract: *Ocimum basilicum L (Lamiaceae)* is used as a traditional remedy for different ailments, including diabetes mellitus. This study investigated the antidiabetic effects of an extract of aerial parts of O. Basilicum. **Methods:** Antihyperglycemic effect of the extract was determined by its



effects on α-amylase and α-glucosidase in vitro, while antidiabetic properties were studied in alloxan induced diabetic rats treated for 28 days with extract and compared to those treated with oral metformin (150 mg/kg). The study and analysis was conducted between 2014 and 2015. **Results:** The treatment with 100 and 200 mg/kg extract significantly (P<0.05) reduced fasting blood glucose concentration and slightly increased mean body weight in treated groups. Oral glucose tolerance was also significantly (P<0.05, 0.001) improved in 100 and 400 mg/kg extract-treated groups. The extract caused a dose-dependent increase in liver glycogen content, while it decreased alanine transferase (18.9-30.56%) and aspartate transferase (6.48-34.3%) levels in a non-dose-dependent manner. A dose of 100 mg/kg also reduced serum cholesterol and triglycerides by 19.3 and 39.54%, compared to a 2.6% reduction of cholesterol seen in the metformin-treated group. The extract was observed to produce significant (P < 0.001) concentration-dependent inhibitory concentration values of 1.62 and 3.86 mg/mL, respectively. **Conclusions:** The antidiabetic properties of the extract may be due to its ability to suppress endogenous glucose release, inhibit glycogenolysis and/or stimulate glycogenesis.

Key Words: Antidiabetic, diabetes mellitus, hyperglycemia, Ocimum basilicum

012 Ezeunala, Mercy N^{1*}, Izebe, Kasim S.¹, Njoku, Moses O.¹ and Ayodele, Michael²

¹ Microbiology and Biotechnology Department, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja. ² Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, Anambra State.

The Role of Locally-Made Beverages in the Transmission of Geo-helminthes and Pathogens within Abuja Metropolis. *Parasitology and Public Health Society of Nigeria (PPSN) Conference 2017.*

Abstract

Abstract No. 098

Locally-made beverages known as 'Kunu' are commonly used to quench thirst, widely served and highly enjoyed during celebrations in Northern Nigeria. These beverages are made from Millet (Pennisetum glaucum)- Kunu gero, Date Palm fruit (Phoenix dactyfera) – Kunu debino, and Tiger nuts (Cyperus esculentus) – Kunu aya, widely packaged in 500ml and 750ml used plastic bottles, chilled and sold or served. This study is aimed at determining the role of these beverages in the transmission of parasites (geo-helminthes) and pathogens. 50 plastic bottles of 500ml/750ml of Kunu aya and Kunu gero were respectively screened for presence of geo-helminthes using concentration method. They were screened for pathogens in selective media appropriate for the bacterial pathogens, and further identified with standard biochemical method. In Kunu Aya, 50% of the drinks revealed the presence of Hookworm and Ascaris ova while 40% of Kunu gero contained Ascaris and Hookworm ova. Hookworm ova in Kunu aya was 5 ova per 500ml and Ascaris ova was 4 ova per 500ml. In Kunu gero had Staphylococcus aureus and Escherichia coli which indicates faecal contamination. Kunu gero additionally had Pseudomonas aureginosa and Salmonella typhimurium isolated. This study revealed the presence of diarrhoel causing pathogens and geo-



helminthes in our locally made beverages. This has public health implications. The need for personal hygiene and proper handling of materials during production of these beverages can never be over emphasized.

Keywords: Geo-helminthes, Pathogens, Kunu aya, Kunu gero, Corresponding Author e-mail: ginik4@yahoo.com

013 Ezeunala^{1*}, **M.N.**, Izebe¹, K. S., Ekpenyong², M., and Tsamaya², N.

¹ Department of Microbiology and Biotechnology,

² Research Clinic, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja.

Burden of Geohelminthes (NTDS) Among Naïve Clients Attending a Primary Health Care in Abuja. Nigerian Society of Microbiology Annual Conference 2017, 4th – 8th December 2017, Bauchi

Abstract

Man desirous to attain total health seeks out avenues and exhibits positive attitudes towards the attainment of a disease free life. The burden of neglected tropical diseases (NTDs) and geohelminthes globally is enormous with over 750 million infected people and 500,000 deaths occurring annually. The health burden of geo-helminthes in Sub-Sahara Africa is concentrated on low resource nations with challenges on provision of adequate water, housing, drainage, sanitation facilities and glaring poverty among her populace. This is a public health concern and therefore a need for reduction of disease burden. This study was aimed at evaluating the geo-helminthes among clients seeking for health solution in Karmo suburb of Federal Capital Territory between January 2015 and July 2017. Five hundred and sixty seven clients (567) comprising of one hundred and ninety seven (197) males and three hundred and seventy two (372) females attended the National Institute for Pharmaceutical Research and Development (NIPRD) clinic. The faecal samples of these clients were analyzed using concentration technique and eggs viewed microscopically. Twenty three (4%) of the clients comprising of thirteen males and ten females were positive. The geo-helminthes comprised of five hookworm eggs (0.9%), three Ascaris eggs (0.5%), ten Entamoeba histolytica cysts (1.8%), four Entamoeba coli cysts (0.7%) and one larva of Strongloides sp. (0.2%). Burden of infection reduced as the years progressed, 2.1% for 2015, 1.8% for 2016 and 0.4% for half of 2017. The study revealed the presence of geo-helminthes in our local community but effective treatment and control awareness can drive the elimination process.

Keywords: Geo-helminthes, naïve, clients, primary health care, NIPRD. Corresponding Author e-mail: <u>ginik4@yahoo.com</u> 014 Ezeunala^{1*}, M.N., Izebe¹, K. S., Njoku¹, M., Ezaka², E. and Okafor², R.

¹Department of Microbiology and Biotechnology, NIPRD, Idu, Abuja

² Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, Anambra state

The Quality And Density Of Parasites Involved When Snacking With *Phoenix Dactylifera* And *Cyperus Esculentus* In Abuja, Fct. *The book of abstracts. parasitology and public health society of nigeria (ppsn) conference 2017. abstract no. 099*

Abstract

Phoenix dactylifera (date palm fruit) and Cyperus esculentus (tiger nut) are rich in sugar and vitamins, used as snacks to quench hunger within FCT, available all year round in markets, shops and hawked by food vendors in wheelbarrows. They are eaten easily in chunks while purchasing for taste. This study was designed to ascertain the quality and density of parasite contamination within FCT between May and July 2017. Date palm and tiger nuts purchased from different localities in Abuja were weighed in batches. The batches of date palm (3 fruits/17.1g) and tiger nuts (10g) were screened using standard methods. Eighty one (27 batches) of date palm were examined of which 26 batches (96.2%) were contaminated with parasite eggs; Ascaris 18 (66.6%), Hookworm 12 (44.4%), Taenia sp. 9 (33.3%), Hymenolepis diminuta 3 (11.1%), Trichuris trichuria 3 (11.1%), Enterobius vermicularis 3 (11.1%), Paragonimus westermani 3 (11.1%). While the tiger nuts had 93.3% parasite contamination (14 out of 15 batches); Ascaris 8 (53.3%), Hookworm 2 (13.3%), Taenia sp. 6 (40%), H. diminuta 1 (6.6%), Clornochis sinensis 1 (6.6%), E. vermicularis 1 (6.6%), Fasciola hepatica 1 (6.6%), Schistosoma haemtobium 1 (6.6%) and Schistosoma intercalatum 1 (6.6%). Ascaris egg was the highest contaminants in date palm and tiger nuts with 58.1 % and 67.4% respectively. Date palm and tiger nuts purchased from Dutse locality had the highest parasitic contamination of 47.9% and 51.6% respectively while those purchased from Masaka locality had no hookworm egg. Parasite density for date palm was eleven (11) eggs per batch, tiger nut six (6) eggs per batch. Snacking with date palm and tiger nuts to quench hunger without proper washing is a potential source of parasitic infestation.

Keywords: Quality, *Phoenix dactylifera, Cyperus esculentus*, date palm, parasites, tiger nuts. Corresponding Author e-mail: ginik4@yahoo.com

015 Fatokun Omolola T., Esievo Kevwe B., Ibrahim Jemilat A. and Kunle Oluyemisi F

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria.

Pharmacognostic evaluation of the leaves and roots of *Cassia sieberiana DC*. Journal of *Pharmacognosy and Phytotherapy 2017: Vol. 9(10): 157-164*

Abstract

Cassia sieberiana DC. (Leguminosae - Caesalpinioideae), commonly known as drumstick and 'aridantooro' in Yoruba, is a perennial tree native to Africa. It is used in ethno-medicine to manage arthritis and rheumatism. Pharmacological activities such as myorelaxant, antispasmodic, anti-inflammatory, and antimicrobial have been reported in literature. Pharmacognostic investigation including microscopy, chemomicroscopy, physicochemical analysis and phytochemical investigations including thin layer chromatographic finger printing were conducted on fresh and



powdered leaf and root samples of this plant. The macro and microscopic studies revealed the leaves to be simple, petiolated, glabrous and pinnately veinnated. The lower epidermal surface is characterized by abundant anomocytic stomata, polygonal epidermal cells and numerous uniseriate, unicellular trichomes. Quantitative leaf analysis revealed the following: stomatal number (163.8), stomatal index (19.04), palisade ratio (17.01), vein islet number (56.45) and vein termination number (61.45). Chemomicroscopic characters present include lignins, tannins, mucilage, starch, oils and calcium oxalate crystals. The physicochemical parameters evaluated are moisture content of 6.3%, total ash of 4.2%, acid-insoluble ash of 3.4%, sulphated ash of 11.0%, water-soluble ash of 0.8%, alcohol-soluble extractive of 21.3%, and water-soluble extractive of 16.7%. Chromatographic fingerprints of ethanol 70% extracts show major spots at Rf = 0.18 daylight (brown), UV366 (deep brown), spray reagent at 100°C (brown); Rf = 0.57 daylight (brown), UV366 (deep brown), spray reagent at 100°C (brown); Rf = 0.89 daylight (green), UV366 (red), spray reagent at 100°C (brown). The pharmacognostic evaluation of the leaves of C. sieberiana is reported here for the first time. The results of this research provide information which can be included in official monograph of the plant for its proper identification and quality control.

Keywords: Cassia sieberiana, pharmacognostic studies, physicochemical studies, chemomicroscopy.

016 Francis Agada¹, Chika Muhammad¹, Ahmed Uba², Halilu Emmanuel Mshelia³ and Halima Lawal Zubairu⁴. (2017)

¹Department of Pure and Applied Chemistry, Faculty of Science, Usmanu Danfodio University, Sokoto, P.M.B; 2346, Sokoto State, Nigeria.

² Department of Medicinal Chemistry, Faculty of Pharmaceutical Sciences, Usmanu Danfodio University, Sokoto, P.M.B; 2346, Sokoto State, Nigeria.

³ Department of Pharmacognosy and Ethnopharmarcy, Faculty of Pharmaceutical Sciences, Usmanu Danfodio University, Sokoto, P.M.B; 2346, Sokoto State, Nigeria.

⁴ Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical research and Development, Abuja, Nigeria.

Comparative Antiproliferative Activity of leaf and stem bark extracts of *Detarium Senegalense* and leaf of *Cymbopogon citratus*. *Chemical Society of Nigeria*, 40th Annual International Conference. Book of Abstract

Abstract

Malignant cancer cells exhibit uncontrollable high proliferation similarly to meristematic cells of seeds, this led to the establishment that agents capable of producing antiproliferative effects are potential anticancer agents. The experimental plant used for this research was sorghum bicolor seeds. The sole aim of this research work is to unveil the antiproliferative potential of *Detarium senegalense* and to evaluate the antiproliferative activity of leaf extract of *Cymbopogon citratus* on radicle length of sorghum bicolor seeds. The three extracts where prepared at concentrations of 10, 20, 40, 60, 80 and 100 mg/cm3 as well as methotrexate (reference standard) at concentration of 0.05 mg/cm3. The growth length was measured at 24, 48 and 72hours of the experiment and expressed as percentage inhibition and percentage growth. The extracts produce considerable amount of antiproliferative effect on the radicle length of the seeds. The antiproliferative activity of the three extracts were concentration (dose) dependent, as the concentration of the extracts of leaves of *D*.



Senegalense increases, the percentage inhibition also increases, with a percentage of 89.47% at an optimum concentration of 100 mg/cm3. Similarly, *D. Senegalense* leaves and *C. citratus* leaves showed percentage inhibition which corresponds to 73.68 % at optimum concentration of 100 mg/cm3 and 86.84 % at an optimum concentration of 80 mg/cm3 after the 72 hours of the incubation period. This research work however, has unveiled the use of *D. Senegalense* as potential therapeutics for cancer treatment especially in developing countries and has added a new-found knowledge to science.

Keywords: D. Senegalense, cymbopogon citratus, phytochemical screening.

017 Ibrahim J. A. I^* and A. E. Ayodele²

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, P.M.B. 21, Garki, Abuja, Nigeria. ²Department of Botany, University of Ibadan, Ibadan, Nigeria.

Pollen Morphology as a Useful Taxonomic Tool in Delimiting the Species of *Loranthaceae* in Nigeria. *International Journal of Plant & Soil Science*, 2017. 20(1): 1-7, 2017; Article no.IJPSS.37478 ISSN: 2320-7035

Abstract

Background and Objective: Pollen grains shape, size, aperture and wall ornamentation have been useful in taxonomic studies of plants especially in resolving relationship or determining variation in a taxa. The Loranthaceae (Mistletoes) are parasitic family with known taxonomic problem of poorly identified species in Nigeria. Pollen grains of fourteen species which spread across six genera of Nigerian Loranthaceae was studied with a view of generating characters that would further help in their identification. Methods: Samples were subjected to standard acetolysis for palynological sample preparation and analysis. Results: Pollen grains are mainly triangular or three-armed in nature with percentage of polar to equatorial axis ranging from 90.69% to 100%. All pollen grains were oblate-spheroidal except the pollen of Helixanthera mannii that was prolate-spheroidal and all the genera had tri-snycolporate pollen grains except pollen grains of Tapinanthus which were tricolporate. The smallest grains are found in the genus Helixanthera while others range from medium to large in size with H. spathulata having the smallest size of 20.75 μ m by 20.75 μ m and the largest of 49.00 µm by 52.50 µm in Globimetula mannii. Conclusion: The information obtained from this study do not only add to the already existing information on the family, but the diagnostic characters obtained can be used in conjunction with other characters like morphology and anatomical characters to delimit the species in the family.

Keywords: Palynology; mistletoes; Nigeria; identification; Loranthaceae.

13

018 IBRAHIM Jemilat Aliyu¹, Henry Omoregie EGHAREVBA¹, Karniyus Shingu GAMANIEL¹

¹National Institute for Pharmaceutical Research and Development (NIPRD) Plot 7&8 Idu Industrial Layout Idu, PMB 21 Garki, Abuja, Nigeria

Chemical and Biological Screening Approaches to *Phytopharmaceuticals*. *International Journal of Science*. 2017. Vol. 6: 22–31. <u>https://www.ijsciences.com/</u>

Abstract

The global demand for phytopharmaceutical products is on the upward trend and will probably continue to rise in the next few decades. This demand is fuelled by the growing acceptability, availability and affordability and the growing scientific evidence of efficacy. However, while great progress is being made in research and development of these products in the developed world, very little progress has been made in research, development and documentation of possible leads/products in developing countries of Africa. The challenges range from dearth of capacity to develop implement appropriate research protocols and tools. This article is an attempt toward providing a guide to the chemical and biologiocal screening approaches in the research and development of phytopharmaceuticals. Approaches towards achieving quality products that meets basic regulatory requirements are discussed.

Keywords: Chemical; Biological; Screening approaches; phytopharmaceuticals; Herbal products; Medicinal plants; Research and development; Quality parameters

019 Kokonne E. Ekere, Yetunde C. Isimi, Judith E. Okoh, Kunle O. Olobayo, Martins O. Emeje

Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Nigeria

Differential scanning calorimetry and thin layer chromatography: Emerging tools for predicting stability of herbal products. Journal of Herbal Medicine, 2017.

Abstract

The stability of extracts made from plant material is essential to ensure the quality, safety and efficacy of the finished product. NIPRIMAL® is a mono herbal formulation of Nauclea latifolia used in the treatment of malaria. This study assessed the stability of the formulation under three different storage conditions; normal room temperature, infrared and under refrigeration. Differential Scanning Calorimetry (DSC) and Thin Layer Chromatography (TLC) were used to monitor the formulations. The DSC analysis was done from 0 to 350 °C under the three storage conditions. Results obtained indicate that NIPRIMAL® was stable at all the storage conditions investigated. TLC after 24 months showed there was no significant difference between the retention factor (RF) values for the various storage conditions. The reference sample had four spots with RF values of 0.47, 0.68, 0.76, 0.82 respectively and these spots were retained in the test formulations with corresponding RF values after 24 months at room temperature and refrigerated temperature being 0.56, 0.73, 0.80, 0.92 and 0.47, 0.68, 0.76, 0.82 respectively. On the other hand, the RF values (0.55, 0.74, 0.77, 0.93) obtained under infrared after 24 months varied slightly from the reference. The sample exposed to infrared had a lower heat capacity compared to that stored under room temperature or refrigeration. A combination of TLC and DSC measurements has been applied for assessing the stability of NIPRIMAL®. Both methods were found to be rapid, sensitive and reliable



in determining its stability. It is concluded that, NIPRIMAL® can be stored under any of the tested conditions without degradation. This study is a major contribution towards developing appropriate stability monitoring parameters for herbal products; a major challenge in the nutraceutical industry.

Keywords: Differential scanning calorimetry, Thin layer chromatography, Formulation, NIPRIMAL®, Stability

020 Mustapha_K.B¹, R.A Kirim¹, O.A. Odeniran^{1*}, T.A. Adelakun² and A.T. Ache³ ¹Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical research and Development, Abuja, Nigeria.

Evaluation of Content of some brands of Paracetamol tablets using a developed reverse phase High Performance Liquid Chromatography method. *Journal of Pharmacy and Bioresources 2017 Vol* 14; 1-7.

Abstract

A Simple, rapid, accurate and economical isocratic Reversed Phase High Performance Liquid Chromatography (HPLC) method was developed, validated and used for the evaluation of content of different brands of Paracetamol tablets. The method was validated according to ICH guidelines and may be adopted for the routine analysis of Paracetamol in dosage forms both as single or combined formulation. Twelve brands of Paracetamol tablets were randomly purchased from pharmacy stores around Abuja, the Federal Capital Territory (FCT) of Nigeria and coded accordingly. Samples were analysed using validated isocratic RP-HPLC with UV detection 254nm at ambient temperature. Analysis time was 6minutes. The inter and intraday precision coefficient of variance for 2 and 8μ g/ml were less than 5% and the percentage recovery was more than 90%. Percentage contents ranged between 93.03-126.43% (0.81-11.12). 41.7% of the assessed brands passed while 58.3% failed with the values being either above or below the BP specification of 95-105% for percentage content of Paracetamol in tablets.

Keywords: Paracetamol, Reversed Phase HPLC, Routine Analysis, Pharmacy Stores

021 Nwafuru S. K.¹, T. C. Akunne¹, I. C. Ezenyi²* and C. O. Okoli¹

¹Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka 410001, Enugu State, Nigeria.

² Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria.

Anti-inflammatory Activity of Leaf Extract and Fractions of *Tapinanthus bangwensis* (Engl. & K. Krause) Danser Parasitic on Citrus angustifolia. European Journal of Medicinal Plants, 2017, 21(3): 1-10, 2017

Abstract

This study was undertaken to evaluate the anti-inflammatory activity of extract of the leaves of the plant. The methanol extract (ME), obtained by cold maceration was fractionated in a silica gel column to afford n-hexane (HF), ethylacetate (EF) and methanol (MF) fractions. The extract and



fractions were subjected to phytochemical analysis using standard methods. Acute toxicity (oral, intraperitoneal) and median lethal dose (LD50) of the extract was determined in mice. Acute antiinflammatory activity of the extract and fractions was evaluated using topical acute edema of mouse ear induced by xylene and systemic acute edema of rat paw induced by carrageenan. Chronic antiinflammatory activity was evaluated using formaldehyde arthritis test in rats and cotton pellet granuloma test in rats. In topical acute inflammation, ME, EF and MF caused significant (P=.05, P<0.01) inhibition of mouse ear edema and their effects were comparable to those of indomethacin. In systemic acute inflammation, ME, EF and MF produced significant (P=.05, P<.001) and sustained inhibition of the development of paw edema in rats. HF did not produce any significant edema inhibition in these models of inflammation. Studies in chronic inflammation showed that the extract and fractions caused significant (P = .05) inhibition of the global edematous response to formaldehyde arthritis in rats. They also significantly (P<.01) inhibited the formation of granuloma on implanted cotton pellets in rats. These findings show that *T. bangwensis* parasitic on *C. angustifolia* leaf extracts and fractions of increasing polarity possess anti-inflammatory properties in acute and chronic inflammation.

Keywords: Anti-inflammatory agents; Loranthaceae; Tapinanthus bangwensis; Citrus angustifolia.

022 Okhale Samuel Ehiabhi¹*, Amarachi Clare Nnachor¹,², Udeme, Effiong Bassey¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute For Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria ²Department of Pure and Applied Chamistry, Nagardi Apikiwa Ukiwanity, PMP 5025

²Department of Pure and Applied Chemistry, Nnamdi Azikiwe University, P.M.B 5025, Awka, Anambra State, Nigeria

Evaluation of HPLC-UV-DAD and antiproliferative characteristics of the leaf infusion of Ximenia americana Linn. *MicroMedicine 2017; 5 (2): 45-52*.

Abstract

Ximenia americana (X. americana) is reputable for the treatment of various ailments in Nigeria. The hot aqueous extract of X. americana leaf (XA) was obtained by infusion. The antiproliferative potential of XA was evaluated employing Sorghum bicolor seed radicle as test subject over the period of 48-96 hours. The mean radicle lengths (mm), percentage inhibition and percentage growth were determined. XA was chemically characterized using colour reactions and high performance liquid chromatography with UV-diode array detector (HPLC-UV-DAD). Phytochemical investigation indicated the presence of tannins, saponins and flavonoids. HPLC analysis revealed thirteen peaks with rutin and ferullic acid eluting at 6.886 and 7.796 minute respectively. XA significantly (p < 0.0001) inhibited S. bicolor seed growth over a period of 48-96 h against the control seeds. At 96 h, XA dose-dependently inhibited seed growth, giving percentage inhibition of 23.24, 29.06, 30.68, 38.27, 49.57, 50.39, 64.60, 79.67 and 82.01% for seeds treated with 1 mg/ml, 2 mg/ml, 4 mg/ml, 8 mg/ml 16 mg/ml, 24 mg/ml, 32 mg/ml, 40 mg/ml and 48 mg/ml respectively with IC50 of 24 mg/ml. Methotrexate 0.167 mg/ml used as positive control gave inhibition of 92.76% at 96 h. This result revealed the potential of XA to inhibit the growth of fast proliferating cells of S. bicolor seed radicle.

Keywords: Ximenia americana; Antiproliferative; Sorghum bicolor; Caffeic acid; Rutin.

NIPRD Compendium of Research Publications (2010 - 2018)

023 Olubunmi Olayemi¹, Christianah Isimi¹, Kokonne Ekere¹, Mahmood Abdullahi Gbate² and Martins Emeje^{1,3}

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja

²Department of Biochemistry, Ibrahim Badamosi Babangida University Lapai, Niger State

³Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Centre for Nanomedicine and Biophysical Drug Delivery, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Determination of sunscreen protection factor number: an emerging *in-vitro* tool for predicting UV protection capabilities. *International Journal of Herbal Medicine*, 2017; 5(1): 06-09.

Abstract

The deleterious effect of ultra-violet rays from the sun on the skin is alarming and agents or substances that can reduce or combat these effects are well sought for. The purpose of this study was to investigate the potential of commonly consumed teas in providing sunscreen protection using the *in vitro* method. Thirty selected teas (green, black and "others") were brewed and diluted to produce 20% v/v aqueous solution. The absorbances of the solutions were determined by the UV spectrophotometer between wavelengths of 320 and 290 nm. The sunscreen protection factors (SPF) were then calculated using the Mansur equation. The determined SPF values were between 10.33 and 25. 33%. The green teas were observed to have the highest absorbance (2.5) and consequently higher SPF (25.33%) followed by the black teas (24.45%) and then the "others". Some of the unclassified teas however had values as high as 25.20% while also having very low values (10.33%). Teas have been postulated to have skin protective abilities when consumed orally or applied topically; this work gives further credit to this postulation. The results reveal that these safe and cheap teas have great potential as sun-protective agents.

Keywords: Herbal teas, sun protection factor, in vitro method

024 Oluwaseun A. Orugun¹, Adeniji K. Olowosulu¹, Olubunmi J. Olayemi², Yonni E. Apeji¹, Avosuahi R. Oyi¹, Kenneth C. Ofokansi³.

¹Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria

²Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja

³Department of Pharmaceutics, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Enugu State, Nigeria.

Material and Tableting Properties of Theophylline Solid Dispersions. Nigerian Journal of Pharmaceutical and Applied Science Research, 2017; 6(1): 43-51.

Abstract

This study was carried out to evaluate the material and tableting properties of theophylline solid dispersions (SDs) prepared by the solvent evaporation technique using Eudragit polymers (RS 100 & RSPO) as carriers. The dispersions were directly compressed into tablets using microcrystalline cellulose (MCC) as filler/binder. Compatibility studies of the prepared dispersions were conducted



using FTIR, DSC and TLC while physico-technical properties of the tablets were evaluated. Results of compatibility studies revealed no chemical interaction between theophylline and the selected polymers. All the tablet properties evaluated were in conformity with the USP specifications. *In vitro* drug release was observed to be prolonged for about 24 h and the mechanism of drug release was principally by diffusion. Stability studies showed that drug content of all the tablets remained within the official specifications after three months. Overall, the material properties of the SDs were consistent with good tableting properties as confirmed by the tablets produced.

Keywords: Solid dispersion, tablets, direct compression, Eudragit®RS100, Eudragit®RSPO, drug release

025 Philip F. Builders¹, Olubunmi J. Olayemi¹ and Chukwuemeka C. Mbah²

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria. ²Department of Pharmaceutical Technology and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, University of Nigeria Nsukka, Enugu State, Nigeria.

Physico-technical properties of granules and tablets of micronized *Moringa oleifera* leaf: The effect of binders. *World Journal of Pharmaceutical Research*, 2017; 6(6): 196-208.

Abstract

An important challenge militating against the general acceptance of herbal medicines is the formulation of appropriate dosage form that meets conventional quality standards. Thus, the objectives of this study are to formulate the micronized leaf of Moringa oleifera into robust tablets and evaluate the effect of some traditional binders on the quality of the tablets. The leaves of M. *oleifera* were micronized to a particle size < 150 µm. Granules of the powder were respectively produced using water, aqueous dispersions of acacia, and maize starch paste as binders. Various physicochemical properties of the granules such as the flow, equilibrium moisture uptake (EMU) were evaluated. The granules were respectively compressed into tablets and the quality of the tablets was evaluated by standard methods by testing the friability, disintegration time, tensile strength, and EMU of the formulated tablets. The results showed that granules produced with aqueous dispersion of acacia as binder had higher EMU than the granules produced with water and maize starch. Tablets formulated with water as binder had higher tensile strength; similarly, the disintegration time of the tablets produced with water, acacia and maize starch were all within the British Pharmacopoeia limits of acceptance. The granules of micronized leaf of *M. oleifera* prepared with water, aqueous dispersion of acacia and starch paste showed variable physicochemical properties. On compression of the granules robust tablets that met official criteria for quality acceptance were successfully formulated with the binders.

Keywords: *Moringa oleifera* leaf, herbal formulation, physico-technical properties, tablets properties, granule properties.

026 Samali A^{1*} ., Mohammed M. I.¹, Ibrahim M. B.¹ and Gamaniel, K.S².

¹Department of Pure and Industrial, Faculty of Science, Bayero University Kano, Kano State, Nigeria.

² Director-General Office, National Institute for Pharmaceutical Research and Development (NIPRD) Idu Industrial Area, Federal Ministry of Health Abuja, Nigeria.

Metal Content Determination of Some Sexual Dysfunction Medicine Samples in Northern Nigeria. *Bayero Journal of Pure and Applied Sciences 2017, 10(1): 234–238*

Abstract

Essential minerals are those that are necessary for normal physiological and biological functions of human body. They act as catalysts such that only trace amount are necessary for cellular function. The study analyzed nine (9) different sex-drive herbal preparations used in the North-western part of Nigeria for essential minerals using Atomic Absorption Spectrophotometric (AAS) method in order to ascertain relationship between sex-drive and the mineral content of these herbal medicines. The result obtained shows the range of the mean concentration of Fe, Cu, Mn, and Zn to be (231.13-440.64) μ g/g, (7.74 - 25.93) μ g/g, (14.09 - 59.66) μ g/g and (6.86 -74.41) μ g/g respectively. The presence of Fe, Cu and Zn indicated the potential role of these herbal preparations in alleviation of sexual dysfunction problems and serves as sex-drivers. The average concentration of Cu and Zn obtained in the samples were above the World Health Organization (WHO) and US Food and Drugs Administration (FDA) permissible limit in herbal drugs as Cu (20ppm) and Zn (50ppm). The consumers of these products need to be cautioned otherwise the tendency of overload which will further result to health hazard is certain.

Keywords: Herbal medicine, Sex-drive, Essential minerals

027 Ugbabe, $G.E^1$.; Tsado, $A.N^2$.; Ajoku, $G.A.^3$; Okhale, S.E.¹; Ezeunala, M. N⁴. and Asawa, E.⁴.

¹Department of Medicinal Plant Research and Traditional Medicine (MPR & TM), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja - Nigeria.

²Department of Basic and Applied Sciences, Niger State Polytechnic, Zungeru, Niger State - Nigeria. ³Medicinal Chemistry and Quality Control (MC & QC) Department, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja - Nigeria

⁴Microbiology, Human Virology and Biotechnology Department, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja–Nigeria

Foliar epidermal microscopy, phytochemical analysis and antimicrobial activities of the leaves and stem bark of Erythrophleum *suaveolens Guill. & Perr. (Brenan)* (Family: Fabaceae/Caesalpinioideae). *International Journal of Basic and Applied Sciences (IJBAS). 2017 Vol. 6 (2). Pp. 36-43*.

Abstract

The foliar epidermal microscopy, phytochemical analysis and anti-microbial activities of the leaves and stem-bark of *Erythrophleum suaveolens* were carried out. The leaf epidermal microscopy revealed anomocytic stomata type on the lower surface. Trichomes were not observed on both surfaces of the leaf. The phytochemical analysis revealed the presence of carbohydrate, flavonoids,



sterols and alcohol (hexane extract): saponin, tannins, terpenes carbohydrates, flavonoids and steroids (ethyl-acetate extract); carbohydrates, terpenes, steroids, and alcohol (methanol extract) of the stem-bark. Absence of saponin, tannin, terpenes, phenols and anthraquinone (hexane extract); alkaloids, phenols and anthraquinones (ethyl-acetate extract), saponins, tannins phenols and anthraquinones (methanol extract) in the stem bark. The leaves had tannins, flavonoids, sterols and phenols (ethyl-acetate extract); tannin, carbohydtrates, flavonoids, terpenes, steroids and phenols (methanol extract). The thin layer chromatography of the leaf (hexane extract) showed three spots with Rf values of 0.20, 0.45 and 0.74. the HPLC spectrum of the leaf (methanol extract) showed 12 peaks. Peaks with retention tmes of 5.475 minutes, 7.542 minutes and 12.483 minutes corresponding to caffeic acid, rutin and ferulic acids respectively. The anti-microbial screening was carried out on the successive extracts of the leaves and stem-bark. The extracts were screened against two standard strains of American Typed culture collection of Salmonella paratyphi a and Candida albicans and five clinical isolates of Pseudomonas aeroginosa, Staphyloccocus aureus, Bacillus sabtilis, Klebsiella pneumonia and E. coli using agar dilution method. At the concentration of 2mg/ml, the foliar hexane and methanol extracts did not exhibit any anti-microbial activity against the yest organisms but the ethyl-acetate extract showed against all the test organisms. The stem-bark extract showed no activity on the test organisms except the methanol extract which exhibited activity on Pseudomonas aeroginosa. Amoxicillin used as standard, exhibited the growth of all the test micro-organism. The results from the study provide finger print for the identification of Erythrophleum suaveolens.

Keywords: Erythrophleum suaveolens, microscopy, phytochemistry, anti-microbial.

028 Wilcox RM¹, Huseman ED¹, Lin S¹, Darkwah BO¹, Emeje MO², Gamaniel KS², Orisadipe A², Enwerem N³, Kefas BA⁴, Gryka RJ¹, Simpson DS¹, Amos S¹*

¹Department of Pharmaceutical Sciences, School of Pharmacy, Cedarville University, Cedarville, USA

²National Institute for Pharmaceutical Research and Development, Abuja, Nigeria ³Division of Nursing and Allied Health, Howard University, USA ⁴Pharmacy Department, University of Virginia, Charlottesville, USA.

Evaluation of the Anticancer Activity of Bioactive Fraction G Extracted from *Pavetta crassipes* in Malignant Brain Tumor Cell Lines, *American Journal of Phytomedicine and Clinical Therapeutics*, 2017; 5(2):16.

Abstract

Objective: Natural products have served as sources of lead compounds that are commonly used in the treatment of human diseases including cancer. *Pavetta crassipes* has been widely demonstrated to have ethnopharmacological potential in the management of malaria, gastrointestinal conditions, central nervous system behavioral disorders, hypertension, and cancer. The goal of our study was to evaluate the biological and molecular effects of Fraction G, obtained from the plant *Pavetta crassipes*, on glioblastoma invasive growth and survival. Methodology: The antiproliferative effects of Fraction G, obtained from *Pavetta crassipes*, was evaluated using the trypan blue exclusion, (3-(4, 5-Dimethylthiazol- 2yl)-2, 5-Diphenyltetrazolium Bromide; MTT), and lactate dehydrogenase (LDH) assays. Flow cytometry and Western blotting analyses were carried out to examine the effects of Fraction G on cell cycle check-points and its effects on epidermal growth factor receptor-mediated signaling of AKT and MAPK pathways. Results: In this paper, we report that the Fraction G obtained from the plant *Pavetta crassipes* induced a reduction in glioma cell viability and proliferation as well as induced an increase in apoptosis as evidenced by cleaved PARP,



increased caspase 3/7 activity, and cell cycle arrest in the G0/G1 check point. Furthermore, we report that Fraction G inhibited the phosphorylation of AKT and MAPK following EGF treatment. Conclusion: Taken together, our results demonstrate that Fraction G has potent inhibitory effects on pathways involved in glioblastoma proliferation and survival.

Keywords: Glioblastoma; Cancer; *Pavetta crassipes*; Natural products; Ethnopharmacology; Cell proliferation; Apoptosis

Year 2016

029 Aboh M.¹, Emeje M.², Oladosu P.¹, Akah I.^{1*} and Gamaniel K.³

¹National Institute for Pharmaceutical Research and Development, Department of Microbiology and Biotechnology, Abuja Nigeria.

²National Institute for Pharmaceutical Research and Development, Centre for Nanomedicine and Biophysical Drug

delivery, Abuja, Nigeria.

³National Institute for Pharmaceutical Research and Development, Director -General's Office Abuja, Nigeria.

Artemisinin combination therapy use in Federal Capital Territory, Nigeria. *African Journal of Pharmacy and Pharmacology*, 2016; 10(38): 805-809.

Abstract

There is an alarming rise in treatment failures from artemisinin combination therapy (ACT). The aim of this study was to access the therapeutic effectiveness of ACT in the market and the rate of reoccurrence of malaria shortly after completion of therapy. The rate of adherence to therapy and relapse rate of four hundred volunteers, who recently treated malaria, were assessed using quantitative interview-semi structured questionnaire. Adherence levels were 56.0% while relapse rate was 47.0%. The rate of relapse among volunteers who adhered to therapy was 40.63%. While encouraging continuous quality assessment of artemisinin combination drugs, it is equally important for public health practitioners and institutions to design deliberate programs to enlighten the public on the importance of adherence to therapy as this rather than quality of medicines may be contributing largely to drug resistance.

Keywords: Artemisinin combination therapy, malaria, quality assessment.

030 Aboh M, Oladosu P, Adeshina G, Olayinka B and Olonitola S. Mercy Itohan Aboh¹, Peters Oladosu¹, Gbonbola Adeshina², Busayo Olayinka², Steve Olonitola³

Screening of Selected Medicinal Plants for Their Antifungal Properties. *TAF Preventive Medicine Bulletin*, 15:1-5. 2016

Abstract

Objectives: The rising incidence of fungal infections has created the need for the next generation of antifungal agents, as many of the currently available ones either have adverse effects, or are not active against emerging or re-emerging fungi, leading to the fast progression of resistant strains. This study aims at evaluating the antifungal activities of some medicinal plants used traditionally for treating skin infections in Nigeria. Methods: In vitro antifungal activities of seven indigenous plants (*Leptadenia hastate, Lawsonia inermis, Hyptis suaveolens, Luffa cylindrica, Jatropha curcas, Pterocarpus erinaceus* and *Afromaxia laxiflora*) were screened against *Candida albicans* ^{ATCC 10231}, *Candida tropicalis* ^{ATCC 13803}, *clinical strains of Candida albicans, Candida tropicalis, Trichophyton rubrum, Microsporum canis* and *Epidermophyton floccosum* using agar dilution and microbroth dilution methods. Terbinafine and fluconazole were used as reference standards in order to compare. Results: The results showed that the ethanol and ethyl acetate extracts of the plants produced better



antifungal effects than the hexane and water extracts. L. cylindrica and H. suaveolens exhibited the strongest inhibitory activity against all the fungi tested with minimum inhibitory concentration values ranging between 250 and 1000 μ g/mL.

Conclusion: The plants screened could serve as leads for the development of new antifungal drugs.

031 Aliyu Adamu¹*, David Musa² and Henry Omoregie Egharevba¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), P.M.B. 21 Garki, Abuja, 900271 Nigeria 2Department of chemistry, Kaduna State University, Kaduna State, 800242 Nigeria

Bioactive chemical compounds and pharmacological prospect of *Mitracarpus villosus* (Swartz) DC- a review. *Asian Journal of Biochemical and Pharmaceutical Research Issue 2(Vol. 7) 2016 ISSN: 2231-256010.24214/AJBPR/7/2/99113 CODEN (USA): AJBPAD*

Abstract

Mitracarpus villosus [Swartz] DC formerly known as Mitracarpus scaber (Zuccarini) is an annual herb which is widely used in the West African traditional system of medicine as an antibiotic for the management of several disease conditions. The quantitative and qualitative phytochemical analysis from previous research have revealed that saponins, flavonoids, tannins, phenols, alkaloid, soluble carbohydrate, cyanide, cardiac glycoside, steroid, terpenoid, essential oil and reducing sugar are the major constituents of M. Villosus. However, resins, coumarins and anthraquinones are also present in the plant. Furthermore, stigmasterols, pentalongin, azaanthroquinones, gallic acid, 3,4,5trimethoxybenzoic acid, 4-methoxyacetophenone, 3,4,5- trimethoxyacetophenone, kaempferol-3-O-rutinoside, rutin, psoralen, oleanolic and ursolic acids have been isolated from Mitracarpus villosus. The essential oils of Mitracarpus villosus, is dominated by the long-chain aldehyde pentadecanal and the polyunsaturated fatty acid ester methyl (7Z,10Z,13Z)- hexadecatrienoate, with lesser quantities of 2.3- dimethylnaphthoquinone, and α -pinene. These compounds are reported to possess several biological and pharmacological activities, although the antibiotic potential of Mitracarpus villosus is well known, the chemical compounds detected in the plant possess; antioxidant, antidiabetic, antiviral, anticonvulsant, antiinflammatory, antitumour, antihyperlycemic, antihyperlipidemic, antihypertensive activities to mention a few. The cardiovascular protective effect and ability to ameliorate neurodegenerative disorder have also been reported for some of the compounds. Based on the chemical constituents of the plant, M. villosus is a potential candidate for the management of diseases like cancer, HIV and AIDS, liver disease, cardiovascular diseases and neurodegenerative disorders and other diseases. However, this claim is subject to scientific studies.

Keywords: *Mitracarpus villosus*; biological activity; pharmacological activity; phytochemicals; treatment

23|

032 Adamu Aliyu*, Ugwu Darlington Chukwuma, Egharevba Henry Omoregie and Kunle Oluyemisi Folashade

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, P.M.B 21, Abuja, Nigeria

Qualitative phytochemical analysis of the leaf of *Moringa oleifera lam*. From three climatic zones of Nigeriak. *Journal of Chemical and Pharmaceutical Research*, 2016, 8(8):93-101

Abstract

Moringa oleifera Lam. (Moringaceae) is one of the most versatile plants cultivated all over the world. It is popular in Nigerian due to its nutritional and medicinal values; almost every part of the plant can be used for food, medication or industrial purposes. They are claimed to treat different ailments in the indigenous system of medicine. The nutritional and medicinal values are due to the presence or absence of certain primary and secondary metabolites synthesized by the plant. Climatic condition, soil composition and other factors are reported to influence the synthesis of these metabolites. Consequently, the nutritional and phytochemical contents of the plant may vary from place to place. Several reports on the qualitative phytochemical analysis of Moringa oleifera leaves from different climatic zones in Nigeria were collated and evaluated. The data revealed the presence of alkaloids, flavonoids, saponins, steroids, tannins and phenolics in Moringa oleifera leaves from all the climatic zones. However, some phytochemicals present in Moringa oleifera leaves from one zone were absent or not detected in the leaves from another zone and this could be attributed to the climatic influence and the solvents used for extraction.

Keywords: Moringa oleifera, leaves, phytochemical, climate, zone.

033 Ahmadu P.U^{1,2}*, Limin-Hu¹, Guozhen L¹, Adah D¹, Peter, Bai J¹, Salawu O.A²

¹Key laboratory for Pharmacology of Chinese medicine, Tianjin university of traditional Chinese medicine, TUTCM,88 Yuquan Road, Nankai District, Tianjin, China P.R ²Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), P.M.B 21, Garki, Abuja, Nigeria

Neuroprotective Effect of *Zhen Tian Wan* on Pial Strip-Induced Cognitive Impairments and antioxidant status in Rats. *JOPAT, 2016, Vol. 15(2) 65 - 77*

Abstract

Zhen Tian Wan (ZTW), decoction consisting of seven herbs including *Rhizoma ligustici,Radix Angelicae sinensis, Ledebouriella sesloides, Radix Angelica pubescentis, Flos carthami, Ramulus uncariae cumuncis and Radix Angelica dahuricae*, has been widely used in traditional Chinese medicine (TCM), as treatment for headaches, migraine, premenstrual syndrome (PMS), and in soothing the nervous systems. The objective of the study was to investigate the neuroprotective effects of the formula using the Pial-strip model and Morris water maze analysis in rats. Doses of 1600, 3200 and 6400 mg/kg body wt orally were used. Dihydroergocristine 0.4 mg/kg p.o was used as the reference standard. The contents of malondialdehyde (MDA) and nitric oxide (NO), and the activity of superoxide dismutase (SOD) in the hippocampus and cortex were measured using



thiobarbituric acid, nitrate reductase and xanthine-xanthine oxidase spectrophotometric methods, respectively. ZTW 1600- 6400mg/kg daily doses to pial strip-lesioned rats for 36 d, from day 6-42 after pial strip significantly reduced the prolonged latency and increased the swimming time spent within the target quadrant. The increased contents of MDA and NO and the decreased activities of SOD induced by the pial strip were significantly improved. ZTW significantly reduced the level of free radicals in pial stripped rats. ZTW can improve learning and memory function and it possess anti-oxidant activity. ZTW may be beneficial in the treatment of vascular dementia.

Keywords: Zhen Tian Wan; pial strip; lesion; Memory; Morris water maze; free radicals

034 Anyebe S.N.¹, Allagh, T.S.¹, Oyi, R.A.¹, Ofokansi, K.C.², Adikwu, M.U.², Olayemi, O.J.¹ and Tytler, B.A¹.

¹Department of Pharmaceutics & Pharmaceutical Microbiology, Ahmadu Bello University, Zaria, Nigeria

²Department of Pharmaceutics and Pharmaceutical Technology, University of Nigeria, Nsukka, Nigeria

Evaluation of Eudragit RS 100 and hydroxymethylcellulose system in solid dispersion of piroxicam. *Nigerian Journal of Scientific Research*, 2016; 15(1): 120-125.

Abstract

The study was carried out to improve the solubility and dissolution rate of piroxicam. a non-steroidal anti-inflammatory drug with poor aqueous solubility by solid dispersion technique. Solid dispersions of piroxicam were prepared by solvent evaporation method using varying ratios of Eudragit RS 100 and low viscosity grade hydroxypropyl methylcellulose (HPMC) as carriers. Physical mixtures of piroxicam were prepared with the same carriers and in the same drug carrier ratio to compare the solubility and drug release behavior. The prepared solid dispersions were evaluated for drug content, solubility, drug release behavior and anti-inflammatory effect. All solid dispersions displayed better solubility and dissolution profile when compared to the pure drug or physical mixtures. Solid dispersion of piroxicam with HPMC (SD4) gave a three-fold increase in solubility when compared to pure drug. Drug release was highest from formulation SD 4 with 78 % of the drug released after 8 h while pure piroxicam released only 47 % of the drug at the same time. There was no loss of anti-inflammatory activity of piroxicam in the solubility and dissolution of piroxicam can be improved using solid dispersion technique.

Keywords: Dissolution, solid dispersion, solubility, formulation

25||
NIPRD Compendium of Research Publications (2010 - 2018)

035 Chukkol Ismail Buba^{1,2,} Samuel E. Okhale¹* and Ibrahim Muazzam¹

¹Department of Medicinal Plant Research and Traditional Medicine (MPR&TM), National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, P. M. B. 21, Garki, Abuja, Nigeria. Department of Chemistry

²Modibbo Adama University of Technology Yola, P. O. Box 740, Jimeta, Adamawa State Nigeria.

Garcinia kola: The phytochemistry, pharmacology and therapeutic applications. *International Journal of Pharmacognosy*, 2016, 3(2): 67-81.

Abstract

Medicinal plants are bioresources harnessed by humans to combat diseases and maintain healthy life. Plants remain the basis for development of modern drugs for the preservation of health. Garcinia kola is considered a "wonder plant" because every part of it has been found to be of medicinal importance. G. kola seed is used as an antipyretic agent in indigenous system of medicine. Pharmacologic studies on the seed, leaf and root of this plant showed potent antimicrobial, antiviral, antiulcer, anti-inflammatory, antihepatotoxic, antidiabetic, antihypertensive, adaptogenic, aphrodisiac and antiasthma activities. This review highlights detailed pharmacological properties and phytochemistry of G. kola in an attempt to provide direction for further research toward drug discovery.

Keywords: Garcinia kola, Phytochemistry, Pharmacological action

036 Egharevba HO^{1*} , Oladosun P^2 , Izebe KS^2

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria

Chemical Composition and Anti-tubercular Activity of the Essential Oil of Orange (*Citrus sinensis* L.) Peel from North Central Nigeria. *International Journal of Pharmacognosy and Phytochemical Research 2016; 8(1); 91-94*

Abstract

The peels of *Citrus sinensis* obtained from a market in Abuja, North-central Nigeria, was hydrodistilled to obtain its essential oil. GC-MS analysis of the oil reveals a new chemo-type rich in α terpineol (35.39%), D-limonene (17.74%), linalool (9.73%), Citronellol (4.88%), γ -Muurolene (4.44%) and Isopiperitenone (3.58%). The oil was screened against local strains of Mycobacterium tuberculosis and was found to be active at a strength of 25% (v/v) (or 0.25 ml/ml). This is the first time the essential oil of C. sinensis with lower limonene than α -terpineol content, and with anti-TB activity would be reported. The findings suggest that the oil could be used as source of industrial feeds for chemical synthesis, preservatives as well as for flavor and fragrance. This could also open up a new research direction in anti-TB drug development and use of essential oil in drug development and foods.

Keywords: Citrus sinensis, sweet orange, Mycobacterium tuberculosis, terpineol, limonene, essential oil



037 Egharevba Henry Omoregie^{1*}, Ibrahim Jemilat Aliyu¹, Ebere Uchechukwu Doris², Okhale Samuel Ehiabhi¹ and Kunle Oluyemisi Folashade¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria. ²Department of Chemistry, Faculty of Science, Imo State University, Owerri, Imo State, Nigeria

Chemical Components of the Essential Oil of *Lantana camara L*. Found in North Central Sudan Region of Nigeria. *American Chemical Science Journal 2016, 12(1): 1-7.*

Abstract

The essential oils of medicinal and aromatic plants remain a veritable tool in the management of ailments in ethnomedicine. Essential oils from medicinal plants had also been reported to possess various pharmacological activities, and have found relevance in food and industrial applications. Lantana camara L. is a well-known poisonous plant in ethnomedicine with proven numerous biological activities. The essential oil of the Nigerian species which has not been well studied was extracted by hydro-distillation and analyzed using a Shimadzu GC-MS QP2010 SE. The major chemical components of the oil were found to be Davanone (15.54%), Eucalyptol (12.72%), β-Phellandrene (10.58%), α-Pinene (9.30%), Caryophyllene (6.99%), and (6E)-Nerolidol (5.68%). This is the first time Davanone has been reported from the species, and the species may present an alternative source for natural davanone.

Keywords: *Lantana camara*; essential oil; davanone; β-phellandrene.

038 Ezenyi Ifeoma C.¹, Peter A. Akah², Charles O. Okoli²

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria. ² Department of Pharmacology and Toxicology, University of Nigeria, Enugu, Nigeria

Antiplasmodial activities of chloroquine and artemisinin in combination with verbascoside, a phenylethanoid glycoside from *Stachytarpheta cayennensis*. *American Journal of Tropical Medicine and Hygiene, 2016, Vol. 95 suppl. 5, p. 88.*

Abstract

Verbascoside (VB), a phenylethanoid glycoside has been shown to possess strong antioxidant and immune-stimulant effects. The present study was designed to evaluate the antiplasmodial effect of VB purified from *Stachytarpheta cayennensis* leaves and its combination with artemether (Art) and chloroquine (CQ) in established Plasmodium berghei berghei infection in mice. VB was obtained by successive column separation of a methanol extract of *S. cayennensis* leaves; identity and purity of the compound were established by nuclear magnetic resonance spectroscopy (proton, carbon), high performance liquid chromatography and differential scanning calorimetric thermal analysis. In antiplasmodial tests, mice were inoculated on day 0 with chloroquine - sensitive P. berghei berghei NK65 infected blood. On day 3, mice were grouped (n=5) and respective groups treated for five days with VB, combinations of VB and CQ, combinations of VB and Art, CQ alone, or Art alone; at a dose range of 1-25 mg/kg of body weight. During treatment, thin films of tail vein blood of the mice were prepared daily and assessed for parasitaemia. After treatment, survival time was also monitored for all the experimental groups. The results showed that VB alone possessed significant (P<0.001) intrinsic antiplasmodial activity and exhibited synergism in combination with CQ, as increasing



doses of VB significantly (P<0.05, 0.01, 0.001) boosted parasite clearance and prolonged survival time compared to CQ alone. Co-administered VB and Art produced significant (P<0.001), rapid and sustained parasite clearance within the first 4 days of treatment compared to Art alone, but survival time was highest in the group that received Art alone and was reduced with increasing doses of VB given in combination with Art. VB also produced a rapid onset action as observed in its ability to elicit rapid parasite clearance when administered alone.

039 Ezenyi Ifeoma C.¹, Peter A. Akah²* and Charles O. Okoli²

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria. ²Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Nigeria.

