

1st

OKU AMPOFO
Memorial Conference

THEME

Medicinal Plant Research:
Innovation and Prospects in a
Pandemic Era

NOVEMBER
1st to 3rd, 2022

AH HOTEL AND CONFERENCE
EAST LEGON, ACCRA

GENERAL INFORMATION

Health Information

Delegates using the Kotoka International Airport (KIA) are reminded to carry their yellow fever and COVID-19 vaccination cards. Those who do not have the full COVID-19 vaccination will be asked to take the vaccine on arrival at the airport. International delegates must fill a health declaration form available at <https://www.ghs-hdf.org/> not more than three days before traveling.

Accommodation & Conference Venue

Both accommodation and venue for the conference is at the AH Hotel and Conference, East Legon in Accra (<https://ahhotelafrica.com>). East Legon is a serene and safe neighborhood in Accra. The environment around the conference venue is generally safe although participants are advised to be vigilant.

All delegates arriving via Kotoka International Airport will be picked on arrival by the Hotel. Thus, delegates need to provide their travel itinerary to the Local Organizing Committee (LOC) for the necessary arrangement for pick up to be made. The AH Hotel and Conference is located at HSE No. 84/86 1st Boundary Road, American House, East Legon, and contacted on via telephone +233500016062.

Registration Desk

Registration Desk will be situated at the entrance of the main Hall of the conference venue on the first day 1st November, 2022 at 1:00pm to 8:00pm local time. All delegates who have paid in advance will be issued with receipt and be given their conference package including the book of abstracts.

Identification of Delegates

Upon registration, delegates will receive conference materials and identification badge that must be worn for the duration of the conference.

Meals and Refreshments

There will be reception dinner on the first day of the Conference on 1st November, 2022 and it will be served from 6:00pm to 10:00pm. Delegates arriving after 10:00pm local time and need to be served dinner should inform the LOC for arrangements. There will be breakfast, coffee break and lunch on the second day of the conference. The third day of the conference will have same meals as the second day including a special dinner.

Security and Emergencies

The LOC assures the delegates of secured and serene environment. In case of emergency, delegates should report to the Protocol Officers at the registration desk area where they will be promptly attended to. Police emergency numbers: 112/ 191/ 1855. These are toll free numbers on all networks.

Facilities

The Hotel has a Wi-Fi and delegates are encouraged to take the Wi-Fi password at the front desk of the Hotel or the registration desk. The Hotel has a gym and a swimming pool. Both facilities are free for delegates and there are instructors who aid patrons to use same. Life guards at the swimming pool close after 6:00pm.

Cell Phones

Delegates are requested to put their cell phones, pagers and tablets on silence during the course of the conference.

Instruction to Presenters

MS Power Point presentation should be given to the technical assistants at the relevant venue at least 30 minutes before the start of the session in which the delegate is presenting. Details of the periods allocated to presenters are indicated in the program.

Instructions to Moderators

Chairpersons / Moderators of sessions should adhere to the program outline to prevent sessions from extending beyond the allocated time.

Posters

There will be no poster sessions for the conference.

Conference Dinner

The conference dinner will be held on 3rd November, 2022 at Villandro Residence Lounge near the Conference venue in East Legon at 7:00pm local time. Means of transportation will be provided for delegates.

Message from the Chairman of the Governing Board, Centre for Plant Medicine Research, Mampong-Akuapem



I am highly honored to share a word of welcome with delegates and invited guests to the first scientific conference of the Centre for Plant Medicine Research (CPMR), Mampong-Akuapem. I am also excited that the Management of the Centre has worked so hard to make this maiden conference a truly international one.

The theme for this first conference, medicinal plant research: innovation and prospects in a pandemic world, is apt because natural products are becoming a natural choice globally. This is the case for drugs where the entire world is becoming more and more interested in natural remedies. Ghana is endowed with

numerous medicinal plants and the Centre must be equipped to join in this global resurgence of the search for herbal alternatives. Indeed William Shakespeare puts it rightly

*There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat,
And we must take the current when it serves,
Or lose our ventures.*

Surely, there is a tide in the frontiers of drug development, a power whose force ebbs and flows in time, and we must learn to go with the flow. Waiting any longer without concrete action only allows our power to pass its crest and begin to ebb. If this great opportunity is omitted, we will find ourselves stranded in miserable shallows.

I wish all participants and delegates a fruitful deliberation and an exciting experience in Ghana.

Mr. Thomas Boateng Appiagyei
(Board Chairman)

Welcome Message From The Executive Director, Centre For Plant Medicine Research (CPMR), Mampong-Akuapem



It is my pleasure and privilege to welcome you all, especially those of you coming from outside of Ghana to the 1st Oku Ampofo Memorial Conference. This conference is written in stars! We are here to honor Dr. Oku Ampofo, the founder and first Director of the Centre for Plant Medicine Research at Mampong-Akuapem- a globally unique organization that is involved in plant medicine research, production, and clinical practice. Indeed, the legacy of Dr. Oku Ampofo in the domain of plant medicine, and national development is monumental.

The Centre for Plant Medicine Research at Mampong-Akuapem was established in 1975 for the promotion of scientific research, knowledge, and development of plant medicine. The Centre has worked over the years to employ the best scientific methods to modernize traditional medicine. Actually, the Centre is involved in the entire value chain of plant medicine production, right from cultivating plant raw materials through research and development of herbal medicines, clinical practice as well as marketing of the herbal products. The vision of the Centre is to make herbal medicine a natural choice for all.

This conference is a testimony of our commitment as a Centre to gain the highest recognition for research and development of herbal products that meet the exacting needs of both patients and industry, through innovative scientific research and productive partnerships. In this historic first memorial conference, research scientists, practitioners, manufactures, policy makers and other key stakeholders from six countries across the world will deliberate on innovations and prospects of herbal medicine in a pandemic era. Furthermore, research scientists from the CPMR will be able to share key research and development outcomes with stakeholders. This conference is truly an epoch-making moment in the history of plant medicine, and the CPMR is proud to host this conference.

I therefore, urge all of you participating in this conference to leverage on the opportunities created for you to meet, network, collaborate, partner, and above all establish new friendships. Let this conference be remembered as the beginning of an exciting era of breaking new grounds in plant medicine.

You are once again most welcome, and I wish you all the very best.

Prof. Alex Asase

Executive Director, Centre for Plant Medicine Research (CPMR)

Message From The Chairman, Local Organizing Committee



Dearest Fellow Delegates and invited guests

I am both delighted and honored to welcome you to the first Centre's Oku Ampofo Memorial (COAM) Conference being held at AH Hotel, East Legon, Accra from 1st to 3rd November, 2022. The Centre for Plant Medicine Research (CPMR), Mampong-Akuapem recognizes the immense contribution of our Founder, Dr. Oku Ampofo not only to the Centre but to the development of traditional medicine in Ghana. In our bid to immortalize his tremendous contribution, the annual scientific symposium of the Centre was named after him in 2017, just a year after its inception. The Centre deems it necessary to maintain this honor after the symposium has metamorphosed into a scientific conference.

The theme for this year's conference is **Medicinal Plant Research: Innovation and Prospects in a Pandemic Era**. COVID-19 has ravaged our planet and, on its path, faced the resilience of mankind. Much of the resistance we offered this pandemic and indeed past ones came from natural products especially herbal medicine. The LOC received 86 abstracts from eight countries but due to logistical constraints we will have 55 papers presented. This conference will have delegates from Barbados, USA, South Africa, DR Congo, Nigeria and Ghana. There are a lot of interesting works from scientists which highlight the innovations and prospects that herbal medicine offered and will provide in this and future outbreaks. I invite all delegates to open your intellectual minds for questions, debates and interactive discussions throughout the conference.

I want to sincerely thank the Management of the Centre in particular the Executive Director and all members of the Local Organizing Committee whose unalloyed support I enjoyed throughout the organization of this first COAM Conference. I also want to offer my profound gratitude to our participants and special guests who honored our invitation. Our external reviewers and editorial team members who spent precious time assessing abstracts are very much appreciated. There is one debt I will be sadly lacking in courtesy if I do not acknowledge. The conference fee, for all the wonderful things we are providing delegates, is but a pittance. Donations from our sponsors including COA, COVID-19 National Trust Fund, the CPMR, the FDA-Ghana, Presbyterian Press, Adom Herbal and many other organizations made all these possible.

Finally, I wish all delegates and participants a fruitful scientific deliberation and wonderful experience in the home of true hospitalities, Ghana.

Thank you all and Akwaaba

A handwritten signature in black ink, appearing to be 'Kofi Donkor'.