Stachytarpheta cayennensis methanol leaf extract and solvent fractions display antiplasmodial activity against plasmodium berghei berghei in vivo. *Int. J. Phytopharmacol. 2016, 7(1):1-9*

Abstract

Stachytarpheta cayennensis L.C. Rich (Verbenaceae) is used traditionally in Nigeria for the treatment of febrile illnesses, including malaria. The present study was aimed at investigating the antiplasmodial effects of S. cayennensis leaf extracts. A methanol extract (ME) and successive hexane (HF), dichloromethane (DCMF) methanol (MF) and aqueous (AF) fractions of S. cayennensis leaves were prepared. Elemental, phytochemical and total phenolic analyses of the methanol extract were carried out. Oral acute toxicity test of the methanol extract was performed in mice. The antiplasmodial activity of the extracts was determined against Plasmodium berghei berghei infection in mice. The antioxidant effect of the methanol extract was evaluated using phenylhydrazine-induced haematotoxicity and against DPPH radical. The oral LD50 of the extract in mice was 3535 mg/kg. All the elements in the plant material were within normal limits and there was no trace of lead (Pb). Glycosides, flavonoids and other phenolic compounds were detected in the extract. The methanol extract significantly (p < 0.05) suppressed parasitaemia in early, repository and established infection while successive solvent fractions (100 mg/kg each) significantly (p<0.05) suppressed parasitaemia by 87.84 (HF), 84.32 (DCME), 97.57 (MF) and 94.59% (AE). The methanol extract also inhibited phenylhydrazine-induced haematotoxicity and scavenged DPPH in a concentration dependent manner (EC50 = $37 \mu g/ml$). These findings indicate that S. cavennensis leaf extracts possesses potent antiplasmodial activity which may be mediated in part through antioxidant effects.

Key words: Stachytarpheta cayennensis, Extracts, malaria, Anti-oxidant, Phytochemistry



040 Ezenyi Ifeoma Chinwude¹, Akah Peter Achunike² And Okoli Charles Ogbonnaya²

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, Abuja, Nigeria. ²Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka 410001, Enugu State, Nigeria.

Antiplasmodial Activity and Some Active Compounds from *Stachytarpheta cayennensis Vahl.* (*Verbenaceae*) Leaf Fractions. *Anti-Infective Agents 2016, 14(2):132-138.*

Abstract

Background: New antimalarial drugs are required to fight resistant parasites and plantderived natural products are a robust source for identifying active lead compounds. Stachytarpheta cayennensis (Verbenaceae) is traditionally used in west and central Africa as malaria remedy. Objective: This study was undertaken to evaluate antiplasmodial activity of S. cayennensis leaf fractions and to isolate and identify some active constituents. Method: A dried, powdered batch of S. cavennensis leaf was extracted with hexane, dichloromethane and methanol. The methanol extract was partitioned with ethyl acetate and water. Solvent portions and ethyl acetate column fractions were investigated in early infection in mice, against chloroquine-sensitive (HB3) and chloroquine-resistant (FCM29) P. falciparum. Compounds I, II and III isolated from active fractions were identified based on their spectroscopic data and further evaluated for antioxidant and heme biomineralization inhibitory activity. Results: Column fractions 6-7, 10-11 significantly ($P \le 0.01$) reduced parasitaemia in vivo and in vitro (IC50 < 50 µg/ml). At a dose of 2.5 mg/kg, compounds I - III significantly (P < 0.05) suppressed infection by 54.91 - 88.95 %. Compound III also displayed strong antioxidant effect (EC50 = 0.05 mg/ml) comparable to equivalent concentrations of ascorbic acid (EC50 = 0.03 mg/ml), whereas compound I elicited stronger inhibitory effect (67.93%) on heme biomineralization than compound III (38.67%). The compounds were identified as apigenin (I), stigmasterol glucoside (II) and verbascoside (III).

Conclusion: The findings showed that *S. cayennensis* leaves contain antiplasmodial-active compounds which show potential for further development.

Keywords: Antiplasmodial activity, malaria, plasmodium falciparum, Stachytarpheta cayennensis

041 Ezenyi Ifeoma Chinwude^{*1,} Oluchi Nneka Mbamalu², Lucy Balogun¹, Liberty Omorogbe¹, Fidelis Solomon Ameh¹, Oluwakanyinsola Adeola Salawu¹

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

²School of Pharmacy, University of the Western Cape, Bellville, South Africa

Antidiabetic potentials of *Syzygium guineense* methanol leaf extract. *Journal of. Phytopharmacology 2016*, *5(4):150-156*

Abstract

This study examines the effects of a methanol extract of Syzygium guineense leaves in streptozotocin (STZ) - induced diabetes, evaluates its effect on alpha glucosidase and 2, 2-diphenyl-1-picrylhydrazyl radical. Diabetes was induced in rats by a single intraperitoneal injection of streptozotocin (60 mg/kg). An oral glucose tolerance test was performed after diabetes induction and repeated after 14 days of treatment with the extract. The extract elicited antihyperglycemic action in diabetic rats evidenced by an improved oral glucose tolerance. A dose of 250 mg/kg of extract significantly (P<0.01, 0.001) enhanced glucose clearance at the end of treatment period and was comparable with metformin, the group also showed increase in hepatic glycogen content by 33.9% relative to the diabetic control. Serum biochemical analysis showed that the extract improved indices of renal and hepatic function by reduction in serum albumin, creatinine, liver enzymes, total and direct bilirubin. Similarly, the extract reduced serum cholesterol, triglycerides and high density lipoprotein (HDL) in a non-dose dependent manner; treatment with 250 mg/kg extract caused significant (P<0.05) reduction of HDL. Groups which received 250 and 500 mg/kg of extract showed reversal of glomerular damage compared with the diabetic untreated group. The extract also exhibited concentration-dependent antioxidant activity (EC50= 0.2 mg/ml) and statistically significant (P<0.01, 0.001) alpha glucosidase inhibitory effect (IC50= 6.15 mg/ml). These findings show the antidiabetic potential of S. guineense leaf extract, likely mediated through its ability to inhibit alpha glucosidase, scavenge free radicals and increase intrahepatic glucose uptake and storage.

Keywords: Alpha glucosidase, Antioxidant, Syzygium guineense.

042 Esievon K. B. O. T. Fatokun, J. A. Ibrahim and O. F. Kunle

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria.

Pharmacognostic Studies of the Leaf of *Senna siamea (lam.)* Irwin & Barneby Family: Caesalpiniaceae. *European Journal of Medicinal Plants 2016: 16(2): 1-7.*

Abstract

Aim: To establish pharmacognostic standard for S. siamea and provide chromatographic fingerprints with a view to assisting in the quality control of medicinal products from the plant. Study Design: Pharmacognostic evaluation of the leaf of Senna siamea.



Place and Duration of Study: Pharmacognosy laboratory, department of medicinal plant research and traditional medicine, national institute for pharmaceutical research and development (NIPRD), Abuja, Nigeria.

Methodology: Chemomicroscopic evaluation and determination of physicochemical properties (moisture content, ash values, extractive values) of the powdered leaves, macroscopy and microscopy of anatomical sections of the leaf were carried out using standard procedures.

Results: Evaluation of the macro and microscopic characters showed that the leaves are dark green, simple and entire. The leaf epidermis is polygonal, has paracytic stomata on the lower surface and uniseriate trichomes. Quantitative leaf analysis revealed stomatal number (464.7), stomatal index (38.23), palisade ratio (4.48), vein islet number (21.71) and vein termination number (20.71). Chemomicroscopic characters present include lignins, tannins, mucilage and oils. The physicochemical parameters evaluated are: Moisture content 7.33%, total ash 6.46%, acid insoluble ash 5.32%, sulphated ash 8.47%, water-soluble ash 1.87%, alcohol-soluble extractive 5.12% and water-soluble extractive 16.71%. Chromatographic fingerprints of ethanol (70%) extract showed major spots at Rf = 0.74 daylight (yellow), UV366 (fluorescent), spray reagent (brown); Rf = 0.91 daylight (green), UV366 (red), spray reagent (brown).

Conclusion: The results from this study have provided information on the morphological, anatomical features and physicochemical parameters of the leaf of Senna siamea. The findings from this study will be useful towards establishing standards which can be included in official monograph of the plant for its proper identification and quality control.

Keywords: Senna siamea; pharmacognostic standards; microscopy; physicochemical studies.

043 IBRAHIM Jemilat A*, Henry O. EGHAREVBA, Adeola I. JEGEDE, Grace E. UGBABE, Ibrahim MUAZZAM, Oluyemisi F. KUNLE and Karniyus S. GAMANIEL

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria

Medicinal plants used and the perception of plant endangerment by the traditional medicine practitioners of Nasarawa State, Nigeria: A pilot study. *International Journal of Biodiversity and Conservation*, 2016. Vol. 8(1), pp. 8-20. Academic Journals

Abstract

The growing role of traditional medicine practice in the health care delivery system of most countries of the world cannot be over emphasized. Needless to say, more than 90% of the remedies used by the practitioners of traditional medicine are medicinal plant based. The growing demand for these plants for medicinal use and the subsequent unsustainable harvesting, livestock browsing and infrastructural development has led to the endangerment of some of the species. A pilot study was conducted to document the medicinal plants used by traditional medicine practitioners (TMPs) and those they perceived to be scarce or endangered in Nasarawa State, Nigeria. Sixty TMPs were interviewed orally with the use of structured questionnaire. A total number of 120 medicinal plant species were identified from the 158 specimens surveyed for treatment of various ailments. Forty eight percent of the respondents did not agree that wild collection of medicinal plants without replacement can increase extinction risk of such plants. Of the medicinal plants mentioned by the TMPs to be scarce, only 33 were identified taxonomically and 75% of them are trees, while 3% are herbs. The study reveals the urgent need for raising of awareness level of the TMPs on plant endangerment, training on good collection practice, sustainable collection, and as well as sensitization on sustainable biodiversity conservation practice.

Key words: Nasarawa State, medicinal plants, biodiversity conservation, Traditional Medicine Practitioners (TMPs).

044 Isimi Christianah¹, Asha Rodrigues², Okafor Ijeoma¹, Okoh Judith¹, Aboh Mercy³ and Emeje Martins Ochubiojo¹

¹National Institute for Pharmaceutical Research and Development, Centre for Nanomedicine and Biophysical Drug delivery, Abuja, Nigeria ²Physical and Materials Chemistry Division, National Chemical Laboratory, Pune, India

³National Institute for Pharmaceutical Research and Development, Department of Microbiology and Biotechnology, Abuja, Nigeria

Rifampicin-loaded Silver-starch Nanocomposite for the Treatment of Multi-resistant Tuberculosis. *Journal of Nanomedicine & Nanotechnology*, 2016.

Abstract

Extraction, purification and synthesis of acetylated cassava starch was undertaken. The degree of modification for the acetylated (modified) starch was calculated to be 0.03. Physicochemical indices interrogated were all significantly (P<0.05) affected by the acetylation. Microstructural studies revealed starches that were predominantly polygonal in shape. The FTIR results confirmed introduction of an acetyl group with a new band at 1728 cm-1. The results further show that, the modification did not degrade the granule morphology, but x-ray pattern showed increased crystallinity in the acetylated derivative. Thermogravimetric analysis and differential scanning calorimetry revealed 2 phase decomposition of both starches and improved gelation capacity with new peaks respectively. Rifampicin (RIF) loaded starch-stabilized silver nanoparticles yielded good mean particle size (248 nm), polydispersity index (0.276) and zeta potential (18.68 mV). There was a significant (P<0.01) sustained release of RIF from the nano formulations up to 14.0 h. Antimicrobial susceptibility tests show that, the nano formulation exhibited good antimicrobial activity. It is therefore concluded that, acetylated cassava starch could be a good stabilizer and vehicle for drug delivery

Keywords: Cassava starch; Acetylation; Physicochemical properties; Nanoformulation; Rifampicin

045 Isimi Christianah¹, Kokonne Ekere¹, Okoh Judith¹, Olubunmi Olayemi¹, Ogbatuluenyi Darlington¹, Asogwa Godwin¹, Aminu Musa² and Martins Emeje^{1,3}

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

²Department of Pharmaceutical Chemistry, Ahmadu Bello University, Zaria, Nigeria

³*Centre for Nanomedicine and Biophysical Drug Delivery, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.*

Phytopharmaceutical properties of herbal teas circulating in the Nigerian market. *African Journal* of *Pharmacy and Pharmacology*, 2016; 10(47): 1007-1013

Abstract

We report herein some phytopharmaceutical properties of commonly marketed teas in Nigeria. The organoleptic and physicochemical properties such as color, odor, physical appearance as well as ash value, moisture content, flow properties, pH and solubility were interrogated using standard methods as the measure of their phytopharmaceutical properties. The results show that, all the teas were coarse in nature and the colors ranged from green to brown. Most of the teas are pleasant to



minty odor, while the tastes ranged from minty, sweet, bitter to tasteless. The ash values obtained were between 0.7 and 1.00. The pH values ranged between 4.23 and 7.89 with cold infusions having higher pH values than the hot infusions. All the teas investigated had angles of repose between 17.13 and 35.81°, Carr's index between 4.65 to 16% and Hausner quotient between 1.08 and 1.19; they also had moisture content $\leq 10\%$ suggesting adequate processing and storage requirements. The teas investigated had variable physicochemical properties which underscores the need for standardization of teas before approval by regulatory authorities.

Keywords: Teas, phytopharmaceutical properties, standardization.

046 John-Africa¹Lucy Binda²*, Nuhu Mohammed Danjuma², Joseph Akpojo Anuka² and Ben Ahmed Chindo^{1,2,3}

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria.

²Department of Pharmacology and Therapeutics, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

³Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, Kaduna State University, Kaduna, Nigeria.

Analgesic and Anti-inflammatory Activities of the Ethylacetate Extract of *Mitracarpus villosus* Leaves in Rodents. *European Journal of Medicinal Plants 2016 15(3): 1-10*

Abstract

Aims: To investigate the effects of the ethylacetate extract of Mitracarpus villosus leaves using various invivo models of pain, inflammation and pyrexia. Study Design: This study was designed to investigate the possible analgesic, anti-inflammatory and anti-pyretic effects of ethylacetate extract of Mitracarpus villosus leaves in rodents. Place and Duration of Study: Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, Abuja, Nigeria; between September 2013 and February 2014. Methodology: The effects of the extract on centrally and peripherally mediated pain were investigated in albino mice and Wistar rats. The anti-nociceptive effects of the extract were tested on acetic acid-induced abdominal writhing, oro-facial formalin-induced pain in mice and carageenaan-induced hyperalgesia in rats. The effects of the extract on inflammation and body temperature were determined using formalin induced paw oedema and Baker's yeast induced pyrexia respectively. Results: The extract at 100 - 400 mg/kg significantly (P ≤ 0.05) and dose-dependently inhibited acetic acidinduced abdominal writhing, decreased the time of face rubbing induced by formalin and increased the withdrawal threshold of rat paws injected with carageenaan to induced hyperalgesia. At 400 mg/kg, paw thickness induced by formalin was significantly reduced when compared to control. The analgesic and antiinflammatory effects of the extract are comparable to pentazocine and diclofenac. Hyperthermia induced by Baker's yeast was significantly reversed by the extract in a manner similar to paracetamol. Conclusion: The results obtained suggest that the ethylacetate extract of *Mitracarpus villosus* leaves may contain biologically active principles with potential analgesic, anti-inflammatory and anti-pyretic effects; thus supporting its use as a phytomedicine and buttressing the need for the isolation and identification of the biologically active constituent(s) of this plant.

Keywords: Formalin; hyperalgesia; mitracarpus; orofacial; pyrexia; phytomedicine

047 Lukman Adewale Alli¹, Abdulfatai Ayoade Adesokan², Adeola Oluwakanyinsola Salawu³

¹Department of Medical Biochemistry, College of Health Sciences, University of Abuja, Abuja, Nigeria.

²Department of Biochemistry, Faculty of Basic Medical Sciences, College of Health Sciences, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.

³Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Antimalarial activity of fractions of aqueous extract of *Acacia nilotica* root. Journal of Intercultural Ethnopharmacology, 2016, 5 (2): 180-185

Abstract

The problem of resistance of malarial parasites to available antimalarial drugs makes the development of new drugs imperative, with natural plant products providing an alternative source for discovering new drugs. Aim: To evaluate the antimalarial activity of eluted fractions of Acacia *nilotica* root extract and determine the phytochemicals responsible for its antimalarial activity. Materials and Methods: The extract was eluted successively in gradients of solvent mixture (hexane, ethyl acetate, and methanol) in multiples of 100 ml, and each fraction was collected separately. Eluates that showed similar thin layer chromatographic profiles and Rf values were combined to produce 4 main fractions (F-1, F-2, F-3, and F-4), which were tested separately for antimalarial activity using the curative test. Changes in body weight, temperature, and packed cell volume (PCV) were also recorded. Results: Fraction F-1 of A. nilotica at 50 and 100 mg/kg b/w produced significant and dose-dependent reduction in parasite count in Plasmodium berghei infected mice compared to the control, and also significantly increased the survival time of the mice compared to the control group. This fraction also ameliorated the malaria-induced anemia by improving PCV in treated mice. Conclusion: Antimalarial activity of extract of A. nilotica root is probably localized in the F-1 fraction of the extract, which was found to be rich in alkaloids and phenolics. Further study will provide information on the chemical properties of the active metabolites in this fraction.

048 Mohammed SB, Ya'aba Y, Oladosu OP, Izebe KS, Njoku M, Abubakar A,Usoroh M and Ibrahim K.

Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development Abuja, Nigeria.

Sero-prevalence of HIV-1 antibodies among clients attending diagnostic laboratory of National Institute for Pharmaceutical Research and Development (NIPRD) Idu-Abuja, Nigeria. *Ewerem Journal of Epidemiology & Clinical Medicine*, 2(1): 34-39.

Abstract

Measurement of HIV prevalence among the general population as well as among specific subgroups who are at high risk of infection is crucial for planning and for providing health care for those who are infected. The prevalence of antibodies to HIV-1/2 amongst individuals attending diagnostic



clinic at National Institute for Pharmaceutical Research and Development (NIPRD) Idu, Abuja, Nigeria was determined from five hundred (500) volunteers from March to September 2015. The testing for the presence of HIV antibodies was carried out using Determine® HIV-1/2 Test Cards (Inverness Medical, Japan), UnigoldTM kit (Trinity Biotech, Ireland) and Stat Pak® HIV-1/2 (Chembio Diagnostic Systems, Inc. USA). The result showed that 75 (15.0%) were HIV positive. 30 (16.7%) out of 180 males and 45 (14%) out of 320 females were tested positive. The highest prevalence was recorded within the age range of 21-30 years. It was also found out that the prevalence is higher among the general population compare to the reported national figure. It is therefore recommended that general population survey be strengthened because this can help in program planning and implementation.

Keywords: Serological, Prevalence, Antibodies, HIV, Unigold, Counsel

049 Mohammed S. B^1 ., Ya'aba Y¹., Uba A²., Ibrahim K¹. and Peters O. A¹. (2016).

¹Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development Abuja, Nigeria. ²Department of Microbiology, Abubakar Tafawa Balewa University Bauchi, Nigeria

Evaluation of Immuno-Stimulatory Effect of *Erythrina Senegalensis* on Immunosuppressed Swiss Albino Rats. *World Journal of Pharmaceutical Volume 5, Issue 9, 162-178*

Abstract

The frequency of life threatening infections has increased dramatically among cancer patients, transplant recipients, AIDS patients and those receiving broad spectrum antibiotics, corticosteroids, and cytotoxic drugs. There is also an upsurge in the number of strains of infectious agents that no longer succumb to antibiotics. Therefore, instead of focusing on drugs that block bacterial growth, researchers shifted to develop drugs that can boost people's natural defenses against microbes. As most of the leguminaseae, Erythrina senegalensis produce many secondary metabolites some of which have a function of defense against pathogenic fungi and bacteria including multidrug resistant pathogens. It is not clear how extracts of these this plant exert its therapeutic effects. Aqueous extracts of the roots, stem bark and leaves was evaluated for their effects on functioning and activities of the immune cells. Extracts were administered orally using carnula and their ability to reverse cyclophosphomide induced leucopenia by enhancing total WBC counts, CD4+ Tlymphocyte count, activate and enhance phagocytic activity in rats were investigated. Data obtained was analyzed using ANOVA and student t-test at p<0.05. The extracts were found to enhance the recovery of CD4+ T-lymphocyte count, white blood cells count, and enhance phagocytic activity of cyclophosphamide induced immunosuppressed rats at 1500mg/kg body weight (p<0.05). The study indicates that the main mechanism of action of the extracts of this plant is immunostimulatory. Again the importance of demonstrating the presence of immunostimulants from this plant portends a great conquest for medicine especially in this era of HIV/AIDS.

Keywords: Immunostimulatory, CD4+, Carnula, Erythrina senegalensis, WBC, Phagocytic.

NIPRD Compendium of Research Publications (2010 - 2018)

050 Muoghalu G. U¹, Akah P. A¹, Okoye T. C¹, Ezenyi I. C³, Ibeneme S², Okoli C. O¹

¹Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka 410001, Enugu State, Nigeria.

²Department of Medical Rehabilitation, Faculty of Health Sciences, University of Nigeria, Enugu Campus, Enugu State, Nigeria.

³Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, Abuja, Nigeria.

Anti-inflammatory activity of fatty extract of *Vitalleria paradoxa* Kernel (Shea butter) and pattern of its clinical use in arthritis in Enugu, South East Nigeria. *Int. J. Basic Clin. Pharmacol. 2016*, *5:2345-51*.

Abstract

Background: The fatty seed extract of *Vitellaria paradoxa* Kernel (Sapotaceae) commonly called "Shea butter", is a popular remedy for arthritis in West Africa. This study investigated the knowledge, prevalence and pattern of use of Shea butter in clinically diagnosed arthritic patients as well as its effects on acute (topical and systemic) and chronic inflammation in rodents.

Methods: Knowledge, prevalence and pattern of use were determined using pre-tested questionnaire in clinically diagnosed patients whereas the anti-inflammatory activity was studied using xylene-induced mouse ear edema, carrageenan-induced rat paw edema, formaldehyde-induced arthritis in rats and cotton pellet granuloma test in rats.

Results: The results showed that of the 164 respondents, 94.1% know about Shea butter and 59.6% have used it mainly as a massage ointment once or twice daily. However, 73.7% of the users combine this remedy with analgesics to achieve relief. The pharmacological tests showed that topical application of Shea butter inhibited acute edema of the mouse ear. Systemic oral

Administration caused significant (p<0.05) suppression of the development of systemic acute edema of the rat paw in a non-dose related manner. Twice daily topical application of Shea butter significantly (p<0.05) inhibited the edematous response to formaldehyde arthritis whereas once daily administration was not effective. Shea butter also caused a significant (p<0.05) non-dose related inhibition of granuloma tissue formation on implanted cotton pellets.

Conclusions: These findings provide a scientific rationale for the use of Shea butter in treatment of disorders of inflammation in traditional medicine.

Keywords: Anti-inflammatory, Shea butter, Vitellaria paradoxa

36

051 Mustapha, B.¹, C. Y. IsimI², R. A. Kirim¹, M. I. Aboh³, E. T. Wojuola¹, P. O. Oladosu³ and M. O. Emeje²

¹ Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development, Idu-Abuja

² Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Idu-Abuja

³ Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu-Abuja

A simple, quick, reproducible and low-cost High-Performance Liquid Chro1matographic method for the analysis of Metronidazole in tablets. *International Journal of Pharmaceutical Sciences and Research*, 2016; 7(7): 2837

Abstract

A simple, rapid, reproducible and low cost High Performance Liquid Chromatography (HPLC) method was developed and used to assess the quality of some brands of metronidazole tablets being marketed in Abuja, Nigeria. Parameters such as assay for the content of active ingredient, dissolution, disintegration, hardness, friability, and microbial load were evaluated using the methods described in the British Pharmacopoeia. Our results show that, a good linear relationship between Peak Area Response and Concentration in the range of 1.5–50µg/mL and a regression coefficient value of 999 was obtained. The method was found to be very sensitive with values of 25.0 and 15.6ng/mL obtained as Limits of Quantification (LOQ) and Detection (LOD) respectively. The result also showed that all but one (T5) of the eight brands evaluated met the British Pharmacopeia (BP) specifications for weight uniformity test, disintegration test and dissolution test. The brand T5, which failed the weight variation test, equally failed the dissolution test. This product was found to have released more than 110 % of the drug content within 45 minutes against the specification in the pharmacopoeia. This product therefore does not comply with the BP dissolution tolerance limits. However, all the brands examined pass the assay for content of active ingredient.

Keywords: Metronidazole, HPLC, Microbial Load, Dissolution

052 Mustapha Kudirat Bola^{1*} Rukaiyatu Abdullahi Kirim¹, Jemilat Aliyu Ibrahim², Philip U. Onuche¹, Moji Taibat Bakare-Odunola³

¹Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Abuja, Nigeria

²Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Abuja, Nigeria

³ Department of Pharmaceutical and Medicinal Chemistry, Faculty of Pharmaceutical Sciences, University of Ilorin, Ilorin, Nigeria

Perception of Use of Herbal and Orthodox Medicines in Parts of Abuja: A Pilot Study. *Journal of Applied Pharmaceutical Science, September, 2016 Vol. 6 (09), pp. 128-132*

Abstract

This study assessed respondents' perception on packaging, affordability, availability, efficacy, and safety of use of herbal and orthodox medicine in the treatment of common diseases in Abuja. Structured questionnaires were administered to elicit information from 200 residents selected from five locations through a purposive sampling method and data were analyzed using descriptive statistics. Orthodox medicines were rated higher than herbal medicine in term of preference, packaging, first-aid and uses. While in terms of affordability, adverse effect, natural and efficacious to the body, the respondents preferred herbal medicine. About Seventy percentage chose orthodox medicine as their first drug of choicewhile 28% preferred herbal medicine as their first drug of choice. 72.96% of the respondents have used herbal medicines without any side effect while 10.77% had experienced adverse effects from its use and 16.33% claimed they have never used herbal medicines for treatment before. The differences in the means of attributes of herbal and orthodox medicines were not statistically significant at P>0. 05. The information obtained is in agreement with WHO statement that over 80% of the world's population depends on traditional medicine for its primary health care.

Key words: Herbal, Orthodox, Medicine, Respondents, Adverse Effect

053 Okhale Samuel Ehiabhi¹*, Adeniyi Yahaya Tijani² and Brendan Okechuchwu Ezugwu^{1,3}

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria. ²Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria. ³Department of Industrial Chemistry, Federal University of Technology, Owerri, P.M.B. 1526

³Department of Industrial Chemistry, Federal University of Technology, Owerri. P.M.B. 1526 Owerri, Imo, Nigeria.

Assessment of Antiproliferative Potential of Hexalobus crispiflorus (Annonaceae). British Biotechnology Journal, 2016, 15(3): 1-7.

Abstract

Background: Hexalobus crispiflorus root aqueous extract (HC) is used to treat breast cancer in Nigeria. Aim: To evaluate the antiproliferative effects of HC using *Sorghum bicolor* seed radicle as test subject. Materials and Methods: Ten millilitres each of one to seven mg/ml HC in distilled water was poured into 9 cm wide Petri dishes overlaid with cotton wool and filter paper. Twenty viable seeds of Sorghum bicolor (Guinea corn) were spread on each plate and incubated in the dark. The lengths (mm) of the radicles emerging from the seeds were measured at 48, 72, and 96h. The control seeds were treated with 10 ml of distilled water containing no extracts. The experiments were carried out in triplicates. The mean radicle lengths (mm) and percentage inhibition were determined. HC was characterized using colour reactions and HPLC-UV-DAD. Results: Phytochemical investigation revealed the presence of tannins, saponins, glycosides, alkaloids, flavonoids, terpenes and steroids. HPLC spectrum gave nine peaks with caffeic acid and rutin eluting at 5.22 and 7.76 minutes respectively. HC significantly (P < 0.001) inhibited S. bicolor seed growth over a period of 48 – 96 h against the control seeds. At 96 h, HC dose-dependently inhibited seed growth, gave inhibition of

35.41%, 40.67%, 58.24%, 61.34% and 63.68% for seeds treated with 1 mg/ml, 2 mg/ml, 4 mg/ml, 6 mg/ml and 7 mg/ml respectively with IC50 of 3 mg/ml. Methotrexate 0.176 mg/ml as positive control gave inhibition of 99.11% at 96 h. Conclusion: This result indicates the propensity of HC to inhibit the proliferation of S. bicolor seed radicle, hence provide preliminary evidence for its use to treat breast cancer.

Keywords: Antiproliferative; *Sorghum bicolor*; cell growth inhibition; caffeic acid; rutin; Hexalobus crispiflorus.

054 OKHALE Samuel Ehiabhi¹*, Chukkol Ismail BUBA,², Peters OLADOSU³, Henry O. EGHAREVBA¹, Grace UGBABE¹, Jemilat A. IBRAHIM¹ and Oluyemisi Folashade KUNLE¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria. ²Department of Chemistry, Modibbo Adama University of Technology, Yola, P.O.Box 740, Jimeta, Adamawa State, Nigeria.

³Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria.

Chemical Constituents and Antimicrobial Activity of the Leaf Essential Oil of *Garcinia kola Heckel* (*Clusiaceae*) from Nigeria. *American Chemical Science Journal 2016. 13(4): 1-7* SCIENCEDOMAIN International

Abstract

All parts of Garcinia kola are used in traditional medicine for various ailments including inflammation and infections. The leaf essential oil (EO) of Garcinia kola was isolated by hydrodistillation using Clavenger type apparatus and subjected to GC-MS analyses. A total of twenty-seven compounds were identified representing 88.27% of the oil. The main components of the essential oil were citronellic acid (48.3%), 5,9-undecadien-2-one (5.12%), α -ionone (4.38%), 3-buten-2-one (3.25%), 2-pentadecanone (2.59%), squalene (2.27%), nonacosane (2.18%), octanal (1.9%), geraniol (1.52%), mesitylene (1.17%) and α -farnesene (1.02%). The oil contained many compounds that were active against Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella pneumonia, Escherichia coli, Candida albicans and Mycobacterium bovis with minimum inhibitory concentrations ranging from >400 to 50 µg/ml and could be exploited for the development of plantbased drugs.

Keywords: Garcinia kola; Clusiaceae; leaves; essential oil; antimicrobial; citronellic acid.

055 Okhale Samuel Ehiabhi, Ezekwesiri Michael Nwanosike

Department of Medicinal Plant Research and Tradidtional Medicine, National Institute for Pharmaceutical Research and Development, IDU Industrial Area, Garki, Abuja, Nigeria

Abrus precatorius Linn (Fabaceae): phytochemistry, ethnomedicinal uses, ethnopharmacology and pharmacological activities. International Journal of Pharmaceutical Science and Research 2016; 1(6): 37-43.

Abstract

The ethnomedicinal uses, phytochemistry, ethnopharmacology and pharmacological applications of Abrus precatorius L (Fabaceae), an endemic medicinal plant in Nigeria is herein highlighted. In traditional medicine, this plant is useful for treating cough, sores, wounds caused by dogs, cats and mice, mouth ulcer, gonorrhea, jaundice and haemoglobinuric bile, tuberculous painful swellings, skin diseases, bronchitis, hepatitis, schistosomiasis, stomatitis, conjunctivitis, migraine and eye pain. Phytochemical studies of bioactive constituents of Abrus precatorius have been reported. Several types of alkaloids, terpenoids and flavonoids including luteolin, abrectorin, orientin, isoorientin, and desmethoxycentaviridin-7-O-rutinoside, glycyrrhizin, abrusoside A to D, abrusogenin and abruquinones D, E and F were identified from the plant. Various pharmacological studies on A. precatorius showed it possessed antimicrobial, antioxidant and hepatoprotective activities. Abrus precatorius seeds contain abrin, one of the most potent toxins known to man. However, because of the seed's outer hard coat, ingestion of uncrushed seeds caused only mild symptoms and typically results in complete recovery. In ethnomedicinal practice, seven whole seeds of A. precatorius are ingested in a single dose to aid vision. Ingestion of the crushed seeds causes more serious toxicity, including death. This species is an important medicinal herb which can be used for various purposes. Further scientific study of Abrus precatorius is required to evaluate the acclaimed traditional uses and discover new lead compounds.

Keywords: Abrus precatorius, phytochemistry, abrin, ethnomedicinal uses, pharmacology

056 Okhale Samuel Ehiabhi¹*, Oluchi Roseline Igwe¹,², Henry O. Egharevba¹, Grace Ugbabe¹, Jemilat A. Ibrahim¹ and Oluyemisi Folashade Kunle¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria. ²Department of Industrial Chemistry, Ebonyi State University, Ebonyi State, Nigeria.

GC-MS Analyses of the Volatile Oil Constituents of the Leaf of Landolphia owariensis P. Beauv (Apocynaceae). European Journal of Medicinal Plants 2016 Vol. 13(2): 1-5, Article no. EJMP.23745. SCIENCEDOMAIN International

Abstract

Aim: Evaluation of the volatile oil constituents of the leaves of Landolphia owariensis collected from Suleja, Niger State, North Central Nigeria in July 2015, where it is valued as an important medicinal



plant used in folk medicines.

Methodology: Fresh leaves were hydrodistilled in an all-glass Clavenger apparatus and their chemical constituents were analyzed by GC-MS.

Results: The examined material contained 0.06% w/w of essential oil. A total of thirty-two compounds were identified in the essential oil, accounting for 86.33% of the oil composition. The main components of the essential oil were pentadecanal (13.63%), 1-dodecanol (6.32%), Thetetradecanol (5.83%), hexadecatrienal (5.62%), squalene (4.63%), β -ionone (3.25%), α -ionone (2.38%), supraene (3.01%), α -farnesene (3%), carophyllene oxide (2%) and (-)-spathulenol (1.78%). Conclusion: Landolphia owariensis leaf essential oil could be used in pharmaceutical formulations or in perfumery and as a renewable source of pentadecanal and 1-dodecanol.

Keywords: Landolphia owariensis; Apocynaceae; leaves; essential oil; pentadecanal

057 Okoh Judith, Okafor Ijeoma, Kokonne Ekere, Ajeh Issac, Isimi Christianah,Olubunmi Olayemi, Martins Emeje

Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Popularity and customer preferences for herbal medicines in Nigeria: A Questionnaire based survey. *Humanities and Social Sciences Letters*, 2016; 4(3): 69-76.

Abstract

This study was designed to ascertain the availability, affordability, and consumption of medicinal plants in Nigeria. A structured questionnaire was used for data collection. The age group of individuals interviewed was between 10 - 59 years. Results show that, herbal medicine awareness and usage was 97 % and 82 % respectively. Most respondents (97 %) admitted to having knowledge of medicinal herbs and their sources of information included family members (58 %), friends (21 %), Herbalist (9%), and Pharmacy (3%). Majority (54%) of the participants took these medicinal herbs in liquid form. On sources of procurement, 17 percent of participants prepared these medicinal plants themselves, 19 % from pharmacies and 17 % from herbalists. Twenty-three percent engaged in self-medication, while 21 % obtained their preparations from herbalists. Sixty-five percent said the products are safe and effective, while sixty-nine percent had no side effects while using the products. On affordability, 15 - 52 % admitted that herbal medicines are very affordable, while 20 % agreed that they are expensive. Over half of respondents' preferred locally manufactured herbal medicines. Analysis of sources of foreign medicinal goods shows that most (75%) were from USA. About 78 % of the participants do not take these medicinal herbs with conventional drugs, alcohol (72 %) or cigarette (80 %). Overall, 69 % of our respondents have benefitted from the consumption of medicinal remedies. It is concluded that, the awareness, perception and access to medicinal herbs in Nigeria is increasing which is likely due to dearth of public health facilities. This calls for health administrators to design appropriate programs to implement and ensure the effective monitoring of circulating herbal products.

Keywords: Herbal medicine, Knowledge, Perception, Attitude, Use, Public health

058 Oladosu P.¹, M. I. Aboh *¹, N. Amaeze², E.C. Mmaju², O. Anuforom¹ and M. Emeje³

¹National Institute for Pharmaceutical Research and Development, ²Department of Microbiology and Biotechnology, University of Abuja, Faculty of Science ³ Centre for Nanomedicine and Biophysical Drug delivery, Abuja, Nigeria

Possible transmission of drug-resistant Salmonella typhimurium and Listeria monocytogenes within the beef industry in Abuja, Nigeria. International Journal of Pharmaceutical Sciences and Research, 2016; 7(9): 3633-3642.

Abstract

Background: Widespread use of antibiotics in livestock production in large-scale across the globe has become of public and veterinary health importance because of its implication in antibiotic resistance. Adequate data in this area of research is not readily available in Nigeria; this study was undertaken in view of the possible link between antimicrobial resistance in farm animals and humans.

Methods: We collected fifty samples of raw beef from different vendors and slaughter houses within Abuja and screened them for the presence of *Listeria monocytogenes* and *Salmonella typhimurium* using standard microbiological methods. The total bacterial and fungal counts, susceptibility of the isolates to different antibiotics and heat sensitivity at 55, 60 and 65°C for 15 minutes were determined.

Results: Our results show that ten isolates of *Listeria monocytogenes* and eighteen isolates of *Salmonella typhimurium* were isolated from the samples. The total viable bacteria count range was 1x 109 - 8x 109cfu/g while the fungal count was 1x 103 - 9x 109cfu/g. One (10 %) of the *Listeria monocytogenes* isolates was resistant to all antibiotics tested while all the *Listeria monocytogenes* isolates were resistant to cefuroxime. Eight (44.4%) of the *Salmonella typhimurium* isolates were resistant to at least three antibiotics. All the *Listeria monocytogenes* and *Salmonella typhimurium* isolates high prevalence of *Salmonella typhimurium* and *Listeria monocytogenes* in selected beef in Abuja. Beef therefore may represent a large reservoir for antimicrobial-resistant *Salmonella typhimurium* and *Listeria monocytogenes*.

059 Olayemi, O. J^1 , Ekunboyejo, A^2 , Bamiro O. A^2 , Kunle O. $O^{1,2}$

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria ²Department of Pharmaceutics and Pharmaceutical Technology, Olabisi Onabanjo University, Ago Iwoye, Ogun State, Nigeria

Evaluation of disintegrant properties of *Neorautanenia mitis* starch. *Journal of Phytomedicine and Therapeutics (JOPAT)*, 2016; 15(2): 53-64.

Abstract

Neorautanenia mitis is a leguminous sub-shrubby climbing plant with a tuberous root which could be exploited as a potential source of pharmaceutical grade starch. This study aims to determine the suitability of *Neorautanenia mitis* starch (NMS) as a disintegrant in tablet formulation. Its physicochemical properties such as solubility, acidity, pH, hydration capacity, swelling capacity, content of amylose and amylopectin and flow properties were determined. The starch (NMS) was



employed as a disintegrant in the preparation of paracetamol granules at concentrations of 7.5, 10 and 15 % and evaluated. The granules were compressed into tablets at 0.5, 0.75, 1.00 and 1.25 MT and tablet properties were evaluated. The physicochemical properties showed NMS has good flow, lower amylose content and higher swelling power than maize starch BP (MS). Tablet formulations containing NMS had similar hardness with those containing MS at 0.5 MT while hardness was observed to increase with increase in compression pressure. Tablets containing NMS were found to elicit faster tablet disintegration than those containing maize starch BP and also had higher t75 values. Furthermore, increasing the compression pressure was found to be decrease the rate of drug release.

Keywords: Neorautanenia mitis starch, disintegrant, compression pressure, paracetamol tablets

060 Olorunsola Emmanuel O.¹, Timma O. Uwah¹, Olubunmi J. Olayemi² and Unyime B. Etukudo¹

¹Department of Pharmaceutics and Pharmaceutical Technology, University of Uyo, Uyo, Nigeria. ²Department of Pharmaceutical Technology and Raw Material Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

Ex-vivo evaluation of crab shell chitosan as absorption enhancer in ciprofloxacin tablet formulation. *African Journal of Biotechnology, 2016; 15(36): 1930-1935.*

Abstract

This study was aimed at evaluating crab shell chitosan as absorption enhancer in ciprofloxacin tablet formulation using the *ex-vivo* model. Six batches of ciprofloxacin tablets containing varying concentrations of crab shell-derived chitosan ranging from 0 to 5 % w/w at 1 % w/w intervals were produced. Batch CTS-0 containing no chitosan served as the control. The crushing strength, friability, disintegration time, dissolution profile and permeation profile of all the batches were determined. Friability was not significantly affected but the crushing strength and disintegration time of tablets decreased with increase in concentration of chitosan. There was no significant difference in the cumulative percent drug released in 1 h but the cumulative percent drug permeated in 4 h increased with increase in the concentration of chitosan. It increased from 68 % (when no chitosan was added) to 81.8 % (when 5 % w/w chitosan was incorporated). The polymer caused a faster onset of drug release but the eventual total drug released was not significantly influenced. It also improved the permeation of the released drug. This study correlates with in-vivo bioavailability study because the usual oral bioavailability of ciprofloxacin without absorption enhancer is 70 %. Hence, crab shell chitosan at concentration of 5 % w/w could increase the absorption of ciprofloxacin from 70 to 82 %. The study suggests the use of the chitosan at this concentration to improve the absorption of ciprofloxacin.

Keywords: Crab shell chitosan, ciprofloxacin, dissolution, permeation, absorption

43

061 Olubunmi Jumoke Olayemi, Habiba Sani Magaji, Terylia Susan Allagh

Department of Pharmaceutics & Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria

Preliminary evaluation of *Sesamum radiatum* leaf mucilage as release modifier in potassium chloride matrix tablets. *Journal of Chemical and Pharmaceutical Research, 2016; 8(2): 31-39.*

Abstract

The objective of this study is to evaluate the use of *Sesamum radiatum* leaf gum as a potential excipient for modifying the release of potassium chloride tablets. The gum was precipitated from the aqueous maceration of the leaves and then characterized to determine some of its physicochemical properties. Potassium chloride granules were prepared by the wet granulation method of massing and screening using 30 %w/w each of *Sesamum radiatum* gum, hydroxypropylmethylcellulose and 1:1 concentration of both polymers. The granules were analyzed for flow parameters and then compressed into tablets in the ErwekaAR 400 single punch laboratory tableting machine using the 12mm punch and die assembly. The tablets were evaluated for uniformity of weight, tablet diameter and thickness, friability, crushing strength and disintegration time. In-vitro studies on the tablets was carried in acid medium (0.1 N HCl) and alkaline medium (phosphate buffer 7.4). The results showed that tablets containing *Sesamum radiatum* gum were able to modify/sustain the release of potassium chloride for up to 9 h, the gum was also able to offer barrier to drug release in the upper gastrointestinal tract (acidic medium). The kinetics of drug release was observed to be zero order which was controlled by swelling and subsequent erosion.

Keywords: Potassium chloride, *Sesamum radiatum* gum, hydroxypropylmethylcellulose, kinetics, swelling and erosion.

062 Oluwaseun Orugun¹, Avosuahi Oyi¹, Adeniji Olowosulu¹, Yonni Apeji¹, Olubunmi Olayemi²

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria. ²Department of Pharmaceutical Technology and Raw Materials Development, National Institute for

Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja

Effect of EUDRAGIT® RS on the release behavior of theophylline solid dispersions. <u>Ceska</u> <u>Slovenska Farmacie</u>, 2016; 65: 226–231

Abstract

The purpose of this study was to extend the release of theophylline using Eudragit® RS 100 and Eudragit® RSPO as carriers. Solid dispersions of theophylline were prepared by the solvent evaporation technique using Eudragit® RS 100, Eudragit® RSPO and their blend in various drug: polymer ratios. The prepared solid dispersions were characterized with respect to entrapment efficiency, solubility and recovery yield. *In vitro* drug release of theophylline from the solid dispersions was evaluated in simulated gastric fluid (SGF) and simulated intestinal fluid (SIF) without enzymes. Solubility studies demonstrated a decrease in the solubility of the drug from the solid dispersions. The solubilities of pure drug and solid dispersions were lowered in SGF compared to SIF. Solid dispersions prepared with Eudragit® RS 100 entrapped a greater amount of theophylline in comparison to those with Eudragit® RSPO or the polymer blends and were able to



extend the release of theophylline over 24 hrs. Formulation SD4 released 95.52% of the drug in SIF and 93.56% in SGF. Hence, it was selected as the optimized formulation because it was able to extend the release of theophylline over 24 hrs.

Keywords: solid dispersion, extended release, Eudragit®, drug release

063 Omolola Temitope Fatokun^{1*}, Omorogbe Liberty¹, Kevwe Benefit Esievo¹, Samuel Ehiabhi Okhale¹ and Oluyemisi Folashade Kunle¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P.M.B. 21 Garki, Abuja, Nigeria.

Phytochemistry, Ethnomedicine and Pharmacology of *Jatropha gossypiifolia L*: A Review. *Archives of Current Research International*, 5(3): 1-21, 2016

Abstract

Jatropha gossypiifolia L. [Euphorbiaceae], widely known as "bellyache bush", is a medicinal plant native to Mexico, south America, India and commonly found in many west African countries such as Nigeria. Folkloric uses of the different parts of this plant in the tropics for the management of various diseases are enormous. Information was sourced from Hinari, JSTOR, PubMed, Medline, African Journals Online, Google Scholar, SCOPUS, and by reviewing the references of relevant literature. More recent studies showed the use of juice and extract of the plant in the management of sickle cell anaemia and the effect of its extracts on the reproductive system. Pharmacological studies have demonstrated significant action of different extracts and isolated compounds as haemostatic, anticholinesterase, antimicrobial, antiinflammatory, antidiarrheal, antihypertensive, and antiproliferative agents, among others, supporting some of its folkloric uses. The major secondary metabolites isolated from various extracts are terpenes-essential oils, alkaloids and coumarinlignans. This review aims to provide an up to date overview of the phytochemistry, ethnomedicinal and pharmacological activities of J. gossypiifolia while providing an insight for future research towards both ethno pharmacological validation of its popular uses and its exploration as a new source of herbal medicinal products.

Keywords: *Jatropha gossypiifolia*; ethnomedicine; phytochemistry; secondary metabolites; ethnnopharmacology.

064 Tijani Adeniyi Yahaya¹, Salawu Oluwakanyinsola Adeola¹, Fidelis Solomon Ameh¹, Ahmadu Peter Uchogu^{1,2}

¹Department of Pharmacology and Toxicology National Institute for Pharmaceutical Research and Development, IDU Industrial Area, P.M.B 21, Garki-Abuja, Nigeria. ²Department of Pharmacology and Therapeutics Faculty of Pharmaceutical Sciences Ahmadu Bello University Zaria-Kaduna State, Nigeria.

Behavioural effects of methanol stem bark extract of *Ficus sycomorus*. International Journal of Research in Pharmacy and Pharmaceutical Sciences 2016 (1) 13-20

Abstract

Background: Neuropsychiatric disorders are characterized by anxiety, altered locomotion and altered sleep pattern characterized by insomnia. *Ficus sycomorus* is a widely used medicinal plant used locally in Northern Nigeria forcalming agitated patients.

Aim: The aim of the current study was to provide scientific evidence to support its continuous use in the management of neuropsychiatric conditions.

Methods: The effect of *Ficus sycomoros* stem bark extract (50, 100 and 200 mg/kg body weight orally), Normal saline (10 ml/kg orally) and diazepam (1 mg/kg body weight orally) on anxiety in mice were evaluated on Elevated plus Maze (EPM), Elevated Zero Maze (EZM) and Open Field Apparatus (OFA).

Results: The extract at doses of 50,100 mg/kg body weight and diazepam (2.5 mg/kg orally) produced significant (p<0.05) increase in time spent in the opened arm of Elevated plus Maze and Elevated Zero Maze when compared to Normal saline treated control. At 200 mg/kg body weight orally the extract paradoxically produced significant (p<0.05) increase in time spent by treated mice in the closed arm of Elevated Plus Maze and Elevated Zero Maze when compared to Normal saline treated control.

The extract at 50, 100 mg/kg body weight orally and diazepam (2.5 mg/kg body weight orally) produced anxiolytic-like effects in treated mice on the open field apparatus. At 200 mg/kg body weight orally the extract produced sedative-like effects on treated mice in the opened field apparatus.

Conclusion: *Ficus sycomoros* stem bark extract possesses anxiolytic activity in mice which may be explored further for leads in the development of potent safe and effective anxiolytic agent for human use.

Keywords: Ficus sycomoros, agitation, calming, extract, open field apparatus

065 UGBABE, Grace E.^{*1}; ELAIGWU, P. O.²; IBRAHIM, Jemilat A.¹; FATOKUN, O.T.¹; ESIEVO, Kevwe B.¹ and KUNLE Oluwayemisi. F.¹

¹Medicinal Plant Research and Traditional Medicine (MPR and TM) Department, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, PMB 21, Garki -Abuja, Nigeria.

²Department of Pharmacognosy, Faculty of Pharmaceutical Sciences, University of Jos, Jos. Nigeria.

Microscopic Evaluation of the Leaf of Vernonia ambigua Kotschy and Peyr. (Family: Asteraceae/compositae) growing in Nigeria. European Journal of Pharmaceutical and Medical Research, 2016,3(6), 88-93

Abstract

Vernonia ambigua Kotschy and Peyr. is a plant in the family Asteraceae/Compositae that has been used traditionally for problems related to reproductive health. Substantial amount of work has been done on the phytochemical profile of the leaf. However, there is no report on the microscopiy of the leaf in literature. Result of the microscopic analysis shows wavy-walled epidermal cells on the upper surface while the lower surface has more or less polygonal epidermal cells. Stomata are present on both surfaces of the leaf (amphistomatic) and are of the anomocytic type. The distribution of stomata is more in number on the lower surface. Trichomes are of two types: long multicellular trichomes with broad base and tapering ends (non-glandular) and peltate (glandular) trichomes with short stalk which are more abundant on the lower epidermis. Spiral vessels and fibres with tapering ends are observed. The data obtained from this study will be useful in the identification of the species, in detecting substitution and adulteration of the plant drug and in developing standards for monograph and future reference.

Keywords: Microscopy, Amphistomatic, Asteraceae, Anomocytic stomata, Vernonia ambigua, Nigeria

066 UGBABE Grace E.^{1*}; ODEH M. O.², IBRAHIM Jemilat A¹ and EGHAREVBA Henry O.¹

¹Medicinal Plant Research and Traditional Medicine (MPR and TM) Department, National Institute for Pharmaceutical Research and Development (NIPRD), Garki, Idu Industrial Area, Idu-Abuja, Nigeria

²Department of Biological Sciences, School of Natural and Applied Sciences, Federal University of Technology, Minna, Niger state

Foliar epidermal microscopy and preliminary phytochemical screening of the leaves and stem bark of *Tamarindus indica Linn*. (*Family: Fabaceae/Caesalpinioideae*). Journal of Chemical and Pharmaceutical Research, 2016, 8(1):452-457

Abstract

The microscopy of the foliar epidermis and the preliminary phytochemical screening of the leaves and stem bark of *Tamarindus indica Linn*. Were carried out the foliar epidermal analysis revealed the presence of diacyticstomata, prismatic crystals as well as polygonal cell shape on the lower and upper



surfaces. The stomata are amphistomatic (on both lower and upper surfaces). Trichomes were not observed on the leaf surfaces. The phytochemical screening of the water extracts of the leaves revealed the presence of carbohydrates, saponin and flavonoids and the absence of tannin, anthraquinone and phlobatanins; while the stem bark revealed the presence of tannins, saponins and flavonoids and the absence of anthraquinone and phlobatanins. The result from this study provides the finger print for the identification of Tamarindus indica and shows some of the chemical constituents of the plant.

Keywords: Microscopy, Amphistomatic, *Diacytic stomata*, *Tamarindus indica*, Secondary metabolites

067 UGBABE Grace Eyinehi*; Samuel E. OKHALE; Henry O. EGHAREVBA and Jemilat A. IBRAHIM

Medicinal Plant Research and Traditional Medicine (MPR & TM) Department, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, PMB 21, Garki - Abuja, Nigeria.

Foliar Microscopy and GC-MS Analysis of the Volatile Oil Constituents of the Leaf of *Cymbopogon citratus (DC.)Stapt. (Poaceae/Graminae)*. *International Journal of Basic and Applied Sciences, 2016. Vol. 5 No. 3. Pp. 45-49*

Abstract

The foliar epidermal microscopy and GC-MS analysis of the volatile oil constituents of the leaf of Cymbopogon citratus (DC) Stapf. were carried out using standard methods. The leaf epidermal microscopy revealed parallel cell arrangement on both the lower and upper surfaces of the leaf, stomata were observed on both surfaces, oil globules weremore abundant on the lower surface and the cells are rectangular or polygonal in shape. The GC-MS analysis of C. citratus essential oil of the leaf revealed a total of 30 volatile chemical components. Two (2) components constituting 100% (% peak area) were identified. The major components were β - citral (35.21%), β -myrcene (18.12%), thymol (15.42%), trans-4,5-epoxy-carane (6.51%), (S)- cis-verbenol (4.60%), 3,6-dimethyl-1,5-heptadiene (3.37%) and β -linalool (2.67%). About 90.68% were monoterpenoids while sesquiterpenoids constituted 4.5%. Also, 67.3% of the components were oxygenated compounds, which maybe responsible for highly bioactive nature of the oilsince the presence of oxygen provides molecular binding sites.

Keywords: Cymbopogoncitratus, Microscopy, Citral, Myrcene, Thymol

068 Ya'aba Y¹., Mohammed S.B¹., Uba A²., Ibrahim K¹. and Oladosu O.P¹ (2016).

¹Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development Abuja, Nigeria.

² Department of Microbiology, Abubakar Tafawa Balewa University Bauchi, Nigeria

Immunological and virological changes in human immunodeficiency virus (HIV) patients with hepatitis C virus (HCV) co-infection on antiretroviral therapy (ART) in North Central, Nigeria. *European Journal of Pharmaceutical Medical Research*, *3(8): 79-85*.

Abstract

The Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) are two viruses with similar characteristics having in common diversities in numerous subtypes and capacities for mutation. A total of 2,322 infected patients with HIV and 109 co-infected with HCV on ART were reviewed after every three months for fifteen months from June, 2013 through February, 2015 at ART hospitals in North Central, Nigeria. The determination of CD4+ count and viral load estimation were carried out using Flow Cytometry (Partec-cyflow, Germany) and PCR based Amplicor HIV-1 monitor version 1.5 (Roche Diagnostic Systems, Branchburg, NJ, USA) according to manufactures instructions. The results of the blood samples showed that ART therapy increased CD4+ count from 231.7±1.9401 to 466.8±2.0285cells/µl and viral load was suppressed from 17786.59±3316.36 to 1371.86±131.04copies/ml for HIV mono-infected patients while the mean CD4+ cell counts of coinfected individuals increased from 157.4±3.945 to 329.9±5.3998cells/µl and viral load decreased from 22821.62±4098.53 to 10246.82±2169.98 copies/ml. The differences in the values were statistically significant (p < 0.05). In conclusion, the reports revealed that at the end of the 9th month of ART, the CD4+ counts and suppression of the viral particles and even the clinical picture of patients tend towards normalcy in HIV mono-infected but these analytes were not adequate even at the 15th month in detecting the success of ART in co-infected patients, when their CD4+ counts were compared with the normal adult range (365–1,571cells/µl). Therefore, clinicians should give more attention and care to those patients co-infected in order to offer quality care.

Keywords: HIV/AIDS; ART; HCV; ARV, HIV/HCV, PCR.

069 Ya'aba Y¹, Mohammed SB¹, Uba A², Ibrahim K¹, Oladosu OP¹

¹Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development Abuja, Nigeria. ²Department of Microbiology, Abubakar Tafawa Balewa University Bauchi, Nigeria

Seroprevalence of hepatitis C virus in HIV positive persons in Federal Medical Centre, Keffi, Nasarawa State, Nigeria. *Ewerem Journal of Epidemiology & Clinical Medicine 2(2): 40-45*.

Abstract

Co-infection with Human Immunodeficiency Virus (HIV) and Hepatitis C Virus (HCV) is becoming a major global problem, leading to increased morbidity and mortality in both developed and developing countries. The aim of this study was to determine the seroprevalence of HCV in HIV seropositive persons accessing healthcare at Federal Medical Centre, Keffi, Nassarawa State,



Nigeria. A total of 808 blood samples of HIV infected persons were collected at the ART clinics from June, 2013 through February, 2015. Serological assay for HCV was done using rapid enzyme linked immunosorbent assay (ELISA) HCV kit ACON and ELISA positive samples were further confirmed with rapid ELISA HCV kit. Of the 808 HIV seropositive samples, 48 were positive for HCV with a prevalence of 5.9% with sex related prevalence of 17(2.1%) males and 31(3.8%) females. The highest prevalence of 26(3.22%) was observed at the age group 28-37 years, followed by 14(1.73%), 5(0.62%) and 1(0.12%) at the age group 18-27, 48-57 and >58 years respectively. The result of this study implies that HIV positive persons are likely to be co-infected with HCV. Hence there is need for its early diagnosis among HIV patients and should strongly be advocated to reduce the risk of further complications among these persons.

Keywords: HIV, HCV, ELISA, Seroprevalence, Co-infection, Mortality.

070 Ya'aba Y 1 , Mohammed SB 1 , Uba A 2 , Ibrahim K 1 , Oladosu O P 1

¹Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development Abuja, Nigeria. ²Department of Microbiology, Abubakar Tafawa Balewa University Bauchi, Nigeria

Epidemiology of hepatitis C virus (HCV) in healthy adults and human immunodeficency virus (HIV) infected patients in North Central Zone, Nigeria. *European Journal of Pharmaceutical and Medical Research*, 3(8): 06-11.

Abstract

Human Immunodeficiency Virus (HIV) and Hepatitis C virus (HCV) infection has each emerged as huge global epidemics. Co-infection of HIV/HCV complicates an already complex set of issues related to diagnosis, clinical disease progression, monitoring disease activity, treatment options and basic immunology. This study was aimed to determine and evaluate the prevalence of HCV among healthy adults and HIV patients accessing healthcare in North Central Zone, Nigeria. A total of 612 apparently healthy adults and 2,322 sero-positive HIV patients participated in the study at the ART clinics from June, 2013 through February, 2015. Each blood sample collected from patients were screened for the presence of antibody to HCV using rapid enzyme linked immunosorbent assay (ELISA) HCV kit ACON (ACON laboratory INC) and ELISA positive samples were further subjected to third generation rapid ELISA HCV kit ORTHO HCV Version 3.0 ELISA (Ortho-Clinical Diagnostics, Raritan, NJ) according to the manufacturer's instructions. Socio-demographic information's of co-infected patients were collected by the use of questionnaire. The prevalence rates for HCV among the healthy adults and HIV patients were 11 (1.8%) and 109 (4.7%) respectively and it can be noticed that there is significant difference between the two population. Having acquired knowledge on the effect of HCV co-infection, therefore there is the need to fully integrate HCV screening as a routine test in our health facilities to reduce risk of HCV related advanced liver disease in the country.

Keywords: HIV; HCV; HIV/HCV co-infection; ELISA; North Central Zone, Prevalence.



071 Ya'aba Y^1 , Mohammed SB¹, Uba A², Ibrahim K¹, Oladosu O P¹

¹Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development Abuja, Nigeria.

² Department of Microbiology, Abubakar Tafawa Balewa University Bauchi, Nigeria

Sero-prevalence of hepatitis C antibodies in the serum of HIV patients attending Federal Medical Centre (FMC), Lokoja, Kogi State, Nigeria. *Ewerem Journal of Epidemiology & Clinical Medicine*, 2(1): 29-33.

Abstract

HCV on the basis of the presence of anti-Hepatitis C antibodies using rapid enzyme linked immunosorbent assay (ELISA) HCV kit ACON and ELISA positive samples were further confirmed with third generation rapid ELISA HCV kit. The study population comprised of 128(35.2%) males and 236 (64.8%) females, of these, 21 (5.8%) were positive for HCV. Six (1.6%) of these were males while 15 (4.2%) were The clinical and public health implications of the convergence of the human immunodeficiency virus (HIV) epidemic and chronic viral hepatitis in sub-Saharan Africa are poorly understood. The prevalence of HIV co-infection with hepatitis C viruses (HCV) varies widely. This prospective study was planned on eligible treatment-naive patients who presented between June, 2013 and February, 2015 to determine and evaluate the prevalence of HCV co-infection among HIV patients accessing healthcare at federal Medical Centre Lokoja, Kogi State, Nigeria. A total of 364 sero- positive HIV patients were screened for females. The prevalence rates of HCV co-infection are increasing in patients with HIV. Having acquired knowledge on the effect of HCV co-infection, it is essential that all HIV infected patients be screened for HCV infection.

Keywords: HCV, HIV, ELISA, co-infection, ACON, ORTHO

072 Ya'aba Y.¹, Mohammed S.B.¹, Uba A^2 ., Ibrahim K¹. and Oladosu O.P¹

¹Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development Abuja, Nigeria. ²Department of Microbiology, Abubakar Tafawa Balewa University Bauchi, Nigeria

Immunological Responses among HIV/AIDS patients before and after HAART therapy in some selected hospitals in North Central, Nigeria. *World Journal of Pharmaceutical Research*, 5(8): 75-85.

Abstract

Human Immunodeficiency Virus (HIV), is the agent that causes acquired immune deficiency syndrome (AIDS). Although, highly active antiretroviral therapy (HAART) is known to profoundly suppress viral replication, it increases CD4+ cell count and delays both disease progression and death. The aim of this prospective cohort study was to assess immunological (CD4+ recovery) responses among HIV infected individuals receiving HAART with long-term follow-up. The study was carried out in some selected ART hospitals in North Central Nigeria from June, 2013 to



February, 2015. Immunological determination was carried out using Flow Cytometry (Partec-Cyflow, Germany), according to manufacturer's instructions. A total of 2,322 HIV positive patients were reviewed after every three months for fifteen (15) months in this study. The mean baseline CD4+ count was 231.7 cells/µl; the mean CD4+ count at the 3rd, 6th, 9th, 12th and 15th month were 281.9, 327.4, 377.8, 416.5 and 466.8 cells/µl respectively. There was a good immune recovery at the 3rd month of therapy from the baseline mean CD4+ T cell count of 231.7 cells/µl to 281.9 cells/µl, which was statistically significant (p<0.05). This remarkable rise was continued in achieving the mean CD4+ count of 327.4 cells/µl at the 6th month of monitoring. In this study, although good CD4+ cells recovery in responses to ART was documented in more than 89% of follow-up cases, despite these patients were enrolled in ART program at decreased CD4+ cells count. Therefore, interventions need to be designed to promote early HIV testing and early enrollment of HIV infected individuals into ART services.

Keywords: ART, CD4+ count, HIV/AIDS, HAART, Cohort.

Year 2015

073 Abdullahi Z.*, Anuka, J. A; Salawu A. O. and. Hussaini I. M

¹ Department of Pharmacology and Toxicology, Kaduna State University, Kaduna-Nigeria.

In-vivo antiplasmodial activity of methanol whole plant extracts of *Tapinanthus dodoneifolius (*DC) Danser in mice. *African Journal of Pharmacy and Pharmacology, 2015, Vol. 9(37), pp. 936-942.*

Abstract

Aqueous preparations of the whole plant of Tapinanthus dodoneifolius (DC) Danser growing on Parkia biglobosa tree are used by the nomads in Northern part of Nigeria for managing malaria, and many other ailments example, diabetes, fever, diarrhoea and wounds. To date, there are no efficacy or safety studies carried out to support its ethno-medicinal use in malaria management. This study aims to investigate the pharmacological activity of the plant relevant to the symptomatic treatment of malaria. High-performance liquid chromatography (HPLC) fractionation of methanol extract of Tapinanthus dodoneifolius (MCETD) produced six fractions (TDF1-TDF6). Three concentrations of the MCETD (100, 200 and 400 mg/kg body weight); and TDF3 (25, 50 and 100 mg/kg) were evaluated for anti-plasmodial activity against Plasmodium berghei parasite in mice using three models: early (suppressive) infection, established (curative) infection and residual (repository, prophylactic) infection. Normal saline and Chloroquine phosphate were used as negative and positive controls respectively. All three models used showed that both the methanol whole plant extract of T. dodoneifolius and TDF3 fraction produced significant (p < 0.01) and dose-dependent chemo-suppressive effect when compared with the negative control group. They also produced a reduction in parasite count and a significant (p < 0.01) and dosedependent increase in the survival times of the infected mice as compared to the negative untreated group. The phytochemical analysis revealed the presence of carbohydrate, tannins, flavonoids, anthracene, cardiac glycosides, saponin glycosides, steroid and triterpenes. The oral and intraperitoneal medium lethal doses (LD50) were estimated to be greater than 5000 mg/kg and 3800 mg/kg respectively. The results suggest the presence of pharmacologically active constituents in the extract with anti-plasmodial activity against Plasmodium berghei that justifies its use in malaria ethnomedicine.

Key words: Tapinanthus dodoneifolius, Plasmodium berghei, anti-plasmodial activity, ethnomedicine, malaria.

53

074 Aboh M. I. ¹, Olayinka B. O^{2^*} , Adeshina G. O. ², Oladosu P. ¹ and Ibrahim K. ¹

¹Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu. P.M.B. 21 Garki, Abuja, Nigeria. ²Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

Antifungal Efficacies of *Ethyl Acetate* Fractions of the aerial parts of *Mitracarpus villosus* (Sw) from Abuja, Nigeria. *British Medical Research Journal BMRJ/2015/15051*

Abstract

Introduction: The use of medicinal plants in the treatment of diseases is as old as man. The development of synthetic (orthodox) drugs led to a decline in the use of herbs however in the past few decades, there has been an increase in the use of medicinal plants, especially in developing countries. Several reports have shown that herbal medicines are well tolerated when compared with synthetic drugs. Over eighty percent of the population in Africa, most especially West Africa, has been reported to depend on medicinal plants for the treatment of infections and diseases. Aims: The main objective of this study is to assess the anti-fungal potentials of the ethyl acetate extract and fractions of the aerial parts of *Mitracarpus villosus* (Sw.) DC from Abuja, Nigeria. Methods: The powdered plant was extracted successively and exhaustively with hexane, ethyl acetate, ethanol and water. Thirty fractions were obtained from the extract using the bioassay.

075 Adzu Bulus¹*, Ben Ahmed Chindo^{1,2}, Florence David Tarfa³, Oluwakanyinsola Adeola Salawu¹ and Ogbaji John Igoli⁴

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development

² Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, Kaduna State University (KASU), Kaduna, Nigeria. Development (NIPRD), Abuja, Nigeria.

³ Department of Medicinal Chemistry and Quality Control, NIPRD, Abuja, Nigeria. 4Natural Products Laboratories, Strathclyde Institute of Pharmacy and Biomedical Sciences (SIPBS), University of Strathclyde, Glasgow, UK.

Isolation and analgesic property of lupeol from *Diospyros mespiliformis* stem bark. *Journal of Medicinal Plants Research*, 2015, 9(30): 813-819

Abstract

Diospyros mespiliformis Hochst (Ebenaceae) stem bark is used in traditional medicine for the management of pain related ailments. Several bioactive compounds have previously been isolated from the plant material that includes pentacyclic triterpenes. This study sequentially extracted and carried out a bioassay-guided fractionation of the plant crude material with solvents of varying polarity using analgesic efficacy in rats as bioactivity marker, aimed to isolate the active constituent. Powdered stem bark of the plant was sequentially extracted with hexane, chloroform and methanol; and preliminary tested for analgesic activity. The chloroform extract being the most active amongst



the three extracts was subjected to column chromatography, and a fraction was eluted with mixture of hexane and ethyl acetate (50:50%) which yielded a compound. Three dose levels (25, 50 and 100 mg/kg) of the compound were administered orally to rats. Acetylsalicylic acid (100 mg/kg, p.o.) was used as the positive control. Nociception was induced mechanically using analgesy meter, and chemically with formalin. The compound alleviated the pain stimulus induced by the analgesy-meter and formalin in rats. The isolated compound was identified as lupeol using thermo-analysis (DSC), colorimetric, chromatographic and spectrometric techniques that included: UV-visible, IR, and 13C- and 1H NMR. It was concluded that lupeol acting alone or synergistically might be responsible for the beneficial effect of the plant in treatment of pain related ailments.

Key words: Diospyros mespiliformis, lupeol, analgesic.

076 Ajoku, G. A.¹, Okwute, S. K.² and Okogun, J.I.³

¹National Institute for Pharmaceutical research and Development, Abuja, Nigeria. ²University of Abuja, Abuja, Nigeria.

³ Pax Herbal Clinic & Research Laboratories, Benedictine Monastery, Ewu-Esan, Edo State, Nigeria

Preliminary phytochemical and antimicrobial screening of the calyx of green *Hibiscus sabdariffa* (*Linn*) (*Malvaceae*). Journal of Phytomedicines and Therapeutics (JOPAT) 2015 1(1) 41-52.

Abstract

Successive extraction of air-dried calyces of *Hibiscus sabdariffa Linn* (green roselle) in cold maceration using hexane, ethyl acetate and methanol gave the corresponding extracts. The phytochemical screening of these extracts revealed the presence of carbohydrates, tannins, phlobatannins, terpenes and sterols. Antimicrobial screening of the extracts showed activity in the ethyl acetate extract at 2000 µg/ml against all the test organisms namely: Esherichia coli (ATCC 25922), Staphylococcus aureus (ATCC 29213), Pseudomonas aeroginosa (ATCC 27853) and clinical isolates of Salmonella typhi, Candida albicans and Bacillus subtilis. One of the ethyl acetate chromatographic fractions exhibited the most significant antimicrobial activity against Candida albicans at MIC of 16 µg/ml, while the other fractions gave MIC ranging between 250 µg/ml and 500 µg/ml against all the test organisms. The methanol extract showed activity against Escherichia coli and Candida albicans but only one of the fractions exhibited partial antimicrobial activity at 500 µg/ml. The hexane extract displayed no activity against all the test organisms. The minimum inhibitory concentration (MIC) of both the ethyl acetate and methanol extracts was 500 µg/ml against *Esherichia coli*. As a standard, chloramphenicol had an MIC of 50 µg/ml against five of the test organisms excluding Candida albicans. The results provide scientific justification and support for the ethnomedicinal use of the plant as a traditional remedy for camel sores, bleeding gum, respiratory tract infections and typhoid fever.

NIPRD Compendium of Research Publications (2010 - 2018)

077 Ajoku, G.A.^{1*}, Okwute, S. K.² and Okogun, J.I.³

¹National Institute for Pharmaceutical research and Development, Abuja, Nigeria.

² University of Abuja, Abuja, Nigeria.

³ Pax Herbal Clinic & Research Laboratories, Benedictine Monastery, Ewu-Esan, Edo State, Nigeria

Isolation of hexadecanoic acid methyl ester and 1,1,2-ethanetricarboxylic acid-1-hydroxy-1,1dimethyl ester from the calyx of green *Hibiscus sabdariffa (Linn)*. *Natural Products Chemistry & Research 2015 3(2) 169-173*

Abstract

The calyx of *green Hibiscus sabdariffa* is used in Nigeria to prepare soup, stew and sauces as distinct from the red variety which is used to produce a popular local drink known as sobo due to their health benefits. This work therefore aims to identify some of the chemical constituents of the green variety which has been scarcely investigated. Hexadecanoic acid methyl ester and 1,1, 2-ethanetricarboxylic acid-1-hydroxy-1,1-dimethyl ester were isolated from the methanol extract of the calyx of the *green Hibiscus sabdariffa* using chromatographic methods, including Flash column chromatography and preparative thin layer chromatography. They were characterized using spectroscopic analysis and gas chromatography-mass spectral (GC-MS) analysis. This is the first report of the presence of hexadecanoic acid methyl ester and 1,1, 2-ethanetricarboxylic acid-1-hydroxy-1,1-dimethyl ester in the calyx of the green variety of this plant. These compounds are probably associated with the antimicrobial and other bioactivities previously reported for the plant.

Keywords: Green Hibiscus sabdariffa; Calyx; Chemical constituents; Spectral characterization

078 Ajoku, G. A. 1^* , Ugbabe, G.E. 1° and Kalpana, J. 1°

¹National Institute for Pharmaceutical research and Development, Abuja, Nigeria

Foliar ultra-structure and antimicrobial screening of the leaf extracts of *Panicum maximum Jacq*. (Family: *Poaceae/Graminae*). *Scholarly Journal of Biological Science 2015 4 (3) 19-22*.

Abstract

The study was carried out in 2011 and 2015 in the Department of Physics, University of Pune, Pune– India and National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria respectively. The study was carried out to establish a finger print for the identification and to investigate antimicrobial activity of the leaf extracts of *Panicum maximum* growing in Nigeria against seven microorganisms. The ultra-structure of the leaf epidermis showed parallel cell arrangement, stomata and trichomes on both upper and lower surface of the leaf. Glandular and nonglandular trichomes occur on both surfaces; the glandular trichomes are in form peltatetrichomes and the non-glandular trichomes are curved with pointed tips. The leaves of *Panicum maximum* were extracted in 70% methanol and absolute methanol by cold maceration at room temperature for 24 hours. The two crude extracts were screened against two standard strains of American Typed Culture Collections, *Salmonella paratyphi* (ATCC 69150) and Candida albicans (ATCC 22015) and Clinical Isolates of *Pseudomonas aeroginosa, Staphylococcus aureus, Escherichia coli, Salmonella*



typhi and *Candida albicans*, from National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria, using agar dilution method. At the concentration of 2 mg/ml, the extracts did not exhibit any antimicrobial activity against all the test microorganisms. Amoxicillin, which was used as a standard, inhibited the growth of all the test microorganisms at the same concentration. The results from this study provide finger print for the identification of *Panicum maximum* and the antimicrobial activities of the extracts corroborate with some other works reported earlier.

079 Akuodor, G. C.¹, Ajoku, G. A.^{2*}, Ezeunala, M. N.², Chilaka, K. C.¹ and Asika, E. C.¹

¹Department of Pharmacology, Faculty of Basic Medical Sciences, College of Medical Sciences, University of Calabar, Calabar, Nigeria. ²National Institute for Pharmaceutical research and Development, Abuja, Nigeria.

Antimalarial potential of the ethanolic leaf extract of *Pseudocedrala kotschyi*. Journal of Acute Disease, Elsevier 2015.23-27.

Abstract

To establish the efficacy of *Pseudocedralakotschyi* (*P. kotschyi*) for the treatment of acute malaria attack used in Nigeria. Methods: The ethanolic leaf extract was investigated for antimalarial activity against *Plasmodium bergheiberghei* (*P. bergheiberghei*) in mice. Four-day suppressive, curative effect against established infection and prophylactic models of antiplasmodial studies were used. Results: The leaf of *P. kotschyi* (100-400 mg/kg b.w. p.o.) exhibited significant dose dependent activity against the parasite in the suppressive and curative, and also had repository activity. The antimalarial effect of *P. kotschyi* is comparable to that of chloroquine. The ethanolic leaf extract also prolonged the survival time of the infected mice. The LD50 of the extract was established to be ≥ 5 000 mg/kg b.w. p.o. in mice. Conclusion: The results showed that the leaf extract has potential antiplasmodial activity, which can be exploited in malaria therapy.

080 Clement Jackson¹*, Martins Emeje² and Sabinus Ofoefule³

¹Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmacy, University of Uyo, Nigeria.

²Centre for Nanomedicine and Biophysical Drug Delivery, Advanced Biology/Chemistry Laboratory, National Institute for Pharmaceutical Research and Development, Idu Abuja, Nigeria. ³Department of Pharmaceutical Technology and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Nigeria.

Use of Xanthan Gum in the Formulation of Diethylcarbamazine for Targeted Drug Delivery. *British Journal of Pharmaceutical Research*, 2015; 5(4): 280-285.

Abstract

Matrix tablets were prepared using xanthan gum (XG) and Diethylcarbamazine was used as model drug. The controlled release of the drug by the polymer matrices in the upper gastrointestinal tract (GIT) was assessed through release studies carried out in the presence and absence of rat cecal content. Desired release profile was noted with Diethylcarbamazine batch with Xanthan gum 30% and 40% (XG3 and XG4.). Presence of Xanthan gum in relatively higher concentration in the tablets



delayed the initial release of drug from the matrices due to swelling and consequent exposure to effect of polysaccharides in the colon. XG3 and XG4 released the drug by zero order kinetics through non fickian mechanism. Drug release in dissolution medium with rat cecal content was significantly (P < 0.05) different from the control (without rat cecal content) for the optimized formulations of Diethylcarbamazine tablets.

Keywords: Diethylcarbamazine; kinetics; release profile.

081 Clement Jackson^{1*}, Martins Emeje², Sabinus Ofoefule³

¹Department of Pharmaceutics and pharmaceutical Technology, Faculty of Pharmacy, University of Uyo, Nigeria. 2Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research, Idu Abuja, Nigeria. 3Department of Pharmaceutical Technology and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka

Statistical Comparison of the Release Profiles of Diethylcarbamazine from Guar Gum and Ethyl Cellulose Matrices. *International Journal of Research in Pharmacy and Biosciences, 2015; 2(3): 25-29.*

Abstract

Matrix tablets were prepared using Xanthan (XG) and ethylcellulose (EC) as polymers. The individual polymers (Guar gum and ethylcellulose) were included in the formulation in various proportions (10% to 40 % w/w) to produced batches GG1, GG2, GG3, GG4, EC1, EC 2, EC 3 and EC 4 in that order. Diethylcarbamazine was used as the model drug. Controlled release (CR) powder mixtures were prepared and evaluated for the angle of repose, bulk density, tapped density, compressibility index and Hausners ratio. The compressed tablets were evaluated for the hardness, uniformity of weight, friability, drug content and *in vitro* dissolution studies. Statistical comparison of the release profiles of the drug formulations from the two natural polymers; guar and xanthan gums. The Cmax for drug release from guar gum matrices were significantly (P<0.05) higher than that of ethylcellulose matrices. The results also revealed that guar gum has a higher retarding ability than ethylcellulose.

Keywords: Guar gum, ethylcellulose, Matrix tablets, Diethylcarbamazine.

082 Clement Jackson¹*, Martins Emeje² and Sabinus Ofoefule³

¹Department of Pharmaceutics and pharmaceutical Technology, Faculty of Pharmacy, University of Uyo, Nigeria.

²Centre for Nanomedicine and Biophysical Drug Delivery, Advanced Biology/Chemistry Laboratory, National Institute for Pharmaceutical Research, Idu Abuja, Nigeria.

³Department of Pharmaceutical Technology and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka.

Ternary Blends of Some Hydrophilic and Hydrophobic Polymers in Colon Targeted Delivery of Diethylcarbamazine. *Jordan Journal of Pharmaceutical Sciences, 2015; 8 (1).*

Abstract

Matrix tablets were prepared using blends of xanthan gum (XG), Guar gum (GG) and ethylcellulose (EC). The polymers were combined using six different ratios; 1:1:1, 1:2:1, 1:2:2, 2:2:1, 2:1:2 and 2:1:1 to produce formulations XG1GG1EC1, XG1GG2EC1, XG1GG2EC2, XG2GG2EC1. XG2GG1EC2 and XG2GG1EC1, respectively. Diethylcarbamazine (DEC) was used as the model drug. The ability of the prepared matrices to target drug release at the colon under the influence of colonic bacteria was evaluated using the dissolution medium containing 4% cecal content. Optimum release of drug was observed with formulations XG2GG2EC1 and XG2GG1EC1 with maximum drug release of 75 and 81%, respectively. Significant difference (P<0.05) was observed between drug release in dissolution medium with and without rat cecal contents for the batches of DEC tablets. Formulations (XG2GG2EC1 and XG2GG1EC1) followed Korsemeyer models (r2 = 0.9903 and r2 = 0.9955) respectively via non – fickian diffusion ($n \ge 0.45$).

Keywords: Matrix, guar, xanthan, ethylcellulose, Diethylcarbamazine, colon delivery.

083 Egharevba, Henry Omoregie^{1*}; Carew, Oka² and Kunle, Oluyemisi Folashade¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Department of Pharmacognosy, University of Jos, Jos, Plateau State, Nigeria

Phytochemical and Pharmacognostic Analysis of *Ficus thonningii* Blume Leaves for Monograph Development. *International Journal of Basic and Applied Sciences 2015, 4(2) 94-100*

Abstract

The *plant Ficus thonningii Blume* is used in ethnomedicine for the treatment of ailments like diarrhoea, dysentery, diabetes mellitus, gonorrhoea, etc. For proper identification and authentication of the plant leaves mostly used in herbal medicine, a phytochemical and pharmacognostic study was undertaken. Macroscopic examination of the leaves showed they are simple, glossy, dark green, thin and papery or slightly leathery. The leaves are elliptic or obovate, sometimes rather elongated or slightly oblanceolate. Chemomicroscopy revealed the presence of lignin, tannin, protein, and oval and round shape starch grains. Oils glands were observed on parenchymatous cells. Microscopic examination of the leaf powder revealed straight-walled epidermal cells with thick cuticle. Palisade cells and group of fibers and spiral vessels were seen. A few unicellular trichomes were also seen. Prisms of calcium oxalate crystals were observed. The phytochemical screening revealed the presence of 10.57 %, acid-insoluble ash value of 0.80%, water-soluble ash value of 6.34%, waterextractive value of 1.37% and alcohol-extractive value was 1.72 %. The findings of this study would be useful in developing a monograph for the plant.

Key words: Chemo-microscopy, Ficus thonningii Blume, Microscopy, Phytochemistry.



084 Egharevba Henry Omoregie¹*, Ibrahim Jemilat Aliyu¹, Ebere Uchechukwu Doris², Ugbabe Grace¹ and Wudil Muazzam Ibrahim¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Department of Chemistry, Faculty of Science, Imo State University Owerri, Imo State, Nigeria

Phytochemical Screening Chromatographic Profiling and Pharmacognostic Analysis on Leaves of *Lantana camara Linn.* International Journal of Basic and Applied Sciences 2015. Vol. 4(4), pp. 206-211.

Abstract

The ethnomedicinally highly dependable and toxic herb Lantana camara was studied for its phytochemical pharmacologic profile to establish some of the profile of the variety found in Northcentral Sahel Savana region of Nigeria. Extraction was done on the leaves *of Lantana camara* using ethylacetate and methanol as solvents respectively. Extraction of the volatile oil from the leaves was also carried out using the Clevenger's hydro distillation apparatus. Phytochemical screening analysis test was carried out on the crude extract of L. camara, using standard protocol and the MPR & TM manual, indicating the presence of carbohydrates, tannins, steroids, reducing sugar, flavonoids, terpene and saponin. TLC was conducted on the volatile oil, ethyl acetate and methanolic extracts of L. camara using hexane: ethyl acetate (5:1), hexane: ethyl acetate (1:4), ethyl acetate: methanol (9:1). The volatile oil and ethyl acetate extracts showed 5 spots while 3 spots were seen on the chromatogram of the methanolic extract. The Pharmacognostic analysis carried out on the plant sample indicated 18% moisture content, 15.2% water extractive value and 9% alcoholic extractive value. Its ash content was 11.25%. The leaf microscopy indicated the presence of stomata, irregular epidermal cells, glandular trichomes, and trichome types on the abaxial layer and abundant stomata, glandular trichome, striated cell, wavy epidermal cells and abundant oil globules on the adaxial layer.

Keywords: Lantana camara, Phytochemistry, chromatography, leaf microscopy, pharmacognosy

085 Egharevba Henry O.¹, Jemilat A. Ibrahim¹*, Grace Ezeh²

¹Department of Medicinal Plant Research and Traditional Medicine [MPR&TM], National Institute for Pharmaceutical Research and Development [NIPRD], Idu–Abuja ²Department of Plant Science Modibbo Adama University of Technology, Yola, Adamawa state, Nigeria

Phytochemical, Pharmacognostic and Microscopic Analyses of the Leaves of *Clerodendrum* polycephalum Baker. Journal of Applied Pharmaceutical Science, 2015, 5 (07), 060-063.

Abstract

Phytochemical, pharmarcognostic and microscopy analysis were carried out on the leaves of *Clerodendrum polycephalum* Baker in order to determine the secondary metabolites present in the plant and the pharmacognostic parameters and microscopic structures of the leaf of the plant. The phytochemical screening indicated the presence of carbohydrate, reducing sugar, tannins, saponins, flavonoids, resins, balsams, alkaloid and phlobatannins and the absence of monosaccharide, combined reducing sugar, pentose sugar, ketoses, cardiac glycosides, sterols, flavonoids aglycone



and anthraquinone. The pharmacognostic analysis for moisture content and extractive values showed moisture content of 7.4%, and alcohol and water extractive value of 23.00% and 22.67% respectively. Microscopic studies revealed the presence of anomocytic Stomata on the lower surface and absence of it on the upper surface. The thin layer chromatographic study showed 5 spots for the hexane extract, 4 spots for ethyl acetate extract, while the methanol extract gave 3 spots. The information obtained would be useful for the authentication of the plant leaf samples, and in development of monograph for the plant.

Keywords: Clerodendrum polycephalum, Phytochemistry, Pharmacognosy, microscopy, TLC

086 Egharevba, Henry Omoregie*; Ibrahim, Aliyu Jemilat; Jegede, Ibikunle Adeola; Ugbabe, Eyinehi Grace; Muazzam, Ibrahim; Kunle, Oluyemisi Folashade and GamanieL, Shingu Kaniyus.

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria

Assessment of Training Needs and Practice of Traditional Medicine Practitioners (TMPs) Towards Integration into Nigerian Healthcare System: A Case Study of Nasarawa State. *International Journal of Life Sciences 2015. 5 Vol. 4. No. 2. Pp.147-153*

Abstract

The potential role of traditional medicine (TM) in enhancing access to healthcare delivery especially in the developing countries like Nigeria and other countries of West Africa cannot be overemphasized. However, integrating the TM practice into the formal healthcare systems has continued to elude these countries due to a number of challenges. Some of these challenges are more easily surmountable than others. Most of these countries have not conducted an empirical in-depth analysis of these problems or potential limiting factors and therefore cannot proffer a substantive solution. This survey focused on Nasarawa State of North-Central Nigeria to identify the types and prevailing TM practices, the nature of diseases or ailments managed and the training gaps that could assist in improving the services rendered towards a proper integration process. The study revealed that infertility (50%), infectious parasitic diseases like malaria and typhoid fever (50%), sexually transmitted diseases (STD) like gonorrhoea (48%) and respiratory diseases such as pneumonia and asthma (40%) ranked among the highest treatment services rendered while bone setting (3%) and neurologic diseases like epilepsy (3%) ranked among the lowest. Herbal Medicine (HM) (83%), Traditional Birth Attendant (TBA) (28%) and mental illness (28%) were the major areas of TM practice by the TMPs in Nasarawa State. Treatment of an ailment could cost as low as N50 and as high as N5, 000, and about 30% of the TMPs did not charge specific amount, but accept whatever gratification was given. About 82% of the TMPs never had any form of training on GMP, GAP, GLP, GCP, good collection and sustainable harvest practices, sanitation and hygiene, record keeping/good record keeping practice, good packaging and labelling, etc. The recommendations given would be useful in developing a training programme for the TMPs toward proper integration into the formal healthcare delivery system.

Keywords: Integration, Nigeria, Nasarawa State, Traditional medicine.
087 Egharevba, Henry Omoregie¹*; Ibrahim, Jemilat Aliyu¹; Kassam, Chakji Danjuma² and Kunle, Oluyemisi Folashade¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Department of Pharmacognosy, School of Pharmacy, University of Jos, Jos, Plateau State, Nigeria

Integrating Traditional Medicine Practice into the Formal Health Care Delivery System in the New Millennium–The Nigerian Approach: A Review. *International Journal of Life Sciences 2015. Vol. 4. No. 2. Pp.120-128*

Abstract

The use of traditional medicine, especially the pharmacological aspect, is on the rise globally. While the developed world has found ways of making huge socioeconomic gains through robust integration plan, there appears to be a huge challenge among the developing country towards realizing such gains through greater access and utilization of traditional medicine, which paradoxically supplies most of the population healthcare need. Due to the negative stigma attached to this form of medicine, integrating traditional medicine into the formal healthcare delivery system continues to suffer a lot of criticisms. Though most of the issues raised to affirm the seemingly inadequate status of traditional medicine and the absolute undesirability for its integration into the formal healthcare delivery are compelling, but they are not insurmountable. This review reassessed the historical development of traditional medicine practice in Nigeria, the challenges of its integration. The proposed solutions and recommendations would be a valuable reference material for the government of Nigeria and other stakeholders in developing a more holistic implementation plan for TM integration into the formal healthcare system.

Keywords: Herbal medicine development, Healthcare delivery system, Integration, Nigeria, Traditional medicine.

088 Egharevba O. Henry¹, Ibrahim A. Jemilat¹*, Mustapha B. Kudirat², Ezenwa O. Uche³, Okhale E. Samuel¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja, Nigeria ²Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja, Nigeria. 3Department of Botany, NnamdiAzikiwe University, P.M.B, 5026. Awka, Anambra State. Nigeria

Phytochemical, Pharmacognostic and Elemental Analysis of *Cayratia gracilis (Guill. & Perr)* Suesseng. Journal of Applied Pharmaceutical Science Vol. 5 (07), pp. 048-052, July, 2015 Available online at http://www.japsonline.com DOI: 10.7324/JAPS.2015.50708 ISSN 2231-3354

Abstract

The plant *Cayratia gracilis (Guill. & Perr.) Sues.*, family Vitaceae, is renowned for its numerous medicinal application in folks medicine especially for its analgesic properties. Phytochemical, physicochemical, microscopic and elemental analyses were carried out on the plant to establish basic monograph information for authentication of the plant samples. The moisture content was 12.7%,



water extractive value was 19%, and alcohol extractive value was 3.9% in the leaves and the moisture content of 8.8%, water extractive value of 14.8% and alcohol extractive value of 1.3% in the stem. Phytochemical screening revealed the presence of 8 secondary metabolites for the leaves and 6 for the stem. The thin-layer chromatographic (TLC) profile of the stem revealed 4, 3, and 2 spots for the hexane, ethyl acetate and methanol extracts respectively, while the leave revealed 5, 2 and 4 clear spots for hexane, ethyl acetate and methanol extracts respectively. Atomic Absorption Spectroscopy (AAS) of the plant shows the presence Zn, Cu, Mn, Mg, Fe, Na, and absence of metals like Pb and Cr. The study reveals microscopic characters that are useful as diagnostic parameters for Cayratia gracilis. Information obtained from this study is important in establishing diagnostic indices for identification, standardization, and also in monograph development of the plant which has ethnomedicinal uses.

Keywords: Microscopy, Physicochemical, Chromatograph, AAS, Elemental, Standardization

089 Egharevba Henry Omoregie¹*, Idah Ewaoche Augustine²

¹Deparment of Medicinal Plant Research and Traditional Medicine (MPR&TM), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja Nigeria ²Department of Chemical Engineering, Ahmadu Bello University Zaria, Kaduna State, Nigeria

Major Compounds from the Essential Oil of the Fruit and Comparative Phytochemical Studies of the Fruits and Leaves of *Dennettia tripetala Barker F*. Found in North Central Nigeria. *International Journal of Pharmacognosy and Phytochemical Research 2015*, 7(6); 1262-1266

Abstract

Dennettia tripetala is a spicy medicinal plant commonly consumed in Nigeria for its spicy fruit and leaf. In most communities, practitioners of herbal medicine prescribe both fruit and leaf of this plant alike. In this study, the fruit essential oil, fruit and leaf of D. tripetala found in North central Nigeria were analysed to identify major chemical components of the oil and the secondary metabolites of the fruit and the leaf using standard procedures. GC-MS analysis of the fruit essential oil revealed three major compounds constituting about 95% of the total eighteen (18) constituents of the oil. The compounds were 2-phenyl nitroethane (72.41%), linalool (18.01%) and (6E)-nerolidol (4.51%). Both fruit and leaf tested positive for carbohydrate, tannin, alkaloids, terpenes, flavanoids, and phenol, while sterol and balsams tested positive in only the fruit. Saponin and resin were not detected in the leaf and fruit. The proximate analysis of the leaf showed a moisture content of 12.37%, water extractive value of 16.16% and an alcoholic extractive value of 16.67%. The 2-phenyl nitroethane which constituted the major component for most reported D. tripetala fruit oil in literature was also found in the same quantum in this study. Hence it is a as chemical marker for the fruit essential oil. Thus both parts of the plant hold similar and high medicinal or pharmacological potentials.

Keywords: *Dennettia tripetala*, 2-phenyl nitroethane, Linalool, Nerolidol, Chemical marker, Phytochemicals, Fruits.

090 EGHAREVBA, Henry Omoregie* and KUNLE, Oluyemisi Folashade

Department of Medicinal Plant Research and Traditional Medicine National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria

Traditional medicine practice in Nigeria in the next decade. *Ewemen Journal of Folklore Medicine* 2015, 1(1), 1-10.

Abstract

The integration of traditional medicine (TM) into the formal health care delivery system of developing countries like Nigeria remains a huge challenge despite the predictable benefits of it capacity to provide sustainable health care service through improve access to healthcare and the consequent reduction in infant and maternal mortality. However, the more advanced countries like China, Japan, Korea, India, Vietnam, US, UK and Germany have also advanced in their integration process with China and India taking the lead. Nigeria with a population of about 170 million people needs to take a cue from these countries and undertake the rapid development of its Traditional Medicine Practice if she is to achieve the goal of universal access to health care within the next decade in the new millennium. This historical research exposed the likely challenges and suggests solutions and next steps towards achieving an acceptable level of TM development and integration within the next decade. The recommendations made would help facilitate and strengthen the official recognition of traditional medicine and its integration into the national health delivery system. It will also assist in coordinating and harnessing the efforts of the stakeholders in the field of traditional medicine, and actualizing the economic potentials derivable from traditional medicine.

Key words: Nigeria, Traditional Medicine, Complementary and Alternative Medicine, Integration.

091 Egharevba H. O. 1^* , Oladosu P.², Izebe K. S.² and Kunle O. F.¹

¹Department of Medicinal Plant Research and Traditional Medicine (MPR&TM), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Department of Microbiology and Biotechnology (MB&BT), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria

Chemical composition and anti-tubercular activity of the fixed oil of seed *Moringa oleifera*. *Journal of Chemical and Pharmaceutical Research*, 2015, 7(12):412-418

Abstract

The seed oil of the highly promoted food plant *Moringa oleifera Lam* was extracted by solvent extraction using Soxhlet apparatus. The oil was methylated and analyzed on a Shimadzu GC-MS QP2010 SE.The oil was also screened against local strains of Mycobacterium tuberculosis by tetrazolium dye microbroth dilution assay and was found to be active at 25% (v/v). The result of GC-MS analysis of the methylated oil revealed 15 chemical components. The three major fatty components of the oil were oleic acid (58.88%), palmitic acid (26.16%) and glycerylmonooleate (5.27%). The anti-tubercular activity of the oil was attributed to the oleic acid and palmitic acid



content. The oil could be a substitute for other oleic acid rich edible oil as well as a raw material for industrial production of oleic and palmitic acid derivatives and oleochemicals. The findings in this study could be exploited in new anti-tubercular drug research and drug design.

Keywords: Moringa oleifera, Mycobacterium tuberculosis, seed oil, oleic acid, palmitic acid, glycerylmonooleate

092 Egharevba H. O.¹*, P. Oladosu², K. S. Izebe², S. K. Okwute³ and J. I. Okogun⁴

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ³Department of Chemistry, University of Abuja, Gwagwalada, Abuja, FCT, Nigeria 4Pax Herbal Nigeria Limited, Ewu, Edo State, Nigeria

Anti-tubercular activity of some bioactive compounds from *Laggera pterodonta* (Asteraceae) (DC.) Sch. BIP. *Journal of Chemical and Pharmaceutical Research*, 2015, 7(12):830-833

Absract

The plant *Laggera pterodonta* is a well-known tropical plant used in ethnomedicine for malaria fever and cough related ailments. Previous report on preliminary investigation had shown that the crude extract had anti-tubercular activity. This study investigated the anti-tubercular activity of some compounds isolated and characterized from the plant. Two of the compounds, taraxasteryl acetate and ethane-1,2-dieicosanoate exhibited significant activity against locally isolated strains of M. tuberculosis with MICs of 691.48 and 269.23 μ M, respectively. These compounds may be responsible for the observed activity of the crude plant extract, suggesting that the plant could be used to develop an anti-tuberculosis herbal medicine.

Keywords: Laggera pterodonta, taraxasteryl acetate, ethane-1,2-dieicosanoate, anti-tubercular activity

093 Egharevba Henry Omoregie^{1*}, Shedrach Hubert², and Okhale Samuel Ehiabhi¹

¹Department of Medicinal Plant Research and Traditional Medicine (MPR & TM), National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria. ²Department of Biosciences, Programme Biochemistry, Salem University, Lokoja, Kogi State, Nigeria.

HPLC Profiling and Phytochemical Analysis of Fruit Extracts of Guinea pepper - *Xylopia aethiopica,* (Dunal) A. Richard. International Journal of Life Sciences 2015, 4(4) 277-282.

Abstract

The hexane, ethyl acetate and methanol extracts of the fruits of *Xylopia aethiopica* were subjected to HPLC fingerprinting to establish their profile. The extracts were also screened for classes of secondary metabolites, and the pharmacognostic parameters of the fruit were determined using standard procedures. HPLC analysis of the hexane, ethyl acetate and methanol extracts revealed eleven, nine and nineteen resolved peaks, respectively. The HPLC profiling revealed that the methanol extract contained caffeic acid (8.19%) and ferulic acid (4.91%). The result of the phytochemical screening of the three extracts showed the presence of carbohydrates, balsams, pseudotannins, saponins, tannins, terpenes, steroids and glycosides in the methanol extract while the hexane and ethyl acetate extracts contained less number of classes of secondary metabolites. The three extracts did not test positive for resin, flavonoids, alkaloids and simple sugars. Pharmacognostic determination showed that the fruits had moisture content of 9.17%, alcohol extractive value of 43.77% and water extractive value of 34.97%. The findings of this study established the HPLC, phytochemical and pharmacognostic profile of the commonly used fruit for references purposes, monograph development and samples authentication.

Keywords: *Xylopia aethiopica*, fruit extracts, HPLC profile, Caffeic acid, ferulic acid, Phytochemistry, pharmacognosy

094 IBRAHIM, Jemilat Aliyu^{1*}; EGHAREVBA, Henry Omoregie¹; OBOKAYI, Oche Deborah²; KUNLE, Oluyemisi Folashade¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Abuja, Nigeria ²Department of Pharmacognosy, Faculty of Pharmaceutical Sciences, University of Jos, Jos, Plateau State, Nigeria

Some medicinal plants of the family Verbenaceae commonly used in Jos, Nigeria – a. *Ewemen* Journal of Folklore Medicine, 2015, Volume 1 | Issue 1 | Page 23 - 30

Abstract

Verbenaceae represent a very important family of medicinal plants of commonly used especially in Jos, Plateau State, Nigeria. This review was carried out in order to identify and document the reported medicinal and ethnomedicinal uses of some plants of the family Verbenaceae that are used for ethnomedicine in Jos. Twelve (12) common medicinally useful plants of the family Verbenaceae used by the inhabitants of Jos, Plateau State, Nigeria were identified and discussed. They include *Aloysia gratissima Linn. (Gillies & Hook.), Clerodendrun capitatum Schum & Thonn., Clerodendrum thomsonae Balf., Duranta repens Linn., Gmelina arborea Roxb., Lantana camara Linn., Lantana involucrata Linn., Lippia multiflora Mold., Tectona grandis Linn., Stachytarpheta cayennensis (Rich.) Vahl., Verbena officinalis Linn., Vitex doniana Sweet. Some the plants species possess antimicrobial, antimalarial, antihypertensive, anti-inflammatory, antidiarrhoeal, sedative, ulcerogenic, fungicidal and antitumour activities. Medicinal properties of these plants are attributed to their chemical constituents. Useful information on these plants including parts used, constituents,*

and medicinal uses of plants are listed. The information contained in this review would be useful for further studies and development of the medicinal plants of this family, especially in drug discovery research.

Key words: Verbenaceae, medicinal plants, Nigeria

095 IBRAHIM J. A¹*, EGHAREVBAH. O¹, NNAMDI R. A², KUNLE O. F¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria, ²School of Pharmacy, University of Jos, Jos, Plateau State, Nigeria.

Comparative Pharmacognostic and Phytochemical Analysis of Ziziphus spina-christi (L.) Desf. and Ziziphus abyssinica Hochst. Ex A. Rich. International Journal of Pharmacognosy and Phytochemical Research 2015; 7(6); 1160-1166. Available online on www.ijppr.com ISSN: 0975-4873

Abstract

Ziziphus spina-christi (L.) Desf. and Ziziphus abyssinica Hochst. ex A. Rich are very important medicinal plants of the family Rhamnaceae. The need for correct identification and authentication of powdered crude drug samples in the face of growing world demand for herbal products cannot be over-emphasized. In this study, the phytochemical and pharmacognostic profiles of the two species were established using standard methods. Quantitative leaf microscopy revealed differences in the distribution of some microstructures like stomata, trichomes and oxalate crystals. Chemomicroscopy and Phytochemical analyses showed similar profiles in both plants with Carbohydrates, tannins, cardiac glycosides, saponins, flavonoids and indole alkaloids been detected, while anthraquinones were absent. Proximate analysis reveals values for moisture content, acid insoluble, water soluble ash values, as well as water and alcohol extractive values which fall within World Health Organization (WHO) recommended standards for crude drugs from medicinal plants. The results obtained in the study could be used for identification and authentication purposes and also in the development of monograph for the medicinal plants.

Keywords: Ziziphus spina-christi, Ziziphus abyssinica, phytochemical, microscopy, chemomicroscopy, morphology, physicochemical

NIPRD Compendium of Research Publications (2010 - 2018)

096 Ibrahim J. A^{1*} , Kunle O. F1, Ayodele A. E^{2}

¹Department of Medicinal Plant Research and Traditional Medicine National Institute for Pharmaceutical Research and Development, PMB 21, Garki, Abuja. Nigeria ²Department of Botany, University of Ibadan, Ibadan. Nigeria

Anatomical Features of the Transverse Sections of the Leaves of Loranthaceae in Nigeria. International Journal of Pharmacognosy and Phytochemical Research, 2015; 7(3); 489-501 ISSN: 0975-4873. Available online on www.ijppr.com

Abstract

The anatomical characteristic of the transverse sections of leaves of the Nigerian parasitic family *of Loranthaceae* were investigated as a contribution to the taxonomy of the family especially in species identification and delimitation. The study revealed presence of palisade tissues for all the species except Tapinanthus bangwensis and T. globiferus. Second layer of palisade cells of Englerina gabonensis and Phragmanthera capitata with wavy outline. Prismatic crystals were present in most of the species and they were either associated with sclereids only or with sclerieds and xylem fibers. Acicular crystals were diagnostic to only *Agelanthus bruneus*. The presence of brachysclereids and astrosclereids are diagnostic features in the family. The anatomical features observed from the study could be utilized for taxonomic purposes especially as diagnostic features for easy identification of the species even when leaf material is in fragment. The information could also be used in monograph preparation for these medicinally useful species.

Keywords: Microscopy, Loranthaceae, Nigeria, Monograph

097 Idakwoji Precious A.¹, Oluwakanyisola A. Salawu², Bilkisu B. Maiha¹, Ifeoma Obidike², Adeniyi Y. Tijani².

¹ Department of Pharmacology and Therapeutics, Ahmadu Bello University, Zaria, Nigeria. ² Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu, Abuja-FCT, Nigeria.