Dr. Kofi Donkor

Chair, Organizing Committee, COAM 2022

MEMBERS OF LOCAL ORGANIZING COMMITTEE



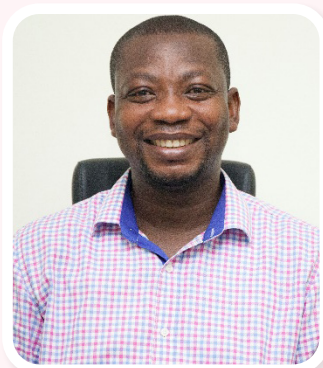
Dr. Orleans Martey



Dr. Olga Quasie



Mr. Stephen Antwi



Dr. Kofi Donkor



Ms. Eunice Ama Oppong



Ms. Susana Oteng Mintah



Mrs. Genevieve Yeboah

MEMBERS OF SCIENTIFIC COMMITTEE

Reviewer	Affiliation
Prof. Emelia Opong Bekoe	Department of Pharmacognosy & Herbal Medicine, University of Ghana, Legon
Dr. Ademola Oyagbemi	Department of Veterinary Physiology & Biochemistry, University of Ibadan, Nigeria
Dr. Ofosua Adi-Dako	Department of Pharmaceutics & Microbiology, University of Ghana
Dr. Maxwell Sakyamah	Department of Phytochemistry, Centre for Plant Medicine Research, Mampong-Akuapem
Dr. Mavis Boakye-Yiadom	Department of Clinical Research, Centre for Plant Medicine Research, Mampong-Akuapem
Mr. Tonny Asafo-Agyei	Department of Plant Development, Centre for Plant Medicine Research, Mampong-Akuapem

CONFERENCE PROGRAM

Day 1: Tuesday 1st November, 2022	
13:00-18:30	Arrival and Registration of Delegates
19:00-22:00	Dinner
Day 2: Wednesday 2nd November, 2022	
05:30-06:30	Gym (Optional)
07:00-8:00	Breakfast
08:00-09:00	Arrival of Delegates and Dignitaries
09:00-11:30	Opening Ceremony
11:30-12:00	Cocktail reception
<div style="background-color: black; color: white; padding: 5px; display: inline-block;">Plenary Session</div>	
<p>Chair: Prof. Augustine Ocloo Dean, School of Biological Sciences, University of Ghana</p>	
12:00-12:30	<p>Keynote Address:</p> <p>The Challenges of Traditional Medicine Development for COVID-19 into Clinical Use – Case Study of PHELA, an African Traditional Medicine Based Product</p> <p style="text-align: center;">Prof. Motlalepula G. Matsabisa Department of Pharmacology, University of the Free State, South Africa</p>
12:30-12:45	<p>Presentation by COA</p> <p style="text-align: center;">Prof. Samuel Ato Duncan COA Research and Manufacturing Ltd, Cape Coast</p>

12:45-13:00	<p>Considerations of Equity in Benefit Sharing from Medicinal Plant Research Outcomes</p> <p style="text-align: center;">Prof. Alfred Oteng-Yeboah Department of Plant and Environmental Biology, University of Ghana</p>	
13:00-13:15	<p>Attitudes and Opinions of Ghanaians towards COVID-19 Vaccine</p> <p style="text-align: center;">Dr. Olga Quasie Department of Pharmacology/Toxicology, CPMR, Mampong-Akuapem</p>	
13:15-13:30	<p>Bioavailability and Stability of <i>Camellia sinensis</i> Tea Catechins through Sonochemistry and Nanoparticle Production: A Review</p> <p style="text-align: center;">Dr. Roger Baylis-Duffield Theales Health Pty Ltd, South Africa</p>	
13:30-14:20	Lunch	
Time	<p>Parallel Session 1A Biological Activities</p> <p>Moderator: Prof. Mohamed Mutocheluh</p> <p>Main Conference Hall</p>	<p>Parallel Session 1B Phytochemistry</p> <p>Moderator: Dr. Samuel Ekere</p> <p>Breakaway Hall</p>
14:30-14:45	<p>Does <i>Croton membranaceus</i> as an Anti-Benign Prostatic Hyperplasia (BPH) Herbal Medicine have Parallel Mechanisms to Conventional Treatments?</p> <p>Zhou R.</p>	<p><i>In-vitro</i> Antioxidant Assays and Computational Investigations of Phytoconstituents from <i>Theobroma cacao</i> Beans as Inhibitors of Neuromodulatory Enzymes</p> <p>Shodehinde S.A.</p>

14:45-15:00	Modulation of Reproductive and Metabolic Functions in Letrozole-induced Polycystic Ovarian Syndrome in Rats by the Ethanolic Extract of <i>Vernonia amygdalina</i> (Del) Leaves	GC/MS Composition and Resistance Modulatory Inhibitory Activities of three Extracts of Lemongrass: Citral Modulates the Activities of Five Antibiotics At Sub-Inhibitory Concentrations on Methicillin-Resistant <i>Staphylococcus aureus</i>
	Fehintoluwa J.	Kabotso D.E. K
15:00-15:15	Bronchodilatory Potential of <i>Mucuna sloanei</i> (Fawcett & Rendle) (Leguminosae) Seeds	Response to Covid-19 Disease in Ghana: A Review of the Herbs
	Cobbinah A.H	Mireku-Gyimah A.
15:15-15:30	Hydroethanolic Stem Extract of <i>Vernonia amygdalina</i> Del. (Asteraceae) Suppresses Yeast Induced Pyrexia and <i>Plasmodium berghei</i> Malaria In Murine Models	Effect Of Seasonal Variations on the Secondary Metabolites and Antioxidant Activities of <i>Bridelia ferruginea</i> Benth., <i>Lippia multiflora</i> Moldenke and <i>Azadirachta indica</i> A. Juss. Leaves
	Quartey K.	Kyei-Baffuor P.
15:30-15:45	Alkaloidal Fraction of <i>Zanthoxylum zanthoxyloides</i> De-promotes Progression of CCl ₄ /Olive Oil-Induced Hepatocellular Carcinoma-Like Phenotypes in Rats	<i>In silico</i> -based Identification of some Selected Phytochemicals in <i>Ageratum conyzoides</i> Leaves as Potential Inhibitors of Crucial Proteins of <i>Blastomyces dermatitidis</i>
	Boye A	Larbi B.E.

	Parallel Session 2A Biological Activities Moderator: Dr. Adeola Salami Main Conference room	Parallel Session 2B Conservation, Ethnobotany & Climate Change Moderator: Prof. A. Oteng-Yeboah Breakaway Hall
15:45-16:00	Lung injury induced by benzo(a) pyrene : chemoprotective effect of curcumin on wistar albino rats. Y. Kolade O.	Spatio-temporal Dynamics; Monitoring Vegetation, a Medicinal Plant Conservation Strategy Atta-Adjei P.
16:00-16:15	Anthelmintic, Haematological and Antioxidant Potential of <i>Spondias mombin</i> L. in Dogs Adekoya O. A.	Ethnobotanical Features of Plant Species Used for Formulation of Herbal Products Against Liver Diseases in Ghana; A Field Survey and Review Dongsogo J.
16:15-16:30	Comparative Anti-Microbial Activity of <i>Cryptolepis sanguinolenta</i> Root and Aerial Parts Extracts towards Repurposing the Aerial Part For Anti-Microbial Product Development Mintah S. O.	Effects of climate change on potential geographic distributions of some African medicinal plants Asase A.