Co-administeration of Ethanolic Leaf Extract of *Moringa oleifera* and Metformin Improves Glucose, Lipid and Protein Profiles of Diabetic Wistar rats. *Biokemistri 2015, 27(3): 123-138.*

Abstract

Herbs are often co-administered with orthodox drugs, raising the potential for herb-drug interactions. This study investigated the pharmacological interaction between ethanol extract of *Moringa oleifera* (MOE) leaves and metformin co-administered to diabetic Wistar rats. Diabetes was induced in rats by administration of 150 mg alloxan/kg body weight intraperitoneally. A dose-response study for MOE at doses of 100-2000 mg/kg body wt. was carried out. A plot of percentage glycaemic reduction at 4h post-treatment versus log dose was used to estimate the median effective dose (ED50). Nine (9) groups of rats were used for the interaction study. Groups I and II served as



normoglycaemic and diabetic controls respectively and received 1ml Normal saline. Diabetic Groups III-V received 375, 750 and 1500 mg/kg MOE respectively. Groups VI-VIII also diabetic received the same doses of MOE respectively but co-administered with a fixed dose of metformin (150 mg/kg). Group IX received metformin (150 mg/kg) alone. Fasting blood sugar (FBS) was monitored weekly and blood samples collected on day 28 for protein and lipid profile assay. The MOE/metformin co-administered groups showed greater antihyperglycaemic activity (p<0.001) than the MOE and metformin alone groups. Significant increases in serum levels of cholesterol, TG and LDLC with the decrease in HDLC levels in the alloxan induced diabetic rats were reversed in MOE (p<0.01) and MOE/metformin (p<0.001) administered groups. These findings indicate that MOE/Metformin co-administration produced additive anti-hyperglycaemic and hypolipidaemic effects compared to either MOE or Metformin alone and may be useful in the therapeutic management of diabetes mellitus that is associated with dyslipidaemia.

Keywords: Diabetes, Hyperglycaemia, Pharmacological interaction, *Moringa oleifera*, Metformin.

098 Idakwoji Precious Adejoh¹*, Salawu, Oluwakanyisola Adeola², Maiha Bilkisu Bello¹, Obidike Ifeoma², Tijani, Adeniyi Yahaya².

¹Department of pharmacology and therapeutics, Ahmadu Bello University, Zaria. ²Department of pharmacology and toxicology, National Institute for Pharmaceutical Research and Development, Idu, Abuja-FCT.

Assessment of biochemical and histopathological changes in diabetic wistar rats co-administered ethanolic leaf extract of *Moringa oleifera* and metformin. *As diabet Int. J Biol. Pharm. Res. 2015,* 6(12): 1008-1019.

Abstract

As diabetes progresses, organ damage ensues. This study investigated the modulatory effect of coadministration of ethanolic leaf extract of *Moringa oleifera* (MOE) and metformin on biochemical parameters and histopathology of some organs of hyperglycaemic rats. Diabetes was induced by injection of 150 mg Alloxan/ kg body weight intraperitoneally to rats. Eight (8) groups of diabetic rats and one (1) group of normoglycaemic rats (n = 6) were used for the study. Groups I and II served as normoglycaemic and diabetic controls respectively and were administered1ml distilled water throughout the experiment. Groups III, IV and V received 375, 750 and 1500 mg MOE /kg respectively, groups VI, VII and VIII received the same doses of MOE respectively but coadministered with a fixed dose of metformin (150 mg/kg), group IX received metformin (150 mg/kg) alone. After 28 days of treatment, rats were sacrificed with blood samples and organs collected for analysis. Results showed that alloxan treatment produced an elevation in the serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), total bilirubin, (Tbil), electrolytes (Na+, Cl-, HCO3+ and K+), creatinine and urea levels. MOE treatment produced a dose-dependent decrease in all the parameters monitored except Na+, HCO3+ and K+ ions which were elevated. MOE/Metformin co-administration at all doses produced



significant (p<0.001) reduction in all the parameters monitored, significant (p<0.001) increase in chloride ions. MOE/Metformin co-administration produced significant (p< 0.001), (p<0.05) increase in the weights of liver and spleen respectively when compared to the diabetic control. Histopathological studies of all treated groups showed beta-cell regeneration of the pancreas while the, brain, liver, kidney and spleens showed no remarkable changes in all groups. It was concluded that co-administration of metformin and ethanolic extract of *Moringa oleifera* leaves could be effective in restoring the functional and structural integrity of organs affected in diabetic condition.

Keywords: Diabetes mellitus, Metformin, Histopathological, Biochemical

099 John-AfricaLucy B.¹* and Mercy Aboh²

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu Abuja, Nigeria. ²Department of Microbiology, Virology and Biotechnology National Institute for Pharmaceutical Research and Development, Idu Abuja, Nigeria.

Evaluation of the Haemostatic Activities of *Sida corymbosa* in Rats. *British Journal of Pharmaceutical Research 2015 5(6): 431-436*

Abstract

Aims: To evaluate the anti-haemorrhagic activity of the leaf extract of *Sida corymbosa* in Wistar albino rats, a plant used to arrest bleeding in ethnomedical practices. Methods: The acute toxicity test was carried out in rats. The haemostatic activities of the extract were investigated using the tail bleeding time and amount of bleeding in rats; effects on haematological parameters were also evaluated in Wistar rats. Preliminary phytochemical analysis was conducted to detect the phytoconstituents of the extract of *Sida corymbosa*. Results: In this study, the oral LD50 of the extract was found to be greater than 5 g/kg. Administration of the extract to rats for 14 days produced a dose-dependent and significant ($P \le 0.05$) decrease in bleeding time and quantity of blood loss in pre-treated rats. On oral administration of the extract, the effects of the treatment on haematological parameters – White blood cells, Red blood cell, haemoglobin concentration were not significantly different from control. Conclusion: This study has shown that *Sida corymbosa* has constituents with anti-haemorrhagic properties in rats thereby providing scientific validation for the ethnomedical use of the plant in bleeding control.

Keywords: Sida corymbosa; haemostasis; bleeding time; amount of bleeding; tannins; flavonoids.

100 Lukman Adewale Alli¹, Abdulfatai Ayoade Adesokan², Oluwakanyinsola Adeola Salawu³, Musbau Adewunmi Akanji.

¹Department of Medical Biochemistry, College of Health Sciences, University of Abuja, Abuja, Nigeria.

²Department of Biochemistry, Faculty of Basic Medical Sciences, College of Health Sciences, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.

³Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria.

⁴Department of Biochemistry, Faculty of Science, University of Ilorin, Nigeria.

Toxicological studies of aqueous extract of *Acacia nilotica* root. *Interdisciplinary Toxicology*, 2015, Vol. 8 (1), pp 48-54.

Abstract

Acacia nilotica is a widely used plant in traditional medical practice in Northern Nigeria and many African countries. The aim of this study was to determine the toxicological effects of a single dose (acute) and of repeated doses (sub-acute) administration of aqueous extract of A. nilotica root in rodents, following our earlier study on antiplasmodial activity. In the acute toxicity test, three groups of Swiss albino mice were orally administered aqueous extract of A. nilotica (50, 300 and 2000 mg/kg body weight) and signs of toxicity were observed daily for 14 days. In the sub-acute toxicity study, four groups of 12 rats (6 male and 6 female) were used. Group 1 received 10 ml/kg b.w distilled water (control), while groups 2, 3 and 4 received 125, 250 and 500 mg/kg b.w of the extract, respectively, for 28 consecutive days by oral gavage. Signs of toxicity/mortality, food and water intake and body weight changes were observed. Biochemical parameters were analysed in both plasma and liver homogenate. In the acute and sub-acute toxicity studies, the extract did not cause mortality. A significant reduction in the activity of lactate dehydrogenase was observed at 250 and 500 mg/kg b.w, while alanine aminotransferase, aspartate aminotransferase and alkaline phosphatase activities were significantly higher than control values at 500 mg/kg b.w. The aqueous extract of A. nilotica was found to be safe in single dose administration in mice but repeated administration of doses higher than 250 mg/kg b.w of the extract for 28 days in rats may cause hepatotoxicity.

Keywords: Acacia nilotica; acute toxicity; sub-acute toxicity

101 Mbah CC*, Ibrahim MI, Builders PF, Isimi CY, Kunle OO.

Department of Pharmaceutical Technology & Raw Materials Development, National Institute for Pharmaceutical Research & Development, Abuja, Nigeria

Formulation and evaluation of a transfersomal vesicular carrier system for enhanced topical delivery of NIPRD-AF1. *Journal of Pharmaceutics and therapeutics, 2015; 15(1): 23-37*

Abstract

The potentials of transfersomal formulations for transdermal delivery of NIPRD-AF1 was investigated. NIPRD-AF1 is a phytomedicine derived from the leaves of an indigenous plant, for use in the treatment of fungal infections. A transfersomal vesicular carrier system of NIPRD-AF1 was formulated and evaluated for topical application. Transfersomes of AF1 were prepared by solvent evaporation method using a phospholipid (Phospholipon 90 H) and varying concentrations of a mixture of surfactants (sodium lauryl sulphate, sorbitan monolaurate and Tween 80), and other performance enhancing excipients. The ointment was prepared by the fusion method using British Pharmacopoeia (BP) standard. The transfersomal carrier system was characterized using vesicle morphology, pH, entrapment efficiency (EE) and stability. The in vitro drug release of the transfersomes were studied using rat skin and Franz diffusion cell and compared to that of the ointment formulation of AF1. Transfersome formulation with the highest concentration of phospholipon and surfactants had optimal characteristics with an entrapment efficiency of 76.4 \pm 0.04%. Optical microscopy showed presence of spherical vesicles in the transfersomal formulation with mean size (diameter) range of $57.5 \pm 2.4 - 79.5 \pm 3.10 \,\mu\text{m}$. The pH values ranged between 6.40 and 6.48. The stability study showed that the transfersome formulations were most stable between 4-8oC. All the transfersomal formulations showed potentials for systemic delivery and better permeation profiles than the ointment formulation of AF1.

Keywords: NIPRD-AF1, transfersome, ointment, permeation, transdermal drug delivery.

102 Mohammed SB^{1}, Ya'aba Y^{1}, Oladosu, O P^{1}, Ibrahim K^{1}, Abu A^{1}, Onoja A J^{2} and Gamaniel KS^{1}(2015):

¹Department of Microbiology, Human Virology and Biotechnology, National Institute For Pharmaceutical Research and Development (NIPRD) Idu-Abuja Nigeria. ²African 2Health Project, Abuja, Nigeria.

Prevalence of Human Immunodeficiency Virus (HIV) and Hepatitis B co-infection among the primitive Koma tribe in Nigeria. *Journal of phytomedicine and therapeutics (JOPAT)* 1(1): 62-69.

Abstract

The Koma tribes are a group of isolated and primitive people along the mountains bordering Nigeria and Cameroun with over 70% of the population still on the mountains. Two communities were selected for the study (n=160). One homogeneous community by the foot of the mountains, predominantly Koma (n=86), while the other was a heterogeneous population, about 3 Kilometers from the homogeneous community (n=74) screened for Hepatitis B and HIV respectively.15% of the population (6.25% female, 8.75% male) tested positive for Hepatitis B while 7.5% (4.4%



female, 3.1% male) tested positive for HIV. 11.25% and 3.75% of the Hepatitis B occurred in the homogeneous and heterogeneous populations respectively. 3.1% and 4.4% of the homogeneous and heterogeneous groups tested positive for HIV respectively. Two of the samples in the homogeneous population were Hepatitis B and HIV co- infected. This study has shown that HIV has eaten deep into all nooks and crannies and even to the most remote societies like Koma. The presence of about 15% of hepatitis B virus infection can fan the progression of HIV to AIDS with no or very poor medical services.

Keywords: Koma people, Hepatitis B, Homogeneous and Heterogeneous

103 Mshelia J.G., Y.E. Apeji and O.J. Olayemi

Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Nigeria.

Powder, compaction and tableting properties of co-processed silicified starch. *British Journal of Pharmaceutical Research*, 2015; 6(2):131-140.

Abstract

To evaluate the powder, compaction and tableting properties of co-processed silicified starch for direct compression formulation. The study was designed to co-process cassava starch and colloidal silicon dioxide in a combination ratio of 98:2 using a simple physical method. Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, between March 2013 and June 2013. Co-processing of cassava starch and colloidal silicon dioxide was carried out using the method of co-fusion where a dispersion of cassava starch was prepared in distilled water (40% w/w) and mixed with colloidal silicon dioxide prior to thermal treatment at a temperature of 54±2°C for 15 min in a water bath. The co-processed mixture was dehydrated with ethanol (99%) and tray dried in a Hot air oven at 40°C for 2 h. It was then kept in an air-tight container for further studies. Powder properties were assessed by measuring the angle of repose, bulk and tapped densities, Carr's index and Hausner's ratio. Compaction studies were carried out on tablets compressed at a range of pressures on the Hydraulic Carver Press and analyzed using Heckel and Kawakita equations. Tablets were prepared using chloroquine phosphate as the drug of choice on a Single Stroke Tablet Press by direct compression and evaluated under uniformity of weight, thickness, crushing strength, friability, disintegration and dissolution tests. The studies revealed an improvement in the functionality of the co-processed excipient with respect to flow, compression and tableting properties when compared to cassava starch. The silicification of cassava starch by co-processing was able to improve the powder and compaction properties of the excipient suitable for producing tablets by direct compression.

Keywords: Cassava starch; colloidal silicon dioxide; co-processing; direct compression; tablet

NIPRD Compendium of Research Publications (2010 - 2018)

104 Obidike, I.C., B. Amodu** & M.O. Emeje*

*Departments of Pharmacology & Toxicology & Pharmaceutical Technology & Raw Material Development, National Institute for Pharmaceutical Research & Development **Halamin Herbal Center, Abuja, Nigeria

Antimalarial properties of SAABMAL®: an ethnomedicinal polyherbal formulation for the treatment of uncomplicated malaria infection in the tropics. *Indian Journal of Medical Research*, 2015; 141: 221-227.

Abstract

Background & objectives: Malaria is a serious problem in the countries of the developing world. As the malaria parasite has become resistant to most of the antimalaria drugs available currently, there is a need to search for newer drugs. This study reports the pharmaceutical quality and *in vivo* antimalarial activities of a polyherbal formulation (SAABMAL®) used as malarial remedy in Nigeria.

Methods: The antiplasmodial activity of SAABMAL® was determined by using the 4-day suppressive test in *Plasmodium berghei*-infected mice. The formulation was tried on three different experimental animal models for *in vivo* antimalarial activities, which are prophylactic, suppressive and curative in mice. Chloroquine and pyrimethamine were used as standard drugs for comparison.

Results: The suppressive study showed that, SAABMAL® (200 and 400 mg/kg/bw) significantly (p<0.01) produced a suppression (29.39 - 100%) of parasitaemia in a dose-dependent manner, while the curative study showed that SAABMAL® at 400 mg significantly (p<0.01) reduced (95.80%) parasitaemia compared with controls. The mean survival time of SAABMAL®-treated groups (100 and 200 mg/kg) was higher than that of the chloroquine-treated group. Histopathologically, no changes were found in the spleen of both untreated and treated groups. SAABMAL® capsules were of good mechanical properties with low weight variation and high degree of content mass uniformity. *Interpretation & conclusions*: The results obtained in this study showed the efficacy of SAABMAL®, a herbal antimalarial formulation against chloroquine sensitive malaria and its potential use in the treatment of uncomplicated malaria infection. Further studies need to be done in humans to test its efficacy and safety for its potential use as an antimalarial drug.

Keywords Antimalarial - efficacy - polyherbal - quality assessment

105 Ogukwe CE, Okhale SE, Tijani AY, Ezugwu BO.

Evaluation of chemical composition, cytostatic and anti-proliferative effects of ethanolic roots extract of *Securidaca longepedunculata (Fresen)*. Journal of Pharmacognosy and Phytochemistry, 2015. 4(4): 267-272.

Abstract

The crave for evidence on the safety and efficacy of traditional medicines has led to this study on evaluation of the chemical composition, anti-proliferative and cytostatic effects of *S. longepedunculata* roots extract. The phytochemical investigation on the ethanol extract revealed the presence of tannins, saponins, saponin glycosides, alkaloids, flavonoids, cardiac glycosides, terpenes and steroids. The HPLC chromatogram showed seventeen peaks and the compounds with retention time of 4.891, 7.247, 8.745, 18.522 and 25.889 minutes corresponded to caffeic acid, rutin, ferulic



acid, apigenin and quercetin respectively. Growth inhibition test of the roots extract on Sorghum bicolor seeds showed a significant (P<0.0001) result throughout the experiment against the control seeds (5% DMSO and Methotrexate). At 96h, percentage growth inhibitions for the seeds treated with 1mg/ml, 2mg/ml, 4mg/ml, 6mg/ml and 8mg/ml were 42.97%, 72.69%, 83.94%, 86.14%, 91.26% and 91.57% respectively. The results suggest the probable use of the plant in traditional medicine for the treatment of tumour related ailments and other diseases. However, further works using appropriate human cell lines are needed to find a novel drug.

Keywords: Anti-proliferative, Cytostatic effects, Phytochemistry, Securidaca longepedunculata, root.

106 Ogukwe Cynthia Ekwy, Okhale Samuel Ehiabhi, Ezugwu Brendan Okechukwu (2015).

Phytochemical and GC-MS analyses of the bioactive components of *Securidaca longepedunculata* (*Fresen*) roots for anti-breast cancer activity. *World Journal of Pharmaceutical Research*, 4(12):1503-1318.

Abstract

Securidaca longepeduncalata (Fresen) which belongs to the family Polygalaceae, has been known to have numerous ethno-medicinal uses. The present work evaluated the phytochemicals and bioactive components of S. longepedunculata roots extract using GC-MS analysis. Standard phytochemical analysis on the roots extract of S. longepeduncalata revealed the presence of tannins, saponins, saponin glycosides, alkaloids, flavonoids, cardiac glycosides, terpenes and steroids. GC-MS (QP2010SE) analysis of the S. longepedunculata ethanolic roots extract showed 45 components. Some of components were 1-Heptadecene (9.50%), 1-Nonadecene (6.83%), 1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester (3.99%), 7,9-Ditert-butyl-1-oxaspiro(4,5)deca-6,9-diene (2.44%), 1-Decanol, 2,2-dimethyl- (1.43%), 5-Octadecenal (3.06%), n-Nonadecanol (5.25%), n-Tetracosanol-(5.69%), Octasiloxane 1,1,3,3,5,5, 7,7,9,9,11,11,13,1315,15-hexadecamethyl- (1.92%), 1-Pentadecene (8.40%) and Bis(2-ethylhexyl) phthalate (8.49%). The presence of various bioactive components suggest the probable use of the plant in traditional medicine for the treatment of tumour related ailments and other diseases.

Keywords: GC-MS analysis, Phytochemistry, Securidaca longepedunculata root.

NIPRD Compendium of Research Publications (2010 - 2018)

107 Olorunsola Emmanuel O¹., Olubunmi J. Olayemi², Stephen O. Majekodunmi¹ and Unyime B. Etukudo¹

¹Department of Pharmaceutics and Pharmaceutical Technology, University of Uyo, Uyo, Nigeria. ²Department of Pharmaceutics and Pharmaceutical Microbiology, Ahmadu Bello University, Zaria, Nigeria.

Extraction and physicochemical characterization of a potential multifunctional pharma-excipient from crab shell wastes. *African Journal of Biotechnology*, 2015; 14(40): 2856-2861.

Abstract

An efficient and beneficial waste disposal mechanism is highly desired. This study was carried out to extract and characterize a potential multifunctional pharmaceutical excipient from crab shell wastes. Shells of *Pachygrapsus mamoratus* were obtained from Oron, a coastal town in Akwa Ibom State of Nigeria. Chitin was extracted from the powdered shell by deproteination and demineralization; and chitosan was derived by alkaline deacetylation of the chitin. The polymer was subjected to Fourier transform infrared (FTIR) spectroscopy and differential scanning calorimetry (DSC). It was also evaluated for flow properties, pH and hydration and swelling characteristics. The shells gave a yield of 17% chitosan. FTIR analysis of the polymer showed C-H bond of substituted cyclic hydrocarbon, cyclic C-N bond, C-O bond of glucose molecules, C-H bond of side chain –CH2OH, presence of β -ester linkage, N-H of amides and bonded and free O-H groups. The last transition in the thermogram of chitosan was a polymer degradation exotherm with a peak at 337.9°C. The chitosan had higher bulk density, higher flow rate, lower Carr's index and lower Hausner's ratio compared to sodium carboxymethylcellulose. It also had lower hydration and swelling capacities. Therefore, the crab shell-derived chitosan has better thermal stability, better flow properties but poorer swelling properties compared to sodium carboxymethylcellulose.

Keywords: Crab shell, chitosan, physicochemical characteristics, pharmaceutical excipient

108 Olubunmi Jumoke Olayemi¹, Susan Terylia Allagh¹, Avosuahi Rukayyat Oyi¹, Adamu Babah Isah¹ and Abimbola Gbenga Olayemi²

¹Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Nigeria. ²Shepahard Consults, Wuse 2, Abuja, Nigeria

Ibuprofen Tablets compression-coated with *Grewia mollis* gum for colonic delivery. *British Journal of Pharmaceutical Research*, 2015; 6(2):107-120.

Abstract

This research was aimed at evaluating the use of *Grewia mollis* Juss. (Tiliaceae) stem bark gum as a compression coating-agent in a formulation intended to deliver ibuprofen to the colon. Ibuprofen core tablets were prepared by the direct compression method and four different compression-coated formulations were produced using powdered and granulated Grewia gum (GG) or hydroxypropyl methyl cellulose (HPMC). The compression-coated tablets were also evaluated for tablet parameters; the *in vitro* drug release studies were carried out in different simulated gastro-intestinal fluids. An *in vivo* study was conducted in New Zealand rabbits using the optimized compression-

coated tablet and compared with a conventional ibuprofen tablets. The pharmacokinetic parameters were estimated from concentration of ibuprofen in the rabbit plasma using the high performance liquid chromatograph (HPLC). The tablets that were compression-coated with powdered GG showed better ability to offer barrier to drug release and to deliver the drug to the colon than those coated with granulated polymers. The tablets coated with powdered GG coated exhibited greater propensity to deliver ibuprofen to the colon than the other coated tablets. A lower Cmax, longer t1/2 of 8.66 h, longer MRT (7.43 h) and shorter ke (0.08 h-1) revealed that ibuprofen remained in the system for a longer period after oral administration of F2 than when MKT was administered. A high correlation coefficient (0.926) was obtained from the *in vitro* drug release studies and *in vivo* studies from F2 indicating that a good relationship was established between both studies. The results of this study have been able to establish that *Grewia mollis* stem bark gum can be used to effectively deliver ibuprofen to the colon.

Keywords: Ibuprofen; grewia gum; hydroxypropyl methylcellulose; colon; pharmacokinetic parameters; rabbit plasma; high performance liquid chromatography

109 Olubunmi Jumoke Olayemi¹, Terylia Susan Allagh¹, Rukkayat Avosuahi Oyi¹, Adamu Babah Isah¹, Ignatius Sylvester Okafor², Abimbola Gbenga Olayemi³

¹Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Nigeria. ²Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, University of Jos, Nigeria. ³Shephard Consults, Wuse 2, Abuja, Nigeria.

Evaluation of ibuprofen colon delivery system using *Grewia mollis* Juss. (Tiliaceae) stem bark gum as matrix-former. *RGUHJS Journal of Pharmaceutical Sciences*, 2015; 5(3): 112-122

Abstract

The aim of this research was to evaluate Grewia gum as a matrix-former for colon delivery of ibuprofen. The gum was extracted by soaking the dried stem bark powder in aqueous solution of sodium metabisulphite for 48 h. Ibuprofen granules were prepared by wet granulation method using Grewia gum at 10, 20, 30, 40 and 50% w/w. The tablets were compressed using 12 mm punch. The physicochemical parameters-uniformity of weight, thickness, diameter, crushing strength, friability, disintegration time was evaluated. The *in vitro* drug release studies were conducted in simulated gastric fluid at $37 \pm 1^{\circ}$ and 100 rpm. The kinetics and mechanism of drug release were determined. The tablets were compared with those of hydroxypropylmethyl cellulose (HPMC) (80-120 cp; H9262) at the same concentrations. The results revealed that *Grewia* gum is highly viscous, not readily soluble in water and has a high swelling capacity (237.5% w/w). It also has moderate flow profile, and large particle size. The matrix tablets containing 40 and 50 % w/w of Grewia gum exhibited highest swelling capacity and showed better ability to offer barrier to drug release in the upper GIT and delivery to colon. None of the matrix containing HPMC was able to prevent drug release in the upper GIT. The in vitro drug release in the absence and presence of rat cecal contents showed no significant difference (p<0.05) using ANOVA. The release kinetics followed zero-order and the mechanism of release was Korsmeyer-peppas super case II mechanism. Conclusion: The findings show that Grewia gum may be used as an effective matrix-former for the delivery of ibuprofen to colon.

Keywords: Colon drug delivery system, *Grewia* gum, Hydroxypropylmethyl cellulose, Ibuprofen, Matrix tablets, Release kinetics.

110 Samali A^{1} Mohammed M.I.², Ibrahim M.B.² and Mbah C.C³

¹ Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development, Federal Ministry of Health, Abuja, Nigeria. ² Department of Pure and Industrial Chemistry, Proven University Kang, Kang State, Nigeria.

² Department of Pure and Industrial Chemistry, Bayero University Kano, Kano State, Nigeria.

³ Department of Pharmaceutical Technology and Raw Materials, National Institute for

 $\label{eq:pharmaceutical} Pharmaceutical Research and Development, Federal Ministry of Health, Abuja, Nigeria.$

Dissolution Profile of Dosage forms of ACT Anti-Malarial Drugs from North-Central Part of Nigeria. *British Journal of Pharmaceutical Research 2015, 6 (1): 1-7*

Abstract

Aims/Objective: To examine the rate and percentage release of the active constituents of brands of ACT anti-malarial drugs using UV-Visible Spectrophotometric method to ascertain its applicability in quality control of ACTs for effective treatment. The study was carried-out on the North-central part of Nigeria between the March, 2013 and July 2013.

Methodology: In vitro release of artemether and lumefantrine from tablets dosage form was evaluated one after the other. The methods comprised of dissolution medium of 900 ml distilled water (for artemether) and 1000 ml of 0.1 M HCl (for lumefantrine) per vessel with the paddle rotating at 100 rpm for 60 minutes (artemether) and 45 minutes (lumefantrine) at the temperature of 36°C to 37°C. The dissolved samples were analyzed using UV-Visible spectrophotometer at 216 nm (artemether) and 302 nm (lumefantrine) after method validation for accuracy, precision, linearity and specificity.

Results: The outcome of the study indicated the best release time for artemether from 2-10 minutes and 10 - 30 minutes for lumefantrine with 88% of the samples complied with USP specified requirement for dissolution test. The statistical P-value (P < 0.05) of mean (0.1007) and variance (0.7533) for artemether released were non-significant, while for lumefantrine, mean (0.0130) and variance (0.0446) were significant among the samples.

Conclusion: This method indicated that, UV-Visible spectrophotometric method could be used as non-simultaneous in vitro dissolution test for artemether and lumefantrine in tablet dosage combination forms. The method is simple, fast and cost-effective therefore it can be adopted for continual periodic monitoring of drug quality in order to sustain survival of quality drugs for malaria treatment among the populace.

Keywords: Artemether; lumefantrine; tablet dissolution test; uv-visible spectrophotometer; northern central Nigeria

111 Tijani Adeniyi Yahaya^{1*,} Aboh Mercy Itohan², Fidelis Solomon Ameh³, Salawu OluwakanyinsolaAdeola¹

Crinum zeylanicum memory enhancing effect is mediated via central cholinergic transmission system. *International Journal of Basic Clinical harmacology; 4: 864-8. 2015*

Abstract

Background: Crinum zeylanicum is widely used in the ethno-therapeutic management of folk management of epilepsy, pain, neuropsychiatric, and dementing disorders in Nigeria. The current study was carried out to evaluate the possible mechanism of the memory enhancing the effect of C. zevlanicum extract and alkaloidal rich fraction in Wistar rats. Methods: The effect of Crinum zeylanicum bulb extract (250, 500, and 1000 mg/kg body weight orally), alkaloidal rich fraction (10, 20, and 40 mg/kg body weight p.o.), normal saline (10 ml/kg orally), or Eserine (0.3 mg/kg body weight i.p.) on spatial memory in rats was evaluated using the Y-maze. The blood samples obtained from rats in all treatment groups were evaluated for cholinesterase activities using modified Michelle electrometric method. Results: The extract and the alkaloid significantly (p < 0.05) and dose-dependently increased spontaneous alternation behavior of rats in Y-maze. The extract produced 20.00%, 35.55%, and 52.00% inhibition of cholinesterase activity in the blood at 250, 500, and 1000 mg/kg body weight, respectively. The alkaloid produced 56.67%, 62.67%, and 68.67% inhibition of cholinesterase activity in blood at 10, 20, and 40 mg/kg body weight (p.o.). Eserine a standard cholinesterase inhibitor at 0.3 mg/kg body weight produced a significant increase in spontaneous alternation behavior and produced 73.33% inhibition of blood cholinesterase activity. Data obtained from the study showed that the enhanced spontaneous alternation behavior observed in rats treated with the extract, and the alkaloid may be due to facilitation of cholinergic transmission resulting from inhibition of cholinesterase activity. Conclusion: The extract, as well as its partially purified alkaloid, possesses potential that may be employed for therapeutic management of Alzheimer's disease.

Keywords: Azheimer's disease, Cholinesterase activity, Blood, Brain homogenate, Y-maze

112 TIJANI Adeniyi Y.*¹, Grace E. UGBABE², Jemilat A. IBRAHIM², Samuel E. OKHALE²

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja–Nigeria

²Medicinal Plant Research and Traditional Medicine (MPR and TM) Department, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Idu Industrial Area, Idu-Abuja, Nigeria.

Neuro-Toxicological Impacts Of Datura Metel Linn. (Family: Solanaceae) Leaves Extract In Mice. *Journal of Neurobehavioral Sciences.2015, Vol.2 (3), pp. 1-5* Familyasi Patlicangiller Olan Boru Çiçeği (Datura Metel Linn.)'Nin Ekstresi Farelerde Nöro-Toksik Etkiler Birakir

Abstract

Datura metel leaves and seeds are widely used in ethno-therapeutic management of Rheumatic pain, asthma and insomnia. Its use has been associated with adverse alteration in behavior which has triggered interest in its safety on the central nervous system. This study was therefore designed to



evaluate acute neuro-toxicological effects of aqueous –methanol extracts of Datura metel in mice. Oral Acute toxicity studies of the leaf extract was carried out in mice. The effects of the extract (25-100 mg/kg body weight orally) on total locomotive activity, motor coordination and spatial memory in Y-maze were evaluated in mice. The effect of Datura metel extract (25-100 mg/kg) in the presence of either atropine (0.3 mg/kg b.w.) or naloxone (0.5 mg/kg b.w., i.p.) on total locomotive activity in an open field apparatus was carried out with the view of predicting its mechanism of action. The oral median lethal dose (LD50) was greater than 2000 mg/kg b.w. The extract produced significant decrease (p<0.05) in total locomotive activity of the treated mice in the open field apparatus. The extract significantly (p<0.05) shortened the time spent on the rota-rod by mice treated with the extract and reduced spontaneous alternation behavior. Datural metel leaves extract produced in mice neurotoxicological effects characterized by sedation and hypokinesia, motor coordination impairment and disruption of short term memory.

Keywords: Datural metel, extract, mice, neurotoxicity, amnesia.

113 Ugbabe, G. E.¹, Bamidele, O.¹, Yakubu, R.O.¹, Ajoku, G.A.², and Okhale, S.E.¹

¹National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

Pharmacognostic and Chromatographic Standardization of *Calyptrochilum emarginatum* (SW.) *Schltr.* (*Orchidaceae*) *Journal of Phytomedicines and Therapeutics* 2015; 1(1): 53-64.

Abstract

Pharmacognostic and chromatographic evaluation of *Calyptrochilum emarginatum* (SW.) a potential drug plant belonging to the orchid family was carried out. High performance liquid chromatographic standardization of the methanol extract revealed sixteen compounds one of which had the same retention time 6.8 minutes as reference rutin. Thin layer chromatography of the hexane extract showed 11 spots one of which had Rf value of 0.5 same as β -sitosterol and the successive ethyl acetate extract gave 9 spots. Proximate analysis revealed moisture content of 11.9%, alcohol extractive value 13.8%. Microscopic evaluation of the leaf epidermis revealed anomocytic stomata which were only on the lower surface (hypostomatic), the epidermal cells were polygonal in shape on both adaxial (upper) and abaxial (lower) surfaces. Trichomes or trichome bases were not found on both surfaces.

Keywords: Orchid, Calyptrochilum emarginatum, microscopy, chromatography, rutin.

YEAR 2014

114 Abiodun Humphrey Adebayo¹*, Lucy Binda John-Africa², Amarachi Grace Agbafor¹ Omolola Elizabeth Omotosho¹ and Timothy Olusoji Mosaku¹

¹ Biochemistry & Molecular Biology Unit, Department of Biological Sciences, Covenant University, PMB 1023, Canaan Land, Ota, Nigeria.

² Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research & Development (NIPRD), Abuja, Nigeria.

Anti-nociceptive and anti-inflammatory activities of extract of *Anchomanes difformis* in rats. *Pakistan Journal of Pharmaceutical Sciences, 2014 27(2) 265-270*

Abstract

Anchomanes difformis is a tropical plant that has been used in folklore to treat diverse complications. The leaf extract of *A. difformis* was investigated for possible anti-nociceptive and anti-inflammatory effects in albino wistar rats. In these independent studies, two sets of twenty-five rats were divided into five groups of five rats per group. Formalin induced pain in rats was used to investigate the anti-nociceptive effect of the extract. The extract was administered orally in the treated groups at doses 200, 400, 800 and 1600 mg/kg with aspirin serving as the positive drug control while the normal control group was not given any extract but water. Studies were also carried out on the egg albumin induced anti- inflammatory activity in rats by inducing oedema on the left hind paw. The result showed a significant inhibition (p<0.05) on the later phase (800mg/kg) of formalin pain induction in rats; similarly, a significant (p<0.05) anti-inflammatory activity was observed at 60, 90 and 120 minutes. The study thus validates the ethnomedicinal usage of *A. difformis* in the treatment of pain and inflammation.

Keywords: Anchomanes difformis; araceae; anti-inflammatory; anti-nociceptive

115 Aboh Mercy I. and Oladosu Peters.

Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu, P.M.B 21 Garki Abuja, Nigeria.

Microbiological Assay of Different Brands of Fluconazole capsules retailed in Abuja, Federal Capital Territory, Nigeria. *Journal of Pharma Research*, 3(4):1-3. 2014

Abstract

Candidiasis caused by *C. albicans* is the most commonly reported opportunistic infection observed in HIV/AIDS patients, occurring in an estimated 80–95% of those with HIV disease. Six different brands of fluconazole hydrochloride marketed in Abuja, Nigeria were collected and assayed using agar diffusion method against clinical isolate of *Candida albicans*. For the purpose of comparism reference fluconazole powder was also screened. The diameter of zones of inhibition produced by the different brands of fluconazole against *C. albicans* ranged between 22.67 – 29.67 mm. Five out of the six brands of fluconazole capsules assayed were comparable with the reference standard.

Keywords: fluconazole, agar diffusion, zone of inhibition.

116 Akuodor G.C.^{1*}, Ibrahim J.A.², Akpan J. L¹, Okorie A. U.¹ and Ezeokpo B.C.¹

¹Department of Pharmacology and Therapeutics, Faculty of Clinical Medicine, Ebonyi State University, Abakaliki, Nigeria

²Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria

Phytochemical and Anti-diarrhoeal Properties of Methanolic Leaf Extract of *Maerua crassifolia* Forssk.

European Journal of Medicinal Plants 2014. 4(10): 1223-1231, 2014, SCIENCEDOMAIN international. www.sciencedomain.org

Abstract

Maerua crassifolia Forssk. Leaf is used in African traditional medicine for the management of gastrointestinal disorders. The anti-diarrhoeal activity of the methanol extract of Maerua crassifolia leaf was investigated in rats. The phytochemical screening was also carried out. The methanol extract of Maerua crassifolia leaf dose dependently decreased intestinal propulsion of charcoal meal in rats. Maerua crassifolia also exerted significant anti-enteropooling effect in rats. A profound anti-diarrhoea activity was observed when the extract was tested in diarrhoeic rats. The frequency of defecation as well as the wetness of the faecal droppings was significantly reduced. Furthermore, the leaf extract produced 100% inhibition of castor oil-induced diarrhoea in rats. Phytochemical screening revealed the presence of alkaloids, saponins, tannins, terpenoids, flavonoids, steroids, resins and cardiac glycosides. The oral LD50 obtained was greater than 5000 mg/kg in rats. The study showed that the methanol extract of Maerua crassifolia leaf possesses anti-diarrhoeal activity and its action may be linked partly to direct inhibitory effect of the extract on the propulsive movement of the gastrointestinal tract smooth muscle.

Keywords: Maerua crassifolia; leaf extract; phytochemical; antidiarrhoea; rats.

117 Akuodor, G. C.¹, Essiet, G. A.¹, Ajoku, G. A.^{2*}, Ezeunala, M. N.² and Chilaka, K. C.¹ ¹ Department of Pharmacology, Faculty of Basic Medical Sciences, College of Medical Sciences, University of Calabar, Calabar, Nigeria. ²National Institute for Pharmaceutical research and Development, Abuja, Nigeria.

Antimalarial potency of the methanol leaf extract of *Maerua crassifolia Forsk (Capparaceae) Asian Pasific Journal of Tropical Disease, Elservier 2014 4(1) 35-39*

Abstract

To investigate the in vivo antiplasmodial effect of methanol leaf extract of *Maerua crassifoliain* mice infected with chloroquine sensitive Plasmodium berghei berghei.

Methods:The extract was evaluated for activity against early infection, curative established infection at dose levels of 100, 200 and 400 mg/kg p.o.Chloroquine at 1e0ff emcgt /akggawinasst used as standard drug.

Results: A dose dependent chemo-suppression of the parasites was obtained at different dose levels of the extract tested with a considerable mean survival time.

Conclusions: The results support continued investigation of components of traditional medicines as potential new antimalarial agents.



118 Ben A. Chindo, Jamilu Ya'U, Nuhu M. Danjuma, **Samuel E. Okhale**, Karniyus S. Gamaniel, Axel Becker.

Behavioral and anticonvulsant effects of the standardized extract of *Ficus platyphylla* stem bark. *Journal of Ethnopharmacology*, 2014. 154, 351–360.

Abstract

Ethnopharmacological relevance: Decoctions of *Ficus platyphylla* Del.-Holl (Family: Moraceae) are used in Nigeria's folk medicine for the management of epilepsy and their efficacies are widely acclaimed among the rural communities of northern Nigeria. The aim of the study is to examine the behavioral and anticonvulsant properties of the standardized methanol extract of Ficus platyphylla (FP) stem bark, in order to scientifically describe its potential values in the management of convulsive disorders.

Materials and methods: High performance liquid chromatography (HPLC) and preliminary phytochemical analysis of the methanol extract were utilized and the intraperitoneal median lethal dose (LD50) determined in mice. The effects of FP were investigated on some murine models of behavior and its anticonvulsant effects studied on pentylenetetrazole (PTZ)-, strychnine (STN)-, picrotoxin (PCT)-, isoniazid (INH)-, aminophylline (AMI)- and maximal electroshock (MES)induced seizures in mice. Results: The intraperitoneal oral LD50 of FP was estimated to be 5000 mg/kg. FP significantly reduced the locomotor activities including the total distance covered, speed, active time and rearing counts. It shortened the onset and prolonged the duration of diazepaminduced sleep, but had no effect on motor coordination on the rota-rod treadmill or beam-walking assay in mice at the doses tested. The extract protected the mice against PTZ- and STN-induced seizures and significantly delayed the latencies of myoclonic jerks and tonic seizures induced by all the standard convulsant agents (PTZ, PCT, INH, STN and AMI) used in this study, but failed to protect the mice against MES seizures at the doses tested. The HPLC fingerprint of the extract shows a spectrum profile characteristic of Ficus platyphylla, while the preliminary phytochemical screening revealed the presence of saponins, flavonoids and tannins. Conclusion: Our study provides scientific evidence that FP may contain psychoactive principles with potential anticonvulsant properties, thus supporting further development of the psychoactive components of this plant as anticonvulsant agents.

Keywords: Ficus platyphylla, Anticonvulsant, Behavior, Mice

119 Bulus Adzu, Mohammed Barau Amizan, Samuel Ehiabhi Okhale.

Evaluation of antinociceptive and anti-inflammatory activities of standardized root bark extract *of Xeromphis nilotica*. *Journal of Ethnopharmacology*, 2014. 158: 271–275.

Abstract

Ethnopharmacological relevance: *Xeromphis nilotica (Stapf) Keay (Rubiaceae)*, popularly known as '*barbaji*' (in Nigeria), is a lowland shrub that grows wild in tropical areas of Africa and Asia. The plant's extract is used for the treatment of various diseases in folk medicine including pain related ailments. Important bioactive constituents have been isolated from the plant among them are coumarin, alkaloids, flavonoids, saponins, and terpenes. This study is aimed to evaluate the analgesic and anti-inflammatory efficacy of standardised aqueous extract of the plant using in vivo models of pain and inflammation in mice and rats. **Materials and methods:** Aqueous extract of Xeromphis nilotica root bark was prepared and standardised using HPLC technique. Three dose levels (25, 100 and 400 mg/kg) of the extract were used, administered orally to laboratory mice and rats.



Acetylsalicylic acid (100 mg/kg, p.o.) was used as the positive control. Nociception was induced in laboratory rodents: chemically using acetic acid and formalin, and mechanically using analgesy meter; while inflammation was induced using fresh raw egg albumin. **Results:** The extract showed 11 constituents peak profiles in the HPLC analysis. The extract alleviates mice response to acetic acid-induced writhing, analgesy-meter and formalin tests. It significantly decreased the oedema induced by egg albumin induced inflammation, but failed to show significant effect beyond 80 min of the test. **Conclusion:** The extract has antinociceptive effect and short acting anti-inflammatory activities. The results justify its usage in the treatment of pain and inflammatory conditions, and also provided evidence of its potential as source of new pain relief drug prototype.

Keywords: Xeromphis nilotica; aqueous extract; Antinociceptive; Anti-inflammatory.

120 Clement Jackson¹, Martins Emeje², Sabinus Ofoefule³

¹Department of Pharmaceutics and pharmaceutical Technology, Faculty of Pharmacy, University of Uyo, Nigeria.

²Centre for Nanomedicine and Biophysical Drug Delivery, Advanced Biology/Chemistry Laboratory, National Institute for Pharmaceutical Research, Idu Abuja, Nigeria.

³Department of Pharmaceutical Technology and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka

Ternary Blends of some Hydrophilic and Hydrophobic Polymers in Colon Targeted Delivery of Metronidazole.

International Journal of Drug Delivery, 2014; 6: 305-310.

Abstract

Matrix tablets were prepared using blends of xanthan gum (XG), Guar gum (GG) and ethylcellulose (EC). The polymers were combined using six different ratios; 1:1:1, 1:2:1, 1:2:2, 2:2:1, 2:1:2 and 2:1:1 to produce formulations XG1GG1EC1, XG1GG2EC1, XG1GG2EC2, XG2GG2EC1. XG2GG1EC2 and XG2GG1EC1 respectively. Metronidazole was used as the model drug. The ability of the prepared matrices to target drug release predominantly at the colon under the influence of colonic bacteria was evaluated using the dissolution medium containing 4 % cecal content. Our results show that, optimum drug release was observed with formulations XG2GG2EC1 and XG2GG1EC1 with Cmax of 60 and 76 % respectively. Significant difference (P<0.05) was observed between drug release in dissolution medium with and without rat cecal contents for the batches of Metronidazole tablets. Formulations (XG2GG2EC1 and XG2GG1EC1) followed Higuchi square roots kinetics (r2 =0.9942) via fickian diffusion (n < 0.45) and Korsemeyer model (r2 = 0.9939) via non fickian diffusion (n > 0.45) respectively.

Keywords: matrix.guar, xanthan, ethylcellulose, metronidazole, colon delivery

121 Egharevba, Henry Omoregie^{1*} and Okwute, Simon Koma²

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu industrial Layout Idu, Abuja, Nigeria. ²Department of Chemistry, University of Abuja, Gwagwalada, Abuja, FCT, Nigeria

Some Bioactive Fatty Derivatives from L. Pterodonta, *Nature and Science 2014, 12(1) 79-86.*

Abstract

The aerial part of *Laggera pterodonta (DC.)* Sch. Bip. (Asteraceae) was extracted successively with hexane and ethyl acetate, and subjected to chemical and microbiological investigations. Chromatographic separation of the extracts led to the isolation of five fatty derivatives identified as 2-triacontoxyethyleicosanoate, triacontyl methyl ether, ethane-1,2-dieicosanoate, eicosanoic acid, ethane-1,2-di-eicosenoate based on their spectral and physicochemical characteristics. The compounds were screened for antimicrobial activities against selected microorganisms, which include Staphylococcus aureus (NCTC 6571), Bacillus subtilis (NCTC 8236), Klebsiella pneumonia (ATCC 10031), Staphylococcus aureus (ATCC 13704), and clinical isolates of Staphylococcus aureus, Streptococcus faecalis, Bacillus subtilis, Bacillus cereus, Escherichia coli, Klebsiella pneumoniae, Klebsiella ozaenae and Shigella dysenteriae. The compounds were found to exhibit selective activities against some of the organisms with a minimum inhibitory concentration (MIC) of between 25 and 100 μ g/ml and a minimum bactericidal concentration of (MBC) of 100 and 200 μ g/ml. The study justified the use of the plant as antibiotic in ethnomedicinal applications, and underscores the important role fatty compounds play in cellular integrity.

Keywords: *Laggera pterodonta*, 2-triacontoxyethyleicosanoate, triacontyl methyl ether, ethane-1, 2-dieicosanoate, eicosanoic acid, ethane-1,2-di-eicosenoate.

122 Ekwunife, C.A.^{1*,} Okafor, C. I., Eneanya, C.I. and Ezeunala M.N.²

¹ Department of Parasitology and Entomology, Nnamdi Azikiwe University Awka, Nigeria. ² Department of Microbiology and Biotechnology, National Institute of Pharmaceutical Research and Development, Idu, Abuja Nigeria.

Human parasitic ova and cyst in local food drinks sold in open markets in Enugu municipality, South - East, Nigeria. *The Bioscientist, Vol 2 (1) Pp 65-69, January 2014.*

Abstract

A cross sectional study on the prevalence of parasitic ova and cyst in local food drinks (Soya milk, Kunu-zaki and Zobo) from four open markets in Enugu municipality, Southeast Nigeria was carried out in March, 2013. Fifty (50) bottles of each drink were bought from hawkers from four different markets, making a total of 600 bottles of drinks. Formol-ether concentration technique was employed to concentrate the parasites in the drinks. Of the 600 bottles of drinks whose content were examined 254(42%) were contaminated with ova and cysts of parasites. Parasites isolated were protozoan (Entamoeba histolytica, Giardia lamblia, Balantidium coli) and helminthes (Ascaris lumbricoides and Trichuris trichiura). E. histolytica was the highest (27.6%) type of parasite recorded. The highest number of parasites 166(30.1%) was recorded in food drinks collected from

Ogbete main market while the lowest number of parasites 117(21.4%) was from Artisan market. Kunu-zaki drink recorded the highest number 192(31.9%) of parasites. However the number of parasites isolated from the different drinks and from different markets did not differ significantly (P>0.05). Study indicated that most of the locally made food drinks being hawked in Nigerian markets and environ are contaminated. Such drinks which are cheap with high nutritional values are beverages from beans, leaves and sorghum. Unhygienic environment and poor handling could be the sources of contamination. Health education involving the food drink producers as well as monitoring the activities and the environment of such producers by health workers is advocated.

Keywords: Parasites, local food drinks, hygiene, South-east Nigeria.

123 Ezenyi I.¹, Aboh M.²

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

² Department of MB&BT, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Distinct mechanisms; including heme biomineralization inhibition, account for Antiplasmodial and antimicrobial effects of *Protea madiensis* leaf extracts. *Basic & Clinical Pharmacology & Toxicology, 2014, vol. 115 (Suppl. 1): 112.*

Abstract

Recently, new strains of bacteria, fungi and parasites have emerged across the globe. This negatively impacts health, general well-being and seriously hinders economic development. Besides exploring small chemical molecules, continuous research on natural products must still be pursued for the discovery of new leads in the development of antiinfectives as they are widely available and are chemically diverse. The plant, Protea madiensis Oliv. (Proteaceae) is traditionally used to treat symptoms of malaria and other infectious diseases in West and central Africa. This study was aimed at investigating the ability of P. madiensis leaf extracts to suppress early malaria infection and microbial growth. P. madiensis methanol leaf extract was prepared by maceration in 80% methanol while successive extracts were prepared by consecutive extraction with n-hexane, dichloromethane, methanol and water. The crude extract was applied to cytotoxicity, antimicrobial, in vivo lethality and suppressive antimalarial tests whereas successive extracts were tested for antimicrobial and malaria suppressive activity in mice. Microorganisms used were Escherichia coli, Salmonella typhi, Proteus mirabilis, Staphylococcus aureus, Bacillus subtilis and Candida albicans. THP-1 cells were used for cytotoxicity testing while chloroquine sensitive Plasmodium berghei was used for the 4day antimalarial test in mice. Results obtained showed the methanol extract was non-cytotoxic at 100 lg/ml and non-lethal in mice at doses up to 5 g/kg. At a dose of 400 mg/kg, it significantly P <0.05 suppressed parasitaemia by 82.43% and this effect was improved only in the aqueous successive extract 98.65%, P < 0.001, which was comparable with the effect of chloroquine. The aqueous successive extract also blocked heme conversion to malaria pigment in vitro by 51.51–65.4% in preliminary tests. In contrast, antimicrobial activity of the crude was enhanced only in the successive methanol extract, which did not suppress parasitaemia in mice. Antimicrobial effects of the methanol extract was evident by MIC values that ranged from 0.125 - 0.5 mg/ml while MICs of the successive methanol extract were less than or equal to 0.125 mg/ml, comparable with chloramphenicol. Hence, P. madiensis methanol extract possesses antiplasmodial and antimicrobial effects brought about by different chemical components acting distinctively, and can be studied as a source of new anti-infectives.



NIPRD Compendium of Research Publications (2010 - 2018)

124 Ezenyi I.C.¹, Salawu O.A¹, Kulkarni R.², Emeje M.³

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu, Abuja, Nigeria.

² Organic Chemistry Division, National Chemical Laboratory, Pune 411008, India. ³ Centre for Nanomedicine and Biophysical Drug Delivery

Antiplasmodial activity-aided isolation and identification of quercetin-4'-methyl ether in *Chromolaena odorata* leaf fraction with high activity against chloroquine-resistant Plasmodium falciparum.

Parasitology Research, 2014, 113: 4415–4422.

Abstract

The present study was undertaken to evaluate the antiplasmodial activity of *Chromolaena odorata* leaf extract and gradient fractions through in vivo and in vitro tests, aimed at identifying its antiplasmodial constituents. Sub-fractions obtained from the most active gradient fraction were further tested for cytotoxicity against THP-1 cells, chloroquine sensitive(HB3) and chloroquine-resistant (FCM29) Plasmodium falciparum. Our results showed the dichloromethane gradient fraction was most effective, significantly (P<0.05) suppressing infection by 99.46 % at 100 mg/kg body weight. Amongst its 13 sub-fractions (DF1–DF13), DF11 was highly active, with IC50 of 4.8 and 6.74 µg/ml against P. falciparum HB3 and FCM29, respectively. Cytotoxicity of DF11 was estimated to be above 50 µg/ml, and its separation by column chromatography yielded a flavonoid which was characterized as 3, 5, 7, 3' tetrahydroxy-4'-methoxyflavone from its spectroscopic data. It significantly suppressed infection (65.43–

81.48 %) in mice at 2.5–5 mg/kg doses and compared favourably with the effects of chloroquine and artemisinin. It may therefore serve as a useful phytochemical and antiplasmodial activity marker of *C. odorata* leaves, which exhibit potential for development as medicine against malaria.