16:30-16:45	Anti-malaria Effect of Standardized Ethanol Leaf Extract of <i>Annickia polycarpa</i> , (DC.) Setten and Maas ex I.M. Turner. (Annonaceae), in <i>Plasmodium berghei</i> Infested Mice Kumatia E.	COA Mixture in literature: Gathering evidence in support of general wellbeing Agbale C.M
16:45-17:00	Antimicrobial Potential of Extract from a <i>Pseudomonas aeruginosa</i> Isolate. Amankwah F.	Plants Used for the Treatment of Skin Diseases by some Herbalists in Ghana Asafo-Agyei T.
Day 3: Thursday 3rd November, 2022		
05:30-06:30	Gym (Optional)	
07:00-8:30	Breakfast	
Plenary Session		
Chair: Prof. Yao Barku		
Department of Chemistry, School of Physical Sciences, University of Cape Coast		
09:00-9:30	Keynote Address: The Potential Contribution of Herbal Medicines to Covid-19 Response and Future Pandemics Prof. Mohamed Mutocheluh Department of Clinical Microbiology, KNUST, Kumasi	
09:30-09:45	Collaborative Research Opportunities at CPMR Dr. Daniel Boamah Centre for Plant Medicine Research, Ghana	

09:45-10:00	<p>Revisiting the Dependence on Indigenous Plant Resources to Inform Interventions for the SARS-COV-2 Pandemic</p> <p style="text-align: center;">Dr. Sonia Peter</p> <p style="text-align: center;">Biocultural Education and Research Programme, St. James, Barbados</p>	
10:00-10:15	<p>The Antiviral Effect of Ghanaian Herbal Extracts and Isolated Compounds on SARS-CoV-2</p> <p style="text-align: center;">Sylvester Kaminta</p> <p style="text-align: center;">Centre for Plant Medicine Research, Ghana</p>	
10:15-10:30	<p>Preliminary Safety Evaluation of Immunim Used as an Immune Booster</p> <p style="text-align: center;">Judith Yeboah</p> <p style="text-align: center;">Centre for Plant Medicine Research, Ghana</p>	
10:30-10:45	<p>An Observational Study on the use of Nibima and Immunim, two Ghanaian Herbal Medicines in the Management of COVID-19</p> <p style="text-align: center;">David Abrokwa</p> <p style="text-align: center;">Centre for Plant Medicine Research, Ghana</p>	
10:45-11:00	<p>Parallel Session 3A</p> <p>Toxicology</p> <p>Moderator: Dr. Daniel Boamah</p> <p>Main Conference Hall</p>	<p>Parallel Session 3B</p> <p>Clinical Studies</p> <p>Moderator: Dr. A. Opeyemi</p> <p>Breakaway Hall</p>

11:00-11:15	Levels of Microbial, Heavy Metals and Organochlorides in Herbal Medicines and Plant Species used for Hepatic Diseases in Ghana. Dongsogo J.	Retrospective Case Series Using Traditional Medicine to Treat Recurrent Urinary Tract Infections Bromley F. A.
11:15-11:30	Chronic Toxicity Evaluation of COA, an Herbal Preparation used for the Management of HIV/ AIDS, Hepatitis, Cancer and Blood Related Diseases Antwi S.	Clinical Evidence of the Efficacy of ArtiCovid (<i>Artemisia annua</i> extract) on Covid-19 Patients in DRC. Nkola J. M.
11:30-11:45	Effect of Aqueous Extract of <i>Cryptolepis sanguinolenta</i> Administration on the Metabolism of Chloroquine Via Cytochrome P450 Isozymes Sakyiamah M. M.	The Effect of a Triad of Herbal Medicines on the Quality of Life of Patients Presenting with Dyspepsia at the Centre for Plant Medicine Research Clinic in Ghana Boakye-Yiadom M.
11:45-12:00	Mycological Safety of Six Powdered Herbal Medicinal Products Sold on the Market in Ghana Appenteng M.A	Clinical Implication of Herbal Antihypertensive Use Among Patients Visiting an Integrated Herbal Unit: A Pilot Observational Study Thomford P.
12:00-12:15	Protection by Naringenin against Cobalt-induced Gastro-toxicity in Rats: The roles of H ⁺ K ⁺ -ATPase pump activity and iNOS expression. Salami A. T.	Ameliorative Effect of Immulate Herbal Supplement on Hepatitis B virus infection: A case report Safo K.

12:15-13:00	Lunch	
Time	Parallel Session 4A Nanoparticles and Essential Oil Moderator: Dr. Orleans Martey Main Conference Hall	Parallel Session 4B Pharmacology Moderator: Prof. Emelia Bekoe Breakaway Hall
13:15-13:30	<i>Capparis erythrocarpos</i> Mediated Synthesized ZnO Nanoparticles and its Therapeutic Potential Kyene O.M.	The Hydroethanolic Leaf Extract of <i>Morinda lucida</i> Reduces PGE ₂ and NO Levels in LPS-activated RAW 264 Cells. Ayertey F.
13:30-13:45	Functionalization of <i>Parkia biglobosa</i> - Mediated Gold Nanoparticle for Improved Drug Delivery Okoampah E.	<i>Parkia clappertoniana</i> Key (Family: Fabaceae) Fruit Husk Extract Demonstrates Wound Healing and Anti-Microbial Effects in Rat Excisional Wound Model Boye A.
13:45-14:00	Investigating the Anthelmintic Potential of <i>Carica papaya</i> -Mediated Silver Nanoparticles in vitro Dauids J. S.	The Inhibition of Dipeptidyl Peptidase-IV by an Extract of Periwinkle (<i>Catharanthus roseus</i> (L.) G Don) and its Potential Antidiabetic Effects in a Streptozotocin-Induced Type 2 Diabetes Mellitus Model in Sprague Dawley Rats Cohall D.

14:00-14:15	Phytochemicals and Biogenic Metallic Nanoparticles as Anticancer Agents in Lung Cancer Mireku-Gyimah A.	<i>Phyllanthus amarus</i> Extract and Fractions; Anti-Inflammatory, Antioxidant and Hypolipidemic Activities in Mice Opeyemi O.
14:15-14:30	Developing Plant Extracts and Essential Oils as Botanical Acaricides for Tick Control: The African Story Olubukola T.A.	Erythropoietic and Spermatogenic Effects of Subchronic Administration of Methanolic Leaf Extract of <i>Dracaena arborea</i> in Rats Ekere S.O
Time	Parallel Session 5A Pharmaceutics Moderator: Dr. Daniel Kabotso Main Conference Hall	Parallel Session 5B Biological Activity Moderator: Dr. Shine Davids Breakaway Hall
14:30-14:45	The Role of Quality Management Systems in Herbal Manufacturing Companies: The COA-RMCL Experience Agbale C.M	Current state of Herbal Medicines Analysis in Africa, and the Way Forward Bekoe E.

14:45-15:00	Evaluation of a Tea Bag Formulation of <i>Tapinanthus bangwensis</i> (Engl. and K. Krause) Danser Leaves, Meant for the Management of Diabetes	<i>Bridelia ferrugenia</i> Benth. as an Herbal Antidiabetic Agent: Is It Time to Reconsider?
	Kumadoh D.	Thomford P.
15:00-15:15	Formulation and Evaluation of Herbal Extract Capsules; The Case of <i>Cryptolepis sanguinolenta</i> used in the Treatment of Malaria	In Vitro Antibacterial Activity of <i>Psidium Guajava</i> (Guava) Leaves Extract on Carbapenem-Resistant <i>Klebsiella Pneumoniae</i> Causing Multi-Drug Resistant Systemic Infections
	Yeboah G.	Appenteng M.
15:15-15:30	Assessment of Medicinal Plants Used Among Idoma Inhabitants During SARS-COV-2 Pandemic in Nigeria	An in vivo evaluation of the versatility of Cocoa pod husk pectin based formulations for the chronodelivery of hydrocortisone in Sprague dawley rats
	Agboola O. O.	Adi-Dako O.
15:30-15:45	Coffee Break	
16:00-17:00	Closing Ceremony	
18:30-	Special Dinner	

Program For Opening Ceremony Of First Oku Ampofo Memorial Conference

Venue: AH Hotel and Conference, East Legon Date: 2nd November, 2022

8:00am –	Arrival of participant and guests	
8:30am –	Cultural display	– Abibigroman
9:00am –	Opening prayer	– Mr. Henry Brew-Daniels
9:05am –	Purpose of gathering	– Chair, LOC
9:10am –	Introduction of special guests and chairperson	– Dr. Olga Quasie
9:15am –	Welcome address	– Prof. Alex Asase, Director CPMR
9:25am –	Chairperson’s address	– Dr. Ernest Ofori Sarpong
9:35am –	COVID-19 National Trust Fund’s interventions-	Dr. William. Collins Asare (Fund Administrator, C-19NTF)
9:45am –	Presentation & discussion on COVID-19 National - Trust Fund herbal medicine Project	Dr. Kofi Donkor
10:15am –	Musical interlude	– Abibigroma
10:25am -	Remarks by Presidential Advisor on Health	- Dr. Anthony Nsiah-Asare
10: 30am –	Speech by Special Guest of Honor-	Prof. Frimpong Boateng
10:45am-	Remarks by Minister of State	Hon. Freda Prempeh, MP

10:50am-	Remarks by Chief of Staff	Hon. Akosua Frema Opare Osei
10:55am –	Chairperson’s closing remarks –	Dr. Ernest Ofori Sarpong
11:00am –	Vote of Thanks –	Mrs. Susan Oteng Mintah
	<ul style="list-style-type: none"> • Group photograph- • Refreshment 	Conference Media Team AH Hotel Catering

MC: Umaru Sanda Amadu, CitiFM

Keynote Address Day One: The Challenges Of Traditional Medicine Development For COVID-19 Into Clinical Use – Case Study Of Phela, An African Traditional Medicine Based Product

Prof. Motlalepula G. Matsabisa Department of Pharmacology, University of the Free State, P.O. Box 339 (G6), Bloemfontein 9300, South Africa

Abstract

A traditional preparation, now called PHELA, meaning “live”, has been used for decades in Africa for a syndrome of diseases, including an age-old disease called Muyaga. PHELA has now found useful as an African traditional medicine for treating HIV and immune compromised persons. With the advent of COVID-19, PHELA has been repurposed for COPVID-19 exploiting its immune reconstitution properties. The current use of PHELA has now been systematically studied and this research adds scientific value to this traditional preparation in order to first, give the African traditional medicines an international scientific perspective. Secondly the systematic and controlled scientific clinical validation of PHELA will help show its safety and potential use by patients with immune compromised system. Thirdly is now to indicate PHELA for long COVID-19 patients presenting with comorbidities of tuberculosis and diabetes. PHELA has been developed as proprietary standardized herbal medicine for wider commercial exploitation to benefit the knowledge holders through royalty payments and more importantly to benefit patients with immune compromised conditions. The scientific development of PHELA and challenges encountered throughout to clinical trials and commercialization will be highlighted as a means to help similar products to avoid such pitfalls.



Keynote Address Day Two: The Potential Contribution Of Herbal Medicines To COVID-19 Response And Future Pandemics

Prof. Mohamed Mutocheluh, Infectious Agents and Cancer Research, Department of Clinical Microbiology, School of Medicine and Dentistry, KNUST, Kumasi



Abstract

Plants have long been recognized for their therapeutic properties. For centuries, indigenous cultures around the world have used traditional herbal medicines to treat a plethora of diseases. According to Facts and Factors, the Global Herbal Medicine Market size was approximately worth USD \$166 billion in 2021. A representative herbal drug used for the Covid-19 response is *Echinacea purpurea* a popular medicine used by native Americans to treat respiratory infections. *Echinacea* has both antiviral and anti-inflammatory properties. Our team previously reported that *Cryptolepis sanguinolenta* (CS) and its active alkaloid cryptolepine boost the antiviral interferon pathway,

inhibit hepatitis B virus replication and inflammatory cytokines. Ghana's FDA approved an open-labelled randomized controlled trial by KNUST scientists of the CS-based herbal drug, Nibima for Covid-19 management at the height of the pandemic – increasing the use of Nibima in the population. Our trial started in March 2021 with a sample size of 48 patients (24 each for intervention and control arms) aimed at establishing the efficacy and safety of Nibima to repurpose it for Covid-19 management. The primary endpoint was to reduce Covid-19 viral load by >50%, speed up clinical recovery, and reduce hospital stay by approximately three days. Study participants were all administered standard Covid-19 drugs, followed by Nibima (intervention arm) or water (control arm). Preliminary results showed that patients of the intervention arm recovered 2.5 days earlier; had fewer deaths; and had reduced inflammatory markers than those of the control arm. In the last century, the major pandemics were driven mainly by viruses, and they would potentially drive future pandemics. These viruses have found ways of subverting the interferon and anti-inflammatory pathways in humans. Based on our recent discovery of Nibima's antiviral activity among others, we advocate for massive investment in herbal medicine research and uptake of its findings. This would position the herbal medicine industry in Ghana for future pandemics and tap into the \$166 billion market share.

COA MIXTURE



FOR GENERAL WELL-BEING

DOSAGE

For General Well-being

- * Mix **10 mL** (1 tablespoon) of COA Mixture with **50 mL** (5 table spoons) of **warm water** and drink the mixture immediately.
- * Allow **an hour** before meals or other medications
- * Repeat dose after **12 hours**.

Supportive Treatment

- * Add **20 mL** (2 tablespoon) of COA Mixture with **50 mL** (5 tablespoons) of **warm water** and drink the mixture immediately.
- * Allow **an hour** before meals or other medications
- * Repeat dose after **12 hours**.

BRANCHES

Cape Coast

059 156 5778
050 987 6891
024 472 6611

Accra

059 497 1158
020 943 8046

Kumasi

059 497 0923
020 943 8043

Takoradi

059 497 0793
020 943 7986

Koforidua

059 497 1281
020 943 8732

UK

+44 7514 433148
+44 7464 636604

USA

+1 (773)-610-1112

DUBAI

+97 1523 560830
+97 1556 364705

coadrugs coadrugs_official coa_drugs
www.coadrugs.org
VISIT OUR WEBSITE

THE NEW PACKAGING

1. COA LOGO ON BOTTLE NECK.
2. WHITE RUBBER PUSH CORK NOW REPLACED WITH AN ALUMINIUM FOIL INDUCTION SEAL.
3. CELLULOSE PAPER IN BLUE CAP



ABSTRACTS



Plenary Presentations

Collaborative Research Opportunities at CPMR

Daniel Boamah, Centre for Plant Medicine Research, Ghana

Abstract

The traditional medicine practice has been perceived as a mere cultural practice and reviled for its non-scientific approach in many parts of the world. In Ghana today, the indispensable research efforts of Centre for Plant Medicine Research (CPMR) since its establishment in 1975, has contributed significantly to the changing perception and acceptance of the industry. Herbal medicine represents the greatest fraction of traditional medicine practice patronized worldwide. The WHO indicates that herbal medicine forms 80% of traditional medicine. In Ghana, about 70% of patients use herbal medicine for various reasons. These show that there are significantly higher proportion of patients seeking herbal medicine compared to conventional treatment. Herbal medicine backed with scientific methods, tools, data and guidelines can make significant contributions in achieving universal health coverage in Africa. The use of herbal medicine has become common due to its comparative low risk, efficacy, accessibility and affordability. The CPMR has been at the forefront championing the cause of herbal medicine use through the scientific spectacle in Ghana and beyond. It stands out as a unique research institution in Africa with the sole mandate of investigating medicinal plants and harnessing their potential as remedies for human healthcare needs. Its core activities are research and development of herbal medicine in various areas of communicable (anti-infective, etc) and non-communicable diseases (diabetes, hypertension, etc). There is clinical service where patients are given herbal products manufactured by CPMR. One crucial service of CPMR is the analysis and testing of herbal products prior to FDA registration. To promote effective research programmes and collaborations, the CPMR has many research departments including Clinical Research Department, Pharmacology and Toxicology with an Animal Experimentation Unit, Phytochemistry, Microbiology, Plant Development and Pharmaceutics Departments equipped with various essential tools. The CPMR presents unique opportunities for partnership and collaborative research in drug discovery and development in Africa and beyond. Let us work together.

Considerations of Equity in Benefit Sharing from Medicinal Plant Research Outcomes

Alfred A. Oteng-Yeboah

Department of Plant and Environmental Biology, University of Ghana, LEGON.

Abstract

The current global edit in the utilization of genetic resources for any developmental process demands the adherence to a set of obligations or principles at the institutional and national levels for providers and users of the resource and its associated knowledge. The details are contained in the supplementary agreement of the United Nations Convention on Biological Diversity (UNCBD) called the Nagoya Protocol on Access and Benefit Sharing. In the guidelines of the protocol, there is the recognition for the provider, considered as the owner of the resource and of any knowledge or information associated with it, and the user also considered as the researcher who gets access to the resource and its associated knowledge. The provider could be an individual, a family unit, a community, an institution representing a country and the user may be an individual, an institution, and a group of both local and or foreign individuals. With Ghana as a Party to the protocol, legislation to domesticate it is currently under consideration. The essence of this discourse is to alert all Ghanaian stakeholders, particularly handlers of Ghanaian genetic resources and holders of their knowledge, to be circumspect when performing roles as providers. The highlights provided here must therefore be seen and understood as guide to the current and future use of the outcomes of medicinal plant researches in Ghana. There is a huge expectation and, to a very large extent, national obligation on the Ghanaian researcher to ensure that the individual(s) or institution(s) acting on behalf of the state, engage(s) in activities that will ensure accountability and the repatriation of benefits from the utilization of Ghanaian genetic resources.