Keywords: Malaria. Medicinal plant. Plasmodium falciparum. Toxicity

125 Grace E. UGBABE¹*, Koji TAKAYAMA², Abiodun E. AYODELE³, KALPANA S. Joshi⁴, NJOKU Moses⁵, Ibrahim ILIYA¹ and Joseph I. OKOGUN¹

¹Department of Medicinal Plant Research and Traditional Medicine (MPR & TM), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja - Nigeria

²*The University Museum, The University of Tokyo, Tokyo – Japan.*

³Botany Department, University of Ibadan, Ibadan - Nigeria

⁴Biotechnology Department, Sinhgad Collage of Engineering, Vodgaon (Budruk), Pune - India

⁵Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development (NIPRD)

Phylogenetic analysis of Nigerian *Bignoniaceae (Juss)*, based on the cpDNA gene sequences rbcL and ndhF.

Asian Academic Research Journal of Multidiciplinary (2014) Vol 1(19): pp.423-440

Abstract:

Aim: A phylogenetic analysis based on two chloroplast genes, rbcL and ndhF, were used to characterize the Nigerian *Bignoniaceae*.

Study Design: These were used to determine the phylogeny of the Nigerian *Bignoniaceae* and the extent of relatedness of Schlegelia and Paulownia to the 'core' *Bignoniaceae*. The choice of rbcL and ndhF, was because of the presence of the primary enzyme responsible for autotrophy and continual adaptation of plants to geographical environments.

Place and Duration of Study: This study was carried out in Department of Medicinal Plant Research and Traditional Medicine, NIPRD; Department of Biology, Faculty of Science, Chiba University, Chiba – Japan and Biotechnology Department, Sinhgad College of Engineering, Pune, India between 2009-2012.

Methodology: Ten species were collected in Nigeria during the period 2007-2009. DNA was extracted from leaf samples by CTAB and amplified to determine the sequences of chloroplast genes, rbcL and ndhF. Maximum parsimony analysis was done including other Genbank data of Boraginaceae, Verbenaceae, Scrophulariaceae, Lamiaceae, Gesneriaceae, Passifloraceae, Oleaceae, Gentianaceae and Solanaceae to infer phylogenetic relationships to the Nigerian Bignoniaceae.

Results: The resulting trees provided the basis for a provisional classification. Our study revealed that the bootstrap values which supported the phylogenetic position of *Bignoniaceae* within the order Lamiales are very low compared to earlier reports. Excluding Paulownia and Schlegelia, Bignoniaceae were found to be monophyletic. Tribes *Bignoniaee*, Crescentiaeae and Coleeae each form a monophyletic group based on this analysis, while the tribe Tecomeae is paraphyletic. Morphologically, the species studied were classified into four major tribes (*Crescentieae, Jacarandeae, Coleeae and Tecomeae*), while phylogenetically there is a need to separate the genus Tecoma and Tebebuia from the other Tecomeae because they occupied lower positions in the phylogenetic trees when the rbcL and the ndhF gene sequences were used.

Conclusion: Our results suggests a need for the revision of the Nigerian *Bignoniaceae*, affirm the limitations of morphological characteristics in classification, and revealed the widening genetic identity in the plant that may continue to define their true new properties. It also reaffirms the status of Paulownia and Schlegelia. This provides useful information on evolutionary pathway of the Bignoniaceae in Nigeria and perhaps West African Flora.

Keywords: *Bignoniaceae*; gene sequences; classification; ndhF; phylogeny; rbc

126 Grace E. UGBABE¹*, Abiodun E. AYODELE², S. Joshi KALPANA³ and Joseph I. OKOGUN¹

¹Medicinal Plant Research and Traditional Medicine (MPR & TM) Department National Institute for Pharmaceutical Research and Development (NIPRD), Idu-Industrial Area, P.M.B 21, Garki-Abuja, Nigeria. ²Botany Department, University of Ibadan, Ibadan, Nigeria. ³Microbiology & Biotechnology Department, Sinhgad College of Engineering (SCOE), Vadgaon (Budruk) Pune – 411 041, India

Ultra-Structure of the Leaf Surfaces of the Family Bignoniaceae Juss. in Nigeria. Global Journal of Botanical Science, 2014, 2 pp. 37–44

Abstract

The leaf surfaces of the Nigerian *Bignoniaceae* were studied using the Scanning Electron Microscope (SEM). The species in this study were: *Crescentia cujete Linn. Jacaranda mimosifolia* D. Don., Kigelia africana (Lam) Benth. Markhamia tomentosa (Benth) K. Schum., Newbuldia laevis (P. Beauv.) Seemann ex Bureau. Spathodea campanulata P. Beauv. Stereospermum acuminatissimum K. Schum. Stereospermum kunthianum Cham. Tabebuia rosea (Berthol) D. C. Tecoma stans (Linn) H, B &K. and Tecoma capensis. The study was conducted using anatomical characters to identify and



delimit the Nigerian taxa at the tribal level. Stomata were observed on the abaxial surfaces of all the species studied. Sunken stomata were found in K. africana while the others had raised stomata. Peltate trichomes were found on some species like the abaxial surfaces of C. *cujete, J. mimosifolia, M. tomentosa, N. laevis T. stans and T. rosea* and on the adaxial surfaces of *C. cujete, M. tomentosa, N. laevis, S. acuminatissimum and T. rosea. M. tomentosa* had both glandular and non-glandular trichomes on the abaxial surface while T. capensis had only non-glandular trichome on the adaxial surface. The non-glandular trichomes of M. tomentosa were long and with blunt tip while those of T. capensis were short and with pointed tips. Striae were found on the abaxial surfaces of *J. mimosifolia and T. stans* and on both the abaxial and adaxial surfaces of *T. capensis*. The genera *Tabebuia* and *Tecoma* are suggested to be retained in the tribe Tecomeae based on striations on their epidermal cells. While other members be assigned to a new tribe '*Spathodeae*'.

127 Jemilat Aliyu IBRAHIM¹*, Henry Omoreige EGHAREVBA¹, Ibrahim ILIYA², Florence TARFA³, Abiodun Emmanuel AYODELE⁴

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, PMB 21, Garki, Abuja Nigeria ²Department of Pharmacy. University of Maiduguri, Maiduguri. Borno State. Nigeria ³Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development, PMB 21, Garki, Abuja Nigeria ⁴Department of Botany, University of Ibadan, Ibadan Nigeria

Chemical profiles as chemotaxonomic tools for *Loranthaceae* in Nigeria. *African Journal of Plant Science*, 2014, Vol. 8(7): 343–352

Abstract

The *Loranthaceae species* are widespread throughout most regions of the world, and are used for various medicinal and ethnopharmacological purposes. However the species vary in their pharmacological activity, sometimes in correlation with the species from same ecological region or host plant, due to variation in the chemical profiles. This has led to great emphasis on caution in identification and collection for use. The wide array of secondary metabolites in Loranthaceae species are believed to be of chemotaxonomic importance. In this study, the leaves of seven Nigeria species from different ecological locations were screened for the profiles of their secondary metabolites with a view towards establishing chemotaxonomic significance. The results show the complete absence of alkaloid from all the species. Over 80% of the species tested positive for balsam, flavonoids and phenols, more than 70% tested positive for tannins, 60% for saponins, and about 50% tested positive for glycosides and volatile oils. Resins, phlobatannin, terpenes, sterols and anthraquinones were present in less than 50% of the species. Some metabolites were completely absent from one or more species. The patterns displayed could be of chemotaxonomic importance for *Loranthaceae* in Nigeria.

Keyword: Loranthaceae, chemotaxonomy, secondary metabolites, Nigeria

NIPRD Compendium of Research Publications (2010 - 2018)

128 Kirim R. A.¹* Mustapha K. B¹, Isimi C. Y², Ache T¹., Sadiq A¹., Galadima I¹. H., Gamaniel K. S³

¹Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

²Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

³Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Quality assessment of different brands of Diclofenac tablets in some pharmacy stores in Abuja. African Journal of Pharmacy and Pharmacology, 2014; 8(37)

Abstract

Diclofenac is one of the most commonly used non-steroidal anti-inflammatory drugs for the treatment of pain, rheumatism and other inflammatory conditions. The drug has analgesic, antipyritic and anti-inflammatory effects. Rapid and sensitive-reversed phase HPLC method and UV spectrophotometer were used to analysis the amount of Diclofenac in the samples and detection was at 276nm. Beer's law is obeyed in a concentration range from of 1.95 to 31.52ug/ml with a correlation coefficient (r=0.998) for the UV spectrophotometer analysis, while in HPLC analysis, the calibration curve was linear with correlation coefficient of 0.9999 at concentration range of 10-80µg/ml and coefficient of variance (CV%) of less than 5%. Percentage contents of Diclofenac from the different pharmaceutical preparations were within 98% to 104% but 42.86% failed, while 57.14% passed the BP recommended range of 95-105.0% of the prescribed content. Recoveries of Diclofenac from various brand of Diclofenac were within 72% to 118%, with standard deviations ranging from 0.1% to 6.2% for UV method. The Drug release profiles were evaluated in vitro using a dissolution test apparatus. The USP paddle method was selected to perform the dissolution profiles of Diclofenac Sodium. From the result, there is still need for the policy markers in the country to checkmate the imports of different brands of pharmaceutical products into the Nigerian market, since almost 50% of the drug analyzed is above the stated amount claimed by the manufacturers.

Keywords: Diclofenac, reversed phase- HPLC, UV-spectrophotometer, percentage content, Nigerian market

129 Lucy Binda John-Africa^{1,2}*, Nuhu Mohammed Danjuma², Joseph Akpojo Anuka² And Ben Ahmed Chindo^{1,2,3}

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, P.M.B 21 Garki, Abuja, Nigeria.

² Department of Pharmacology and Therapeutics, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

³ Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, Kaduna State University, Kaduna, Nigeria.

Sedative properties of *Mitracarpus villosus* leaves in mice. *International Journal Biological and Chemical Sciences 2014 8(5): 2132-2142*



Abstract

The leaves of *Mitracarpus villosus (Sw.) DC*. (Rubiaceae) have several therapeutic applications in the West African folk medicine for the management of a plethora of stress-related diseases including headaches. This study was designed to evaluate the sedative properties of the ethylacetate extract of *Mitracarpus villosus* on open field (OFT), diazepam-induced sleep, staircase climbing, head-dips in the hole-board test and rota rod test in mice. Graded doses (100 - 400 mg/kg) of the extract significantly and dose-dependently prolonged the duration of diazepam-induced sleep (P<0.05), decreased the number of squares crossed in the OFT (P<0.0001), decreased number of head-dips in the hole-board test (P<0.05) and reduced steps climbing (P<0.05) in mice. The extract at the doses tested had no effect on motor coordination as observed in the rota-rod treadmill assay in mice. Our results revealed that the ethylacetate extract of *Mitracarpus villosus* leaves may contain psychoactive principles that are sedative in nature, thus supporting further development of the psychoactive components of this plant for management of stress-related diseases. © 2014 International Formulae Group. All rights reserved.

Keywords: Mitracarpus villosus, sedation, diazepam, locomotion.

130 Lucy Binda John-Africa¹*, Tijani Adeniyi Yahaya¹, Christianah Yetunde Isimi²

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu, Abuja

² Department of Raw Materials Research and Pharmaceutical Technology, National Institute for Pharmaceutical Research and Development, Idu, Abuja

Anti-Ulcer and Wound Healing Activities of *Sida Corymbosa* in Rats. *African Journal of Traditional Complementary and Alternative Medicine 2014 11(1):87-92.*

Abstract

There are strong beliefs in the efficacy of traditional medical systems worldwide. Many herbs have been acclaimed to possess antiulcer effects and could be unexplored sources of new lead compounds. Sida corymbosa R. E. Fries (Malvaceae) is used in Northern Nigeria to treat ulcers and wounds. This work aimed to investigate the usefulness of Sida corymbosa in treatments of stomach ulcers and wounds in traditional medicine. Materials and Methods: Effect of the aqueous extract was determined on gastric ulceration, rate of wound healing and inflammation using ethanol-induced and diclofenac-induced ulceration, wound excision model and albumin-induced inflammation respectively in rats. Results: The study demonstrated the anti-ulcer activity of Sida corymbosa as the extract (250, 500 and 1000 mg/kg) showed a dose-dependent, significant (P<0.05) reduction of ulcer indices against gastric ulcers induced by both ethanol and diclofenac. Topical application of a formulation prepared with the extract of Sida corymbosa on surgically created incisions produced an increase in the rate of healing of the wounds. The extract of Sida corymbosa exhibited a significant (P < 0.05), dose-related decrease in inflammation induced by fresh egg albumin. This study showed that Sida corymbosa has constituents with the ability to reduce the severity of haemorrhagic gastric lesions, promote wound healing and reduce inflammation. These actions may be attributed to any one of the active constituents or as a result of synergistic effects of these phytoconstituents. Conclusion: This study validates the use of the plant in traditional medicine for the treatment of stomach ulcers and wounds.

Keywords: Sida corymbosa, Anti-Ulcer, Wound Healing

NIPRD Compendium of Research Publications (2010 - 2018)

131 Njoku J.C¹, Ajayi J.A¹; Pitman S.L²; Dakul D.A¹; Njoku O.M³.

¹Applied Parasitology and Entomology Unit, Department of Zoology, Faculty of Natural Sciences, University of Jos, Jos, Plateau State;

² Plateau State Specialist Hospital, Jos, Plateau State;

³ Department of Microbiology and Human Virology, National Institute for Pharmaceutical Research and Development, Idu, Abuja.

Urogenital schistosomiasis in females from some suburban communities of Jos, north central Nigeria. *Journal of Pharmacy and Biological Sciences (IOSR-JPBS), Vol. 9(3) Ver. III; 2014, PP 69-79.*

Abstract

Schistosomiasis of the urethral tract leads to the destruction of the mucosal cells of the reproductive organs by the piercing action of the oval spines. Urogenital schistosomiasis has remained a major contributor to the disease burden in Plateau State, Nigeria. The urine syringe filtration technique and urine strip test were diagnostic methods used to determine the prevalence, intensities and symptoms of Schistosoma haematobium infections in the study population. Out of the 1245 persons screened parasitologically, 1007 were apparently healthy with a prevalence of 265 (26.3%: 95% C.I. 23.5 -29.1%) with an overall mean egg excretion of 87eggs/10ml and females aged 11-20years had the highest prevalence (21.7%; 95% C.I 19 – 24%) compared to the children 0 - 10 years who were the least infected (0.2%; 95% C.I. 0.1 - 0.5%). Statistically, a significant difference was observed among the different age groups (Cal $\chi 2 \ 0.05 = 40.94 > \text{Tab} \ \chi 2 \ 0.05 \ \text{df.5} = 11.07$; P < 0.0). The remaining 238 persons were symptomatic with a prevalence of 51 (21.4%: 95% C.I. 16.1-26.7) and an overall mean egg excretion of 78 eggs/10 mls with females aged 21-30 years (29.6%) having the highest infection. Although, statistically, symptomatic urogenital schistosomiasis was not dependent on age (Cal $\chi 2\ 0.05 = 8.32 < \text{Tab}\ \chi 2\ 0.05\ \text{df5} = 11.07$; P > 0.05). In relation to associated symptoms, 4.9% persons had haematuria, 27.9% had proteinuria while a larger population of 64.6% had neither haematuria nor proteinuria in their urine. For water contact patterns, economic activities (65.7%) including, irrigation agriculture and domestic chores (23.6%) accounted for most water contacts especially during the main dry season.

Keywords: Haematuria, Human water contact activities. *Proteinuria, Schistosoma haematobium,* Urogenital Schistosomiasis.

132 Nkemakolam Nwachukwu¹*, Martins O. Emeje², Sabinus I. Ofoefule³

¹Department of Pharmaceutics & Pharmaceutical Technology, University of Port Harcourt, Choba, Rivers State, Nigeria

²Department of Pharmaceutical Technology & Raw Material Development, National Institute For Pharmaceutical Research & Development, Idu, Abuja, Nigeria

³Department of Pharmaceutical Technology & Industrial Pharmacy, University of Nigeria, Nsukka, Enugu State, Nigeria

Formulation and In Vitro Evaluation of vitamin A palmitate tablets containing Carbopol 971. *American Journal of Pharmacy and Pharmacology, 2014; 1(4): 45-50.*

Abstract

The sustained release (SR) properties of vitamin A palmitate (VAP) from tablet matrices formulated with a poly (acrylic) acid polymer, Carbopol 971 (CP 971) were investigated *in vitro*. Formulations containing Carbopol 971 at concentrations of 10, 20, 30 and 40 % w/w were wet granulated using ethanol 95% v/v. Micromeritic evaluation of the dried granules, tablet characterization and drug dissolution studies were done in 0.05 M phosphate buffer (containing Triton X – 100®), simulated intestinal fluid (SIF) and simulated gastric fluid (SGF) without enzymes. Results obtained showed a burst release of VAP within 60 min (1 h) of the test followed by a slow retardation of VAP release over the next 7 h as the concentration of the CP 971 increased indicating SR activity. Dissolution of vitamin A palmitate was higher in the 0.05 M phosphate buffer than in SIF and SGF. The release kinetics involved mixed order while release mechanism was dominantly diffusion controlled (Fickian or Case I).

Keywords: Sustained Release, Micromeritic, Spectrophotometric, Carbopol 971, Vitamin A Palmitate

133 Nwachukwu, N.¹*, Emeje, M. O.², Ofoefule, S. I.³

¹Department of Pharmaceutics & Pharmaceutical Technology, University of Port Harcourt, Choba, Rivers State, Nigeria

²Department of Pharmaceutical Technology, National Institute for Pharmaceutical Research & Development, Idu, Abuja, Nigeria

³Department of Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka, Enugu State, Nigeria.

Application of Carbopol 971 as a sustained release matrix for theophylline hydrate tablets. *American Journal of Pharmacy and Pharmacology, 2014; 1(1): 6-11.*

Abstract

An *in vitro study* on the application of Carbopol 971 (CP 971) as a matrix in the formulation of oral sustained release (SR) tablets of theophylline hydrate was carried out. Carbopol 971 was employed as matrix in the concentration range of 10 to 40 % w/w. The matrix tablets were prepared by the wet granulation method with 95% v/v ethanol as the dispersing fluid. Dissolution rate studies on the tablets were carried out over an 8 h period in three media of 0.1 N Hydrochloric acid (HCl, pH 1.2), simulated gastric fluid, (SGF, pH 1.3) without pepsin and simulated intestinal fluid (SIF, pH 7.2) without pancreatin. There was significant retardation of drug release in all three media as the polymer concentration increased. A burst release was achieved within 60 min (1 h), after which there



was a gradual and sustained release of the drug over 7 h. Theophylline release was faster in the alkaline medium (SIF) than in the acidic media (0.1 N HCl and SGF). The mechanism of release of the formulations at all concentrations of the polymer matrix was dominantly diffusion controlled (Fickian or Case I).

Keywords: Theophylline Hydrate, Carbopol 971, Dissolution Studies, Sustained Release, *In vitro*, Matrix

134 Nwachukwu, Nkemakolam¹*, Emeje, O. Martin², Ofoefule, I. Sabinus³

¹Department of Pharmaceutics & Pharmaceutical Technology, University of Port Harcourt, Choba, Rivers State, Nigeria

²Department of Pharmaceutical Technology, National Institute for Pharmaceutical Research & Development, Idu, Abuja, Nigeria

³Department of Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka, Enugu State, Nigeria.

Evaluation of a poly (acrylic) acid polymer as a sustained release matrix for ciprofloxacin hydrochloride. *International Journal of Science, Technology and Society, 2014; 2(4): 85-90*

Abstract

An evaluation of the sustained release (SR) properties of a polyacrylic acid polymer, Carbopol 971(CP 971) as matrix in the formulation of ciprofloxacin hydrochloride (CH) tablets was carried out. The CP 971 in concentrations of up to 40 % w/w were wet granulated using ethanol 95% v/v and the dried granules were evaluated for packing, densification and flow properties. The tablets were evaluated for hardness, friability, uniformity of weight and content of active ingredient. The formulations dissolution profiles were tested in 0.1 N Hydrochloric acid (0.1 N HCl, pH 1.3), simulated gastric fluid (SGF, pH 1.2) and simulated intestinal fluid (SIF, pH 7.2) without enzymes. Results obtained showed significant retardation (p < 0.05) of ciprofloxacin release as the polymer concentration increased. Drug release was significantly different in the three media used with the release rate being faster in SGF than 0.1 N HCl and SIF. This can be attributed to the high solubility of the drug in acidic media. More than 50% of drug content was released within 4 h. Ciprofloxacin tablets containing 20 % w/w was adjudged the best formulation and drug release from the formulation was diffusion controlled (Fickian).

Keywords: Poly (Acrylic) Acid, Ciprofloxacin Hydrochloride, Micromeritics, Densification, Sustained Release

NIPRD Compendium of Research Publications (2010 - 2018)

135 Okhale S.E.^{1*}, Ugbabe G.E.¹, Bamidele O^1 , Ajoku G.A.² and Egharevba H.O.¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P. M. B. 21 Garki, Abuja, Nigeria. ²Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, P. M. B. 21 Garki, Abuja, Nigeria.

Phytochemical and antimicrobial studies on extractives of *Calyptrochilum emarginatum (SW)* Schltr (Orchidaceae) growing in Nigeria.

Academic Journals: Journal of medicinal Plant Research 2014. Vol. 8(4), Pp. 223-228.

Abstract

Calyptrochilum emarginatum is an epiphytic shrub belonging to the orchid family with numerous medicinal uses. Phytochemical investigation of the leaf extractives revealed the presence of tannins, flavonoids, carbohydrates, terpenes, sterols and saponins. Alkaloids and cardiac glycosides could not be detected. Antimicrobial studies of the extracts revealed that at a minimum inhibitory concentration (MIC) of 1.6 mg/ml, the hexane and methanol successive extracts exhibited bactericidal activities against Staphylococcus aureus. The straight run methanol extract and the successive ethyl acetate extract did not show any activity against all the microorganisms investigated namely, *S. aureus, Candida albicans, Klebsiella pneumonia, Escherichia coli and Salmonella paratyphi* at the same concentration.

Keywords: *Calyptrochilum emarginatum*, orchid, phytochemicals, antimicrobial, minimum inhibitory concentration (MIC).

136 Okhale, Samuel E., John Decatur, Yasuhiro Itagaki, Joseph O. Amupitan, George I. Ndukwe, George Ellestad, Joseph I. Okogun.

Tetrahedron, 2014 70(37): 6656–6662. DOI: 10.1016/j.tet.2014.06.067.

Abstract

Herein we describe an unprecedented formation of a cyclopropane ring through the conversion of a methyl group that was not functionalized for the purpose. In a one-step reaction, 7-deacetoxy-7ahydroxygedunin (4) afforded two new gedunin derivatives, namely 7-deacetoxy-13,14,18-cyclopropyl-7a,15b, 17x-trihydroxy-gedu-16-oic acid (7) and 7-deacetoxy-9,11-en-7a,15b-dihydroxygedunin (8) along with the known 7-deacetoxy-7,9-diene-15b-hydroxygedunin (5).

Keywords: *Gedunin*, Acid-catalysed rearrangement reaction, Intramolecular cyclopropanation, Chemosystematics, Phylogenetic history

137 Samali A.¹, Mohammed M. I², Ibrahim M.B.² and K. S. Gamaniel K.S.³

¹ Department of Medicinal Chemistry & Quality Control, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

² Department of Pure and Industrial Chemistry, Bayero University Kano, Kano State

³ Director General Office, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

Quality Status of Brands of Chloroquine Tablet Dosage Form from Northern Part of Nigeria. *Journal of Chemical and Pharmaceutical Research, 2014, 6 (11):75-79*

Abstract

Quality of anti-malarial drugs in malaria endemic countries needs more attention than ever before due to increased circulation of substandard drugs in the society. In this study, physicochemical quality parameter test of common brands of chloroquine tablet dosage forms obtained from Northern part of Nigeria was evaluated using appropriate methods. The level of non-compliance with respect to registration with NAFDAC and manufacturer's address, weight variation, friability, hardness and disintegration are 12.5%, 12.5%, 71.43%, 28.57% and 0% respectively. The results indicated gross quality failure of all the quality parameters analyzed, therefore there is urgent need to prompt for action in order to arrest the situation, otherwise the region and the country as whole is at risk. This study serves as a litmus test for drug quality condition for the entire country.

Keywords: Anti-malaria, chloroquine, quality, Northern Nigeria.

138 Tijani Adeniyi Yahaya, Samuel Ehiabhi Okhale, Salawu Oluwakanyinsola Adeola.

Neuropharmacological effects of standardized aqueous stem bark extract of *Parkia biglobossa* in Wistar rats. *Avicenna Journal of Phytomedicine 2014. 4(1):59-71*

Abstract

Objective: *Parkia biglobossa* stem bark decoction is a popular medicinal plant preparation used as calming agent for tensed patients in traditional medicine. The aim of this study was to evaluate the effects of aqueous stem bark extract of Parkia biglobossa (AEPB) and its active fraction AEPBF3 on anxiety, spontaneous alternation behavior, and locomotor activity. The open field apparatus was used to evaluate effects of AEPB and AEPBF3 on locomotion. The APBE and the active fraction AEPBF3 were standardized using reverse phase high performance liquid chromatography to establish finger print to ascertain identity and stability

of the extracts over time. **Materials and Methods:** The oral median lethal doses (LD50) of AEPB and AEPBF3 were evaluated using modified Lorke's method in rats. The effect of APBE (50-200 mg/kg p.o.), APBEF3 (25 and 50 mg/kg p.o.), diazepam (2.5 mg/kg, i.p.), and 10 ml normal saline/kg on anxiety-like behavior, spontaneous alternation behavior, and locomotion activity were evaluated in rats on elevated plus maze (EPM), Zero-maze, Y-maze, and open field apparatus, respectively. The oral LD50 values of AEPB and AEPBF3 were estimated to be 5000 mg/kg and 3800 mg/kg body weight in rats, respectively. **Results**: AEPB and AEPBF3 significantly (F6, 41=2342, p<0.0001) increased time spent in the open arm of EPM and significantly (F6, 41=2323, p<0.0001) increased time spent in open arms of the Zero maze. The AEPB and AEPBF3 administration produced significant increase

(F5, 35=154, p<0.0001) in spontaneous alternation behavior in rats. The AEPB extract and its

fraction AEPBF3 significantly increased total locomotor activity (F6, 41=413, p<0.0001) and rearing (F6, 41=150, p<0.0001) in the open field apparatus. **Conclusion:** The results of the present study provided evidence for anxiolytic and nootropic effects of the AEPB and AEPBF3, thus providing scientific basis for its continuous use in the management of neuropsychiatric disorders characterized by apprehension and amnesia.

Keywords: Anxiety, Locomotion, Memory, *Parkia biglobosa*, Spontaneous alternation, behaviour, Y-maze

139 Yerima M.¹, Anuka J.A.¹, Salawu O.A.^{1,2} And Abdu-Aguye I.¹

¹ Department of Pharmacology and Therapeutics Ahmadu Bello University, Zaria Nigeria. ² Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD) Abuja, Nigeria. ³ Department of Human Physiology Ahmadu Bello University Zaria Nigeria.

Antihyperglycaemic Activity of the Stem-Bark Extract of *Tamarindus indica L*. on Experimentally Induced Hyperglycaemic and Normoglycaemic Wistar Rats. *Pakistan Journal of Biological Sciences*, 2014, Vol. 17(3), pp. 414-418.

Abstract

Diabetes is the most common endocrine disease and its prevalence is reaching epidemic proportion worldwide. In 2002, WHO Expert Committee on diabetes mellitus recommended an urgent and further evaluation of the folkloric methods of managing the disease. In response to this recommendation, several medicinal plants are currently being investigated for their hypoglycaemic activity and one of such plants is Tamarindus indica. Tamarindus indica is a slow growing tree that is resistant to strong winds and perennial. The stem-bark extract of the plant is used locally for the management of diabetes. The stem-bark extract of Tamarindus indica L. was investigated for its hypoglycemic action on experimentally induced hyperglycaemic Wistar rats using a single dose of alloxan monohydrate (150 mg kg-1 IP). The oral LD50 of the extract was found to be greater than 5,000 mg kg-1. Phytochemical screening revealed the presence of carbohydrates, glycosides, saponins, flavonoids, cardiac glycosides, tannins, alkaloids and triterpenes. The 1000 mg kg-1 dose of the extract lowered the blood glucose level significantly (p<0.05) at the 4th, 8th and 16th h. The 500 mg kg-1 lowered the BGL significantly (p<0.05) throughout the study. In the oral glucose load method the 1000 mg kg-1 dose of the extract significantly (p<0.05) lowered elevated blood glucose at the 3rd and 5th. The 500 mg kg-1 lowered the blood glucose from the 1st to the 5th, while the 250 mg kg-1 also lowered the blood glucose level but only significantly at the 5th h. The extract is practically non toxic when administered orally. The stem-bark extract of Tamarindus indica Linn significantly lowered elevated Blood Glucose concentration (BGL) in the experimental animal models, while the crude extract was able to prevent an elevation in BGL when used in the oral glucose load model.
140 Yerima M^1 , Anuka J.A¹, Salawu O.A², Abdu-Aguye I.¹ and Tanko. Y^3

¹ Department of Pharmacology and Therapeutics Ahmadu Bello University, Zaria Nigeria. ² Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD) Abuja, Nigeria.

³Department of Human Physiology Ahmadu Bello University Zaria Nigeria.

Antihyperglycaemic activity of the flavonoid-rich fraction of the extract of *Tamarindus indica* L. on experimentally induced hyperglycaemic wistar rats. *Journal of Applied Pharmaceutical Science*, 2014, Vol. 4(08), pp. 064-068

Abstract

Diabetes is the most common endocrine disease and its prevalence is reaching epidemic proportion worldwide. *Tamarindus indica* is a slow growing tree that is resistant to strong winds and perennial. The stem-bark extract of the plant is used locally for the management of diabetes. The objective of this work was to investigate the potentials of the flavonoid-rich portion of *Tamarindus indica* at lowering elevated blood glucose level. The flavonoids-rich portion of the stem-bark extract of *Tamarindus indica L*. was investigated for its hypoglycemic action on experimentally induced hyperglycaemic Wistar rats. The oral LD50 of the extract was found to be 1,265 mg/kg. The flavonoid-rich fraction lowered the Blood Glucose Level (BGL) in the three doses used (100, 200 and 400 mg/kg) there was a significant reduction with the 400 mg/kg dose at 24 hours. The flavonoid-rich portion of *Tamarindus indica Linn* significantly lowered elevated BGL in the experimental animal models.

Keywords: Alloxan, fructose, Hyperglycemia, metformin, Tamarindus indica

YEAR 2013

141 Aboh M. I^{*} Oladosu P. and Ibrahim K.

Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu. P.M.B 21 Garki, Abuja.

Antimicrobial Activities of Some Brands of Household Disinfectants Marketed In Abuja Municipal Area Council, Federal Capital Territory, Nigeria. *American Journal of Research Communication 2013:Vol1 (8) 172-183*

Abstract

The antibacterial activities of five brands of household disinfectants were obtained from different locations within the Federal Capital Territory, Nigeria and comparatively studied using the Rideal Walker Phenol coefficient test and quantitative suspension test. The quantitative suspension test was carried out at the recommended concentrations of the manufacturers for household and utensil disinfection. The active compounds of the products according to their respective labels were: D1-(Chloroxylenol 4.8%), D2- (Dichloroxylenol 2%), D3- (Chlorhexidine gluconate 0.3% and cetrimide 3%), D4 - (Dichlorometaxylenol 2.5%), D5-(Chlorhexidine gluconate 0.3% and cetrimide 3%). The test organisms were clinical isolates of *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Klebsiella aerogenes* and *Escherica coli*. The phenol coefficient of the disinfectants ranged between 5.0 - 9.0. All the disinfectants showed strong bactericidal effect against the organisms used with exception to *Pseudomonas aeruginosa* to which only D5 and D3 were effective.

Keywords: Antibacterial activity, Disinfectants, Neutralizer

142 Bulus Adzu¹; Kudirat Bola Mustapha²; Collen Masimirembwa³; Obiageri Obodozie² Rukaiyatu Abdullahi Kirim²; Karniyus Shingu Gamaniel⁴

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, PMB 21, Abuja, Nigeria

² Departments of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development, PMB 21, Abuja, Nigeria

³ African Institute of Biomedical Science and Technology (AiBST), Cnr Chinhoyi Str./Jason Moyo Ave. No. 9 at LAPF Centre, Harare, Zimbabwe

⁴ Director General/Chief Executive Officer, National Institute for Pharmaceutical Research and Development, PMB 21, Abuja, Nigeria.

Simulation of metabolism-based herb-drug interaction: towards safe and efficacious use of NIPRD-AM1. *Avicenna Journal of Phytomedicine. (2013) 3: (3), 201-204*

Abstract

To evaluate the effect of NIPRD-AM1 on CYP3A4 in order to generate clinically significant data for its safe and efficacious use.

99

Materials and Methods: NIPRD-AM1 is a phytomedicine developed from aqueous root extracts of *Nauclea latifolia Smith (Rubiaceae)* for the treatment of uncomplicated malaria. The effect of NIPRD-AM1 on CYP3A4 was measured with and without the addition of NIPRD-AM1, by testing different concentrations of the product at 37 °C in reactive mixtures with ketoconazole (2.5 μ M) as the positive control.

Results: Results showed a very low IC50 value of 0.01 mg/ml similar to that of ketoconazole (0.016 mg/ml).

Conclusion: Metabolic processes of NIPRD-AM1 are likely to inhibit CYP3A4, with potential implication on drugs that are CYP3A4 substrates. This is a promising approach for guidance towards the safe and efficacious use of NIPRD-AM1.

Keywords: CYP3A4; Herb-Drug Interactions; Nauclea latifolia; NIPRD-AM1

143 Egharevba Henry Omoregie* and Kunle Oluyemisi Folashade

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Idu Industrial Layout, Idu, P.M.B. 21 Garki, Abuja, Nigeria.

Broad Spectrum Antimicrobial Activity of Extracts of *Jatropha curca*. *Journal of Applied Pharmaceutical Science 2013, 3 (04), 083-087*

Abstract

Jatropha curcas L. leaf and stem were extracted successively with hexane, ethylacetate, methanol and aqueous methanol. The extracts were tested in vitro for activity against standard strains microorganisms and clinical isolates. The zones of inhibition, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) were determined. The organisms exhibited different degree of susceptibility to the inhibitory activity of the crude extracts. The zones of inhibition, MIC and MBC/MFC ranged from 14-37 mm, 1.25-10 mg/ml and 2.5-20 mg/ml for the susceptible organisms, respectively. The methanol extract was the most active and exhibited good activity against most food pathogens like Escherichia coli, Staphylococcus aureus, Salmonella typhimurium, Shigella dysenteriae, Psuedomonas aerugunosa, P. flourescenses, Klebsiella pneumonia and K. ozaenae. The highest activity was an MIC of 1.25 mg/ml and MBC of 2.5mg/ml. The activities observed could be due to the presence of some of the secondary metabolites like tannins, alkaloids, sterols, glycosides, saponins, terpenes and flavonoids which have been reported from the plant by other workers.

Keywords: Jatropha curcas, antimicrobial, vitexin, atherospermidine

144 Garba, S. T¹., Kolo, B.G¹., Samali, A.² &Nkafaminya, I. I.³

¹Department of Chemistry, P.M. B. 1069. University of Maiduguri, Borno State, Nigeria.

² National Institute for Pharmaceutical Research and Development Idu Industrial Area Abuja, Nigeria.

³ Department of Chemistry, P. M. B. 2076. Federal University of Technology Yola (FUTY). Adamawa State, Nigeria.

Enhanced Phytoextraction ability of *E. Indica* at different level of applied EDTA. *International Journal of Science and Nature (IJSN) 2013,.4(1). 72-78*

Abstract

Phytoextraction ability of the grass *Eleusine indica* under the influence of different level of applied chelator; ethylenediaminetetraacetic (EDTA) was assessed. Sets of laboratory experiment were conducted; viable seeds of the grass were seeded into 0.5-1.0kg experimental soil. The experimental soil was characterized for its physicochemical properties. Four days after germination the soil was treated with EDTA at the rate of; 1.5, 2.0, 3.0, 4.0, and 5.0 g/kg experimental soil. Experiments were watered every 5 days with 200 ml of water. At the end of the pot experiment the root and the shoot of the experimental grass were treated and analyzed. The result showed that at 1.5g EDTA for instance the levels; 114.30, and 3551.58µg/g were observed in the root whereas the shoot had 42.80 and 922.10µg/g for Cd and Zn respectively. At 3.0g EDTA the level increases to; 260.70, and 5558.93µg/g in the root and the shoot had; 36.55, and 686.88µg/g for the metals Cd, and Zn respectively. And at 5.0g EDTA the level equally increases to 337.08 and 5749.18µg/g for Cd, and Zn respectively in the root whereas the shoot had 25.85, and $446.85\mu g/g$ for the metals; Cd, and Zn respectively. Except for Cadmium in the shoot, the increase in the levels of the metals in the root and shoot was found to be directly proportional to the applied EDTA. The high level of the metal (Zn) in the shoot and with no symptom or sign of toxicity suggest that E. indica may be used as Zn hyperaccumulator when the level of the metal is much higher in the soil.

Keywords: Phytorestoraion, phytostabilization, soil, pollution, toxicity, environment, XRF, root, shoot

145 Ifeoma C. Ezenyi¹, Lalasoanirina Ranarivelo², Salawu A. Oluwakanyinsola¹ And Martins Emeje³

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, P.M.B. 21, Abuja, 900001 Nigeria.

² Centre National d' Application de Recherches Pharmaceutiques (CNARP), Antananarivo, 101 Madagascar.

³ Centre for Nanomedicine and Biophysical Drug Delivery, Advanced Biology/Chemistry Laboratory, National Institute for Pharmaceutical Research and Development, Idu, Abuja, Nigeria

Analgesic, anti-inflammatory, and heme biomineralization inhibitory properties of *Entada africana* ethanol leaf extract with antiplasmodial activity against *Plasmodium falciparum*.

Journal of Basic and Clinical Physiology and Pharmacology, 2013, 25(2):217-23.

Abstract: Background: *Entada africana (EA)* is a medicinal plant used in West Africa for the treatment of malaria fever, but its efficacy against malaria is yet to be scientifically validated. Our study explores the antimalarial potential of the ethanol leaf extract of *EA*.

Methods: The antiplasmodial activity of EA against chloroquine-sensitive (HB3) and chloroquineresistant (FcM29) Plasmodium falciparum was determined as well as its peripheral antinociceptive and anti-inflammatory properties. The effect of the extract on human monocytic (THP-1) cells was recorded as a measure of cytotoxicity, whereas the inhibitory effect on heme detoxification was evaluated as a possible mechanism of antiplasmodial activity.

Results: At a concentration of 100 μ g/mL, EA was noncytotoxic and displayed moderate antiplasmodial activity against HB3 and FcM29 (IC 50 = 26.36 and 28.86 μ g/mL, respectively). It also exhibited concentration-dependent inhibition of synthetic heme (IC 50 = 16 mg/mL). The

extract (200 mg/kg body weight) showed significant (p < 0.05) inhibition of paw inflammation, and significantly (p < 0.01, 0.05) reduced the number of abdominal writhes induced by acetic acid (58.62%-65.51%), which was higher compared to that of diclofenac (50%, p < 0.05).

Conclusions: These findings suggest that peripheral antinociceptive effects and parasiticidal activity of *EA* contribute to its antimalarial properties and it can be further explored as effective therapy against malaria infection.

Keywords: malaria; medicinal plant; Plasmodium falciparum.

146 Ifeoma Obidike, Okhale S. E. Aboh Mercy Itohan, Salawu Oluwakanyinsola Adeola

Isolation, fractionation and evaluation of the antiplasmodal properties of *Phyllanthus niruri* resident in its chloroform fraction.

Asian Pacific Journal of Tropical Medicine, 2013. 6(3):169-175.

Abstract

Objective: To investigate the antiplasmodial activity of Phyllanthus niruri (P. niruri) methanol extracts (ME) and its fractions in mice. Methods: P. niruri methanol extract and its chloroform, ethanol and aqueous portions were tested against chloroquine-sensitive Plasmodium berghei berghei in early, established and repository models of infection using Knight and Peter's 4-day suppressive model, Ryley and Peters curative model and Peters prophylactic model respectively. Results: Chemosuppression of parasitaemia (37.65%-50.53 %) was elicited by 100-400 mg/kg (b.w.) of ME. At doses of 100 mg/kg b.w., the chloroform fraction (F1) significantly (P<0.01) suppressed parasitaemia by 85.29%, while ethanol and aqueous fractions (F2 and F3, respectively) elicited 67.06% and 51.18% chemosupression. The most active fraction, F1 was selected for further antiplasmodial screening. In established infection, ME reduced parasitaemia (15.81% - 62.96%) while F1 significantly (P < 0.01) reduced parasitaemia (44.36% - 90.48%), with effects comparable to that of chloroquine (96.48%). The prophylactic antiplasmodial activity of ME (92.50% suppression) was also significant (P<0.01) and was more effective than pyrimethamine (85.00%). Additionally, cell membrane integrity of non-parasitized erythrocytes incubated with 125 - 500 mg/ml F1 was maintained. Conclusion: These findings indicate the antiplasmodial efficacy of P. niruri methanol extract, and the localization of this effect in its chloroform fraction.

Keywords: Malaria, Phyllanthus niruri, Plasmodium

147 Jemilat A. $IBRAHIM^1$ and A. E. $AYODELE^2$

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja ²Department of Botany and Microbiology, University of Ibadan, Ibadan Taxonomic Significance of Leaf Epidermal Characters of the Family Loranthaceae in Nigeria. **World Applied Sciences Journal, 2013, 24 (9): 1172-1179.**

Abstract

Members of the parasitic family *Loranthaceae* are known for their destructive nature to host plants as well as for their medicinal value. Taxonomic revision and distribution study of the family in Nigeria was recently carried out. The taxonomic importance of leaf epidermal characters in the family Loranthaceae has been investigated with light microscopy in the present study. Amiphstomatic leaf type, polygonal cell shape, straight to curved anticlinal wall and pericytic stomata types were features common to all the species. Trichome and trichome bases were restricted to the genus Phragmanthera, striations were absent in *Agelanthus brunneus* (Engl.) Balle & Halle, *Englerina gabonensis* (Engl.) *Balle and Tapinanthus cordifolius Polh.* & Wiens. Largest cells of 67.0µm occurred in *Agelanthus bangwensis* (Engl. & K. Krause) Danser. This is the first detailed account of epidermal and stomatal characters of the Loranthaceae in Nigeria.

Keywords: Loranthaceae, Epidermal, Stomata, Nigeria

148 Jemilat Aliyu Ibrahim, Jephthah O. Odiba and Oluyemisi Folashade Kunle (2013).

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja, Nigeria

Comparative evaluation of the Pharmacognostic, Phytochemical parameters and Microscopic studies of the leaves of Gardenia erubescens and Gardenia ternifolia (Family Rubiaceae). *International Research Journal of Plant Science, 2013, (ISSN: 2141-5447) Vol. 4(6) pp. 149-157.*

Abstract

Preliminary pharmacognostic, phytochemical and microscopic analyses were carried out on the leaves of *Gardenia erubescens Stapf* and Hutch and *Gardenia ternifolia Schum and Thonn., Family Rubiaceae.* The moisture content was 9.1% and 10.7%, ash value 5.6% and 5.3%, and acid-soluble ash value 2.8% and 2.4% respectively. Phytochemical screening revealed the presence of nine secondary metabolites while Thin Layer Chromatography (TLC) revealed several spots for the hexane, ethylacetate and methanol extracts. The study reveals microscopic characters that are useful as diagnostic parameters for the two Gardenia species. Information obtained from this study is important in establishing diagnostic indices for identification, standardization, and also in monograph development of the plants which have many ethno medicinal uses. **Keywords**: Microscopy, *Gardenia erubescens, Gardenia ternifolia.*

103

149 Kunle, Oluyemisi Folashade^{1*}; Ali, Adejoh Adache² and Egharevba, Henry Omoregie¹

¹Department of Medicinal Plant Research and Traditional Medicine (MPR&TM), National Institute for Pharmaceutical Research and Development (NIPRD), Idu, PMB 21 Garki, Abuja, Nigeria ²Faculty of Pharmaceutical Sciences, University of Jos, Jos, Nigeria

Medicinal Plants Used for the Treatment of Malaria in Rukuba, Bassa Local Government Area of Plateau State, Nigeria.

International Journal of Basic and Applied Sciences, 2013, 2(4) 134-138

Abstract

The global burden of death due to malaria continues to rise due to increasing resistance of the malaria parasite to chloroquine, the most affordable and commonly used drug for malaria in Nigeria. There are also reports of development of resistance against artemisinin-based combination therapy (ACT), which is currently the approved therapeutic treatment for malaria by the World Health Organisation (WHO). However, not much seems to have been done to document and exploit the untapped resources of indigenous medicinal plants used traditionally for the treatment of malaria. In this study, medicinal plants used as antimalaria therapy in Rukuba, Bassa Local Government Area of Plateau State in North Central Nigeria, were surveyed and reported. The existing knowledge, attitude and practices related to malaria recognition, control and treatment were documented. Eighteen plants belonging to thirteen different families were mostly used in these communities. The plant parts used included barks, roots, leaves or whole plant. The recipes also could be a combination of various species of plants or plant parts. Forms of preparation were decoction, infusion, concoction and tincture. The most frequently used plants were Azadirachta indica A. Juss, Vernonia amygdalina Del., Carica papaya L., Allium sativum L., Khaya grandifoliola C. DC., Morinda lucida Benth and Rauwolfia vomitoria Afz. This study also recommends standardization and sustainable herbal and environmental practices as ways toward achieving better resource utilization in th;e fight against malaria. These antimalarial medicinal plants could be sources of new hit/lead compounds in antimalaria chemotherapy.

Keywords: Antimalaria, medicinal plants, Rukuba, Bassa, Jos, Nigeria

150 Kunle Oluyemisi Folashade and Egharevba Henry Omoregie

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu-Industrial Area, Abuja, Nigeria

Chemical constituents and biological activity of medicinal plants used for the management of sickle cell disease - A Review. *J Med Plant Res, 2013, 7(48):3452-3476.*

Abstract

Since 1910 when sickle cell disease was first reported by Dr. James Herrick and the subsequent characterization by Linus Pauling who hypothesized on the nature of sickle cell haemoglobin (HbS) and its role in sickle cell anemia in 1952, the cure and treatment for the disease has remained a challenge for the entire humanity, with millions of sufferers around the world, and the attendant negative social economic impact. With a current sickle cell trait (healthy carriers who have inherited the mutant gene from only one parent) prevalence of between 10 to 40% across equatorial Africa, 1 to 2% on the North African coast and < 1% in South Africa, current orthodox treatment regimens



continue to give unsatisfactory outcome. The use of herbal remedies especially in the developing or low income countries has made treatment more affordable and accessible, and thus, appears to be yielding some positive prospect in drug development, especially with the development of NIPRISANTM in 1997 by the National Institute for Pharmaceutical Research and Development (NIPRD) in Nigeria. Most of these herbal remedies exploit the combined pharmacological activities of medicinal and aromatic plants widely available in the tropics. Such pharmacologic activities include antioxidant, anti-inflammation, antipyretic, antidehydration, ion-chelating, etc. This review exposed the knowledge-gaps in the chemical constituents of these plants and suggests areas of further research and development focus.

Keywords: Sickle cell disease, medicinal plants, chemical constituents, antioxidants, phenolics.

151 Odeniran O. Adebisi and Samali A.

Department of Medicinal Chemistry and Quality Control (MCQC), National Institute for Pharmaceutical Research and Development (NIPRD), Federal Ministry of Health Idu Industrial Area P.M.B 21 Garki, Abuja

Poverty and hypertension in Nigerian adults: A barrier to its control and treatment. Unique Research Journal 2013.1(3), 014-020.

Abstract

Nigeria is the fifth largest oil producer in the world with a population of about 150 million people but it is among the 20 poorest countries in the world. The primary cause of poverty in Nigeria is failure to distribute the country's vast oil revenues more equitably and inability to develop employment opportunities through non-oil industry sectors. Poverty is as a result of corruption, greed and mismanagement of public funds. Hypertension is a chronic medical condition in which the blood pressure is elevated. It is defined as when the blood pressure reading is 140/90 mmHg or more based on at least 2 or more reading on separate occasion. The increasing burden of hypertension in Nigeria is of grave consequences since very few people get treated and the control is low; resulting in complications such as stroke, heart failure, kidney failure and permanent end-organ damage. Socioeconomic barriers to the control of hypertension in Nigeria include inadequate financing of the health sector, lack of education, inadequate health workers, poor laboratory support; besides poverty, political instability, gender inequality, corruption, high cost of drugs, unemployment are common feature in many parts of the country. Other barriers to patient-related such as limited access to health care, non-adherence to therapy, lifestyle and secondary causes such as other underlying diseases such as parathyroid disease and drug side effects and physician's knowledge deficits regarding current control rate and prescribing patterns. Useful Interventions would be to lower the cost of treatment through more funding of research institute in research of drugs and development from our indigenous phytomedicines locally. Other useful Intervention is in the area of Pharmaceutical Care. Pharmaceutical care (PC) in the management of hypertension is a field that is under-utilized in this country.

Keywords: Poverty and corruption, poorly controlled hypertension, pharmaceutical care.

105

152 Okhale S. E., Amupitan J. O., Ndukwe I. G., Ayo R. G., Oladosu P. O. and Okogun J. I.

Synthesis and antibacterial activity of 7-deacetoxy-7a-hydroxygedunin, African Journal of Pure and Applied Chemistry, 2013. 7(4):157-163.

Abstract

A convenient synthetic route for bioactive 7-deacetoxy-7 α -hydroxygedunin was realized by onestep conversion of 7-deacetoxy-7 α -hydroxygedunin potassium salt. *The 7-deacetoxy-7\alpha-hydroxygedunin* was obtained in 88% w/w yield as a fluffy white precipitate by recrystallization from methanol. The 7-deacetoxy-7 α -hydroxygedunin and the starting material were evaluated for antibacterial activity against Bacillus subtilis, Staphylococcus aureus, Escherichia coli, and Klebsiella pneumoniae using the microbroth dilution assay. It was discovered that 7-deacetoxy-7 α hydroxygedunin potassium salt had minimum inhibitory concentration (MIC) of 1000 µg/ml against K. pneumoniae, 2000 µg/ml against S. aureus, and E. coli. However, B. subtilis was not susceptible to 7-deacetoxy-7 α -hydroxygedunin potassium salt at 2000 µg/ml. interestingly; 7-deacetoxy-7 α hydroxygedunin had MIC of 2000 µg/ml against B. subtilis, and E. coli; and MIC of 1000 µg/ml against K. pneumoniae.

Keywords: 7-deacetoxy-7a-hydroxygedunin, synthesis, gedunin potassium salt, antibacterial.

153 Oladosu, P.¹, Isu, N.R.^{2^{*}}, Ibrahim, K.¹, Okolo, P¹ and Oladepo, D.K¹

¹National Institute for Pharmaceutical Research and Development, Idu Industrial area, P.M.B 21, Garki, Abuja, Nigeria. ²Biology Department, Faculty of Science, University of Abuja, Gwagwalada, Abuja, Nigeria.

Time kill-kinetics antibacterial study of Acacia nilotica. Accepted 8 October, 2013

Abstract

In vitro time-kill kinetics antibacterial study of Acacia nilotica was assessed against Pseudomonas aeruginosa, Escherichia coli and Staphylococcus aureus determined by plate count technique and analyzed by percentage and log reduction. All test organisms were susceptible to the aqueous methanolic extract. The minimum inhibitory concentration ranged between 0.5 and 1 mg, while minimum bactericidal concentration ranged between ≥ 1 and ≥ 2 mg/ml. Average log reductions in viable cell counts for the extract ranged between 0.18log10 and 0.35log10 cfu/ml for P. aeruginosa, 0.27log10 and 1.95log10 cfu/ml for S. aureus and 0.27log10 and 0.45log10 cfu/ml for E. coli after 10 h interaction at 0.5x MIC and 1x MIC. Most of the extracts were rapidly bactericidal at 2x MIC achieving a complete elimination of most of the test organisms within 12 h exposure. A good correlation was found between the killing curves and the MIC of A. nilotica against the test organisms.

Keywords: Time-kill kinetics, antibacteria, Acacia nilotica, percentage reduction.

154 Olubunmi Olayemi, Bashiru Salihu, Susan Allagh

Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria.

Evaluation of the binding properties of *Spondias purpurea* gum in metronidazole tablet formulations.

International Journal of Pharmacy and Pharmaceutical Sciences, 2013; 5(2):584-589.

Abstract

This study is aimed at investigating the binding ability/properties of Spondias purpurea (also known as plum) bark gum in metronidazole 200mg tablet formulation. Characterization of the gum was carried out according to the B.P official procedure for percentage yield, organoleptic properties, morphology, loss on drying and particle size determination. The wet granulation method of massing and screening was employed in the formulation of the granules. The gum was used at a 1, 2, 5 and 10%w/w concentrations while pharmaceutical grade gelatin was used as a standard. The granules were evaluated for particle size distribution, moisture content, flow rate, bulk and tapped density, Hausner's ratio and Carr's indices. The granules were compressed at 4.0 metric tonnes (MT) with the target weight of each tablet being 500mg. The tablets were evaluated for uniformity in weight, tablet thickness, crushing strength, friability, disintegration time and dissolution profile. The gum was observed to be polygonal in shape, crystalline in texture with a neutral pH. There was a linear correlation between concentration and viscosity. The granules possessed good flow properties as indicated by the low angle of repose, Hausner's ratio and Carr's index. Tablet disintegration and dissolution time were observed to increase with increase in gum concentration while friability decreased. Spondias purpurea gum produced tablets with better mechanical strength, longer disintegration time and faster onset of drug release at low concentrations. It can be inferred therefore that Spondias purpurea bark gum has binding abilities which can be employed especially when high mechanical strength and fast to moderate release is desired.

Keywords: Metronidazole, Spondias purpurea bark gum, Gelatin, Wet granulation, Binder.

155 Philip F Builders^A, Kabele-Toge B^C, M. Builders, B.A Chindo^B, Patricia A Anwunobi^A, Yetunde C. Isimi^A.

^ADepartment of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

^BDepartment of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

^cDepartment of Pharmaceutics and Industrial Pharmacy, Delta State University Abraka. Delta State

Wound Healing Potential of formulated Extract from *Hibiscus Sabdariffa* Calyx. *Indian Journal of Pharmaceutical Sciences*, 2013; 75(1): 45-52

Abstract

Wound healing agents support the natural healing process, reduce trauma and likelihood of secondary infections and hasten wound closure. The wound healing activities of water in oil cream of the methanol extract of *Hibiscus sabdariffa* L. (Malvaceae) was evaluated in rats with superficial skin excision wounds. Antibacterial activities against *Pseudomonas aerogenosa, Staphylococcus aureus* and *Echerichia coli* were determined. The total flavonoid content, antioxidant properties and



thin layer chromatographic fingerprints of the extract were also evaluated. The extract demonstrated antioxidant properties with a total flavonoid content of 12.30 ± 0.09 mg/g. Six reproducible spots were obtained using methanol: water (95:5) as the mobile phase. The extract showed no antimicrobial activity on the selected microorganisms, which are known to infect and retard wound healing. Creams containing *H. sabdariffa* extract showed significant (*P*<0.05) and concentration dependent wound healing activities. There was also evidence of synergism with creams containing a combination of gentamicin and *H. sabdariffa* extract. This study, thus, provides evidence of the wound healing potentials of the formulated extract of the calyces of *H. sabdariffa* and synergism when co-formulated with gentamicin.

Keywords: Antimicrobial activity, antioxidant activity, *Hibiscus sabdariffa calyx*, water in oil cream, wound healing

156 *Philip F. Builders^A, Kabele-Toge B.^B, Adarki W. Pongri ^A, Oluranti D. Abolude^A Chukwuemeka C. Mbah^A, Patricia A. Anwunobi^A, Yetunde C. Isimi^A.

^ADepartment of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria. ^BDepartment of Pharmaceutics and Industrial Pharmacy, Delta State University Abraka. Delta State.

Impact of Co-processing on some fundamental physicochemical and functional properties of Microcrystalline Cellulose. IOSR. *Journal of Pharmacy and Biological Sciences, 2013; 5(2): 55-67*

Abstract

The aim of this study was to evaluate the effect of co-processing of microcrystalline cellulose (MCC) with Eudragit L100(R), cellulose acetate phthalate and ethyl cellulose respectively on the compaction, flow and disintegration properties of MCC. Co-processing MCC with the different polymers enhanced the flow and disintegration properties of MCC as a direct compression excipient for tablets production. When evaluated with the Heckle model, there was no remarkable change in the packing characteristics of the modified motifs in relation to the unmodified; however there was a slight but variable decrease in dilution capacity. This study shows the potential attribute of co-processing MCC with other polymers.

Keywords: Microcrystalline cellulose, Eudragit L100, cellulose acetate phthalate, ethyl cellulose, coprocessing

157 Ranjan Dutta Kalita^a, Yutika Nath^a, Martins E. Ochubiojo^{a,b,} Alak Kumar Buragohain^a,*

^aDept of Molecular Biology and Biotechnology, Tezpur University, Tezpur 784028, Assam, India ^bDept of Pharmaceutical Technology and Raw Materials Development, National Institute of Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria

Extraction and characterization of microcrystalline cellulose from fodder grass; *Setaria glauca* (L) P. Beauv, and its potential as a drug delivery vehicle for isoniazid, a first line antituberculosis drug. *Colloids and Surfaces B: Biointerfaces, 2013; 108:85–89.*

Abstract

Microcrystalline cellulose (MCC) is generally produced through acid hydrolysis of woody plants and agro sources. MCC synthesized from a common wild grass Setaria glauca (L) P. Beauv was characterized to explore the possibility of application in pharmaceutical industry especially as a drug delivery vehicle. The SEM, TGA, XRD and FTIR investigations of the prepared MCC reveal that the 5–30 _m long, non-aggregated MCC rods have high crystallinity index of 80% and were stable at 286 °C. The preliminary investigation of the MCC incorporated micro beads containing isoniazid, one of the first line drugs for treatment of tuberculosis was carried out in the simulated intestinal fluid (SIF). The MCC incorporated micro beads with isoniazid drug load showed sustained release up to 24 h with release of 0.521 _g of isoniazid equivalent drug in the SIF system. No cytotoxicity of the MCC was observed in the hemolytic assay. The MCC also showed good antioxidant activity. Thus, the study reveals that the MCC can be prepared from an inexpensive and abundant grass species. The MCC have properties advantageous for application in the pharmaceutical industry and may be explored further in drug delivery research.

Keywords: Microcrystalline cellulose, *Setaria glauca* (L) P. Beauv, Thermal stability, Antioxidant, Drug delivery, Tuberculosis

158 Simon Koma Okwute¹ & Henry Omoregie Egharevba²

¹Department of Chemistry, Faculty of Science, University of Abuja, Gwagwalada, F. C. T., Nigeria ²National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Industrial Layout, Garki, Abuja, Nigeria

Piperine-Type Amides: Review of the Chemical and Biological Characteristics. *International Journal of Chemistry 2013*, *5(3)*, *99-122*

Abstract

A new group of alkaloids emerged in 1819 following the isolation of piperine from the fruits of Piper nigrum. Since then, a large number of these compounds now referred to as piperine-type alkaloids or alkamides or piperamides have been isolated commonly from species belonging to the genus piper (piperaceae) which have worldwide geographical distribution. As a result of the traditional uses of piper species as spices in foods and in phytomedicines globally a number of their extractives and indeed the constituent amides have been screened for pharmacological properties. The biogenesis of the amides has been investigated and a number of synthetic pathways have been developed to make them readily available for biological studies. It has now been established that piperine and its analogues are potential pesticides and possess a number of medicinal properties. They are regarded as universal enhancers in pesticide and drug formulations. This review enhances our knowledge of these amides and paves way for further work.

Keywords: piper species, piperine-type amides, chemical, biological, characteristics

159 Tijan Adeniyi Yahaya, Salawu Oluwakanyinsola Adeola, Samuel Okhale, Ibrahim Muazzam.

Pharmacological Effects of Standardized Extract of *Piliostigma reticulatum* Fruit on The Central Nervous System of Swiss Albino Mice: Scientific Justification for its Use in Management of Neuropsychiatric Disorders in African Traditional Medicine. *The Journal of Toxicology and Health. 2013. Photon 103, 211-218.*

Abstract

Piliostigma reticulatum fruit preparations are popularly used in Nigeria for therapeuticmanagement of fatigue, stress, insomnia and as calming agent for mood. The aim of this study was to provide scientific evidence for its continuous use in folk medicine. The ethanolic fruit extract of Piliostigma reticulatum PRFE was standardized using reverse phase high performance liquid chromatography to establish finger print for identity and quality assurance. The oral median lethal (LD50) dose was evaluated in mice. The effects of PRFE diazepam and imipramine were assessed on elevated plus maze, hole-board, forced swim and open field apparatus. The extract was acutely safe at 5000 mg/kg body weight. The extract produced central depressant effect doses of 400 and 800 mg/kg in eelevated plus maze, hole-board and forced swim test. The results obtained suggested that Piliostigma reticulatum fruit extract contains bioactive components with central depressant effects that may be useful in managing neuropsychiatric disorders thus providing scientific evidence in support of its use in therapeutic application in folk medicine for neuropsychiatric disorders. The mechanism of action of the crude and identity of its active principles remains unknown.

Keywords: *Piliostigma reticulatum*, fruit, mice, anxiety, depression, CNS CNS: central nervous system

160 Tijani Adeniyi Yahaya*, Salawu Oluwakanyinsola Adeola ,Uboho Unyime Emma

¹Department of Pharmacology and Toxicology National Institute for Pharmaceutical Research & Development, P.M.B. 21, Garki-Abuja, Nigeria.

Neuro-protective effect of Carvedilol, an adrenergic antagonist against scopolamine-induced cognitive impairment in mice. *Journal of Applied Pharmaceutical Science, 2013, Vol. 3 (8 Suppl 1), pp. 32-36.*

Abstract

The use of β - adrenoceptor blocking agents (β -blockers) in the clinical treatment of cardiovascular disorders and glaucoma are associated with enhancedvigilance, attention, reward, learning and memory. The present study was designed to explore the possible role of Carvedilol, an adrenergic antagonist in ameliorating scopolamineinduced neurotoxicity in rats. Mice were divided into control and treatment groups. Control mice for each test received 10 ml normal saline/kg while the treatment groups (n = 6) received Carvedilol (2.5, 5 and 10 mg/kg orally) and1 mg scopolamine/kg intraperitoneally). One hour after sildenafil and thirty minutes after scopolamine administration orally and intraperitoneally respectively, the animals were assessed for 5 minutes on elevated plus maze, Y-maze and open-field. The parametersmeasured on the EPM were memory acquisition and



memory retention latencies with and without scopolamine while spontaneous alternation behaviour was measured in Ymaze. The effect of Carvedilol on locomotion was assessed in mice using open field.Carvedilol significantly (p<0.001) shortened memory acquisition and retrieval latencies in mice with scopolamine–induced cognitive deficit. Carvedilol produced significant (p<0.0001) increase in spontaneous alternation behaviour in both memory intact and memory deficit models. Carvedilol however, had no effect on locomotor activity of mice. The results suggest that Carvedilol enhanced memory acquisition and retrieval in cognitive deficit and cognitive intact mice. It also improved short term memory as indicated by increase in spontaneous alternation behaviour in mice. Carvedilol may therefore be useful in management of dementing disorders such as Alzheimer's disease.

Keywords: Carvedilol, memory, mice, Alzheimer's disease

161 Tijani Adeniyi Yahaya, Abubakar Sadiq, Ajayi Oluwakemi Ifeoluwa, Nneka N. Ibekwe, Okhale Ehiabhi Samuel, Salawu Oluwakanyinsola Adeola.

Behavioural effect of standardized aqueous whole plant extract of *Acanthospermum hispidum*: Ethnopharmacological Justification for its use in folkloric management of malaria. *Pharmacology OnLine 3:45-55.*

Abstract

Acanthospermum hispidum DC is a medicinal plant commonly used locally for the treatment of malaria, cough, diarrhoea, typhoid, inability to sleep well and vomiting. The aim of the study was to evaluate the behavioural effects of the aqueous whole extract of Acanthospermum hispidum in young chicks and mice. The oral acute toxicity of Acanthospermum hispidum was carried out in young chicks and mice using the acute toxic class method. The antiemetic effect of the extract (50, 100 and 200 mg/kg body weight orally) and metoclopramide (5 mg/kg intramuscularly) was assessed using copper sulphate-induced retches in young chicks. The effect of the extract (50, 100 and 200 mg/kg body weight orally) on apomorphine-induced pecking in chicks, pentobarbitone-induced sleep, exploratory behaviour on hole board apparatus and motor coordination on rota rod were evaluated. The oral median lethal (LD_{50}) dose of the extract was greater than 2000 mg/kg in chicks and mice. Acanthospermum hispidum extract significantly (F4, 49=222, p<0.0001) inhibited copper sulphateinduced retching when compared to negative control while metoclopramide significantly inhibited copper -induced retches. The extract (at 50, 100 and 200) and chlorpromazine at 2 mg/kg body weight significantly reduced ($F_{4,49}$ =331, p<0.0001) apomorphine-induced pecking in young chicks. The extract (50, 100 and 200 mg/kg) and diazepam (30 mg/kg) significantly ($F_{4,29}$ =18, p<0.0001) shortened onset but prolonged (F $_{4,29}$ =637, p<0.0001) duration of sleep in pentobarbitone –induced sleep. The extract significantly (F $_{4,29}$ =98, p<0.0001) reduced frequency of head dip in hole board apparatus but had no effect on motor coordination. The results suggested that Acanthospermum hispidum possesses potent anti-emetic and sedative effects but had no effect on motor function which explains its continued use for management of malaria symptoms in folk medicine. These effects may have been mediated by flavonoid and tannins present in the extract.

Keywords: Malaria, Acanthospermum Hispidum, Retches, Dopamine, Stereotypy



162 Tijani Adeniyi Yahaya¹, Lucy Binda John -Africa¹, Moh'd Abubakar Sadiq¹, Habila Nathan2, Ben Ahmed Chindo¹, Salawu Oluwakanyinsola Adeola¹

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu Industrial Area, Abuja, Nigeria ²Department of Biochemistry, Faculty of Sciences, Ahmadu Bello University, Zaria, Nigeria.

Anxiogenic effects of antimalarial agents involve GABA-ergic neurotransmission systems. *The Journal of Infectious Diseases. 2013 112: 152-159*

Abstract

The chemotherapeutic management of malaria infection is currently facing challenges of therapeutic failure due to drug resistance, quality and compliance with treatment regime due to toxicity. The aim of the current study was to evaluate the effect chloroquine (CQ), amodiaquine (AQ), artesunate (AS) and artesunate- amodiaquine (AS-AQ) fixed combination on animal models of anxiety using elevated plus maze (EPM), dark-light shuttle box and open field. The effects of these drugs were also examined evaluated on Glutamic acid decarboxylase (GAD) to test the possible involvement of GABAergic systems on drugs- induced anxiety. Chloroquine, amodiaquine and artesunate produced anxiety like behaviours characterized by increased timespent in dark arm of EPM; shortened time spent in light arena and increased time spent in dark box of the light –dark shuttle box while artesunate-amodiaquine fixed combination produced anxiolytic like effects in mice. However, All the drugs used in the study had no effect on locomotion in open field. Biochemical evaluation of brain homogenates of treated animals revealed decreased expression of glutamic acid decarboxylase, the enzyme responsible for GABA synthesis. The anxiogenic effect produced by chloroquine, artesunate and amodiaquine in mice was due to low GABAergic activity caused by reduced synthesis of GABA.

163 UGBABE, Grace E.¹*; AYODELE, Abiodun E.²; KALPANA, Joshi S.³; OKOGUN, Joseph I.¹

¹Department of Medicinal Plant Research and Traditional Medicine (MPR & TM), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja - Nigeria ²Botany Department, University of Ibadan, Ibadan - Nigeria ³Biotechnology Department, Sinhgad Collage of Engineering, Vodgaon (Budruk), Pune - India

Ultrastructure of the pollen grains in the *family Bignoniaceae Juss* in Nigeria. *International Journal of Medicinal Plant Research*, 2013 Vol. 2(9) pp. 254-260

Abstract

Pollen morphology of eight species belonging to the *Bignoniaceae* in Nigeria was described using Scanning Electron Microscope (SEM). The species studied were Crescentia *cujete Linn, Jacaranda mimosifolia D. Don., Kigelia africana (Lam) Benth., Markhamia tomentosa (Benth) K. Schum., Newbouldia laevis (P. Beauv.) Seemann ex Bureau., Spathodea campanulata P. Beauv., Stereospermum acuminatissimum Cham. and Tecoma stans.* Reticulate exine ornamentation were observed in all pollen grains of the species studied. The shapes of most of the pollen grains were circular except from those of J. mimosifolia and T.stans which were elliptic. The pollen grains of all species examined were tricolpate (except from those of C. cujete which were non-aperturate)



isopolar with long colpi and a reticulate tectum. The pollen grains of the species studied were radially symmetrical, isopolar or apolar. The general shapes were subspheroidal to prolate. The AMB is rounded to triangular. The apertures are usually three in number, always equatorially placed. This study points to a reclassification of the family Bignoniaceae.

Keywords: Scanning electron microscopy, *bignoniaceae*, pollen grains, ultrastructure, *bignoniaceae juss*.

164 Ya'u. J, Chindo B.A, Yaro A.H, Okhale S.E, Anuka J.A, Hussaini I.M

Safety assessment of the standardized extract of *Carissa edulis* root bark in rats. Journal of Ethno-pharmacology, 147 (3) : 653 – 61. doi:10.1016/j.jep.2013.03.064DOI: http://dx.doi.org/10.1016/j.jep.2013.03.064.

Abstract

Ethnopharmacological relevance: Preparations of *Carissa edulis (Vahl)* have been used in the Nigerian traditional medicine for the management of fever, sickle cell disease, epilepsy, pain and inflammation for many years and their efficacy is widely acclaimed among the Hausa communities of northern Nigeria.

Aim of the study: The present studies aimed at evaluating the toxicological properties of the standardized ethanol extract of C. edulis root bark in rats, in order to determine its safety and to complement earlier efficacy studies on this widely used medicinal plant.

Materials and methods: High performance liquid chromatography (HPLC) and preliminary phytochemical analysis of the extract were conducted and its oral median lethal dose (LD50) determined. Signs of toxicity, body weight changes, relative organs weight, feed and water consumption were monitored following 28 days of daily oral administration of graded doses of the extract in rats. Effects of the extract on sex hormones, low and high-density lipids, hematological and biochemical parameters were examined and pathological changes of the vital organs after treatment with the extract were also investigated.

Results: The oral LD50 of the extract was estimated to be >5000mg/kg. The body weights of treated rats increased progressively, but the changes were not significantly different from the control groups. The extract neither produces significant changes in feed and water consumption nor affected the relative organs weight. Although some variations were observed in hormonal and lipid profiles hematological and biochemical indices; these important parameters were normal and within acceptable limits. No lesions or pathological changes of the organs attributable to treatment with the extract were observed from the pathological examinations. The HPLC fingerprint of the extract shows a spectrum profile characteristic of C. edulis, while the preliminary phytochemical screening revealed the presence of saponins, flavonoids, tannins, anthraquinones and cardiac glycosides.

Conclusion: Our results provided evidence that short-term administration of the tandardized ethanol extract of C. edulis root bark at doses lower than 1000 mg/kg is safe in rats and may not exert severe toxic effects.

Keywords: Carissa edulis; acute toxicity; sub-acute toxicity; hematology; biochemistry; rats.

113

YEAR 2012

165 Aboh M. I.^{1*,} Okhale S. E^2 and Ibrahim K.¹

¹Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu, P. M. B. 21 Garki, Abuja. ²Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development, Idu, P. M. B. 21 Garki, Abuja.

Preliminary studies on *Luffa cylindrica*: Comparative phytochemical and antimicrobial screening of the fresh and dried aerial parts.

African Journal of Microbiology Research Vol. 6(13), pp. 3088-3091, 9 April, 2012

Abstract

The Nigerian climate favours a wide variety of plants with vast antimicrobial and medicinal potentials, some of which have been used traditionally for decades. The fresh and dried aerial parts (leaves, flowers and stem) of *Luffa cylindrica* were extracted with water, chloroform and methanol and screened for secondary metabolites. Extracts were found to contain alkaloids, saponins and tannins. The extracts also showed antimicrobial activity against *Staphylococcus aureus* and *Candida albicans*. The zones of inhibition ranged between 18.00 and 27.00 mm. *L. cylindrica* extract showed a greater zone of inhibition on *C. albicans* ranging from 20.00 to 27.00 mm. The fresh plant extract was shown to be more active than the dried plant extract. The inhibitory potentials of this plant can be attributed to its phytochemical contents. With the increasing rate of candidiasis infection worsened by the high rate of HIV/AIDS infection, this plant holds great promise for development into phytomedicine for the treatment of candidiasis in the near future.

Keywords: Luffa cylindrica, aerial parts, secondary metabolites, candidiasis, antimicrobial.

166 Afieroho O. E, Olubukola A Odeniran and Odiba J. O.

Spectrophotometeric Assay of *Levofloxacin* content in some marketed genrics in Nigeria using graphical standard comparism approach.

The Global Journal of Pharmaceutical Research 2012 Vol 5; 1031-1035.

Abstract

This present study is aimed at the determination of the content of *levofloxacin* in nine marketed generics (coded L1-L9) in Nigeria. Content of active determination was done using the method of Vipul and Afieroho et.al (2011). The graphical and standard comparison approaches were used. Tablet weight variation, and TLC examination was done using standard procedures. TLC examination showed that all the nine brands contained levofloxacin Rf 0.53. Except for three L6, L7 and L8, the content of levofloxacin in the selected brands were within the allowable 90-110 % limits for tablets using either the graphical or standard comparison approach with no observed significant difference p > 0.05. Non conformity with pharmacopoeia standards was observed in the weight uniformity results for three brands L3, L4 and L8. The result while further validating the recovery accuracy of the method also indicated the need for improved and strict regulation of formulated pharmaceutical products by the regulatory authorities in Nigeria to ensure product quality and safety.

Keywords: Levofloxacin, Assay, Graphical and Standard Comparison Approach

167 Akuodor G. C.¹, Akpan J. L.¹, Ezeunala M. N.², Ajoku, G. A. Essien A. D.², Megwas A.U.¹, Okoroafor Dorcas O.¹, Iwuanyanwu T. C² and Osunkwo U. A.²

¹National Institute for Pharmaceutical research and Development, Abuja, Nigeria. ²Department of Pharmacology, Faculty of Basic Medical Sciences, College of Medical Sciences, University of Calabar, Calabar, Nigeria.

Evaluation of anti-ulcer and antimicrobial effects of *Verbena hastataleaf* extract. *African Journal of Pharmacy and Pharmacology2012 6(11) 778 – 782*

Abstract

The ulcer protective and antimicrobial effects of the ethanolic leaf extract of *Verbena hastata*, a popular herbal traditional medicine in southern Nigeria, were assessed using ethanol and indomethacine induced gastric ulcer in rats and against some disease causing microorganisms, respectively. The extract (100-400 mg/kg, p.o) exerted ulcer-protective activities against ethanol and indomethacine-induced ulceration in rats with maximum anti-ulcer effect observed at 400 mg/kg. In addition, V. hastate leaf extract (2.00 mg/ml) showed absence of antimicrobial effects against all the tested organisms. The oral LD50 values obtained were greater than 5000 mg/kg in mice. The results clearly indicate that *V. hastataleaf* extract possesses potent ulcer protective properties. It might be a useful contribution to highlight the mechanism of action of this plant as anti-ulcer agent.

168 Ameh S. J¹, Tarfa F. ¹, Ayuba S. ¹, Gamaniel K. S. ²

¹Department of Medicinal Chemistry and Quality Control (MCQC), ² Director-General Office, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, PMB 21 (Garki), Abuja, Nigeria.

Herbal Product Realization in Accordance with WHO and ISO Guidelines. *Int'l Journal of Pharmaceutical Sciences and Research 2012, 3 (10): 4019-4035*

Abstract

Background: Following the Alma-Ata Declaration of 1978, the World Health Organization (WHO) began the issuance of guidelines for developing standardized herbal preparations from Traditional Medicine (TM). Similarly in 1987, the International Organization for Standardization (ISO) launched the most anticipated industrial standard (ISO 9001) in world history. The seventh (7th) clause of ISO 9001's eight clauses is devoted to "Product Realization"- a quality management system (QMS) procedure that includes: planning of product realization; appreciation of customer-related processes; design and development processes; purchasing; production and service provision; and control of measuring and monitoring equipment.

Purpose: The article takes a hard look at the QMS processes involved in product realization and the critical stages of the WHO model of herbal drug development from TM, with a view to devising a framework that can be used to promote the production of quality herbal products, commencing from the stage of ethnobotanical survey, through the laboratory, to the clinic.

Methodology: Both the WHO model of herbal drug development and the 7th clause of ISO 9001:2008 were critically reviewed and combined to yield a framework that is discussed within the



context of guiding herbal drug development from TM. Results and Discussion: The resulting WHO-ISO framework of herbal product realization is discussed in terms of its relevance to practical problems of GMP-production using herbal starting materials, given their innate variability in composition, potency and appearance. Conclusion: The provisions of ISO 9001's seventh clause can, to a large extent, be applied to the production of quality herbal products developed in accordance with WHO.

169 Asha Rodrigues^a, Martins Emeje^{a,b,*}

^a Physical and Materials Chemistry Division, National Chemical Laboratory, Pune, India ^b Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria

Recent applications of starch derivatives in nanodrug delivery. *Carbohydrate Polymers*, 2012; 87: 987–994.

Abstract

Starch has found use in industries as diverse as food, textiles, cosmetics, plastics, adhesives, paper, and pharmaceuticals. From a pharmaceutical standpoint, starch finds its value in solid-oral dosage forms, where it has been used as a binder, diluent, and disintegrant. However, only recently has the use of starch in nanotechnology started to make significant advances in biomedical applications, including newer drug delivery techniques. There has been a considerable effort to develop biodegradable nanoparticles as effective drug delivery systems. Being cheap, non-toxic, renewable, biodegradable and compatible with many other materials for industrial applications, starch is attracting the interest of drug delivery scientists. We have put together in a short and concise format, recent applications of starch derivatives in the emerging field of nanodrug delivery with the conclusion that a lot still needs to be done.

Keywords: Starch, Applications, Nanotechnology

170 Ayuba Samall^{1*,} Florence David Tarfa¹, Olubukola Adebisi Odeniran¹, Cordelia Edoyi Onanuga¹ and Bulus Adzu²

¹Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development (NIPRD), Federal Ministry of Health, P.M.B. 21, Idu Industrial Area, FCT Abuja Nigeria.

² Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Federal Ministry of Health, P.M.B. 21, Idu Industrial Area, FCT Abuja Nigeria.

Efficacious Activities of Aqueous Extract of *Phyllanthus niruri* Against *Acetaminophen*-induced Hepatitis in Rats.

Int.J. Biol. Chem. Sci., 2012, 6 (3), 920-930.



Abstract

The efficacy of aqueous extract of *Phyllanthus niruri* against *acetaminophen*-induced hepatitis in rats was evaluated. The hepatic injury was induced with 200 mg/kg, p.o. of acetaminophen, which led to rise in serum levels of the biochemical parameters observed. These are the aspartate aminotransferase (AST) and alanine aminotransferase (ALT) which were elevated by 22% compared to respective negative control. Treatment with the plant extract (500, 1000 and 2000 mg/kg, p.o.) lowered the biochemical parameters of the respective serum AST 31 to 38%, ALT 20 to 31%, Bilirubin -2 to 4%, protein 5 to 15%, cholesterol 0.2 to 0.5%, and albumin 5 to 12%. The histopathological results indicated that, the effect of the extracts on the condition of the liver as compared to the normal control ranges from mild to moderate. The biochemical variations were as a result of the different treatment involved in the study. The result therefore, shows lowering of the elevated parameters in the serum and possible reversal of hepatic cell damage with aqueous extract of Phyllanthus niruri. The trend of the study shows that, the longer the period of treatment at lower doses, the better the efficacy of the plant extract.

Keywords: Phyllanthus niruri, hepatitis, acetaminophen, biochemical, histopathology, rats.

171 Egharevba $H.O^1$, Okwute, S. K² and Okogun, J.I¹ and Igoli, J³

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Idu-industrial Layout Idu, PMB 21 Garki, Abuja, Nigeria;

²Department of Chemistry, Faculty of Science, University of Abuja, PMB.117, Gwagwalada, FCT, Nigeria

³Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow

A new bioactive pterodondiol *from Laggera pterodonta (DC)* Sch. Bip AUTHORS. *International Journal of Natural Products Research (IJNPR) 2012, 1(3): 45-53*

Abstract

Extracts of the aerial part of Laggera pterodonta (DC) Sch. Bip.(Asteraceae) were subjected to chemical and microbiological investigations with the aim of isolating some of the bioactive constituents in support of its ethnomedicinal application for the treatment of infectious diseases. Chromatographic separation of the extracts led to the isolation of a new bioactive pterodondiol, 5, 7, 10-epi-cryptomeridiol, and two sterols identified as stigmasteryl-3 β -O-D-glucopyranoside and stigmasterol, based on spectral characterization. The compounds were screened for antimicrobial activities against some pathogenic microorganisms using well-diffusion method and were found to exhibit significant activities at MIC 50 μ g/ml and MBC 200 μ g/ml. The study has justified the use of the plant as an antibiotic in ethnomedicinal applications.

Keywords: Laggera pterodonta; 5, 7, 10-epi-cryptomeridiol; stigmasterol; stigmasterol.



NIPRD Compendium of Research Publications (2010 - 2018)

Egharevba H.O^{1*}, Kunle O.F¹, Okwute S.K², Okogun J.I¹ 172

1Department of Medicinal Plant Research and Traditional Medicine National Institute for Pharmaceutical Research & Development (NIPRD), Idu Industrial Layout, Idu, P.M.B. 21 Garki, Abuja, Nigeria.

2Department of Chemistry, University of Abuja, Gwagwalada, FCT, Nigeria

Chemical Constituents of the Essential Oil of Laggera pterodonta (DC) Sch Bip From North-Central Nigeria. Journal of Applied Pharmaceutical Science (JAPS) 2012, 02(08): 198-202

Abstract

The aerial part of Laggera pterodonta plant found in North-Central part of Nigeria was hydrodistilled and the volatile subjected to GCMS analysis. 23 components were identified in the essential oil of which n-Triacontane was the major constituent (~43%). Other major volatile constituents include, Dimethoxydurene (~9%), Caryophyllene oxide (~7%), Linoleoyl chloride (~7%), oleic acid (~4%), gamma-Eudesmol (~4%), 2, 6, 10-trimethylundeca-1, 3, diene (~3%) and n-Dotriacontane (~3%). This is the first time that n-triacontane is being found as the major constituent of an essential oil, and also the first time the composition of the essential oil of Laggera pterodonta from North-central Nigeria is being reported.

Keywords: Laggera pterodonta, essential oil, chemical composition, n-triacontane, 2, 6, 10trimethylundeca-1, 3, diene, 7-methyl-1-undecene, gamma-Eudesmol.

Emeje M^{1,2}*, Kalita R², Isimi C¹, Buragohain A², Kunle O¹ and S Ofoefule³ 173

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, (NIPRD) Idu, P.M.B.21 Garki - Abuja, Nigeria ²Department of Molecular Biology and Biotechnology, Tezpur University, Assam, India ³Department of Pharmaceutical Technology and Industrial Pharmacy University of Nigeria, Nsukka, Enugu state, Nigeria

Synthesis, physicochemical characterization and functional properties of an esterified starch from an underutilized source in Nigeria. African Journal of Food, Agriculture and Nutrition, 2012; 12(7): 7001-7018

Abstract

Acha (Digitaria exilis Stapf), also known as Findi, Hungry rice, Petit mil and White fonio, is a small seeded cereal, indigenous to West Africa, which is generally classified as millet. It grows in various parts of Nigeria, Sierra Leone, Ghana, Guinea Bissau and Benin Republic. That species is the most important of a diverse group of wild and domesticated *Digitaria* species that are harvested in the savannas of West Africa. It is one of the primary cereals of southern Sudan and Ethiopia in Africa. It has potential to improve human nutrition, boost food security, foster rural development and support sustainable use of lands. In this study, acha starch was subjected to modification by acetylation. The acetylated acha starch with degree of modification 0.78 had reduced foaming capacity and amylose contents. The starches have similar organoleptic properties ranging from white, gritty, non-sticky to bland tastes. Physicochemical indices investigated such as true density, bulk and tapped densities, water absorption capacity, moisture content, total and acid insoluble ash, and pH were reduced by the acetylation of acha starch. The modification resulted in a significant (P < 0.05) increase in the solubility as well as water and oil absorption capacities of the starch. Scanning electron microscopy



revealed starch granules that were predominantly polygonal in shape. Acetylation did not alter the granule morphology. X-ray pattern of the native starch was A type, with similar pattern in the acetylated derivative. Fourier transform infrared spectroscopy (FTIR) results revealed a new band at 1728 cm-1. Thermogravimetry revealed 3 phase decomposition of both the native and modified starches. The acetylation as revealed by Differential scanning calorimetry studies improved the gelation capacity of the native starch and revealed two endothermic peaks and one exothermic peak each for both starches. There was considerable reduction in the peak temperature of gelatinization (Tp) of native starch and a significant (P < 0.05) decrease in the enthalpy of gelatinization (DH) was noticed after acetylation.

Keywords: Digitalis exilis, starch, acetylation, physicochemical properties

174 Emeje Martins, Ohwoavworhua Frank, Isimi Christianah and kunle Olobayo

Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

The moisture content of NIPRISAN, a polyherbal formulation for the management of sickle cell anemia affects the direct compaction tabletting properties of silicified microcrystalline cellulose. *International Journal of Ayurvedic and Herbal Medicine*, 2012; 2(5): 771:778

Abstract

The aim of this study is to investigate the effect of the moisture content of NIPRISAN®, a herbal extract on the direct compression tableting properties of SMCC 50 and SMCC 90. NIPRISAN® extract was exposed to a saturated solution of potassium nitrate in a glass desiccator for one week. Granules were compressed at varying compression pressures and subjected to various tests. Results obtained show that, the SMCC 50-NIPRISAN® combinations had higher moisture content than SMCC 90-NIPRISAN® combination. At 18 - 25 KN compression pressure, tablet hardness decreased with addition of the herbal extract. There was no discernible difference in the effect of moisture on tablet hardness irrespective of whether SMCC 50 or 90 was used as the direct compression agent. Initial addition of the extract to SMCC had the most pronounced effect on tablet strength. At moisture level greater than 18.4 %, no suitable tablets could be produced. With tablets compressed at 26.25 KN, the initial addition of the extract did not have any appreciable effect on the hardness of the tablet, with both grades of SMCC used. Increasing the moisture content to 26 % with SMCC 50 resulted in tablets of unsuitable hardness. Deformation characteristics of SMCC 50 were more affected by moisture than SMCC 90. Generally, there was increased tablet hardness with increase in the compression pressure irrespective of the grade of SMCC used. Friability results show that as the moisture content of the tablets increased, the tablets become more friable. Results of tablet disintegration show that, the presence of the extract in the formulation increased the disintegration time irrespective of the SMCC used and this was most pronounced at the higher compression pressures of 25 and 26.25 KN. Disintegration times with SMCC 50 was longer than those of SMCC 90. Pressure variation and moisture content also affected disintegration times. At lower pressures and increased moisture contents, there was a decreased disintegration time irrespective of SMCC grade. SMCC 50 and 90 are suitable direct compression excipients and disintegrants in herbal solid dosage formulations, the optimal moisture level was found to be 28.7 %.

175 Jemilat A. Ibrahim^{1*}, Opeoluwa Makinde¹ and Nneka N. Ibekwe²

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja. ²Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja

Pharmacognostic, Physicochemical Standardization and Phytochemical Analysis of leaves of Cultivated *Crotalaria lachnosema Stapf.* Journal of Applied Pharmaceutical Science, 2012, 2 (9): 067-070.

Abstract

Towards authentication and quality assurance of medicinal plants, pharmacognostic, physicochemical and preliminary phytochemical studies of the leaves of *Crotolaria lachnosema Stapf* were carried out. The macroscopic and microscopic evaluation revealed characters that are of diagnostic value and useful in authentication of the plant. The Physicochemical analyses reveals values for moisture content, alcohol extractive, water extractive and total ash which are within the World Health Organisation (WHO) standards for crude drug from medicinal plants. Phyto-screening for secondary metabolites revealed the presence of saponins, terpenes/steroids, flavonoids, resins and balsams, while alkaloids, glycosides and tannins were absent. Information obtained from these studies can be used as markers in the identification and standardization of this plant as a herbal remedy and also towards monograph development on the plant.

Keywords: Authentication, chromatograph, Macroscopic, Microscopic

176 Kunle Oluyemisi Folashade * and Egharevba Henry Omoregie

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Layout Idu, PMB 21 Garki, Abuja, Nigeria.

Essential oil *of Lippia Multiflora Moldenke*: A Review. *Journal of Applied Pharmaceutical Science (JAPS) (2012) 02(01): 15-23*

Abstract

Lippia multiflora Moldenke is a tropical to subtropical herbaceous aromatic plant widely distributed throughout tropical Africa, South and Central American countries. It has been traditionally used in various communities for different purposes ranging from therapeutic febrifuge in form of tea and fumigants to non-therapeutic drink for relaxation and sedation, and as well as condiments. Of most economic and scientific importance is the essential oil in the aerial part of the plant, the "lippia oil". The therapeutic properties of the plant are largely attributed by researchers to the oil. This review is aimed at collating all the scientific data available on the oil and drawing attention to its chemical components, pharmacological activities and resources for industrial exploration and exploitation.

Keywords: Lippia multiflora, essential oil, monoterpenes, sesquiterpenes.



177 Kunle, Oluyemisi Folashade¹*, Egharevba, Henry Omoregie¹ and Ahmadu, Peter Ochogu²

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Layout Idu, PMB 21 Garki, Abuja, Nigeria. ²Timuin University of Traditional Chinese Medicine, Timuin Chine,

²Tianjin University of Traditional Chinese Medicine, Tianjin, China

Standardization of Herbal Medicines. International Journal of Biodiversity and Conservation (IJBC) 2012, 4(3):101-112

Abstract

There is increasing awareness and general acceptability of the use of herbal drugs in today medical practice. Although most of these application are unorthodox, it is however a known fact that over 80% of the world population depends on herbal medicines and product for healthy living. This rise in use of herbal product has also given rise to various form of abuse and adulteration of the products leading to consumers' and manufacturers' disappointment and in some instances fatal consequences. The challenge is innumerable and enormous, making the global herbal market unsafe. This review seeks to enlighten stakeholders in herbal medicine on the need to establish quality parameters for collection, handling, processing and production of herbal market. The processes of good quality assurance and standardization of herbal medicines and products were also discussed.

Keywords: Herbal medicine, standardization, quality control.

178 Lucy B. John-Africa*, Maryam S. Idris-Usman, Bulus Adzu and Karniyus S. Gamaniel

^{*}Department of Pharmacology and Toxicology, National Institute for pharmaceutical Research and Development, P.M.B 21, Garki, Abuja, Nigeria.

Protective effects of the aqueous extract of *Nymphaea lotus* L. (Nymphaeaceae) against ethanolinduced gastric ulcers. *International Journal Biological and Chemical Sciences 2012 6(5): 1917-1925*

Abstract

Effects of the aqueous extract of Nymphaea lotus were investigated on ethanol induced gastric lesions in rats. The extract (250, 500, 1000 mg/kg) significantly (P < 0.05), dose dependently, protected the rat gastric mucosa against the necrotising effects of ethanol. Preliminary phytochemical screening of the extract revealed the presence of saponins, tannins, flavonoids, terpenes, and had an oral LD50 of >5000 mg/kg. These results shows that aqueous extract of Nymphaea lotus contains active ingredients with a therapeutic potential against gastric ulcers, and thus authenticate the use of Nymphaea lotus as an antiulcer agent in traditional medicine. © 2012 International Formulae Group. All rights reserved.

Keywords: Nymphaeae lotus, ethanol-induced gastric ulcers, gastroprotection.



179 Martins Emeje¹* Lucy John-Africa² Yetunde Isimi¹ Olobayo Kunle¹ Sabinus Ofoefule³

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria

²Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria

³ Department of Pharmaceutical Technology and Industrial Pharmacy University of Nigeria, Nsukka Enugu state, Nigeria.

Eudraginated polymer blends: A potential oral controlled drug delivery system for theophylline. *Acta Pharmaceutica 2012 62: 71–82*

Abstract

Sustained release (SR) dosage forms enable prolonged and continuous deposition of the drug in the gastrointestinal (GI) tract and improve the bioavailability of medications characterized by a narrow absorption window. In this study, a new strategy is proposed for the development of SR dosage forms for theophylline (TPH). Design of the delivery system was based on a sustained release formu- lation, with a modified coating technique and swelling features aimed to extend the release time of the drug. Dif- ferent polymers, such as Carbopol 71G (CP), sodium carboxymethylcellulose (SCMC), ethylcellulose (EC) and their combinations were tried. Prepared matrix tablets were coated with a 5 % (m/m) dispersion of Eudragit (EUD) in order to get the desired sustained release profile over a period of 24 h. Various formulations were evaluated for micromeritic properties, drug concentration and in vitro drug release. It was found that the in vitro drug release rate decreased with increasing the amount of polymer. Coating with EUD resulted in a significant lag phase in the first two hours of dissolution in the acidic pH of simu-lated gastric fluid (SGF) due to decreased water uptake, and hence decreased driving force for drug release. Re- lease became faster in the alkaline pH of simulated intes- tinal fluid (SIF) owing to increased solubility of both the coating and matrixing agents. The optimized formula-tion was subjected to in vivo studies in rabbits and the pharmacokinetic parameters of developed formulations were compared with the commercial (Asmanyl®) formu- lation. Asmanyl® tablets showed faster absorption (tmax 4.0 h) compared to the TPH formulation showing a tmax value of 8.0 h. The Cmax and AUC values of TPH formu- lation were significantly (p < 0.05) higher than those for Asmanyl[®], revealing relative bioavailability of about 136.93 %. Our study demonstrated the potential useful- ness of eudraginated polymers for the oral delivery of the sparingly soluble drug theophylline.

Keywords: theophylline, polymer blends, modified release, in vitro release, in vivo release.

122

180 Mbah C. C.*, Emosairue C. O., Builders P. F., Isimi C. Y., and Kunle O. O.

Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Idu, PMB 21 Garki, Abuja, Nigeria.

Effect of process parameters on the properties of some metronidazole tablets and capsule formulations. *African Journal of Pharmacy and Pharmacology*, 2012; 6(24): 1719-1725

Abstract

This work was aimed at evaluating the properties of metronidazole capsules and tablets formulated by different methods in comparison with some commercially available tablet brands to ascertain the influence of formulation parameters and the unpopularity of clinical use of the capsule in Nigeria. Three batches of metronidazole 200 mg tablets were formulated by wet granulation, dry granulation and direct compression methods. Metronidazole 200 mg capsules were formulated by hand filling technique. The formulations and two commercially available tablet brands (M & B, Cardinal) were evaluated following standard procedures. All the formulated tablets passed the uniformity of weight and content, disintegration and dissolution tests but failed the friability test to a significant degree in the order: Dry > Direct Compression > Wet. The release profiles were in the order: Wet > Direct Compression > Wet. The release profiles were in the order: Wet > Direct Compression > Wet. The release profiles were in the order: Wet > Direct Compression > Wet. The release profiles were in the order: Wet > Direct Compression > Wet. The release profiles were in the order: Wet > Direct Compression > Wet. The release profiles were in the order: Wet > Direct Compression > Dry > M & B > Capsule > Cardinal, with significant (P < 0.05) difference between the highest and the lowest. The results indicated that variations in formulation parameters had important influence on the qualities of solid dosage formulations of metronidazole. Except for one commercial brand, all the tablet formulations tested generally performed better than the capsule formulation, probably supporting its unpopularity in Nigeria.

Keywords: Metronidazole, capsules, tablets, granulation, dissolution profile.

181 Okhale, S. E., Amupitan, J. O., Ndukwe, I. G., Oladosu, P. O. and Okogun, J. I

Synthetic modification of gedunin and comparative antibacterial activity of *gedunin* and 7-deacetoxy- 7α -hydroxygedunin potassium salt. *African Journal of Pure and Applied Chemistry*, 2012 6(14):183-189.

Abstract

Gedunin, a highly oxidized triterpenoid was obtained from hexane extractive of stem wood of Entandrophragma angolense (Welw) C. D. C. of the family Meliaceae. The gedunin was dissolved in minimum methanol at 40°C and set aside in the dark for recrystallization. Pure gedunin crystals were obtained in 0.092% yield. Methanolic alkaline hydrolysis of the gedunin afforded 7-deacetoxy-7α-hydroxygedunin potassium salt in 90.53% w/w yield. The gedunin and 7-deacetoxy-7α-hydroxygedunin potassium salt were screened against Bacillus subtilis, Staphylococcus aureus, Escherichia coli, and Klebsiella pneumoniae using broth microdilution assay method. 7-Deacetoxy-7α-hydroxygedunin potassium salt had minimum inhibitory concentration (MIC) of 1000 µg/ml against K. pneumoniae, 2000 µg/ml against S. aureus, and E. coli. However, B. subtilis was not susceptible to 7-deacetoxy-7α-hydroxygedunin potassium salt at 2000 µg/ml. Gedunin was not active against all the bacterial organisms tested at 2000 µg/ml.

Keywords: Gedunin, synthesis, gedunin potassium salt, antibacterial, broth microdilution method.



182 Okhale, Samuel Ehiabhi¹*, Egharevba, Henry Omoregie¹, Ona, Eneyi Comfort¹,² and Kunle, Oluyemisi Folashade¹,³

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Area, Idu, P. M. B. 21 Garki, Abuja, Nigeria.

²Department of Chemistry, Ahmadu Bello University, Zaria, Nigeria ³Department of Pharmacognosy, Faculty of Pharmacy, University of Jos, Nigeria

Phytochemical and proximate analyses and thin layer chromatographic fingerprinting of the aerial part of *Chenopodium ambrosioides Linn Chenopodiaceae*. *Journal of Medicinal Plant Research (JMPR,) 2012, 6(12): 2289-2294*

Abstract

The aerial part of Chenopodium ambrosioides L., reputable for the treatment of malaria And diabetes in Nigeria was qualitatively screened for the presence of secondary metabolites using standard methods. Some proximate pharmacognostic parameters were also determined. The results of the phytochemical screening revealed the presence of alkaloids, tannins, saponins, flavonoids, phenols, terpenes, sterols, cardiac glycosides, volatile oils and carbohydrates. The proximate pharmacognostic analysis revealed a moisture content of 10.90%, total ash value of 14.65%, acidinsoluble ash value of 3.05%, water-soluble ash of 6.25%, water-soluble extractive value of 3.18% and alcohol-soluble extractive value of 13.20%. The thin layer chromatographic fingerprinting and phytochemical screening revealed several clear spots attributable to the various chemical components, which could be isolated from the plant. This study shows that C. ambrosioides is a potential drug plant considering the rich phytochemical and proximate pharmacognostic profile of the aerial part, and this may be responsible for the observed pharmacological activity in its folkloric application. The result of this study is the first of its kind, and is informative for standardization and monograph development of this herbal plant.

Keywords: Chenopodium ambrosioides, secondary metabolites, Thin layer chromatography, pharmacognostic analysis, antimalaria, Mexican tea, ash value.

183 Rahul V. Manek¹ Philip F. Builders,² William M. Kolling,³ Martins Emeje,² and Olobayo O. Kunle²

¹Formulation Development, Execelisi Inc., South San Francisco, California, 94080, USA ²Department of Pharmaceutical Technology and Raw Materials Development, National Institute of Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria ³School of Pharmacy, South Illinois, University, Edwardsville, Illinois, 62062, USA. Physicochemical and Binder Properties of Starch obtained from Cyperus esculentus. American Association of Pharmaceutical Scientists PharmSciTech, 2012; 13(2).

Abstract

The purpose of this study was to isolate starch from the tubers of *Cyperus esculentus* L. and evaluate its physicochemical and binder properties. Extraction of starch using sodium metabisulfite yielded 37 g of starch per 100 g of the tubers. Scanning electron microscopy indicated that Cyperus starch consists of oval to elliptical particles with a smooth surface. Cyperus starch demonstrates a narrow particle size distribution with a mean of 8.25 µm. Cyperus starch conforms well to United States



Pharmacopeia standards established for widely used starches like maize and potato. The X-ray powder diffraction pattern and moisture sorption profile of Cyperus starch were comparable to that of maize starch. Cyperus starch had lower swelling power than maize and potato starch, indicative of stronger associative forces within the granules. Carr's index and Hausner ratio indicate that Cyperus starch should have comparable flow properties with respect to maize and potato starch. Cyperus starch was employed as binder for the formulation of metronidazole tablets. Formulations containing 5%, 7.5%, and 10% Cyperus starch were compared with those containing 10% potato starch. At 10% binder concentration, the tablets containing Cyperus starch exhibited better hardness and negligible friability as compared with those with potato starch. Although the binder concentration had a significant effect on the disintegration time of the tablets, it did not seem to affect the dissolution profile. These results indicate that Cyperus starch provides excellent binding properties without compromising drug release characteristics and should be explored in pharmaceutical formulations.

Keywords: *Cyperus esculentus*; Cyperus starch; pharmaceutical excipient; physicochemical evaluation; starch characterization.

184 Samali A.^{*}, Rukaiyatu A. Kirim and Mustapha K. B.

Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development (NIPRD), Federal Ministry of Health, P.M.B 21, Idu Industrial Area, FCT Abuja, Nigeria.

Qualitative and Quantitative Evaluation of Some Herbal Teas Commonly Consumed in Nigeria. *African Journal of Pharmacy and Pharmacology 2012, 6(6), pp. 384-388*

Abstract

Herbal tea can be use for therapeutic or nutritional purposes, depending on the chemical constituents present. This study aims at evaluating phytochemical, physicochemical parameters and elemental contents of herbal teas commonly consumed in Nigeria. Level of essential and toxic metals in medicinal plants is a matter of great concern all over the world. Six different brands of herbal teas were analysed in this study. Phytochemical screening results showed the presence of tannins, steroids, terpenoids, saponins, cardiac glycosides, flavonoids, alkaloids and phlobatannins, while the physicochemical parameters which includes moistures content, ash, water extractive and alcohol extractive matter values ranges from 7.55 to 21.20, 5.52 to 9.28, 8.86 to 14.80 and 4.22 to 7.05%, respectively. Atomic absorption spectroscopy (AAS) was used for the elemental analysis of different teas in which the content ranges from 0.83 to 2.63, 3.28 to 5.96, 7.45 to 86.67, 0.53 to 2.85 and 1.11 to 9.73 µg/g for chromium (Cr), iron (Fe), manganese (Mn), Lead (Pb) and zinc (Zn) respectively. The outcome of this study serves as an important contribution to knowledge in establishing quality parameters for the standardization of herbal tea in Nigeria.

Keywords: Phytochemical, physicochemical, elemental analysis, herbal tea.

185 Samali, A.^{*}, Florence, D. T., Odeniran, O. A. and Cordelia O.N.

Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research and Development, Federal Ministry of Health P. M. B. 21, Idu Industrial Area, FCT, Abuja.

Evaluation of Chemical Constituents of *Phyllanthus niruri*. *Afr.J. of pharmacy and pharmacology* 2012, 6(3), 125-128.