Keywords: Developmental process, Researcher, legislation, stakeholders, knowledge

Attitudes and Opinions of Ghanaians towards COVID-19 Vaccine

Kofi Donkor, Olga Quasie, Stephen Antwi, Appiah Kubi, Bobi Barimah

Centre for Plant Medicine Research, Mampong-Akuapem

Abstract

The objectives of this study were to establish the attitudes and opinions of Ghanaians towards the COVID-19 vaccine, understand the basis of their attitudes and postulate measures to counteract negative attitudes and opinions. Data were collected through a cross-sectional survey of adults that assessed respondents' beliefs in the disease, ethnicity, educational background, attitudes and opinions towards the vaccine and preferred remedy option for the disease from April, 2021 to June, 2021. To understand the attitudes and opinions of respondents towards the vaccine, a focused group discussion involving 5 males and 4 females lasting 2 hours was conducted. A total of 683 respondents were sampled and of these, 15% had very little or no knowledge of the COVID-19 infection while 35.4% of respondents believed the vaccine was not created by some people to destroy others. Rather alarmingly, 64.6% of the respondents either believed the vaccine was created to harm people (33.2%) or were not sure (31.4%). As high as 58.1% of the respondents either will not take (30.6%) the vaccine or were undecided (27.5%) if given the opportunity to vaccinate. Similarly, 46% of the respondents either believed the COVID-19 vaccine will not offer the desired protection (18.7%) or were not sure (27.2%). This study has shown that effort must be made in creating awareness of COVID-19 especially among low infected regions. Similarly, an aggressive public education to counteract conspiracy theories especially on social media must be waged.

Keywords: Hesitancy, COVID-19 vaccine, ethnicity, focused group discussion, attitudes and opinions

Bioavailability and Stability of *Camellia sinensis* Tea Catechins through Sonochemistry and Nanoparticle Production: A Review

Roger Baylis-Duffield

Theales Health Pty Ltd, 41 Sloane Square, Bryanston 2191, Gauteng, South Africa

Abstract

More than 120 known diseases are currently active through bacteria, virus, fungus or parasites that are freely spread through protein-protein interfaces in crystal structures of homologous proteins in animals and humans. These diseases include all known Coronaviruses, Tuberculosis, HIV, Malaria, Ebola and Salmonellosis. As a Chinese traditional medicine, Green Tea catechins have been administered to humans over hundreds of years, delivering natural solutions and limited control measures by mitigating health burdens associated with numerous diseases. However, like all natural product extracts, bioavailability remains a major problem through secondary metabolites which are invariably responsible for the bioactivity of the products that are poorly absorbed upon administration. Nanoparticles are a useful tool in developing Traditional Herbal Medicine extracts from numerous indigenous plants that supports increased bioavailability of the active compounds in herbal products. CSA prophylactic is a catechin complex produced through the sciences of sonochemistry, ultra sound and sonocrystallization of the live *Camellia sinensis* leaf. These nanosphere catechins are produced in a bioavailable form that have addressed efficacy, metabolism, degradation, toxicity, dosage and full life and are further supported with improved cis-trans isomeric paired electrons that form a chemical bond as nucleophilic reagents in the phenolic hydroxyl groups with pyrogallol and galloyl moieties. The extract is a complex of clinically proven bioavailable eight catechins, other polyphenols, caffeine, and twenty amino acids, encased in amorphous glass shards where the nanospheres are protected indefinitely against degradation via a constant temperature and pressure within a Gibbs Free Energy Thermal dynamic system. This delivers efficient free radical scavenging by catechins reacting or combining with different molecules under appropriate conditions such as improved T cells. In conclusion the health benefits of catechins against numerous diseases are achieved through bioavailability, T-Cell activities, and protein-protein cell binding that delivers preventative and apoptosis free radical scavenging against disease infected cells.

Keywords: Chinese traditional medicine, bioavailability, nanoparticles, *Camellia sinensis*

Parallel Session 1A

Does *Croton membranaceus* as an Anti-Benign Prostatic Hyperplasia (BPH) Herbal Medicine have Parallel Mechanisms to Conventional Treatments?

Zhou, R.¹. Boye, A.² Boakye-Yiadom, M¹ Martey, ONK^{1*} Asase, A.

1. Centre for Plant Medicine Research, Mampong-Akwapim, Ghana
2. Department of Medical Laboratory Science, University of Cape Coast, Ghana

Abstract

In Ghanaian traditional medicine, *Croton membranaceus* is one of the foremost plants used for ameliorating Benign Prostatic Hyperplasia (BPH). Currently, four herbal products containing *C. membranaceus* or in combination with other medicinal plants are indicated for BPH and have been approved by the Food and Drug Authority (FDA). Despite wide usage, its specific mechanism of action remains unclear due to the paucity of research. Scientific literature reports on phytochemical isolations, preclinical and clinical observational studies may aid in the efforts to explain the mechanism of action of *C. membranaceus*. Publication search on the use of *C. membranaceus* or its isolated compounds and conventional pharmaceuticals for the management of BPH were extracted from various scientific data base including PubMed, Science Direct, Research Gate and Google Scholar and other online sources. In comparing the activities and structural congruity of isolated compounds of *C. membranaceus* to that of active pharmaceuticals: the mechanism of action by which *C. membranaceus* may mediate its anti-BPH effect is through 5 α -reductase inhibition and adrenoceptor blockade. pro-apoptotic and anti-inflammation. Thus, *C. membranaceus* may have multiple targets to BPH treatment unlike active pharmaceutical ingredients. The mechanism of action of *C. membranaceus* is therefore parallel to that of orthodox drugs including finasteride and dutasteridewhich acts as 5 α -reductase inhibitor; tamsulosin, alfuzosin and others which acts as α_1 -adrenoreceptor blockers; doxazocin which acts as pro-apoptosis. However, more research on preclinical studies of *C. membranaceus* and isolated compounds needs to be carried out to strengthen the available data on the mechanism of action as it is still inadequate.

Keywords: *Croton membranaceus*, BPH, 5 α -reductase inhibitor, apoptosis, Inflammation, alpha-receptors

Modulation of Reproductive and Metabolic Functions in Letrozole-induced Polycystic Ovarian Syndrome in Rats by the Ethanolic Extract of *Vernonia amygdalina* (Del) Leaves

Femi-Olabisi, Fehintoluwa Joy*¹ Akamo, Adio Jamiu² and Oladoye Odunayo Olowolehin³

*¹Department of Biochemistry, Mountain Top University, Ogun, Nigeria

²Department of Biochemistry, Federal University of Technology, Abeokuta, Nigeria

³Department of Biochemistry, University of Ilorin, Ilorin, Nigeria.

Abstract

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder associated with symptoms such as hyperandrogenism, amenorrhea, and polycystic ovaries. The aim of the present study was to evaluate the phytochemistry of ethanolic extract of *Vernonia amygdalina* leaf (EEVAL) and its effect on letrozole-induced PCOS in female Wistar rats. The phytochemistry of EEVAL was determined via standard methods. Twenty female Wistar rats (164.11 ± 5.35g) were randomized into 5 groups (A - E) of 4 each. Letrozole (1 mg/kg) was administered orally for a period of 21 days to induce PCOS in group B-E. The animals in group A (control) received 0.5 ml of distilled water while the PCOS rats in groups B, C, D, and E were treated with 0.5 ml of distilled water, 7.14mg/kg of metformin co-administered with 2mg/kg clomiphene citrate (CC and 50 and 100 mg/kg body weight of EEVAL respectively for 21 days. The phytochemical screening of EEVAL revealed the presence of secondary metabolites such as saponins, alkaloids, flavonoids, and coumarins. The GC-MS chromatogram of EEVAL shows that 1-Fluorooctane (CH₃(CH₂)₇F) has the highest peak with a retention time of 4.606. The trend of acyclicity in the oestrous cycle with evidence of persistent estrus phase in PCOS rats was reversed by EEVAL in a manner similar to what was observed in PCOS rats administered metformin and CC. The administration of EEVAL at 50 and 100 mg/kg B.W. to PCOS rats significantly (p<0.05) improved fasting blood sugar (FBS), total cholesterol (TC), Triglycerides (trigs), HDL-C, LDL-C, insulin, testosterone, luteinizing hormone (LH) and estradiol in the serum. The *V. amygdalina* leaves is therefore revealed to have the potential to modulate both endocrine and metabolic pathways involved in PCOS. Therefore, it can be used in the management/treatment of the reproductive and metabolic disorders related to PCOS subject to further experimental validation.