Abstract

The study was carried-out to evaluate the chemical constituents of *Phyllanthus niruri*, a commonly multifunctional activities herbal plant used for curing different ailment. The plant (roots, leafs and stem) was collected in Federal Capital Territory Abuja, Nigeria in the months of July to August, 2009 and used throughout the study. Phytochemical, elemental and physicochemical constituents of the plant was evaluated and the results were as follows: Phytochemical screening indicated the presence of alkaloid, balsams, sterols, carbohydrate, glycoside, flavonoids, tannins, phlobatannins, resins and terpene in trace; while the essential elements detected were of variable concentrations (mg/L) as; Ca (157.419 \pm 1.42), Na (14.393), K (11.344), P (2.341), Mg (59.627 \pm 0.54), Mn (7.926 \pm 0.27), Fe (34.552 \pm 815), Cu (3.082 \pm 0.67) and Zn (3..346 \pm 0.24) but Cd, Pb and Ni were not detected by the equipment. Physicochemical parameters evaluated were, percentage moisture content (12.4057 \pm 0.45% w/w), total ash (6.9950 \pm 0.46 %w/w), bitterness value (1636.88 \pm 0.74 Units/g), water extractable matter (1.3353 \pm 0.10% w/w) and retention value (RF) value (0.5772, 0.5781, 0.5665). The results indicated that, the plant is rich in various chemicals which may be the reason for its activities against different ailment as claimed by the indigenous people.

Keywords: *Phyllanthus niruri*, physicochemical, phytochemicals, essential elements.

186 Tijani A.Y, Salawu O.A, Odeniran Olubukola Adebisi

Neuropharmacological effects of *Crinum zeylanicum* alkaloid fraction in laboratory animals. *PharmacologyOnLine 2012 Vol 1; 51-58.*

Abstract

Preparations of *Crinum zeylanicum* (CZ) bulb extract are used in traditional medicine in Nigeria for management of malaria, general debility, childhood convulsions and epilepsy. The objective of this study was to investigate some neuropharmacological effects of alkaloid extracted from *Crinum zeylanicum* bulb. The oral acute toxicity of *Crinum zeylanicum* alkaloid was carried out in mice using modified L' orke's method. Pentobarbitone-induced sleep was used to study the sedative effect at 3 dose levels of 10,20, and 40mg extract/kg body weight. The anti-emetic effect was evaluated using the Copper sulphate-induced emesis in one day old chicks, the hypothermic effect was evaluated in normopyretic mice while the anticonvulsant effect was evaluated using Pentylenetetrazole (PTZ) – picrotoxin (PCT) – induced seizure models in mice. The oral acute toxicity of the extract was found to be 770mg extract/kg body weight. The alkaloid significantly (p< 0.01) shortened the onset and prolonged pentobarbitone-induced sleeping time. The extract at 10,20 and 40 mg/kg body weight produced inhibition of retching in one day old chicks by 27.4,4.53 and 50.8% respectively. The alkaloid significantly (P< 0.05) decreased the body temperature of



normopyretic mice and protected against PTZ – and PCT – induced seizures in a dose dependent manner. These results indicate that the alkaloid fraction of Cz possesses antiemetic, hypothermic, anti-conlsant and sedative effects.

Keywords: Crinum zeylanium, Alkaloid, Emesis, Pentobarbitone, hypothermia, epilepsy.

187 Tijani Adeniyi Yahaya¹, Lucy Binda John - Africa¹, Sadiq Moh'd Abubakar and Ben Ahmed Chindo¹

¹Department of Pharmacology and Toxicology National Institute for Pharmaceutical Research and Development Idu industrial Area Abuja, Nigeria.

Behavioural effects of Benylin-Codein in mice. Nature and Science, 2012 10(4):83 - 88

Abstract

The over-the-counter Benylin cough syrup containing codeine (B-C) has emerged as a new agent widely abused in Nigeria among the youths for its opium-like effects such as sedation, euphoria and ability to enhance tolerance for hard work. In the present study the behavioural effects of the cough syrup on locomotion using open field apparatus and short-term memory using Y-maze were evaluated in mice. The behavioural effects of B-C on locomotion and memory were evaluated in mice grouped into four groups of six mice. Groups I served as the control and received 10 ml normal saline/kg body weight while groups II, III and IV received 10.95, 21.90 and 43.80 mg/kg repeatedly for 7-days. Single oral administration of the cough syrup significantly (p<0.001) and dose-dependently increased total locomotive activity and rearing in open field. It significantly decreased short term memory indicated by decrease in spontaneous alternation behaviour and increased the total spontaneous motor activity of mice in Y- maze. Repeated administration of the cough syrup significantly (p<0.001) and dose-dependently decreased total locomotive activity and rearing in open field apparatus and short term memory in Y-maze. These findings suggest that single and repeated administration of the cough syrup decreased locomotion, rearing and impaired short term memory resulting in sedation, impaired motor and mental activities.

Keywords: motor behavior, short-term memory, Y-maze, open field.

188 Umeh $O.N.C^{1*}$, Emeje $M.O^{2}$ and Ofoefule $S.I^{1}$

¹Department of Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka.

²National Institute for Pharmaceutical Research and Development, Abuja.

Effect of Some Channeling Agents on the Release of DFK from a Hydrophobic Polymer Matrix. *Research Journal of Pharmaceutical, Biological and Chemical Sciences, 2012; 3(4): 1173-1177.*

Abstract

Ethylcellulose, a hydrophobic polymer, when employed at a relatively high concentration in a formulation, especially in sustained release formulation is capable of retarding drug release unless a channeling agent is incorporated. The present study was undertaken to investigate the effect some



channeling agents (maize starch, alginic acid, sodium lauryl sulphate (SLS) and polyethylene glycol 4000 (PEG 4000) will have on the release of a poorly water soluble drug, diclofenac potassium (DP) from ethylcellulose matrix. Diclofenac potassium granules and matrix tablets were prepared by the wet granulation method and the tablet properties evaluated as a function of polymer additive include: hardness, friability and dissolution profiles in phosphate buffer (pH 7.5). Results obtained indicated variability in DP release in the presence of the polymer additives. Whereas the presence of maize starch or alginic acid led to an increased release of DP, the presence of SLS or PEG 4000 caused significant retardation in the DP release. The behavior of SLS and PEG 4000 is consistent with established inconsistencies of their behavior in formulation, a behavior which has been attributed to micelle formation when used at certain concentrations in formulations. The release of DP generally changed from anomalous (non-Fickian) to Fickian in the presence of all the additives. The overall results indicated that maize starch or alginic acid can be utilized as channeling agents to enhance the release of DP from ethylcellulose matrix while still maintaining the sustained release integrity of the matrix.

Keywords: Diclofenac potassium, ethylcellulose matrix, channeling agents, enhancement, retardation micelles.

YEAR 2011

189 Aboh Mercy Itohan*, Oladosu Peters and Ibrahim Kolo

Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu. P.M.B 21 Garki, Abuja, Nigeria.

Bacterial contaminants of salad vegetables in Abuja Municipal Area Council, Nigeria. Malaysian Journal of Microbiology, Vol 7(2) 2011, pp. 111-114.

Abstract

Salad vegetables are essential part of people's diet all around the world. They are usually consumed raw and often without heat treatment or thorough washing; hence have been known to serve as vehicles for the transmission of pathogenic microorganism associated with human diseases. Fresh samples of lettuce, carrot and cucumber collected from different markets and vendors in Abuja Municipal Area Council, Federal Capital Territory, Nigeria were evaluated for bacterial loads using spread plate agar dilution method. Bacterial loads ranged from 1.6 x 106 to 2.9 x 108 cfu/g. *Escherichia coli, Klebsiella* and *Enterobacter* were amongst the coliforms (lactose fermenters), while *Proteus, Pseudomonas aeruginosa, Salmonella* and *Shigella* were non-lactose fermenters associated with the samples. *Staphylococcus aureus* was isolated from majority of the samples.

Keywords: salad vegetables, heat treatment, coliforms, pathogenic, bacterial load, agar dilution **E-mail:** <u>itohan07@yahoo.com</u>

190 Akuodor G. C.^{1*}, M. Idris Usman¹, J. A. Ibrahim², K. C. Chilaka³, J. L. Akpan⁴, S. Dzarma¹, I. Muazzam² and U. A. Osunkwo¹

¹Depatment of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), P.M.B. 21, Garki, Abuja, Nigeria

²Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), P.M.B. 21, Garki, Abuja, Nigeria

³Department of Pharmacology and Therapeutics, Faculty of Medicine, Nnamdi Azikiwe University, Awka, Nigeria

⁴Department of Pharmacology and Therapeutics, Faculty of Clinical Medicine, Ebonyi State University, Abakiliki, Nigeria

Anti-nociceptive, anti-inflammatory and antipyretic effects of the methanol extract of *Bombax* buonopozense leaves in rats and mice. *African Journal of Biotechnology. 2011, 10 (15): 3191-3196.*

Abstract

Methanolic extract of Bombax buonopozense was evaluated for possible anti-nociceptive, antiinflammatory and anti-pyretic activities in mice and rats. Acetic acid-induced abdominal constriction test in mice and formalin test in rats were used to investigate the antinociceptive effect of the extract. Studies were carried out on yeast-induced pyrexia and egg albumin-induced anti-inflammatory activity in rats. The extract produced a significant decrease in acetic acid-induced writhing in mice and inhibition of late phase of the formalin pain test in rats. The methanolic extract of B.



buonopozense leaf also produced a potent antipyretic effect and significant inhibition of egg albumin-induced anti- inflammatory activity in rats. The result suggests that B. buonopozense contains biologically active substances with potential values for the treatment of fever, painful and inflammatory conditions.

Keywords: Bombax buonopozense; analgesic, inflammation, pyrexia.

191 Anwunobi A. P^1 and M. O. Emeje^{1,2}*

¹Biophysical Drug Delivery Unit, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Nanoscience Group, National Chemical Laboratory, Pune, India.

Recent Applications of Natural Polymers in Nanodrug Delivery. *Journal of Nanomedicine and nanotechnology*, 2011; S4–002.

Abstract

Natural biopolymers such as starch, chitosan and gelatin have found use in industries as diverse as food, textiles, cosmetics, plastics, adhesives, paper, and pharmaceuticals. The food industry uses these polymers as a thickening agent in snacks, meat products, fruit juices. They are also used in the manufacture of disposable items like fast food utensils and containers. From a pharmaceutical standpoint, these polymers have been extensively used in solid oral dosage forms, where they have been used as binders, diluents, disintegrant and matrixing agents. In recent times, nanotechnology has started to make significant advances in biomedical applications, including newer drug delivery techniques. There has therefore been considerable research into developing biocompatible, biodegradable submicron devices as drug delivery systems using natural polymers, this is because, they occur widely in nature, generally biocompatible, biodegradable, safe and non-immunogenic. There are reports of these polymers been made into colloidal particles that act as carriers for both large and small drug molecules, conferring on the drug molecules properties which enhance delivery actively or passively, thereby tuning them for use as controlled, ocular, transdermal or intranasal delivery systems. In more advanced areas of drug delivery, these polymers have also been tested for gene therapy and tissue engineering. This review examines the properties and recent applications of three (3) natural polymers; starch, chitosan and gelatin in nano-drug delivery.

Keywords: Natural polymers; Nanotechnology; Drug delivery

192 Builders, M.I.¹, Wannang, N.N¹, Ajoku, G.A.^{2*,} Builders, P.F.¹, Orisadipe, A.² and Aguiyi, J.C.¹

¹ Department of Pharmacy, University of Jos, Plateau State, Nigeria.

² National Institute for Pharmaceutical research and Development, Abuja, Nigeria. Evaluation of the Antimalarial Potential of Vernonia ambigua Kotschy and Peyr (Asteraceae). International Journal of Pharmacology 2011 7 (2) 238-247.

Abstract

Some traditional medicine practitioners in Nigeria have claimed the use of the decoction of the whole plant of *Vernonia ambigua* for the management of malaria. The aim of this study is to

130

authenticate the antimalarial potential of this plant by evaluating its antiplasmodial activities. The feeze-dried decoctions of the whole plant of V. ambigua were used for the study. The phytochemical components and the antioxidant activity using 2,2-Diphenyl-1-picryl-hydrazyl radical (DPPH) were determined. The oral median lethal dose (LD50) and in vivo antiplasmodial activity were determined in Swiss albino mice. Different doses of the extract (50, 100, 200, 300, 400, 500, and 600mg/Kg PO) were administered to the mice infected with 1 X 107 Plasmodium berghei berghei. Four days suppressive and curative effects against established infections as well as prophylactic activities were evaluated. The in vitro antiplasmodial activity was carried out on plasmodial falciparum using different concentration of the decoction. The decoction showed the presence of alkaloids, flavonoids, tannins, saponins, sterols, phenols and reducing sugars and a moderate antioxidant activity. The LD50 was estimated to be greater than 5000mg/Kg. Effective dose dependent inhibitions of parasitaemia were observed in the suppressive, curative and prophylactic tests. The in vitro screening also showed a moderate antiplasmodial activity $(31.62\mu g/ml < IC50 < 50\mu g/ml)$. The effective antiplasmodial activities of V, ambigua could be attributed to its content of certain phytochemicals and may partly explain its use for the treatment of malaria.

193 Christiana Isimi^a, Ifeoma Obidike^b, Mercy Aboh^c & Martins Emeje^{ad}

^a Department of Pharmaceutical Technology and Raw Materials Development, Abuja, Nigeria ^b Department of Pharmacology and Toxicology, Abuja, Nigeria

^c Department of Pharmaceutical Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

^d Nanoscience Group, Division of Physical and Materials Chemistry, National Chemical Laboratory, Pune, India

Anti-plasmodial activity of the mixed stem bark extracts of Anogeissus leiocarpus and Prosopis africana and in vitro evaluation of its tablet dosage form. *Journal of Herbs, Spices & Medicinal Plants 2011, 17:4,419-435.*

Abstract

The antinociceptive, immunostimulatory, and antiplasmodial properties of *Anogeissus leiocarpus* and *Prosopis africana* combined aqueous extract (AA1) and its single tablet formulation were evaluated. Results showed that AA1 suppressed parasitaemia in early infection by 50% and 69% at 200 and 400 mg.kg-1 body weight (b.w) respectively. In established infection, AA1 reduced parasitaemia by 55% to 78% at 100 to 400 mg.kg-1 b.w. Dissolution results show that the tablets formulated with 10% disintegrant released 90% of the drug in less than 30 min, proving to be suitable in acute malaria attack.

Keywords: antimalarial, medicinal plants, mixed herbal formulation

NIPRD Compendium of Research Publications (2010 - 2018)

194 Emeje M. O.^{1,3}, P. I. Okolo¹, C. Y. Isimi¹, S. I. Ofoefule²

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

²Department of Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka, Enugu State, Nigeria

³Nanoscience Group, Division of Physical and Material Chemistry, National Chemical Center, Pune, India.

Multilayered tablets of Vitamin A palmitate using blends of a vegetable fat with Xanthan and Guar gums. *Journal of Pharmaceutical Science and Technology 2011 Vol. 3 (7): 631-644.*

Abstract

Multilayered tablets of vitamin A palmitate were prepared using different types, proportions and blends of two natural polymers; xanthan gum (XG), guar gum (GG) and a vegetable fat (DF) obtained from Irvingia gabonensis (dika fat). The effect of various formulation factors like polymer proportion, polymer type and pH of the dissolution medium on the in vitro release of the drug was studied, using the half change technique, in 500 ml of dissolution medium, at 100 rpm. Release kinetics were analyzed using Zero-order, Higuchi's square-root and Ritger-Peppas' empirical equations. In vitro release performance as revealed by the time taken for 50 and 70% of the drug to be released (t50% and t70% respectively), showed that the release rate depended on the type of polymer, blend ratio and proportion of dika fat incorporated. Multilayered tablets containing blends of GG and DF (3:1) as well as those containing GG and XG (3:1) were found to exhibit immediaterelease characteristics as they had t70% values of 42 and 48 min respectively. Tablets containing blends of DF and XG (1:3) showed t50% value of 330 min and extended the release up to 8 h, while tablets containing DF and GG (1:1) showed t50% value of 180 min and equally extended the release up to 8 h. Mathematical analysis of the release kinetics indicated that the nature of drug release from the multi-layered tablets followed non-Fickian or anomalous release. Drug release from multilayered tablets of vitamin A containing blends of guar and xanthan gums with dika fat demonstrates the advantage of multilayer technology over the conventional monolithic matrix system in improving the performance of the single polymers.

Keywords: Multilayered tablets, Vitamin A palmitate, Xanthan gum, Guar gums, Dika fat, In vitro release.

195 Etubi, B.¹, Musa, A.O¹. and Olayemi, $O.J^2$.

¹Department of Biological Sciences, Ahmadu Bello University, Zaria. ²Department of Pharmaceutics and Pharmaceutical Microbiology, Ahmadu Bello University, Zaria.

Phytochemical and physicochemical studies of *Vitellaria paradoxa* C.F. Gaertn gum. *Nigerian Journal of Pharmaceutical Sciences*, 2011; 10(2): 27-33.

Abstract

The Shea tree (*Vitellaria paradoxa*, family Sapotaceae) is known to be used worldwide. The most prominent being the production of Shea butter from its seed which is in the food, cosmetics and pharmaceutical industries. The gum exudates from the bark of *Vitellaria paradoxa* was evaluated for its physicochemical and phytochemical properties. The gum powder was characterized for its viscosity, moisture sorption capacity, pH, flow rate, Carr's index, Hausner's ratio, organoleptic



properties, solubility and particle size distribution. The phytochemical screening of the gum revealed the presence of carbohydrate, cardiac glycosides, saponins and alkaloids. The results of physicochemical also showed that the gum is completely soluble in water, its dispersion in distilled water has an acidic pH and the viscosity of the gum increased with an increase in the gum concentration. In addition, the gum was observed to have good flow properties as indicated by the angle of repose 18.36, flow rate of 7.60 g/sec, Hausner's ratio of 1.3 and Carr's index of 25.5 %. The results of this study indicate that the gum is suitable as a raw material for cosmetic and pharmaceuticals products.

Keywords: Vitellaria paradoxa, phytochemical screening, physicochemical properties, gum.

196 Godwin C Akuodor^{1*}, Augustine D Essien¹, Jemilat A Ibrahim², Augustine Bassey³, Joseph L Akpan⁴, Nwakaego C Ikoro⁵ and Simon C Onyewenjo⁶

¹Department of Pharmacology, College of Medical Sciences, University of Calabar, Nigeria

²Department of Medicinal Plant Research and Traditional Medicine, National Institute for

Pharmaceutical Research and Development (NIPRD), P.M.B. 21 Garki, Abuja, Nigeria ³*Department of Pharmacology, Faculty of Clinical Medicine, University of Uyo, Nigeria*

⁴Department of Pharmacology, Faculty of Clinical Medicine, Ebonyi State University, Abakaliki, Nigeria

⁵Department of Optometry and Optical Technology, Federal University of Technology, Owerri, Nigeria and

⁶Department of Biology and Microbiology, Federal Polytechnic Nekede, Nigeria

Phytochemical and antimicrobial properties of the methalonic extracts of *Bombax buonopozense* leaf and root. *Asian Journal of Medical Sciences*, 2011, 2: 190-194.

Abstract

Objective: The leaf and root of Bombax buonopozense which have some ethnomedicinal applications were subjected to phytochemical screening and antimicrobial activity against some disease causing microorganisms.

Material & Methods: The phytochemical composition was evaluated using standard procedures. Susceptibility of these clinical isolates (Staphylococcus aureus, Bacillus subtilis, Klebsiella pneumonae, Proteus spp. and Escherichia coli) to the extracts was determined using the agar diffusion method.

Results: Phytochemical screening revealed the presence of alkaloids, flavonoids, tannins, saponins, terpenoids, steroids, phlobatannins, anthraquinones and carbohydrates (mostly in root). The root extracts demonstrated antibacterial activity against all the organisms tested, while the leaf extract had activity on S. aureus and B. subtilis only.

Conclusion: The findings indicate that the root extract contain the most active components which may be used to source antibiotic substances for possible treatment of bacterial infections.

Keywords: Bombax buonopozense; phytochemical; antimicrobial agent; medicinal plant


197 Jegede I.A., Ibrahim, J.A. and Kunle O. F

Phytochemical and pharmacognostic studies of the leaf and stem-bark of Anthocleista vogelii (Planch). *Journal of Medicinal Plants Research 2011. Vol. 5(26), pp. 6136-6139.*

Abstract

The phytochemical screening of the powdered leaves and the stem bark of Anthocleista vogelii revealed the presence of carbohydrates, saponins, flavonoids, terpenes, sterols and phenols. Alkaloid was present in the leaves only. Moisture content, total ash value, acid-insoluble ash, water-soluble ash values and extractive values were also determined. Thin layer chromatography (TLC) analyses revealed seven spots for the leaf while the stem-bark revealed three spots using normal phase plates. The microscopic analysis of the upper and lower surfaces of the leaf revealed the presence of polygonal epidermal cells. The stomata distribution in the upper surface of the epidermis is more than that of the lower surface. The transverse section of the leaf indicated the presence of two layers of palisade cells, peculiar lignified astrosclereids scattered in the mesophyll. The transverse section of the stem bark showed diagnostic features such as the presence of astrosclereids, brachysclereids, macrosclereids, 3 or 4 layers of cork cells and medullary rays. The chemo microscopic analysis of the leaf and stem bark revealed the presence of lignin, cutin and oil globules. The result of this study revealed the chemical constituents and pharmacognostic profile of the plant. These are required in the preparation of a monograph in the plant.

Keywords: Anthocleista vogelli, pharmacognosy, medicinal plants.

198 Jegede, A., Oladosu, P., Ameh, S., Kolo, I., Izebe, K., Builders, P., Yahaya T., Okhale, S., Mustapha, B., Busu, S., Shittu, H. and Gamaniel, K

National Institute for Pharmaceutica Research and Development (NIPRD)

Status of management of diabetes mellitus by traditional medicine practitioners in Nigeria. *Nigeria Journal of Medicinal Plants Research, 2011 5(27): 6309-6315.*

Abstract

Traditional medicine (TM) as practiced in Nigeria is involved with the management of diseases such as (HIV/AIDs), malaria, tuberculosis, diabetes mellitus, hypertension, fungal infections, and cancerous growths among others. Diabetes mellitus is a universal health problem affecting human societies at all stages of development. The prevalence of diabetes mellitus has been increasing steadily in Nigeria and this trend might be attributed to expensive and un- accessible anti diabetic drugs, negative lifestyles and genetic makeup, among other reasons. Most sufferers have therefore resulted to consulting traditional medical practitioners (TMPs) to manage their health conditions. Currently there are no available data on the role and status of traditional medicine practice in the management on diabetes mellitus in Nigeria. A survey was therefore conducted in November 2009 to document the status of traditional medicine practice involved in the management of diabetes mellitus in six geographical zones of the country. Data was collected by oral interviews of over 70 TMPs and their responses documented in a specially designed questionnaire. This paper intends to highlight the results obtained from the survey with the aim of providing a better understanding of TM practice and availability of necessary statistics to aid the promotion, standardization and integration of the practice into national health care system.

Keywords: Traditional medical practice, diabetes mellitus, medicinal plants, survey.

199 Jemilat A. Ibrahim^a and A. E. Ayodele^b

^aDepartment of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja ^bDepartment of Botany and Microbiology, University of Ibadan, Ibadan

Taxonomic Revision of the Nigerian Loranthaceae. Nigerian Journal of Botany, 2011, 24 (1): 153-188.

Abstract

The family Loranthaceae was studied throughout its range in Nigeria. Fifteen species in six genera were recorded in the study. The species are widely distributed most being locality specific. The investigation revealed highly variable leaf shapes in most of the species, linear-lanceolate to ovate-lanceolate in Agelanthus dodoneifolius and sessile in Tapinanthus cordifolius. Corolla is reflexed in the genus Tapinanthus; erect in Englerina and Agelanthus; coiled in Globimetula, erect and reflexed in Phragmanthera. Flowers are on a spike in Helixanthera. From this study, it is concluded that sterile specimens of this family might be very difficult to identify. A taxonomic key based on these macro-characters and colour pictures are presented for the identification of mistletoes found in Nigeria.

Keywords: Loranthaceae, Macromorphology, Taxonomy, Mistletoes, Nigeria

200 Josephat Ogbonna², Martins Emeje^{1,4}*, Momoh Mumini², Anthony Attama², and Sabinus Ofoefule³

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja.

²Department of Pharmaceutics, University of Nigeria, Nsukka, Enugu state

³Department of Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka, Enugu state, Nigeria.

⁴Nanoscience group, National Chemical Laboratory, Pune, India.

The dual role of a Carboxymethylated starch in monolithic polymeric matrices of ciprofloxacin. *International Journal of Pharmacy and Pharmaceutical Sciences, 2011; 3(4).*

Abstract

The effects of low level primogel on the release profile of ciprofloxacin hydrochloride from tablet matrices of ethylcellulose (EC), eudragit 1-100 (EU), hydroxyethyl cellulose (HE) and hydroxypropyl methyl cellulose (HP) were investigated. Primogel was used at 0, 4 and 8 % w/w concentrations and the granules were prepared by wet granulation method with ethanol as the granulating solvent. Results show that, primogel exhibits a dual character of enhancing or retarding drug release from the polymer matrices depending on the type of polymer used. Primogel in the hydrophobic polymers was found to be an effective disintegrant causing a release of over 90 % of drug in just 30 min. It was however, found to be a good retardant in the hydrophilic polymers where drug release was sustained for more than 8 h. Primogel had an appreciable effect on drug release mechanism changing it from fickian to anomalous and vice versa also depending on the polymer type. Primogel, a carboxymethylated starch may be a useful additive in monolithic polymeric matrices of ciprofloxacin when immediate or sustained release oral dosage forms are intended.

Keywords: Primogel, Hydrophilic and hydrophobic polymers, Ciprofloxacin, Tablets

201 Martins Emeje¹, Amaka Izuka¹, Christiana Isimi¹, Sabinus Ofoefule², and Olobayo Kunle¹

¹Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja. ²Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka, Nigeria

Preparation and Standardization of a herbal agent for the therapeutic management of Asthma. *Pharmaceutical Development and Technology, 2011; 16(2): 170–178*

Abstract

This study aims to develop a suitable single tablet dosage form containing a mixture of hot water stem back extracts of Anogeissus leiocarpus and Prosopis africana (AA1), suitable for use in the therapeutic management of asthma. The compaction characteristics of the oven-dried hot water extract (HWE) were studied using the Heckel equation. The mechanical properties as well as disintegration and dissolution profile of the compacts were also assessed. The results showed that AA1 exhibited high densification due to dye filling while the subsequent rearrangement of the granules did not contribute, significantly, to their densification. The granules had enhanced plasticity as shown by the low yield point, Py. The tablets produced from the extract had good mechanical properties, with hardness increasing with compression pressure while the friability decreased. Of the four disintegrants tested, tablets containing Explotab had the shortest disintegration time of 11 min while tablets containing Prosolv had the longest disintegration time of 40 min. The order of disintegrant property is Explotab > Cellactose > Emcocel > Maize starch > Prosolv. Dissolution results (t90%) show that tablets containing Explotab released 100% of the drug in 20 min proving to be the most suitable in acute asthma attack. The order of dissolution is Explotab > Cellactose > Maize starch > Prosoly > Emcocel. It is concluded that incorporation of Explotab (10%w/w) as a disintegrant in AA1 preparation produced tablets of suitable compressional properties and ensured adequate drug release for the management of acute asthma.

Keywords: Asthma; tablets; compaction properties; Anogeissus leiocarpus; Prosopis Africana

202 Martins Emeje¹, Samaila Boyi¹, Ifeoma Obidike², Christiana Isimi¹, Olobayo Kunle¹, & Sabinus Ofoefule³

¹Department of Pharmaceutical Technology and Raw Material Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria,

²Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria,

³Department of Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka, Nigeria.

Natural Anti-Diabetic Compound for the Therapeutic Management of Diabetes mellitus and its Drug Delivery System. *Journal of Dietary Supplements Aug 2011, Vol. 8, No. 3: 266–279*

Abstract

A single tablet dosage form containing the freeze-dried aqueous leaf extract of *Vernonia amygdalina* (AD1), suitable for use in the therapeutic management of diabetes mellitus, has been developed. The compaction characteristics of the extract were studied using the Heckel equation. The mechanical properties as well as disintegration and dissolution profile of the compacts were also assessed. The results showed that AD1 exhibited very low densification due to dye filling and addition of



filler–binders contributed significantly to their subsequent densification. The tablets produced had good mechanical properties. Of the three filler–binders tested, tablets containing Avicel had the shortest disintegration time of about 5 min, while tablets without any filler–binder had the longest disintegration time of 50 min. Dissolution results (T90%) showed that tablets containing Avicel released 100% of the extract in less than 15 min proving to be the most suitable in acute diabetes. The order of dissolution is Avicel > maize starch > lactose > extract. It is concluded that incorporation of Avicel as a filler–binder in AD1 preparation produced tablets of suitable compaction properties and ensured adequate drug release for the therapeutic management of diabetes mellitus.

Keywords: Compaction properties, diabetes mellitus, tablets, Vernonia amygdalina

203 Martins Emeje^a*, Christiana Isimi^a, Stephen Byrn^b, Joseph Fortunak^c, Olobayo Kunle^a and Sabinus Ofoefule^d

^aDepartment of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Idu, P.M.B.21 Garki-Abuja, Nigeria. ^bDepartment of Medicinal Chemistry and Physical Pharmacy, Purdue University, Indiana, USA.

^cDepartment of Chemistry, Howard University, USA.

^dDepartment of Pharmaceutical Technology and Industrial Pharmacy University of Nigeria, Nsukka, Enugu State, Nigeria.

Extraction and Physicochemical Characterization of a New Polysaccharide Obtained from the Fresh Fruits of *Abelmoschus Esculentus*. *Iranian Journal of Pharmaceutical Research 2011; 10* (2): 237-246

Abstract

This paper is the first multi-scale characterization of the fluidize-dried gum extracted from the fresh fruits of the plant *Abelmoschus esculentus*. It describes the physical, thermal, sorptional and functional properties of this natural gum. Elemental analysis, scanning electron microscopy (SEM), particle size analysis, X-ray powder diffraction (XPRD), thermo-gravimetric analysis (TGA), differential scanning calorimetry (DSC), Fourier transmittance infra-red (FT-IR), and nuclear magnetic resonance (NMR) spectroscopy were used to characterize the gum sample. *Abelmoschus Esculentus* Gum (AEG) had a glass transition temperature (Tg) of 70°C and no melting peak. It showed a 14.91% loss in weight at 195°C. X-ray diffractogram showed numerous broad halos for AEG. Elemental analysis showed that AEG contains 39.5, 7.3, 51.8, and 1.4% carbon, hydrogen, oxygen and nitrogen respectively. The results obtained in this study established the fundamental characteristics of AEG and suggests its potential application in the food, cosmetic and pharmaceutical sectors.

Keywords: *Abelmoschus esculentus* gum; Physicochemical characterization; Thermal stability; Sorption profile.



204 NJOKU OM, Edubio-Petzkedoko A, Rokkos C, Idoko JA, Oladepo DK, Ibrahim K, Kuecherer C, Pauli G, Ganmaniel KS

National Institute for Pharmaceutical Research and Development, Abuja, NIGERIA.

Cell tropism of Nigerian HIV- 1 strains in macrophages and dendritic cells: implications on anti-HIV drugs and HIV vaccine development. *3rd African Network for Drugs and Diagnostics Innovation (ANDi). 4th Stakeholder Meeting, and Donors Conference, October 2011. United Nations Conference Center, Addis Ababa, Ethiopia. 184*

Abstract

Background. Sub-Saharan Africa leads the HIV pandemics with about 67% HIV infections and AIDS cases. Nigeria alone is home to 2 of every 10 HIV/AIDS cases. The development of anti-HIV drugs and AIDS vaccine affected by HIV subtypes and recombinant forms of the virus as well as by the diverse host genetics that determine route of exposure to HIV of different populations. HIV tropism is critical for understanding the mechanisms by which these viral characteristics impact pathogenesis and response to therapeutics. Methods. Nigeria HIV-1strains were isolated and cultured by autologous proliferation in donor PBMCs and MT-2 cells. The replicative abilities and cytopathic properties (RT, p24) of the isolates were used to classify separate biologic and phenotype groups. Replication competence of the isolates in macrophages (MO) and dendritic cells (DCs) prepared by appropriate GM-CSF and interleukin supplementation were determined in donor PBMCs. P24 was determination by EIA and used to establish replication potentials. Results. Eleven isolates were successfully cultivated. Of the 11, 5 were SI compared to 6 NSI strains. In MT-2 culture, 55.6% (6/11) SI were recorded. Fifteen primary isolates of 6-characterized parent stock (subtypes: A, G, IbNG), were titrated with recorded high infectivity (TCID50 μ g/ml = 1.02x106; just as the replication ability: $p24 = \ge 835 - \ge 1440 \text{ pg/ml}$: $\ge 1405 - \ge 1530 \text{ pg/ml}$ for test isolates and reference 96 virus respectively. Preferential cell tropism of the subtypes for MO (66.7%) was observed. Multiple factor analysis established favored growth of Nigerian HIV-1 strains in MO than DCs with a correlation between age of viral isolate and cell infectivity. Conclusion. Susceptibility of Nigerian HIV-1 is one host factor determining HIV-1 transmission disease pathogenesis and potential drug targets. Results were linked to the implications of cell tropism in the development of anti-HIV medicines/vaccines, clinical trials, response to antiretroviral therapy and use of primary cells in in vitro and in vivo anti-HIV drug discovery/evaluation research in laboratory and human studies.

Keywords: HIV Cell tropism, immunotherapy, anti-HIV drugs and HIV vaccine development **E-mail:** <u>njokum2003@yahoo.com</u>

205 Obiageri O. Obodozie¹; Benjamin U. Ebeshi¹;Kudirat B. Mustapha¹; Rukaiyatu A. Kirim¹; Margaret Ekpenyong²; Uford S. Inyang²

¹Department of Medicinal Chemistry and Quality Control National Institute for Pharmaceutical Research & Development (NIPRD)Abuja, Nigeria ² NIPRD Staff and Research Clinic Abuja, Nigeria.

The effects of an investigational antimalarial agent, NIPRD-AM1 on the single dose pharmacokinetics of metronidazole in healthy human volunteers. *European Journal of Drug Metabolism and Pharmacokinetics January 2011, Volume 35, Issue 3–4, pp 103–108*

Abstract

The effect of concurrent administration of a novel phytomedicine, NIPRD-AM1 used for the treatment of malaria on the pharmacokinetics of metronidazole was investigated in healthy volunteers. The study was a completely randomized one, crossover involving administration of single dose metronidazole tablets (200 mg \times 2) concomitantly with NIPRD-AM1 capsules (250 mg \times 2) to 11 healthy volunteers. Blood samples were collected before and at pre-determined time intervals following administration of the drugs. Serum concentrations of the unchanged metronidazole were analyzed using a modified simple and sensitive reversed phase high performance liquid chromatography (HPLC) method. The method showed good precision for metronidazole with coefficient of variation less than 10%. The Pharmacokinetic parameters (AUC, Cmax, and Tmax) were generated using GraphPad Prism software version 2. The derived pharmacokinetic parameters (AUC, Cmax) following the administration of metronidazole alone and co-administration with NIPRD-AM1 were 76.12 µg/ml per hour, 7.94 µg/ml and 73.52 µg/ml per hour, 7.83 μ g/ml, respectively. This differences were not statistically significant (P < 0.05) and the relative bioavailability was found to be about 96%. The comparable relative bioavailability value obtained shows that there is little or no interaction between NIPRD-AM1 and metronidazole. The findings, therefore, showed that metronidazole can be administered with the phytomedicine NIPRD-AM1 without any significant effect on the pharmacokinetic profiles of metronidazole.

Keywords: Metronidazole Herbal Co-administrarion Drug interaction HPLC

206 Obidike I. C. 1 , Aboh M. I. 2 , & Salawu O. A. 1

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria. ² Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria

Microbiological and Mucociliary Properties of the Ethanol Extract of *Hymenocardia acida* on Selected Respiratory Clinical Isolates. *Journal of Dietary supplements*, 2011, 8(1): 1-11.

Abstract

The antimicrobial property of the ethanol leaf extract of *Hymenocardia acida (H. acida)* on some opportunistic respiratory pathogens was evaluated in this study. We also assessed the activity of the extract on tracheal mucociliary activity using murine tracheal mucus exudation and mucociliary motility in pigeons as experimental models. Phytochemical screening of the extract was done; and



acute toxicity of the extract in mice was carried out using Lorke's method for estimation of its median lethal dose. Results show the presence of carbohydrates, saponins, tannins, flavonoids, alkaloids, resins, and balsams in the extract and the absence of anthraquinones, terpenes, and sterols. Results of the acute toxicity test showed that the extract was slightly toxic, with an estimated median lethal dose of 1,767.77 mg/kg body weight. At 50, 100, and 200 mg/kg body weight of H. acida, tracheal mucus exudation was increased by 14.29, 19.24, and 33.82%, respectively. The effect on mucociliary velocity was dosedependent as 50, 100, and 200 mg/kg body weight of the extract led to increased ciliary activity by 7.69, 61.5, and 81.6%, respectively. The effects of the extract (200 mg/kg body weight) on mucus exudation and clearance were significant (p < .05) and higher than the effect of ammonium chloride. Although the extract did not inhibit the growth of C. albicans and K. pneumoniae, it exhibited moderate antimicrobial activity against Escherichia coli, Proteus mirabilis, Pseudomonas aeruginosa, and Staphylococcus aureus. These findings show the mucociliary activity and antimicrobial properties of *H. acida* ethanol extract, and justify its use in the treatment of airway disorders.

Keywords: antimicrobial, ethanol leaf extract, Hymenocardia acida, mucociliary Activity

207 Obidike¹I.C., Emeje M.O. 2,3

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Idu, P.M.B.21 Garki, Abuja, Nigeria.

² Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Idu, P.M.B.21 Garki, Abuja, Nigeria.

³ Nanoscience Group, Physical and Materials Chemistry Division, National Chemical Laboratory, Pune, India

Microencapsulation enhances the anti-ulcerogenic properties of Entada Africana leaf extract. Journal of Ethnopharmacology, 2011, 137(1): 553-561.

Abstract

Ethnopharmacological relevance: The antiulcer potentials of most plants still remain largely unexplored, despite their prospects evidenced by their use as ethnomedicine. *Entada africana (Mimosaceae)* has been widely used in Africa for the treatment of skin infections, wounds, tonic for stomach troubles and against diphtheria-like throat complaints. The aim of the present study was to evaluate the anti-ulcer properties *of Entada africana (EA)* ethanol leaf extract and to obtain a novel multiparticulate pharmaceutical formulation (ACE) with it. Materials and methods: Ethanol or Indomethacin was administered to rats after oral administration of EA (200, 400 and 800 mg extract/kg b.w), ACE (400 and 800 mg/kg bw), cimetidine (100 mg/kg bw), misoprostol (40 microg/kg bw) or distilled water/saline (vehicle). Anti ulcer property was evaluated by examining and scoring stomach lesions.

Results: The extract exhibited significant (P < 0.01) cytoprotective effect against ethanol and indomethacin induced gastro ulceration. The microcapsules showed enhanced cytoprotective effect against ethanol and indomethacin induced gastro ulceration. Histopathologically, the effects of EA and ACE on mucus epithelia were mild with reduced neutrophil, eosinophil and lymphocytic infiltration in stomach tissues of rats ulcerated with ethanol.

Conclusions: Our current findings show that EA and its multiparticulate formulation may be a useful preparation in peptic ulcer disease.

Keywords: Alginate, Calcium chloride, Microcapsules, Antiulcer, Entada Africana

NIPRD Compendium of Research Publications (2010 - 2018)

208 Okoli C.O.¹, Obidike I.C.², Ezike A.C.¹, Akah P.A.¹, and Salawu O.A.²

¹Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Enugu State, Nigeria.

² Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria.

Studies on the possible mechanisms of antidiabetic activity of extract of aerial parts of *Phyllanthus niruri*. *Pharmaceutical Biology*, 2011, 49(3): 248-255.

Abstract

Context/objectives: The effects of methanol extract of aerial parts of *Phyllanthus niruri L.* (*Euphorbiaceae*), an antidiabetic herb, on glucose absorption and storage in diabetes were studied to elucidate the mechanisms of blood glucose lowering and glycemic control in diabetes. Methods: The effect of chronic oral administration of the extract on glycemic control was evaluated in alloxan diabetic rats using blood glucose lowering and post-prandial glucose suppression activities as well as effects on hemoglobin glycation and body weight. Effects on glucose mobilization and storage were assessed using the weight and glycogen content of liver isolated from treated diabetic rats, while in vitro inhibition of α -amylase and α -glucosidase enzyme activities were used as indices of effect on glucose absorption.

Results: Results showed that the extract lowered blood glucose, suppressed postprandial rise in blood glucose following a glucose meal, reduced hemoglobin glycation and increased absolute and relative weights as well as glycogen content of liver in diabetic rats. Treatment with the extract also ameliorated the decrease in body weights caused by the diabetic disease. In vitro, the extract inhibited α -amylase (IC50: 2.15 ± 0.1 mg/mL) and α -glucosidase (IC50: 0.2 ± 0.02 mg/mL) activities.

Discussion and conclusion: These findings suggest that aerial parts of *P. niruri* may owe their blood glucose lowering properties to inhibition of glucose absorption and enhancement of glucose storage.

Keywords: Antidiabetic, α-amylase, α-glucosidase, *Phyllanthus niruri*

209 Olayemi O.J., Olayinka B.O. and Musa A.I.

Department of Pharmaceutics and Pharmaceutical Microbiology, Ahmadu Bello University, Zaria.

Evaluation of antibiotic self-medication pattern amongst undergraduate students of Ahmadu Bello University (Main Campus), Zaria.*Research Journal of Applied Sciences Engineering and Technology*, 2010; 2(1): 35-38.

Abstract

The prevalence and pattern of self-medication with antibiotics among undergraduate students at the Main Campus of Ahmadu Bello University, Zaria was evaluated using structured self-medication administered questionnaire. A total of 430 questionnaires were randomly distributed based on hostel of residence with a respondent rate of 65.80 %. Majority of respondents, 65.50 % were aged between 16-28 years, while 188(66.40 %) were males and 95(33.60 %) were females. Distribution of respondents by Faculties showed they were mainly from Arts (43.20 %), Social Sciences (42.10 %) and Medicine (19.80 %). Over half of the respondents (56.90 %) admitted they self-medicate. Self-medication with antibiotics was most prevalent among students of health-related faculties,

Pharmaceutical Sciences (80.40 %) and Medicine (80.40 %) and least prevalent among students from the Faculty of Engineering (27.80 %). The major reasons given for self-medicating with antibiotics were; assumed knowledge on antibiotics (35.00 %), prior experience on use (28.30 %), while others admitted to lack of time to go for consultation (14.50 %) and attitude of school clinic staff (14.50 %). Majority of respondents (75.90 %) however, self-medicate with antibiotics occasionally. The most reported antibiotic class (43.10 %) was the \$-lactams (as ampicillin and ampiclox®) while ciprofloxacin (a fluoroquinolone) was rarely used (10.60 %). The conditions for which antibiotics were taken included GIT infections (84.10 %), UT infections (42.10 %) and skin infections (15.20 %). More than half of the respondents (55.80 %) purchased the drugs from private pharmacies. These findings highlight the need for planning interventions to promote the judicious use of antibiotics within the student population and indeed the Nigerian population.

Keywords: Antibiotics, rational use and self-medication

210 Olubunmi Olayemi, Oremeyi Jacob

Department of Pharmaceutics and Pharmaceutical Microbiology, Ahmadu Bello University, Zaria

Preliminary evaluation of *Brachystegia eurycoma* seed mucilage as tablet binder. *International Journal of Pharmaceutical Research and Innovation*, 2011; 3:1-6.

Abstract

Brachystegia eurycoma seed mucilage was evaluated for use as a tablet binder in metronidazole formulations in comparison with gelatin. The granules were formulated by the wet granulation method using the extracted mucilage and gelatin as binder at 1, 2, 4, 6%w/w concentrations. The granules were found to possess good flow property as indicated by the angle of repose, Hausner's ratio and Carr's index. The formulated tablets were evaluated for uniformity of weight, thickness, tablet hardness, friability, disintegration times, drug assay and dissolution profile. Generally, the tablets formulated from *Brachystegia eurycoma* seed mucilage were softer than those of gelatin, had good uniformity of weight and disintegrated within the official specified times for uncoated tablets. The tablets had a rapid dissolution rate which indicates the efficacy of *Brachystegia eurycoma* seed mucilage as a binder where fast release of a drug is desired.

Keywords: *Brachystegia eurycoma* seed mucilage, binder, wet granulation method, dissolution rate, metronidazole

211 Oluyemisi Folashade Kunle, Mgbeahurike Bonaventure Agbo, Samuel Ehiabhi Okhale, Jegede Ibikunle Adeola and Okogun J.I

Phytochemical and Pharmacognostic Standardization of the Powdered Leaf of Hypoestes *rosea P. Beauv Acanthaceae*. *International Research Journal of Plant Research, 2011 2(11):323-327.*

Abstract

The leaves of the antimalarial wonder plant Hypoestes rosea P. Beauv of the Acanthaceae family was subjected to phytochemical and pharmacognostic investigations to determine its microscopical features, secondary metabolite content and also some of its physical constants. Phytochemical studies of the powdered leaf revealed the presence of terpenes, sterols, balsam, and monosaccharides, reducing sugars, tannins, flavonoids and carbohydrates. Moisture content, total ash and acid-



insoluble ash values, alcohol soluble and water soluble extractive values were determined and found to be 11.99%, 11.13%, 0.64%, 12.70% and 22.17 % w/w, respectively. The leaf microscopy, reported here for first time, showed wavy walled epidermal cells on both surfaces with abundant distribution of paracytic stomata on the lower surface and short stalked glandular trichomes on the upper surface; wostly oblong cystoliths on both surfaces. Transection of the leaf across the midrib is characterized by meristele consisting of proto and metaxylem vessels preceded by a bundle of phloem cells. The results of the study could be useful in setting some diagnostic indices for the identification and preparation of a monograph of the plant.

Key words: *Hypoestes rosea*, microscopy, chemical composition, monograph, bioactivity, antimalarial.

212 Philip F. Builders*, Patricia Ogwuche, Yetunde Isimi and Olobayo O. Kunle

Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

Some Critical Effects of Binder Concentration on the Granule and Tablet Properties of a Potent Herbal Extract-AM1. *African Journal of Pharmacy and Pharmacology 2011 Vol. 5(13)*, pp. 1603-1611

Abstract

The ability to convert potent herbal medicines into robust tablet will require a good understanding of certain critical factors such as effect of binder concentration on granule particles and tablets properties. In this study, granules of AM-1, a prototype herbal extract has been produced by the wet granulation process of massing and screening using different concentrations of maize starch gel as binder. The effect of the binder concentrations and granule particles' size on the granules' flow and moisture uptake characteristics as well as, their effect on the friability and tensile strength of tablets produced with the granules were investigated. The AM-1 granules prepared with the different concentrations of maize starch gel as binder were of variable particulate dimensions. The particle size and size distribution of the granules showed a remarkable binder concentration sensitivity with a shift to larger particles with increasing binder concentrations. The flow of the granules as determined by evaluating their angle of repose and Carr compressibility indices showed enhanced flow relative to the unformulated AM-1. At simulated tropical humidity and temperature conditions, the AM-1 granules exhibited binder concentration sensitivity to moisture uptake. There was also a reduction in the moisture uptake ability of the granulated AM-1 relative to the ungranulated sample. The tensile strength and friability of the AM-1 tablets showed binder concentration and granule particle size sensitivity: the duo increased with increase in binder concentrations as swell as particle size. This study has shown the effects of granulation as well as starch gel concentration on some critical formulation properties of an herbal extract AM-1, obtained by freeze drying the aqueous decoction of a powdered root material.

Keywords: Herbal extract AM-1, starch gel, binder concentration, granule properties, tablet properties



213 Shiihii, S.U.1*, ²Musa, H., ²Bhatia, P.G., ³Martins E

¹Pharmacists Council of Nigeria, Lagos

²Department of Pharmaceutics and Pharmaceutical Microbiology Ahmadu Bello University Zaria ³National Institute for Pharmaceutical Research and Development, Abuja

Evaluation of physicochemical properties of *Eleusine coracana* starch. *Nigerian Journal of Pharmaceutical Sciences*, 2011; 10(1): 91-102.

Abstract

Starch remains the most commonly used excipient in the Pharmaceutical Industries. Starch has been extracted from seeds of Finger millet (*Eleusine coracana*), by steeping in water and varying steeping time, deproteinating /deacidifying agents, sedimentation methods, dry milling and by breaching the grain. Some of the physicochemical properties were evaluated in order to characterize the starch in comparison amongst methods and with Maize starch (BP) as a Pharmaceutical excipient. The grain steeped for 24hrs gave the best yield of 50.59%. The following parameters were studied; PH, Hydration capacity, swelling capacity, Moisture sorption and content, true density, powder porosity, acidity, ash value and Amylose, Amylopectin ratio. The study reveals differences in physicochemical properties between the starches of Eleusine coracana and standard Maize starch. There were similarities in the gelatinization temperature ash value and Amylose, Amylopectin ratios. *Eleusine coracana* starch could match the requirement for Pharmaceutical use especially when treated or modified.

Keywords: Evaluation, Starch; Physicochemical Properties, Eleusine coracana

YEAR 2010

214 Egharevba H.O*

National Institute for Pharmaceutical Research and Development (NIPRD), Idu Industrial Layout Idu, PMB 21 Garki, Abuja, Nigeria

Effect of Cadmium on some Biochemical Parameters of a Germinating Seed *J. Chem. Soc. Nigeria*, (2010) 35(1):105-110

Abstract

Continued environmental exposure to cadmium, one of the most renowned heavy metal pollutants with no known beneficial effect to man and plant has continued to draw major attention from many researchers world over. In this study, the effect of cadmium contamination on som of the biochemical activities of a viable germinating seed using Vigna unguiculata L. (Cowpea) seeds was reported. Cowpea seeds were treated in solution containing varying concentration of cadmium chloride (CdCl2H2O) by imbibitions. The concentrations of cadmium (Cd) in the solutions used for treatment were 0, 0.8, 8, 40, 100 and 180 ppm. The chlorophyll and protein content of the shoot and that of the cotyledon were estimated in the seedlings. The phosphorylase and amylase activities in the cotyledons were measured at specific germination time until 120 hours germination time. Results showed that cadmium exhibited inhibitory effect on the enzymes activities (especially at the onset of germination). There were decrease in the ratio of chlorophyll "a" to "b" and a decrease in the long and short wavelength form of chlorophyll "a", with increasing cadmium concentration. Protein content in the cotyledon showed no significant change between 0 and 18 ppm cadmium (ca. 27mg/g), while at 40 ppm and above, there was an increase to about 48mg/g with no linear change as concentration increased. The protein content of the shoot also followed similar pattern with no significant change between 0 and 18 ppm (ca. 13mg/g) and then a sharp increase at 40 ppm (ca. 22mg/g). There were however no apparent growth at 100 and 120 ppm. The ration of the protein content in cotyledon to shoot was 2:1. Cadmium contamination of seeds for cultivation purposes seems biochemically detrimental to germination and survival of the seedlings when a concentration of 40 ppm is reached.

Keywords: Cadmium, cowpea, protein, chlorophyll, phosphorylase, amylase.

215 Egharevba H. O*

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Abuja, Nigeria

Effect of Cadmium on Seed Viability of Vigna Unguiculata. *Ethnobotanical Leaflets, 2010, 14: 312-318*

Abstract

Cadmium, a heavy metal pollutant of growing global concern was investigated for its effect on grain seeds viability using Vigna unguiculata. The cowpea seeds were germinated after treatment in solution containing varying concentration of cadmium chloride monohydrate (CdCl2H2O). The concentrations of cadmium (Cd) in solution used for treatment were 0.00ppm, 0.80ppm, 8.00ppm, 40.00ppm, 100.00ppm and 180.00ppm. the percentage germination at 120 hours germination time

and rate of increment in shoot height between 120 and 168 hours were determined. Results shows that the percentage germination and rate of increment in shoot height decreased as cadmium level in the treatment solution increased. There were however no growth at 100 and 120 ppm. The lethal concentration of cadmium for 50% of the viable seeds (LC50) in the treatment solution appears to be at about 40 ppm.