Keywords: *Vernonia amygdalina*, Letrozole, Polycystic ovarian syndrome, hormones

Bronchodilatory Potential of *Mucuna sloanei* (Fawcett & Rendle) (Leguminosae) Seeds

Anthony Hugh Cobbinah¹, Merlin L.K.Mensah², Abraham Yeboah Mensah²

¹Food and Drugs Authority (FDA)

²Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, KNUST

Abstract

Mucuna sloanei commonly called horse-bean eye or locally known as ‘ate’(Twi). The seed is dried, roasted, pulverized and either eaten raw, mixed with porridge or taken with honey in the management of asthma and other respiratory disorders. However, there is no scientific evidence to support this claim. The hydroethanolic extract of the seeds was investigating its bronchodilatory potential responsible for the anti-asthmatic activity. Animal studies involved the use of histamine induced broncho-constriction in Twenty-five (25) guinea pigs. They were grouped (n=5) and subjected to histamine challenge and the time taken in seconds, to show first sign of respiratory distress was observed as rippling spasm (PCT). They were kept in Groups A, B, C, D, E. A received 30mg/kg, B 100 mg/kg, C 300 mg/kg, D Normal Saline and E, the standard bronchodilator salbutamol, at a concentration of 0.2mg/kg body weight. The effect of the hydroethanolic extract on isolated guinea pig ileum was also studied to know the mechanism by which the extract exhibited muscle relaxant activity. The ileum was mounted in an organ bath containing Tyrode’s solution. The extract offered a maximum degree of protection of 42.29% at 300 mg/kg body weight which was comparable to protection by the standard drug salbutamol 48.06% at 0.2 mg/kg body weight. The extract showed maximal relaxation effect against histamine and acetylcholine induced contraction of 100 mg/ml. This revealed a dose dependent bronchodilator activity and antihistaminic effect of the extract. The effect by the hydroethanolic extract thus justifies its traditional use in asthma management to some extent.

Keywords: *Mucuna sloanei* seed, Bronchodilation, Anti-histaminic, Acetylcholine.

Hydroethanolic Stem Extract of *Vernonia amygdalina* Del. (Asteraceae) Suppresses Yeast Induced Pyrexia and *Plasmodium berghei* Malaria in Murine Models

Anna Kwarley Quartey¹, Yakubu Jibira², Arnold Forkuo-Donkor², Isaac Ayensu³, Adwoa Agyakoma Oduro-Kwarteng¹, Sussana Emi-Reynolds Asuamah¹ and Patience Noah¹

¹Department of Pharmaceutical Sciences, School of Pharmacy, Central University, Accra, Ghana.

²Department of Pharmacology, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana.

³Department of Pharmaceutical Chemistry, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana.

Abstract

Vernonia amygdalina has been widely utilized in Ghana and other West African states for numerous parasitic infections, diabetes and some inflammatory conditions. In this study we evaluated the antipyretic and antimalarial properties as well as *in vitro* antioxidant activities of an hydroethanolic stem bark extract of *V. amygdalina* (VAE). The antipyretic effect of VAE was assessed using Baker's yeast-induced pyrexia and the antimalarial activities of VAE against *Plasmodium berghei*-infected mice in the Peters 4-day suppressive test. The antioxidant activities of the stem bark of VAE were determined by DPPH radical scavenging and total phenol content assay. Phytochemical screening was carried out using standard methods. VAE (100-600 mg kg⁻¹) dose dependently decreased the Baker's yeast induced fever in young rats. Also, it exhibited a significant ($F(5, 24) = 91.35, P < 0.0001$) anti-plasmodial activity in the mouse model. VAE caused a percentage suppression of 81.80 ± 3.76 at 600 mg kg⁻¹ and a relative antioxidant activity in the DPPH radical scavenging assay with an IC_{50} of $146.4 \pm 2.31 \mu\text{gml}^{-1}$ and a total phenol content of $345.7 \pm 4.56 \text{ mg g}^{-1}$ of gallic acid equivalence. Preliminary phytochemical screening showed that the extract contained tannins, reducing sugars, flavonoids, terpenoids and alkaloids. *V. amygdalina* hydroethanolic stem bark extract evoked promising antipyretic, antiplasmodial and antioxidant effects.

Key words: *Vernonia amygdalina*, pyrexia, malaria, antioxidants, Baker's Yeast, *Plasmodium berghei*.

Alkaloidal Fraction of *Zanthoxylum zanthoxyloides* De-promotes Progression of CCl₄/Olive Oil-Induced Hepatocellular carcinoma-Like Phenotypes in Rats

Alex Boye^{1*}, Orleans Martey², Victor Yao Atsu Barku³

¹ Department of Medical Laboratory Science, School of Allied Health Sciences, College of Health and Allied Sciences, University of Cape Coast, Cape Coast, Ghana

² Department of Pharmacology, Center for Plant Medicine Research (CPMR), Mampong-Akuapem, Eastern Region, Ghana

³ Department of Chemistry, School of Physical Sciences, University of Cape Coast, Cape Coast, Ghana

Abstract

Zanthoxylum zanthoxyloides (*Z. zanthoxyloides*) is used in folk medicine to treat inflammatory disorders but its effect against inflammation-related cancers remains unknown. This study assessed prophylactic activity of stem and root alkaloidal extract of *Z. zanthoxyloides* (SRAEZZ) against CCl₄/olive oil-induced HCC-like phenotypes in rats. Dried stem and roots of *Z. zanthoxyloides* were initially pulverized into powder, cold macerated with 70% ethanol, filtered and concentrated using a rotary evaporator. The resultant ethanol extract was basified and extracted with chloroform to obtain SRAEZZ. A total of 36 healthy male Sprague-Dawley rats (weighing between 210 - 270 g) were randomly assigned into 6 groups (control, model, Capecitabine, and SRAEZZ [50, 100, and 200 mg/kg]) and treated for 36 days. Control group received only normal saline (5 mL/kg *po*). The remaining groups received CCl₄/olive oil (1 mL/kg *po*) in the morning and respective treatments in the afternoon on the same dosing day while model group received normal saline (5 mL/kg *po*). Food and water intake, survival rate, serum α -fetoprotein (AFP), C-reactive protein (CRP), liver enzymes (ALP, AST, ALT, Bilirubin, creatinine, urea, creatinine kinase-MB, creatinine kinase), serum electrolytes, cardiac markers, and full blood count (FBC) were measured. SRAEZZ yield was 0.58%. SRAEZZ treatment improved survival rate compared to model. AFP and CRP levels increased significantly in model group compared to control, however, SRAEZZ dose-dependently decreased CRP and AFP relative to model. SRAEZZ treatment decreased liver enzyme activity compared to model. SRAEZZ treatment improved food and water intake relative to model. SRAEZZ has prophylactic activity against CCl₄/olive oil-induced HCC-like phenotypes in rats. This finding provides a basis for further characterization of alkaloids from *Z. zanthoxyloides* as potential natural templates for development of anti-HCC natural products.

Keywords: *Zanthoxylum zanthoxyloides*, Sprague-Dawley rats, α -fetoprotein, C-reactive protein

Parallel Session 1B

***In-vitro* Antioxidant Assays and Computational Investigations of Phytoconstituents from *Theobroma cacao* Beans as Inhibitors of Neuromodulatory Enzymes**

*Shodehinde S.A.¹, Omoboyowa D.A.¹ and Balogun T.A.¹

¹Department of Biochemistry, Faculty of Science, Adekunle Ajasin University, PMB., 001, Akungba Akoko. Ondo State. Nigeria.

Abstract

Neurodegenerative disease (ND) is a heterogeneous group of disorders characterized by progressive deterioration of neuronal cells in the nervous system. As such, this study was carried out to evaluate the pharmacological potential of aqueous extract from the medicinal plant, *Theobroma cacao*, from which bioactive compounds were identified with the potential to inhibit Arginase II and Monoamine Oxidase B (MAO-B). Chemical profiling and characterization of *T. cacao* using High-Performance-Liquid-Chromatography reveal the presence of catechin, p-coumaric acid, epicatechin, gallic acid, caffeic acid, kaempferol, and ellagic acid as the common compounds in the Amazon and Amelonado type of *T. cacao*. The total phenolic content in Amelonado and Amazon were 1.42mg and 0.27mg GAE/g extract, respectively. Flavonoid content was 0.46mg in Amelonado and 0.72mg in Amazon. Antioxidant activity of the plant via DPPH radical scavenging effect shows *T. Neurodegenerative cacao* has 49.33% in Amelonado and 42.49% in Amazon. The high degree of radical scavenging effect of *T. cacao* was relatively the same in Amelonado and Amazon, which may be attributed to their high phenolic contents. To further establish the molecular mechanism of *T. cacao* antioxidant property and inhibitory mechanism against Arginase II and MAO-B. Computational techniques incorporating molecular docking, pharmacokinetics models, and molecular dynamics simulation were employed. The molecular docking results showed anti-neurodegenerative potential with Epicatechin showing the highest inhibition against MAO-B with a docking score of -11.156kcal/mol and kaempferol inhibiting Arginase II with a docking score of -7.002kcal/mol. The lead complexes (epicatechin-MAOB and Kaempferol-Arginase II) were subject to MD simulation for a period of 100ns for stability analysis. The stability shows the compounds established molecular interactions and were found to be stable. The pharmacokinetics model reveals the compound are promising therapeutic agents. Overall, bioactive compounds from *T. cacao* may be ideal phyto-drugs in the management of neurological disorders.

Keyword: Neurodegenerative disease, Amelonado, Arginase, Monoamine Oxidase, Simulation

GC/MS Composition and Resistance Modulatory Inhibitory Activities of Three Extracts of Lemongrass: Citral Modulates the Activities of Five Antibiotics at Sub-Inhibitory Concentrations on Methicillin-Resistant *Staphylococcus aureus*

Daniel E. K. Kabotso, David Neglo, Pius Kwashie, Irene A. Agbo and Daniel A. Abaye

Department of Basic Sciences, School of Basic and Biomedical Sciences, University of Health and Allied Sciences, PMB 31, Ho, VR, Ghana.

Abstract

We investigated whether the aqueous, and ethanolic extracts, and essential oil of lemongrass (*Cymbopogon citratus*) in combination with selected antibiotics—ampicillin, tetracycline, streptomycin, cefloxacin and amoxicillin exhibited antimicrobial resistance modulatory effects on methicillin-resistant *Staphylococcus aureus* (MRSA). MRSA growth inhibition zones were greatest for the lemongrass essential oil at concentrations of 1, 2, 5, 10, and 20% (w/v). The MIC for lemongrass essential oil was 0.5 mg/mL while it was 4 mg/mL for both the aqueous and ethanol extracts. Evaluation of the extracts at sub-inhibitory concentrations in combination with each of the five antibiotics for antibacterial resistance modifying activities showed that lemongrass essential oil highly potentiated the activities of amoxicillin, streptomycin and tetracycline. While the ethanolic extract enhanced the activities of tetracycline and ampicillin, the aqueous extract only increased the activity of tetracycline against MRSA. The activity of cefloxacin with the extracts was indifferent. GC-MS analysis of lemongrass essential oil showed three prominent compounds: neral, geranial and geranyl acetate constituting 94% of the composition. The compounds were also observed in the ethanolic and aqueous extracts but to a lesser extent when analyzed by HPLC-UV (λ 233 nm). Our study confirms the antibacterial properties of the extracts especially lemongrass essential oil. It also demonstrates that the essential oil potentiates the activities of three antibiotics against the biofilm-forming MRSA. The biocidal, anti-biofilm formation and antibiotic potentiating abilities, mainly attributable to citral and geranyl acetate further confirms the lemongrass as a potential source of phytochemicals, especially citral for the fight against antibiotic resistance.

Keywords: *Staphylococcus aureus*, *C. citatus*, HPLC-UV, essential oil

Response to Covid-19 Disease in Ghana: A Review of the Herbs

Nana Ama Mireku-Gyimah¹, Paul Owusu Donkor¹, Cindy Kitcher¹, Joseph Adusei Sarkodie¹, Emelia Oppong Bekoe^{1*}, Obed Kwaku Boateng¹ and Alexander Kwadwo Nyarko²

¹*Department of Pharmacognosy and Herbal Medicine, School of Pharmacy, University of Ghana, Accra, Ghana;* ²*Department of Pharmacology, School of Pharmacy, University of Ghana, Accra, Ghana*

Abstract

The majority of people living in developing countries including Ghana rely on alternative medicine for many aspects of their healthcare needs. Throughout the COVID-19 pandemic, a lot of alternative treatments have been adopted in a bid to prevent contracting – and sometimes purported to cure – the disease. In March, 2020 Ghana registered its first COVID-19 case. The cases rose steadily to 47,202 with 320 deaths by November, 2020. Ghana is however believed to have had one of the lowest death rates from COVID-19, attributed to several factors but not limited to a milder manifestation of the disease, immunological factors, cultural and environmental factors, preventive therapy, and even behavioural changes. In this review, we examined the herbs, fruits, vegetables as well as other alternative therapies that have been employed by many Ghanaians with the aim of COVID-19 disease prevention and or cure. In all, nineteen (19) medicinal herbs, two (2) mineral and vitamin supplements as well as three (3) alternative methods adopted by Ghanaians have been discussed, highlighting their antiviral activities, and/or immune boosting effects.

Keywords: COVID-19, Herbs, Preventive Therapy

Effect of Seasonal Variations on the Secondary Metabolites and Antioxidant Activities of *Bridelia ferruginea* Benth., *Lippia multiflora* Moldenke and *Azadirachta indica* A. Juss. Leaves

Juss. Leaves

Prince Kyei-Baffuor¹, Peter Atta-Adjei², Peter Bolah¹, Ebenezer Ehun¹, Christiana Opare¹, Henry Brew-Daniels¹, Alfred Ampomah Appiah¹ and Maxwell Mamfe Sakyiamah^{1*}

¹ *Phytochemistry Department, Centre for Plant Medicine Research, Mampong-Akuapem, Ghana*

² *Plant Development Department, Centre for Plant Medicine Research, Mampong-Akuapem, Ghana*

*For correspondence: msakyiamah@cpmr.org.gh

Abstract

Seasons have direct impact on the quantity and distribution of phytochemicals in medicinal plants, and subsequently on the quality and therapeutic potentials of resulting products. The aim of the study was to investigate the effect of the annual seasonal variations in Ghana on the phytochemical composition and antioxidant properties of the leaves of *Bridelia ferruginea* Benth, *Lippia multiflora* Moldenke and *Azadirachta indica* A.Juss. The medicinal plants were collected at the end of each quarter from September 2021 to June 2022, representing four seasons. The phytochemical constituents of the plant materials were screened, and quantified. TLC and FTIR profiling of the extracts were also analyzed, serving as fingerprint. Using the DPPH free radical scavenging activity, the antioxidant properties of the three plant materials harvested at the different seasons were evaluated. From the results, total phenolic content (TPC) of *B. ferruginea*, *L. multiflora* and *A. indica* leaves were all highest in season 1 and lowest in season 2. The total flavonoid, alkaloid and saponin contents in *B. ferruginea* leaves were all highest in season 4. The total flavonoid and saponin contents were highest in season 1 and season 3 respectively for *L. multiflora*, but highest in season 2 and season 4 respectively for *A. indica*. The antioxidant activity of *B. ferruginea*, *L. multiflora* and *A. indica* were strongest for samples collected in season 1, Season 3 and Season 4 respectively. All three samples collected in season 2 had the lowest antioxidant activity. The findings from the study confirms that variations in season may affect the phytochemical constituents and antioxidant activities of *B. ferruginea*, *L. multiflora* and *A. indica* leaves. Therefore, seasons should be considered in harvesting of these medicinal plant materials for the production of herbal products.

Keywords: *Bridelia ferruginea* Benth, *Lippia multiflora* Moldenke, *Azadirachta indica* A.Juss, seasonal variations and phytochemical constituents

In silico*-based Identification of some Selected Phytochemicals in *Ageratum conyzoides* Leaves as Potential Inhibitors of Crucial Proteins of *Blastomyces dermatitidis

Maxwell Mamfe Sakyamah*¹, Evans Larbi Boakye¹ and Samuel Kojo Kwofie^{2,3}

¹ Phytochemistry Department, Centre for Plant Medicine Research, P.O. Box 73 Mampong-Akuapem, Ghana

² Department of Biomedical Engineering, School of Engineering Sciences, College of Basic & Applied Sciences, University of Ghana, PMB LG 77, Legon, Accra, Ghana

³ West African Centre for Cell Biology of Infectious Pathogens, Department of Biochemistry, Cell and Molecular Biology, College of Basic and Applied Sciences, University of Ghana, Accra, Ghana

Abstract

Blastomyces dermatitidis poses health threats to humans due to the frequency of infections (Blastomycosis) and the increasing resistance to existing standard antifungal drugs. Moreover, the use of experimental *in vitro* and *in vivo* approaches in search for potent drug candidates is costly and time consuming. The aim of this study was to evaluate the pharmacological properties of some reported phytoconstituents of *Ageratum conyzoides* against key enzymes of *Blastomyces dermatitidis* using *in silico* approach. A total of twenty-nine reported bioactive compounds previously isolated from the leaves of *A. conyzoides* were selected by a literature survey and their 3D SDF structures were downloaded from PubChem database. Applying molecular docking and dynamics simulation techniques, the phytoconstituents (ligands) were docked with the binding-ligand pocket of three simulated enzymes; *Saccharomyces cerevisiae* lanosterol 14- α demethylase, Human squalene epoxidase and thymidylate synthase from *Pneumocystis carinii* using autodock 4.0 software and the poses that showed lowest binding energies were visualized using ligplot⁺. The results obtained from the docking studies of the selected phytoconstituents in *A. conyzoides* leaves showed that four out of the twenty-nine ligands (sitosterol, catechin, stigmasterol, and 5-benzamido-4-oxo-6-phenylhexanoic acid) interacted with and showed very good binding affinity towards the three crucial antifungal drug target receptors, and exhibited significant inhibition compared to the standard drugs. Therefore sitosterol, catechin, stigmasterol and 5-benzamido-4-oxo-6-phenylhexanoic acid from *A. conyzoides* leaves hold a promising potential to be explored for their antifungal activities.