Keyword: Cadmium, cowpea, viability, germination.

216 Egharevba H.O*. and Kunle O.F

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Abuja, Nigeria

Preliminary Phytochemical and Proximate Analysis of the leaves of Piliostigma thionningii (Schumach) Milne-Redhead. Ethnobotanical Leaflets (2010) 14: 570-77

Abstract

Piliostigma thionningii (Schumach) Milne-Redhead leaves from Idu Area of the Federal Capital Territory (FCT) Abuja. Nigeria, were collected and qualitatively analyzed for identification of phytochemical constituents. The results showed the presence of bioactive constituents of carbohydrates, glycosides, flavonoids, tannins, saponins, balsams, volatile oil, and terpenes. Phlobatannins, resins, alkaloids, anthraquinones and sterols were not detected. The proximate analysis of the leaves revealed a composition of 9.90% moisture content, 4.62% total ash value, 11.28% alcohol soluble extractive value, 2.50% water soluble extractive value and 0.91% acid insoluble ash value. More research work is recommended on the plant leaves for isolation and characterization of bioactive compounds that may be active against malaria parasites and other diseases.

Keywords: Piliostigma thionningii, phytochemical screening, proximate composition.

217 Egharevba Henry .O^{1*}, Peters Oladosu², E. Samuel Okhale¹, Iliya Ibrahim¹, Kunle O Folashade¹, K. Simeon Okwute³ and I. Joseph Okogun¹

¹Department of Medicinal Plant Research and Traditional Medicine (MPR & TM), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ²Department of Microbiology and Biotechnology (M and BT), National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria ³Department of Chemistry, University of Abuja, Nigeria

Preliminary Anti-Tuberculosis Screening of Two Nigerian Laggera Species (Laggera pterodonta and Laggera aurita). Journal of Medicinal Plant Research (JMPR) 2010, 4(12):1235-123

Abstract

Crude methanolic extracts of the aerial part of the two Laggera species (*Laggera pterodonta* (DC.) Sch. Bip. and *Laggera aurita* (Linn f.) DC.) from the family Asteraceae (Compositea), found in Nigeria were screened against Mycobacterial bovis (BCG strains). The two extracts were found to be active at minimum inhibitory concentrations (MIC) of 625 μ g/ml further fractionation and



screening of the fractions against BCG shows moderate activity for some of the fractions. The four compounds (crystals) isolated in the process did not show any activity, but are currently being analyzed by spectroscopy for characterization and identification.

Keywords: Laggera pterodonta, Laggera aurita, anti-tuberculosis.

218 Egharevba, Henry Omoregie 1*; Abdullahi, Makailu Sabo²; ³Okwute, Simon Koma; ¹Okogun, Joseph Ibumeh

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Abuja, Nigeria ²National Research Institute for Chemical Technology, Zaria, Nigeria ³Department of Chemistry, University of Abuja, Nigeria

Phytochemical Analysis and Broad Spectrum Antimicrobial Activity of Laggera pterodonta (DC) Sch. Bip (Aerial Part). *Researcher, (2010) 2(10): 35-40*

Abstract

Laggera pterodonta (DC) Sch Bip Aerial part was extracted successively with hexane, ethyl acetate and methanol. The extracts were screened in vitro for activity against standard strains microbes and clinical isolates. The zones of inhibition, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) were determined. The in vitro antimicrobial screening revealed that the extract exhibited varying activity against different microbes with zones of inhibition ranging from 14-32mm, MIC ranging from 1.25 - 5mg/ml, and MBC/MFC of 2.5-10mg/ml. The highest activity was an MIC of 1.25 mg/ml and MBC of 2.5mg/ml. The activities observed could be due to the presence of some of the secondary metabolites like, alkaloids, tannins, sterols, glycosides, saponins, terpenes and flavonoids present in the plant. Isolation work to determine compound(s) responsible for activities is ongoing.

Keywords: Laggera pterodonta, phytoconstituents, antimicrobial, MIC, MBC, MFC

219 Egharevba, Henry Omoregie ^{1*};Iliya, Ibrahim1; Ibekwe Nneka²; Abdullahi, Makailu Sabo³; Okwute, Simon Koma⁴; Okogun, Joseph Ibumeh¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Idu Industrial Layout, Idu, P.M.B. 21 Garki, Abuja, Nigeria.

²Department of Medicinal Chemistry and Quality Control, NIPRD

³National Research Institute for Chemical Technology, Zaria, Nigeria

⁴Department of Chemistry, University of Abuja, Nigeria

Broad Spectrum Antimicrobial Activity of *Psidium guajava* Linn Leaf. *Nature and Science, 2010,* 8(12): 43-50

Abstract

Psidium guajava Linn leaf was extracted successively with hexane, ethylacetate and methanol another crude extract of aqueous methanol was also carried out. The extracts were tested in vitro for activity against standard strains microbes and clinical isolates. The zones of inhibition, minimum



inhibitory concentration (MIC), minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) were determined. The in vitro antimicrobial screening revealed that the extract exhibited varying activity against different microbes with zones of inhibition ranging from 14-35mm, MIC ranging from 1.25 - 10mg/ml, and MBC/MFC of 2.5-20mg/ml for the sensitive organisms at the tested concentrations. The highest activity was an MIC of 1.25 mg/ml and MBC of 2.5mg/ml. None of the extract exhibited activity against fungi isolates except the standard strains of Candida albicans. The activities observed could be due to the presence of some of the secondary metabolites like, Tannins, saponins, terpenes and flavonoids which were detected and have previously been reported in the plant.

Keywords: Psidium guajava extracts, phytoconstituents, antimicrobial, MIC, MBC, MFC

220 Egharevba, Henry Omoregie^{1*}; Kunle, Oluyemisi, Folashade¹; Iliya, Ibrahim¹; Orji Peace Nkiruka²; Abdullahi, Makailu Sabo³; Okwute, Simon Koma⁴; Okogun, Joseph Ibumeh¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Idu Industrial Layout, Idu, P.M.B. 21 Garki, Abuja, Nigeria.

²Department of Plant Science and Technology, University of Jos, Jos, Nigeria ³National Research Institute for Chemical Technology, Zaria, Nigeria ⁴Department of Chemistry, University of Abuja, Nigeria

Phytochemical Analysis and Antimicrobial Activity of *Punica granatum* (fruit bark and leaves). *New York Science Journal*, 2010, 3(12): 91-98

Abstract

Punica granatum Linn (fruit bark and leaves) were macerated with hexane, ethylacetate, methanol and water successively. The extracts were tested in vitro for activity against standard strains microbes and clinical isolates. The zones of inhibition, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) were determined. The in vitro antimicrobial screening revealed that the extract exhibited varying activity against different microbes with zones of inhibition ranging from 14-34mm, MIC ranging from 0.625 - 10mg/ml, and MBC/MFC of 1.25-10mg/ml for the sensitive organisms at the tested concentrations. The highest activity was an MIC of 0.625 mg/ml and MBC of 1.25mg/ml. The activities observed could be due to the presence of some of the secondary metabolites like, alkaloids, anthraquinones, sterols, glycosides, saponins, terpenes and flavonoids detected in the plant.

Keywords: Punica granatum, phytoconstituents, antimicrobial, MIC, MBC, MFC

221 Egharevba, Henry Omoregie^{1*;} Ocheme Owochoi Emmmanuel³; Ugbabe Grace¹; Abdullahi, Makailu Sabo⁴; Iliya, Ibrahim¹; Okhale, E. Samuel¹; Kunle, Oluyemisi Folashade¹; Jemilat Ibrahim¹; Nneka Ibekwe²; Okwute, Simeon Koma⁵; Okogun, Joseph Ibumeh¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Idu Industrial Layout, Idu, P.M.B. 21 Garki, Abuja, Nigeria.

²Department of Medicinal Chemistry and Quality Control, National Institute for Pharmaceutical Research & Development (NIPRD), Idu Industrial Layout, Idu, P.M.B. 21 Garki, Abuja, Nigeria. ³Department of Plant Science and Technology, University of Jos, Nigeria ⁴National Research Institute for Chemical Technology, Zaria, Nigeria ⁵Department of Chemistry, University of Abuja, Nigeria

Phytochemical Screening and Antimicrobial Studies of Methanol, Ethyl and Hexane Extracts of *Vitex doniana*, Sweet (Stem Bark and Leaf) *Nature and Science, 2010, 8(8): 177-185*

Abstract

The pulverized stem bark and leaf of *Vitex doniana* Sweet were extracted successively under soxhlet with hexane, ethylacetate and methanol. The extracts were qualitatively screened for the presence of some secondary metabolite, and then tested in vitro for activity against some common disease causing microbes. Both standard strains and clinical isolates were used in the antimicrobial screening. The zones of inhibition, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) were determined. The results of phytochemical screening revealed the presence of terpenes, sterols, alkaloids, flavonoids, tannins, saponins, glycosides, carbohydrates and balsams while resins were not detected. The in vitro antimicrobial screening using the well diffusion technique revealed the extract to have broad spectrum activity with zones of inhibition ranging from 19 to 24mm, MIC of 2.5 and 10mg/ml for all the sensitive organisms, and MBC and MFC of 2.5-5 and 10mg/ml respectively. The highest activity was an MIC of 1.25 mg/ml and MBC of 2.5mg/ml. The activity index (A.I) shows that the extracts were more active against some microbe especially the enteric bacteria like Klebsiella pneumonia, Klebsiella ozaenae, Shigella dysenteriae, Basillus subtilis, Salmonella typhi and Staphylococcus Aureus, while the Proportion index show that the methanol and water extract of the stem bark is a better broad spectrum antibiotic than the other extract. This study provides some scientific base for the use of the plant in traditional medicine. The activities observed could be due to the presence of some of the secondary metabolites like terpenes, alkaloids and flavonoids which have known antimicrobial activity.

Keywords: Vitex doniana, phytochemical, antimicrobial, MIC, MBC, MFC

222 Egharevba, Henry Omoregie^{1*;} Odigwe Anselem C².; Abdullahi, Makailu Sabo³; Okwute, Simon Koma⁴; Okogun, Joseph Ibumeh¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development (NIPRD), Idu Industrial Layout, Idu, P.M.B. 21 Garki, Abuja, Nigeria.

²Department of Chemistry, Federal University of Technology, Minna, Nigeria ³National Research Institute for Chemical Technology, Zaria, Nigeria ⁴Department of Chemistry, University of Abuja, Nigeria

Phytochemical Analysis and Broad Spectrum Antimicrobial Activity of *Cassia Occidentalis L*. (whole plant) *New York Science Journal, 2010, 3(10): 74-81*

Abstract

Cassia occidentalis L. whole plant was extracted successively with hexane, ethylacetate and methanol. Another crude extract of aqueous methanol was also carried out. The extracts were tested in vitro for activity against standard strains microbes and clinical isolates. The zones of inhibition, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC) and minimum fungicidal concentration (MFC) were determined. The in vitro antimicrobial screening revealed that the extract exhibited varying activity against different microbes with zones of inhibition ranging from 14-34mm, MIC ranging from 1.25 - 10mg/ml, and MBC/MFC of 2.5-20mg/ml for the sensitive organisms at the tested concentrations. The highest activity was an MIC of 1.25 mg/ml and MBC of 2.5mg/ml. The activities observed could be due to the presence of some of the secondary metabolites like, alkaloids, anthraquinones, sterols, glycosides, saponins, terpenes and flavonoids detected in the plant.

Keywords: Cassia occidentalis, phytochemicals, antimicrobial activity, MIC, MBC, MFC

223 Emeje M. O.³* Ofoefule S. I.¹, Nnaji A. C.¹, Ofoefule A. U.² and Brown S. A.⁴

¹Department of Pharmaceutical Technology and Industrial Pharmacy, University of Nigeria, Nsukka, Enugu State, Nigeria.

²Centre for Energy Research and Development, University of Nigeria, Nsukka, Enugu State, Nigeria.

³National Institute for Pharmaceutical Research and Development, Abuja, Nigeria. ⁴Department of Pharmaceutics and Pharmaceutical Technology, University of Uyo, Nigeria.

Assessment of bread safety in Nigeria: Quantitative determination of potassium bromate and lead. *African Journal of Food Science*, 2010; 4(6): 394–397.

Abstract

Potassium bromate is an additive widely employed by bread makers to improve bread quality. On account of its deleterious effect and carcinogenicity in humans, certain levels of potassium bromate are not allowed in bread. Use of potassium bromate in bread is banned in many countries including Nigeria. The present evaluation was carried out in eastern part of Nigeria where consumption of bread is high. Twenty-three different brands of breads were sampled. Quality assessment shows that, all the brands contained potassium bromate in a quantity that exceeded the minimum allowed by the FDA. In addition, all the sampled breads contained trace amount of lead, a substance which is harmful to health. On the basis of these, all twenty three bread brands sampled were considered unsafe for human consumption and bread makers should be discouraged from using potassium bromate as bread improver.

Keywords: Bread, safety, potassium bromate, lead.

224 Ibrahim J^{1*} , Ajaegbu V.C.² and Egharevba H.O¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Idu Abuja, Nigeria ²Department of Biochemistry, Imo State University, Owerri, Imo State, Nigeria

Pharmacognostic and Phytochemical Analysis of Commelina benghalensis L. *Ethnobotanical Leaflets*, (2010) 14: 610-15

Abstract

Phytochemical and pharmacognostic analysis and thin layer chromatography were carried out on the herb, Commelina benghalensis L. The phytochemical screening revealed the presence of phlobatannins, carbohydrates, tannins, glycosides, volatile oils, resins, balsams, flavonoids and saponins, while terpenes, sterols, anthraquinones, and phenols were absent. The pharmacognostic analysis revealed moisture content of 11.60%, ash value of 6.24%, water soluble extractive value of 22.45%, alcohol soluble extractive value of 5.99% and acid insoluble ash of 1.21%. thin layer chromatography development revealed three spots for hexane extract, six spots for ethyl acetate and five spots for methanol.

Keywords: Commelina benghalensis, phytochemistry, pharmacognostic, chromatography.

225 IBRAHIM J. A*, I. MUAZZAM, I. A. JEGEDE and O. F. KUNLE

Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja, Nigeria

Medicinal Plants and animals sold by the "Yan-Shimfidas' of Sabo Wuse in Niger State, Nigeria. *African Journal of Pharmacy and Pharmacology 2010, Vol. 4(6) pp 386-389*

Abstract

Sabo Wuse, a resettlement in Tafa Local Government Area of Niger State inhabits the original inhabitants of Wuse in Abuja, the Federal Capital of Nigeria. Despite the close proximity of about 65km to the urban settlement of Abuja, Sabo Wuse is still a relatively remote settlement; their lifestyle remained more or less unchanged and therefore, relied on their traditional knowledge for health care delivery. Recent ethnobotanical survey in Sabo Wuse has documented plants not indigenous to the area. In view of this, a survey was carried out to identify and document plants and animal materials sold by the Yan- shimfidas in the local settlement and to study their uses in treatment of ailments and other socio-cultural problems. The result shows that most of the herb sellers of Sabo Wuse were immigrants from the northern part of the country who had stayed in the village of Sabo Wuse for over twenty years. Thirty-four different plant species in twenty-one different families were documented. These were in the form of stem barks, leaves, roots, fruits, seeds, flower buds and fruit juices. Six different animal fats and skin, dung or other parts of animal of twenty two different species were also documented. All the materials documented were used for the treatment of various diseases and ailments ranging from the physical to the metaphysical. The study uncovered the remains of ancient medical practices which still exist in traditional societies in Nigeria. Therefore, the documentation of these practices can conserve the culture and traditional knowledge of this community.

Keywords: Indigenous knowledge, 'Yan-Shimfida', Sabo-Wuse, Nigeria.

226 IBRAHIM, Jemilat^{1*}; AJAEGBU, Vivian Chioma²; EGHAREVBA, Henry Omoregie¹

¹Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), Abuja, Nigeria 2Department of Biochemistry, Imo State University, Owerri, Nigeria

Pharmacognostic and Phytochemical Analysis of Commelina benghalensis L. *Ethnobotanical leaflets*, 2010, 14: 610-615

Abstract

Phytochemical and pharmacognostic analysis and thin layer chromatography were carried out on the herb, Commelina benghalensis L. The phytochemical screening revealed the presence of phlobatannins, carbohydrates, tannins, glycosides, volatile oils, resins, balsams, flavonoids and saponins, while terpenes, sterols, anthorquinones and phenols were absent. The pharmacognostic analysis revealed moisture content of 11.60 %, ash value of 6.24%, water soluble extractive value of 22.45 %, alcohol soluble extractive value of 5.99% and acid insoluble ash of 1.21%. The thin layer chromatography development revealed three spots for hexane extract, six spots for ethyl acetate and five spots for methanol.

Keywords: Commelina benghalensis, phytochemistry, pharmacognostic, chromatography.

227 Idris-Usman M. S.¹*, John-AfricaL¹., Akuodor G. C.¹, Ugwu T. C.² And Osunkwo U. A.¹

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD) Abuja, Nigeria.

² Department of Pharmacology and Clinical Pharmacy Faculty of Pharmaceutical Sciences Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

Antinociceptive and antipyretic properties of the pharmaceutical herbal preparation, Radix bupleuri in rats. *Journal of Medicinal Plants Research 2010 4(8) 659-663*

Abstract

Chai hu is a Chinese herb growing both in northern and southern China. It has the English names hare's ear and Chinese throwax root. Its botanical name is Bupleurum chinense D.C. The pharmaceutical preparation of the extract is called *Radix bupleuri (R. bupleuri)*. In this study the antinociceptive and antipyretic properties of R. bupleuri were studied in mice. Yeast was used to induce pyrexia while acetic acid induced writhes and tail flick methods were used to investigate the nociceptive properties of the extract. Acute toxicity studies were also done to determine the median lethal dose LD50. The extract significantly (P<0.05) reduced acetic acid induced writhes compared with the control. The extract (50 mg/kg) showed a higher percentage inhibition of the acetic acid induced writhes compared to the positive control, acetyl salicylic acid (ASA). Tail flick model also revealed an increase in latency time for mice to flick their tail out of a warm bath maintained at a temperature of 50°C at the 25 mg/kg dose level compared to the control (P<0.05). The extract also significantly (P<0.01) reduced the temperature of rats after pyrexia induction. The results of this study justify the use of this extract by traditional Chinese herbalist as pain killer and for the treatment of fever.

Keywords: Radix bupleuri, herbal, antipyretic, antinociceptive

228 Ifeoma Chinwude Obidike¹, Oluwakanyinsola Adeola Salawu¹, Mary Ndukuba¹, Charles Ogbonnaya Okoli², Uche Alex Osunkwo¹

¹Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development, Abuja, Nigeria.

² Department of Pharmacology and Toxicology, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Enugu, Nigeria.

The Anti-Inflammatory and Antinociceptive Properties of the Chloroform Fraction From *Phyllanthus niruri* Plant Is Mediated via the Peripheral Nervous System. *Journal of Dietary supplements, 2010, 7(4): 341-350.*

Abstract

Phyllanthus niruri (Euphorbiaceae) is used folklorically for the treatment of diabetes, malaria, fever, diarrhea, liver disease, and urolithiasis. As an initial step toward isolating compounds effective against inflammation and pain, this study is aimed at providing scientific evidence for the anti-inflammatory, antinociceptive, and antipyretic properties of the chloroform soluble fraction (PNF1) of *Phyllanthus niruri* methanol extract in rats and mice. Three doses of PNF1 [25, 50, 100 mg/kg body weight (bw)] were used. Screening was done using acetic-acid induced writhing, eggalbumin-induced pedal inflammation, Randall-Selitto test, hotplate test, and yeast-induced pyresis as experimental models. Results show that PNF1 significantly (p < .01) inhibited writhing response induced by acetic acid at all doses used by 56.2%-66.7% and caused significant (p < .05, p < .01) reduction of yeast-induced pyrexia (21.6%-40.9%). Significant (p < .01) reduction of egg albumininduced inflammation was observed only at a dose of 100 mg PNF1/kg bw, which was comparable with the effect produced by aspirin (100 mg/kg bw). At 50 and 100 mg/kg bw, PNF1 significantly (p < .05, p < .01) increased pain threshold of inflamed tissue in the Randall–Selitto test but did not increase response to thermally induced pain in the hot-plate test. It is concluded that PNF1 possesses antipyretic, anti-inflammatory, and antinociceptive effects that are peripherally mediated. This justifies its use in traditional medicine and its potential as a candidate for further development.

Keywords: Anti-inflammatory, antinociceptive, antipyretic, Phyllanthus niruri

229 Josephat Ogbonna¹, Martins Emeje^{*2}, Sabinus Ofoefule¹

¹Department of Pharmaceutical Technology, University of Nigeria, Nsukka, Enugu, Nigeria, ²Department of Pharmaceutical Technology and Raw Materials Development, NIPRD, Abuja, Nigeria.

Effect of Low Level Sodium Lauryl Sulphate on the Sustained Release Polymer Based Matrix Tablets of Ciprofloxacin. *Inventi Impact: Pharm Tech, 2010; 1(1).*

Abstract

The effects of sodium lauryl sulphate (SLS), a surfactant widely used as a wetting agent on the *in vitro* release of ciprofloxacin hydrochloride (CPF) embedded in four different polymers; ethylcellulose (Etcell), hydroxyethylcellulose (HEC), eudragit 1-100 (EUD) and hydroxyl propylmethyl cellulose (HPMC) were investigated. The wet granulation method of massing and screening using hydro alcoholic medium was used. CPF tablets of all the polymers were of good physical quality with respect to appearance, drug content uniformity, hardness, weight variation and friability. *In vitro* release studies show that, ethylcellulose extended drug release more than the other



polymers, while the fastest release was obtained from eudragit. The presence of sodium lauryl sulphate (SLS) led to about 2-3 fold increase in the rate of drug dissolution from HPMC matrices while further decreasing dissolution rate in Etcell matrices. The overall result demonstrates that drug release was found to be dependent on both polymer type and concentration of the surfactant. Kinetic studies show that, drug release was both by diffusion and erosion of polymers depending on polymer type, with the presence of SLS only significantly affecting HPMC matrices.

Keywords: Ethylcellulose, eudragit l-100, hydroxyethylcellulose, hydroxypropyl methylcellulose, sodium lauryl sulphate, ciprofloxacin hydrochloride, sustained release.

230 Mann Abdullahi, Mohammed Shehu, Adeyanju Victoria

Antimicrobial Activity of the root bark and leaf extracts of the *Capparis brassii* DC. *Journal of Pharmaceutical and Biomedical Sciences*, 2010

Abstract

Infective diseases pose serious threat to global human health. Many plants are used locally in traditional medicine to treat TB-related symptoms. Nigeria offers a rich floral diversity that are used traditionally to treat bacterial infection. *Capparis brassii* DC (Capparidaceae) is one of such plants commonly used in Bida, Niger State, Nigeria for the treatment of bloody cough and other respiratory tract infections. The present aim was to investigate the antimicrobial activity of the methanolic and aqueous extracts of the root bark and leaf of *Capparis brassii* DC. Settings and Design: Air-dried ground root bark and leaves of *Capparis brassii* macerated with methanol and water were screened against nine human pathogenic microbes. Methods and Material: The extracts from both plant parts were prepared, phytochemically analysed and screened against nine human pathogenic microbes namely: methicillin resistance Staphylococcus aureus, Salmonella typhii, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus species, Proteus vulgaris, Escherichia coli, Candida albicans and Mycobacterium bovis (BCG strain). Results: All the extract showed varying degree of antimicrobial activities on the microbes used. The extracts exhibited significant antimycobacterial activity against M. bovis and showed weak activity against P. aeruginosa, S. typhii and Bacillus spp while the remaining test organisms were resistant to the extracts. The phytochemical analysis revealed the presence of carbohydrate, tannins, saponins, sterol, resins, alkaloids in leaf, while flavonoids and terpenes were also found in the root. Therefore, the present result revealed that this plant has promising antibacterial properties indicating its potential for the discovery of antibacterial principles. Conclusions: This investigation confirms the folkloric use of the Capparis brassii as indigenous medicines for bacterial infections and the data obtained could serve as an important platform for further study on this plant.

Keywords: Antimicrobial activity, antimycobacterial activity, *Capparis brassii*, phytochemical analysis.



231 Martins Emeje,*,^{a,e} Olajide Olaleye,^a Christiana Isimi,^a Joseph Fortunak,^b Stephen Byrn,^c Olobayo Kunle,^a And Sabinus Ofoefule^d

^a Department of Pharmaceutical Technology and Raw Materials Development, National Institute for Pharmaceutical Research and Development; Garki–900001, Abuja, Nigeria

^b Department of Chemistry, Howard University; Washington, D.C. 20059, U.S.A.

^c Department of Medicinal Chemistry and Physical Pharmacy, Purdue University; IN 47907–2091, U.S.A.

^d Department of Pharmaceutical Technology and Industrial Pharmacy University of Nigeria; Nsukka–400001, Enugu State, Nigeria

^e Department of Molecular Biology and Biotechnology, Tezpur University; Tezpur–784028, Assam, India.

Oral Sustained Release Tablets of Zidovudine using Binary Blends of Natural and Synthetic Polymers. *Biol. Pharm. Bull.*, 2010; 33(9): 1561-1567.

Abstract

Oral sustained release matrix tablets of zidovudine (ZDV) were prepared using different types, proportions and blends of carbopol 71G (C71) and a plant gum obtained from Abelmoschus esculentus (AEG). The effect of various formulation factors like polymer proportion, polymer type and pH of the dissolution medium on the in vitro release of the drug was studied, using the half change technique, in 900 ml of dissolution medium, at 100 rpm. Release kinetics were analyzed using Zero-order, Higuchi's square-root and Ritger-Peppas' empirical equations. In vitro release performance as revealed by the time taken for 70% of the drug to be released (t70%), showed that the release rate decreased with increase in polymer proportion. Matrix tablets containing 10 and 20% AEG were found to exhibit immediate-release characteristics. Matrix tablets containing 30% AEG showed t70% value of 204 min and extended the release up to 5 h, while matrix tablets containing 30% carbopol showed t70% value of 234 min and extended the release up to 6 h. Three blends of AEG and C71 at the ratio of 1 : 2, 2 : 1 and 1 : 3 showed t70% values of 132, 312 and 102 min respectively and extended the release up to 8 h. Mathematical analysis of the release kinetics indicated that the nature of drug release from the matrix tablets followed Fickian and anomalous release. Drug release from matrix tablets of zidovudine containing blends of AEG and C71 demonstrates the advantage of blending a natural and synthetic polymer over single polymer use.

Keywords: sustained release; matrix tablet; zidovudine; *Abelmoschus esculentus*; polyacrylic acid polymer

NIPRD Compendium of Research Publications (2010 - 2018)

232 Njoku OM; Oladepo DK; Ibrahim K; Osunkwo U; Mohammed SB; Osuagwu F; Adegoke VO; Ajoku G, Ya'aba Y; Izebe KS; Abu A, Usoroh, M; Imadeh G; Idoko JA; Inyang SU and Gamaniel K.

¹*Human Virology, Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu Industrial Area. PMB 21 Garki Abuja FCT, Nigeria.* ²*Institute for Human Virology Abuja, Nigeria. AIDS Prevention Initiative (APIN) Research Laboratory, Jos University Teaching Hospital, Jos Nigeria*

Rapid assessment of AIDS cure claim in partnership with traditional herbal practitioner Experiences from observational study and evaluation of 'GOGA' an acclaimed herbal remedy for treatment of HIV and AIDS. *The 5th Nigeria AIDS Conference. 5th National Conference on HIV/AIDS in Abuja, Nigeria May 2 - 5, 2010*

Abstract

Objective: Cure for AIDS continues to be elusive, thus creating desperation among PLWHAs, as they seek ways of improving their health; in our communities with endemic poverty and inadequate healthcare. Herbal remedies from traditional medicine practitioners (TMPs) are part of our medicare. While some TMPs claim cure and treatment of HIV/AIDS; evidence is still limited to relief of AIDS symptoms. We conducted an assessment of GOGA to determine its impact on AIDS disease and treatment of HIV. Methods: Following ethical approval, a prospective study on treatment outcome of GOGA was conducted for federal ministry of health, Nigeria. Relevant exclusion/inclusion criteria were used to recruit 24 adult HIV-1+, ART naï¿1/2ve adult volunteers. Protocol was designed relative to TMPs schedule of treatment. GOGA was administered by TMP and clinical team. Volunteersï¿1/2 blood plasma were analyzed for efficacy (HIV-1 RNA suppression), using COBAS, Roche. Serum chemistry, haematology and immunological response were assessed with Reflotron, Sysmex and Partec Cyflow, respectively. Results: High viral RNA suppression recorded in 2 volunteers was <-2Log viral load required for significance. GOGA showed no significant benefit in 14 of 17 adherent volunteers. HIV-1 viral RNA increased in 6(35.3%) volunteers. No significant viral suppression (P>0.05) in 8(47.1%). Continued immune suppression recorded in 62.5% (10 of 16), compared to 25.0% with significant rise in CD4 count (P<0.05). All volunteers remained positive for HIV-1 antibodies. Haematology and serum chemistry analysis revealed neither adverse event nor acute toxicities. Conclusion: GOGA suppressed neither HIV-1 immunodeficiency, viral load, nor reversed HIV serostatus. Thus, may not possess anti-HIV properties. This study provides a platform for rapid assessment of HIV/AIDS herbal remedies. It also revealed the willingness to participate and recruitment strategies in evaluating HIV herbal remedies. It is hoped that this will benefit FMOH, Nigeria in addressing local AIDS cure and HIV treatment alternatives.

233 Njoku OM¹. Oladepo D¹, Mohammed SB¹, Ya'aba Y¹, Aboh, M, Abubakar A. Usoro M¹, Ibrahim K¹.Alash'le AG², Gamaniel K¹

¹*Human Virology, Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development, Idu Industrial Area. PMB 21 Garki Abuja FCT, Nigeria.*²*Institute for Human Virology Abuja, Nigeria*

Status of Hepatitis B Virus Coinfections in HIV Infected Nigerians Undergoing Antiretroviral Therapy. *The 5th Nigeria AIDS Conference. 5th National Conference on HIV/AIDS in Abuja, Nigeria May 2 - 5, 2010*

Abstract

Objective: Hepatitis B virus (HBV) coinfection in people living with HIV (PLWHA) is associated with reduced survival time, decreased ART benefit and liver disease, a major cause of death in AIDS. Vaccination and treatment exist for HBV and can reduce the pervasiveness of HBV/HIV coinfection. We monitored coinfection status of 1158 ART naïve and experienced individuals between 2007 and 2010

Methods: Routinely collected specimens from 1158 confirmed HIV positive Nigerians living with the virus were tested for HBV surface antigen (Smart CheckTM, HBsAg ELISA). CD4+ T cell count were measured with ParTec Cyflow. While serum chemistry was assessed for kidney and liver function; descriptive percentage were used to characterize the observations in age, gender and HIV status. Multi-variation analyses were employed in the assessment of perdition of impact of coinfection.

Results: Of the 1158 individuals, 162 (13.88%), were HBV positive fifty six (4.48%) of the positive individuals had the dual infection of HIV and HBV. Though 2007 represented highest infection (19.09%), HBV prevalence was consistently high >10% (range: 10.61 - 19.09%) during the 2.8 years of this Study. HBV coinfected individuals were more likely to be middle aged male 15.47% - 5.5%, respectively. Most HIV/HBV coinfected individuals failed liver function test tests (p<0.05). Although not significantly different (p<0.05), HBV/HIV coinfection represent lower CD4+ cell count, compared to monoinfected individuals.

Conclusion: The result underscores the potential public health impact of HBV and HIV/HBV coinfection in Nigeria, where HBV vaccination, routine screening in normal and HIV-infected population is still a major challenge. This result strongly points to the need for HBV screening in ART naive and blood transfusion Centres to slow the spread of HBV in high risk populations. The high prevalence of the treatable and vaccine-preventable infection, calls for public health concern, especially in maximizing ART benefits and managing the dual epidemics.

Keywords: Hepatitis B Virus, prevalence, HBV/HIV Coinfection, Antiretroviral Therapy

234 Oga, Enoche F.¹, Tarfa, Florence D.¹, Ajoku, Gloria A.¹, Ikokoh, Patrick P.¹ and Obodozie, Oby O.¹

¹National Institute for Pharmaceutical research and Development, Abuja, Nigeria.

Physicochemical and Microbiological Assessment of the Quality of Some Brands of Bottled Water Sold in Nigerian Market. *International Journal of Drug Discovery and Technology. 2010 1(1) 1-8.*

Abstract

This study aims to assess the quality of 11 brands of bottled water on sale in the Nigerian market using the bottled water standards, guidance and regulations issued by various agencies. The following parameters were assessed: physical/organoleptic properties (odour, taste, turbidity, pH, colour), Chemical parameters (conductivity, total dissolved solids, hardness, dissolved Oxygen, elemental limits for Na, K, Pb, Mn, Fe, Cu, Cr, Ca, Cd, Zn, Mg) as well as the microbial evaluation using standard methods and equipment. Results show that 9.1% of the samples analyzed had an excess of Mn content, 100% exceeded the Fe limit, 27.3% exceeded the Ca limit, 81.8% exceeded the Mg limit. All the brands fell within acceptable limits for Na, K, Pb, Cu, Cr, Cd and Zn as well as the physical parameters assessed. There is no implication of coliform bacteria contamination in any of the samples analyzed. Results indicate the need for more surveillance, routine inspection and quality analysis to be enforced by the relevant regulatory agencies to ensure conformity with stated guidelines for drinking water quality in order to safeguard public health.

235 Okhale, Samuel Ehiabhi¹, *, Amanabo, Mercy Omachonu², Jegede, Ibikunle Adeola², Egharevba, Henry Omoregie¹, Muazzam, Ibrahim Wudil², Kunle, Oluyemisi Folashade²,⁴

¹*Phytochemistry Research Laboratory*

²Pharmacognosy Research Unit Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research & Development, Idu Industrial Layout Idu, P.M.B. 21 Garki, Abuja, Nigeria.

³Deparment of Chemistry, Federal University of Technology, Minna, Nigeria ⁴Department of Pharmacognosy, Faculty of Pharmacy, University of Jos, Nigeria

Phytochemical and Pharmacognostic Investigation of Antidiabetic *Scoparia dulcis Linn Scrophulariaceae* Whole Plant Grown in Nigeria. *Researcher*, 2010, 2(6):74-80.

Abstract

Scoparia dulcis Linn has been widely reported to have pharmacological uses arising from its widespread folkloric uses. Some of these pharmacological properties have been evaluated and include antidiabetic, antitumor and antiviral. However, very limited work has been carried out on the Nigerian species toward documenting its ethnomedicinal uses and establishing its phytochemical and pharmacognostic fingerprints. Studies were therefore carried out to determine the phytochemical and pharmacognostic profile of S. dulcis L. grown in Nigeria. The phytochemical analysis of the powdered whole plant revealed the presence of carbohydrates, flavonoids, saponins, tannins, alkaloids, and terpenes. Successive extraction yielded hexane extract 1.93%, ethyl acetate extract 1.54%, and methanol extract 14.50%. Quantitative pharmacognostic analysis gave moisture content 7.74%, alcohol extractive value 20.00%, water extractive value 20.00%, total ash 6.32%, acid–insoluble ash 0.82% and water soluble ash 0.37%. Leaf and seed coat microscopy is reported



here for the first time. Leaf microscopy revealed upper and lower epidermal surfaces made up of wavy-walled somewhat polygonal cells, with bundant stomata, striations, cystoliths and a fair distribution of glandular trichomes with multiseriate heads and particular base cells. The transverse section of the stem indicated a thick layer of cutin preceding the epidermal cells followed by a layer of collenchyma cells, thin layer of pericyclic fibers and a layer of phloem bundle preceding long trachids, proto- and meta- vessels leading to a collateral vascular bundle arrangement. The centre of the section was made up of parenchyma cells with traces of small raphids-type of calcium oxalate crystals. These phytochemical and pharmacognostic fingerprints of S. dulcis grown in Nigeria are relevant for developing monograph of this potential drug plant and as quality indices for its development into a phytomedicine.

Keywords: Scoparia dulcis L.; phytochemicals; pharmacognosy, microscopy

236 Okhale, Samuel Ehiabhi, Odiniya, Emmanuel Odiniyaand Kunle, Oluyemisi Folashade.

Preliminary Phytochemical and Pharmacognostical Investigation of *Pediatrics Antimalarial Laggera pterodonta* (DC) Sch. Bip.: Asteraceae of Nigerian Origin. *Ethnobotanical Leaflets*, 2010. 14: 457-66.

Abstract

Laggera pterodonta is a reputable ethnomedicinal plant in Nigeria for the treatment of pediatric malaria and inflammations. The leaves, stem and root of Laggera Pterodonta (DC) Sch. Bip (compositae) were investigated for their phytochemical and thin layer chromatographic profiles. Twelve secondary metabolites namely carbohydrates, terpenes, flavonoids, phenols, tannins, phlobatannins, sterols, alkaloids, volatile oil, balsams, reins and chlorogenic acid were detected in all the plant parts. Carbohydrate and resin were present in the leaves. Saponins were present in the stem and root. Quantitative pharmacognostic analysis of the leaves revealed moisture content of 9.57%, total ash of 19.45%, acid-insoluble ash of 2.35%, alcohol extractive value of 16.12%, and water extractive value of 27.75%. Comparative thin layer chromatography of the successive cold maceration and soxhlet extraction using solvents of increasing polarities: hexane, ethyl acetate and methanol of the leaves, stem and root showed that soxhlet extraction yielded more components. This is the first report of the presence of alkaloids in this plant.

Keywords: Laggera pterodonta, chemical composition, alkaloids, antimalaria, pharmacognosy.

237 Oladosu, P^1 , Isu, N R^2 , Ibrahim, K¹ and Ibrahim, J. A^3

¹Department of Microbiology and Biotechnology, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja, Nigeria ²University of Abuja

³Department of Medicinal Plant Research and Traditional Medicine, National Institute for Pharmaceutical Research and Development (NIPRD), PMB 21, Garki, Abuja, Nigeria

Ethnobotanical survey and Preliminary Evaluation of some selected medicinal plants used in the treatment of tuberculosis in parts of Northern Nigeria. *Zuma Journal of Pure and Applied Sciences Vol 8 (1): 1-7.*

Abstract

Ethno-botanical survey of plants used in the treatment of tuberculosis in some parts of Northern Nigeria was carried out. The information obtained was based on interviews and interaction with herbalists, spiritualist, hunters, farmers and nomadic pastoralists. A total number of fifteen plant species belonging to ten families of Fabaceae (5) 33.3%, Meliaceae (2) 13.5%, Polypodiaceae (1) 6.10%, Loranthaceae (1) 6.10%, Compositae (Asteraceae) (1) 6.10%, Moraceae (1) 6.10%, Annonaceae (1) 6.10%, Brassiceae (1) 6.10% and Verbenaceae (1) 6.10% were identified from the study. The plants or plant parts are either in the form of leaves, fruit, stem bark or root bark or combination of one or more are used in form of decoction or infusion. Antituberculosis screening of the crude extracts of these plants by broth microdilution technique revealed that minimum inhibitory concentration against Mycobacterium bovis ranged from 625 to 1250μ g/ml concentration. All the species identified were widely used by the local people in traditional medicine to treat other human ailments apart from tuberculosis. There is an array of plants used locally to treat tuberculosis, and bioassay of these plants could provide leads for drugs as an antituberculosis molecule.

Keywords: Antimycobacterial, ethnomedicinal plants

238 Olubunmi J. Olayemi, Halima-Sadia Mahmud, Yonni Apeji

Department of Pharmaceutics and Pharmaceutical Microbiology, Faculty of Pharmaceutical Sciences, Ahmadu Bello University, Zaria.

Effect of concentration on the release property of *Khaya senegalensis* gum in chloroquine phosphate tablet formulation. *International Journal of Applied Pharmaceutics*, 2010; 2 (3):22-26.

Abstract

Khaya gum gotten from the bark of *khaya senegalensis* was used as disintegrant in chloroquine phosphate tablets and was evaluated and compared to maize starch and microcrystalline cellulose. Batches of 5, 7.5 and 10 %w/w were formulated for the three excipients. *Khaya* gum was observed to swell to about ten (10) times its weight in water. The granules of all the batches were observed to have good flow properties. Tablets of all the batches containing *khaya* gum were observed to be softer, disintegrated faster and had greater dissolution than the tablets of the MCC batches. An increase in the concentration of the *khaya* gum led to slower disintegration of the tablets. The dissolution profile showed that an increase in the concentration of *khaya* gum led to a retardation in the release of the drug and the effective concentration for fast disintegration and quick drug release was found to be 5 %w/w. The mechanism of disintegration and drug release was attributed to the gum's water uptake and swelling capacity.

Keywords: Disintegrant, gum, khaya senegalensis, chloroquine phosphate.

239 Omojola MO¹*, Akinkunmi YO², Olufunsho KO³, Egharevba HO³ and EO Martins³

¹*Corresponding author: Raw Materials Research and Development Council PMB 232 Garki, Abuja. Nigeria.

²National Office for Technology Acquisition and Promotion, PMB 5074, Wuse Abuja ³National Institute for Pharmaceutical and Development (NIPRD), PMB 21 Garki, Abuja Nigeria

Isolation and Physico-Chemical Characterization of Cola Starch. *African Journal of Food Agriculture Nutrition and Development (AJFAND) 2010, 10(7): 2884-2900*

Abstract

Cola nitida (Vent). Schott & Endl, a tropical dicotyledonous tree (family-malvaceae and sub-familystercullioideae), is a well-known plant in the sub-Saharan Africa and renowned for its socioeconomic importance in Nigeria and other parts of West Africa. The plant was examined for the nut's starch composition and its physicochemical properties compared with corn starch. The starch was isolated using 1 % w/v sodium metabisulphite and the proximate analysis (in %) was found to be 4.60 protein, 0.54 crude fibre, 0.54 fat, 1.06 ash, 67.57 total starch and 10.42 moisture. The starch percentage solubility was 7.48 % with a swelling capacity of 8.85 % and an amylose/amylopectin content of 24:76. It has a pasting temperature of 74.5 °C, gelatinization temperature of 74 °C hydration capacity of 88.59 %, emulsion and foam capacities of 5.22 % and 1.87 % respectively. The Rapid Visco Analysis (RVA) of the cola starch has a peak viscosity of 314.42 RVU and the results of the Differential Scanning Calorimetry (DSC) showed peak temperature of 321 °C and onset temperature of 300.7 °C. The photomicrograph indicates that the starch granule is oval in shape, generally small sized with occasional large ones, loose granules with no aggregation and had a mean particle size distribution of 15.33 % at 710 µm. The mineral content composition gave: iron 0.263mg/100g; phosphorus 67.43mg/100g; potassium 4.36mg/100g; calcium 9.40mg/100g; zinc 0.48mg/100g; magnesium 3.78mg/100g; copper (trace), and sodium 1.55mg/100g. Generally, the values obtained for the physicochemical and functional properties compared favorably with that of corn starch, and suggest that cola starch in the unmodified form can be used as a gelling agent, a fat replacer in the food industries where low fat is required and in the manufacture of noodles. It however cannot be used as an emulsifier as a result of its low emulsion and foam capacities.

Keywords: Cola, starch, isolation, composition, properties

240 Tijani Y. ^{1*,} Ojo O. E. ², Oladepo D. K. ³, Salawu O. A. ¹, Mohammed S. B. ^{3,} Osunkwo A. U. ¹, Izebe K. S. ³ and Yaaba Y. ³

¹ Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja, Nigeria.

² EOL limited, Ado - Ekiti, Ekiti State, Nigeria.

³ Department of Microbiology and Biotechnology National Institute for Pharmaceutical Research and Development (NIPRD) Idu, Abuja, Nigeria.

Evaluation of Immunostimulatory Effects of Viracomb in Rabbits. *Journal of AIDS and HIV Research Vol. 2 (4): 88-94.*



Abstract

Viracomb is a herbal based preparation used in management of conditions associated with immunosuppression. The present study was undertaken to evaluate the immunostimulatory effect of Viracomb in rabbits. Acute toxicity study was carried out in rabbits using acute toxic class method. In the immunostimulatory study, healthy adult rabbits were randomized into five groups of five rabbits per group. Group I rabbits served as the positive control and received 10 ml normal saline/kg while rabbits in groups II, III, IV and V received 50 mg cyclophosphamide/kg body weight on days 0, 2 and 4 and thereafter, rabbits in groups II, III and IV were given daily doses of 75, 150 and 300 mg Viracomb/kg body weight for 28-days while group V served as the negative control. The effect of viracomb on feed and water intake, body weight changes, CD4+ count, haematological and biochemical parameters were evaluated. The oral median lethal dose was estimated to be greater than 5000 mg extract/kg body weight. Viracomb exerted significant decrease in feed intake at 75 mg/kg while slight increase in feed intake was observed at 150 and 300 mg /kg body weight. Significant (p < 0.05) decrease in water intakewas observed at all dose levels used for the study. There was no remarkable change in body weight of rabbits at all doses used for the study. There was significant (p < 0.05) increase in CD4+ counts of rabbits given 150 mg / body weight kg while unremarkable changes were observed in CD4+ counts of rabbits given 75 and 300 mg/kg body weight respectively at the end of the 28-days study. Significant dose dependent increase in haematological profiles was observed while biochemical parameters remained normal. These findings indicate that viracomb is safe acutely and possess immunostimulatory activity and thus, provide evidence for its acclaimed effect in the management of immuno-suppressed related disorders.

Keywords: Viracomb, Cyclophosphamide, Immunosuppressed, rabbits, immunostimulatory.

241 Ugbabe, G.E.¹, Ayodele, A.E.¹, Ajoku, G.A.^{1*}, Kunle, O.F.¹, Ibrahim, K.¹ and Okogun, J.I.¹

¹National Institute for Pharmaceutical research and Development, Abuja, Nigeria. Preliminary Phytochemical and Antimicrobial Analysis of the Leaves of Nigerian. BignoniaceaeJuss. Global Journal of Agriculture and Biological Research. 2010 1(1) 001-005.

Abstract

The phytochemical and antimicrobial analysis of the leaves of ten species of the Nigerian *Bignoniaceae* Viz. *CrescentiacujeteLinn, Jacaranda mimosifoliaD. Don., Kigeliaafricana(Lam.)* Benth, Markhamiatomentosa (Benth.) K. Schum., NewbouldialaevisSeem., Spathodea campanulata P. Beauv., Stereospermum acuminatissimum K. Schum., Stereospermum kunthianumCham., Tabebuiarosea(Berthol.)DC. and Tecomastans (Linn.) H.B. & K. were carried out. *Crescentiacujete, Jacaranda mimosifolia, Tabebuiarosea and Tecomastansare* introduced species while the others are introduced to Nigeria. The phytochemical analysis included thescreening of leaf extracts of the species for secondary metabolites such as carbohydrates, tannins, phlobatannins, anthraquinone, saponin, flavonoids, alkaloids, sterols, resins, and phenolic nucleus. The resultsshow the presence of sterols, flavonoids, terpenes, tannins, resins, carbohydrates and phenolic nucleus in all thespecies. Whereas Phlobatanins and Alkaloids remained absent in all the species. Antimicrobial screening wascarried out using 2.0_mg/ml of successive extracts (hexane, ethyl acetate, methanol and water) of each species. The test organisms were *Pseudomonas aeruginosa, Escherichia coli, Candida albicans, Bacillus subtilis, Staphylococcus aureus* and



Salmonella typhi, which were clinical isolates. Results were taken after 24hours torecord the growth (no activity) or no growth (activity) of the test organism on each of the extracts. The antimicrobial screening shows that all the hexane extracts exhibited activity on *B. subtilis* and *S. aureus* and the hexane extract of *C. cujete* had activity on all the test organisms. The hexane extract has more activity on the test organisms followed by the ethylacetate extracts while the water extract has the least activity on the test organisms. On the other hand, in the ethylacetate extract only *C. cujete* had activity on all test organisms; and the ethylacetate extracts of *N. laevis* and *S. acuminatissimum* had no activity at all on all test organisms. In the methanol extracts *C. cujete*, *J. mimosifolia*, *N. laevis*, *S. acuminatissimum*, and *T. stanshad* activity on *P.aeruginosa*.

242 Ugbabe, $G.E^{1*}$, Ezeunala, $M.N^{2*}$, Edmond, $I.N^3$, Apev, J^1 and Salawu, $O.A^3$

¹Medicinal Plant Research and Traditional Medicine (MPR & TM) Department, National Institute for Pharmaceutical, Research and Development, (NIPRD) PMB 21 Garki, Abuja, Nigeria., ²Microbiology and Biotechnology (MB &BT), Department, NIPRD, Nigeria. ³Pharmacology and Toxicology (P &T) Department, NIPRD, Nigeria.

Preliminary Phytochemical, Antimicrobial and Acute Toxicity Studies of the Stem, bark and the Leaves of *acultivated Syzygium cumini Linn*. (Family: *Myrtaceae*) in Nigeria. *African Journal of Biotechnology Vol.* 9(41), pp. 6943-6747, 11 October, 2010

Abstract

The phytochemical, antimicrobial and acute toxicity studies of the leaf and stem bark extracts of *Syzygium cumini Linn*. grown in Abuja, Nigeria was carried out. The phytochemical screening revealed the presence of carbohydrates, saponins, tannins, terpenes, volatile oil, sterols, resins balsam, phlobatanins and flavonoids in the leaves and stem bark of the species studied. Alkaloids and anthraquinones were absent in all the plant parts studied. 70% methanol extracts were used for antimicrobial and acute toxicity studies. The six test organisms used for antimicrobial studies were: *Pseudomonas auriginosa, Escherichia coli, Staphylococcus aureus, Candida albicans, Bacillus subtilis* and *Salmonella typhii*. The oil from the leaves showed activity on all the stem bark extract showed no activity on any of the test organisms used. The oil had a saponification value of 363 and an acid value of 4.21. The lethal dose 50% (LD50) in mice was found to be >5000 mg/kg for the stem bark and at 3,873 mg/kg for the leaf extracts.

Keywords: Phytochemical, antimicrobial, acute toxicity, Syzygium cumini, Nigeria.

NIPRD Compendium of Research Publications (2010 - 2018)

243 UGBABE, Grace E^{1*}; EZEUNALA, Mercy N²; EDMOND, IN³; APEV, John¹; and SALAWU, OA³

¹Department of Medicinal Plant Research and Traditional Medicine (MPR & TM), National Institute for Pharmaceutical Research and Development (NIPRD)

²Department of Microbiology, Human Virology and Biotechnology, National Institute for Pharmaceutical Research and Development (NIPRD)

³Department of Pharmacology and Toxicology, National Institute for Pharmaceutical Research and Development (NIPRD)

Preliminary Phytochemical, Antimicrobial and Acute Toxicity studies of the stem bark and leaf of a cultivated Syzygium cumini Linn. (Family: Myrtaceae) in Nigeria. *African Journal of Biotechnology 2010 Vol*, (9)41, pp.6943–6947

Abstract

The phytochemical, antimicrobial and acute toxicity studies of the leaf and stem bark extracts of Syzygium cumini Linn. grown in Abuja, Nigeria was carried out. The phytochemical screening revealed the presence of carbohydrates, saponins, tannins, terpenes, volatile oil, sterols, resins balsam, phlobatanins and flavonoids in the leaves and stem bark of the species studied. Alkaloids and anthraquinones were absent in all the plant parts studied. Freeze dried 70% methanol extracts were used for the antimicrobial and acute toxicity studies. The six test organisms used for antimicrobial studies were: Pseudomonas auriginosa, Escherichia coli, Staphylococcus aureus, Candida albicans, Bacillus subtilis and Salmonella typhii. The oil from the leaves showed activity on all the test organisms; the leaf extract showed no activity on any of the test organisms used. The oil had a saponification value of 363 and an acid value of 4.21. The lethal dose 50% (LD₅₀) in mice was found to be > 5000mg/kg for the stem bark and at 3,873mg/kg for the leaf extracts.

Produced by NIPRD

Copyright 2018