Keywords: *In silico*, *Ageratum conyzoides*, phytoconstituents, *Blastomyces dermatitidis*, antifungal

Parallel Session 2A

Lung injury induced by benzo(a)pyrene : chemoprotective effect of curcumin on wistar albino rats.

Oluwakemi. Y. Kolade¹ and Temidayo .A. Oladiji²

¹Nigerian Institute for Oceanography and Marine Research P. M. B. 12729, Victoria Island, Lagos, Nigeria.

²Department Of Biochemistry, Faculty of life Sciences, University Of Ilorin, Ilorin, Kwara State.

Correspondence: kemmystick2006@gmail.com

Abstract

The study evaluated the chemoprotective effects of Curcumin against B[a]P-induced pulmonary injuries. The experimental design consisted of five treatment groups (Benzo[a]pyrene (1mg) treatment only, Benzo[a]pyrene (1mg) with 50mg Curcumin treatment, Benzo[a]pyrene(1mg) with 100mg Curcumin treatment, Benzo[a]pyrene (1mg) with 200mg Curcumin treatment and Control (i.e rats that received neither Benzo[a]pyrene nor Curcumin treatment). Rats were acclimatized for 7days before they were orally administered the varying doses of Benzo[a]pyrene and Curcumin every other day for 6weeks. After 6weeks, the rats were sacrificed. Body weights and lung weights were taken and histopathological assessment of sections of the lungs were carried out across the groups. There was significant decrease ($p>0.05$) in body weights and significant increases ($p>0.05$) in lung weights of rats treated with Benzo[a]pyrene alone as compared to control. Histopathology of lung tissues showed evidence of pathological changes in rats treated with Benzo[a]pyrene alone when compared with control and Curcumin ameliorated groups. Rats co-treated with Benzo[a]pyrene and Curcumin showed early return to normal histological architecture in their lungs. Curcumin treatment seemed to be effective in ameliorating the toxic effects of Benzo[a]pyrene on the lungs of the Wistar rats.

Keywords: Benzo[a]pyrene, Curcumin, Lungs, Toxicity, Wistar Rats

Anthelmintic, Haematological and Antioxidant Potential of *Spondias mombin* L. in Dogs

Adenubi, O.T.¹, Iwegbu, P.G.¹, Adekoya, O.A.^{1*}, Akande, F.A.², Salihu, T.³, Lawal, T.³, Rahman, S.A.⁴, Ola-Davies, O.E.⁵ and Olukunle, J.O.⁶

¹Department of Veterinary Pharmacology and Toxicology, College of Veterinary Medicine, Federal University of Agriculture, PMB 2240, Alabata, Abeokuta, Ogun State, Nigeria.

²Department of Veterinary Parasitology and Entomology, College of Veterinary Medicine, Federal University of Agriculture, PMB 2240, Alabata, Abeokuta, Ogun State, Nigeria.

³Nigeria Natural Medicine Development Agency (FMST), 9, Kofo Abayomi Street, Victoria Island, Lagos State, Nigeria.

⁴Department of Veterinary Physiology and Biochemistry, College of Veterinary Medicine, Federal University of Agriculture, PMB 2240, Alabata, Abeokuta, Ogun State, Nigeria.

⁵Department of Veterinary Physiology and Biochemistry, Faculty of Veterinary Medicine, University of Ibadan, Oyo State, Nigeria.

⁶Department of Radiation Oncology, Division of Translational Radiation Sciences, University of Maryland School of Medicine Baltimore, Maryland USA.

Abstract

Associated side effects and anthelmintic resistance to synthetic anthelmintics limit their use. This study evaluated the anthelmintic, haematological and antioxidant activities of *Spondias mombin* (SM) in dogs. In addition, phytochemical analyses and *in vitro* antioxidant assays of SM's fractions were done using standard methods. Ten Nigerian indigenous dog breed (aged 2-6 months), were equally allocated into two groups (A and B) and infected with 400 L₃/mL *Ancylostoma caninum* suspension orally and topically, two weeks after pre-treatment with 200 µg/kg ivermectin. On day 31 post infection, Group A was administered 5 mg/kg pyrantel pamoate (PP) once, while Group B was administered 500 mg/kg aqueous leaf SM extract for two days. Their physical condition, faecal egg count, body weights (BW), haematological, antioxidant and serum biochemistry were evaluated before and two weeks post treatment (PT). Data were presented as mean ± SEM, analyzed using student t-test and Chi-square, and p-value ≤ 0.05 was significant. Melanic faeces voided by dogs in both groups returned to normal colour and consistency PT, with SM comparing well with PP. There was slight decrease in WBC (8.74±4.85 to 8.37±1.78x 10³/µL), improvement in PCV (30.60±6.54 to 33.20±4.87%), serum biochemistry and antioxidant values for Group B, though not statistically significant (p = 0.2). Total cholesterol and phospholipids were significantly reduced PT in Group B (p = 0.05). Nine phytochemicals were identified in SM fractions and the plant demonstrated high free radical scavenging activity. *Spondias mombin* is an effective anthelmintic, which can be developed further in the management of canine helminthosis.

Keywords: Helminthosis, dogs, fractions, *Spondias mombin*, Nigeria

Comparative Antimicrobial Activity of *Cryptolepis sanguinolenta* Root and Aerial Part Extracts towards Repurposing the Aerial Part for Antimicrobial Product Development

Susana Oteng Mintah^{1*}, Daniel Boamah¹, Henry Hackman², Paa Kwesi Gordon¹, Dorothy Baiden², Maxwell Mamfe Sakyiamah¹, Doris Kumadoh¹, Henry Brew-Daniels¹, Peter Attah-Adjei Jnr.¹

¹ Center for Plant Medicine Research, Mampong-Akuapem, Ghana

² Science Laboratory Technology Department, Faculty of Applied Sciences, Accra Technical University, Accra, Ghana

Abstract

In Ghana, the root of *Cryptolepis sanguinolenta* is widely known and used for treating uncomplicated malaria. Also, a lot of research have confirmed its antimicrobial efficacy, with little or no such reports on other parts of the plant. Meanwhile, there is a lot of pressure on *C. sanguinolenta* root, due to its basic use as an antimalarial agent and has therefore limited its use as an antimicrobial agent. The study sought to compare the antimicrobial efficacy of the aerial part and root of *C. sanguinolenta*, towards antimicrobial product formulation from the aerial parts which are currently not effectively used in the country. The phytochemical constituents present in aerial part and root of *C. sanguinolenta* were screened and total alkaloids extracted and quantified. The agar well diffusion and broth dilution assays were used to assess and compare the antimicrobial activity of aqueous, 70% and absolute ethanol extracts, as well as extracted total alkaloids of the aerial part and root. A decoction was formulated from the aerial part and its antimicrobial efficacy compared to existing root decoction and other herbal products for treating microbial infections. Alkaloids and reducing sugars were present in both the aerial and root extracts, with 0.204% and 0.502% total alkaloids yield respectively. The mean zone of inhibition ranged from 22.3±0.47 to 9.0±0.00 for aerial part as compared to root extracts of 35.7±0.47 to 9.0±0.00; MICs for both aerial and root extracts ranged between 1.56-25 mg/mL and MLCs were 6.25 - >100 and 3.13 - >100 mg/mL for aerial and root extracts respectively. The total alkaloids extracted from both root and aerial part inhibited the growth of *C. albicans* with MIC below the texted concentration of 0.001 mg/mL (<1 µg/mL). The product formulated had comparable antimicrobial activity to other herbal products and hence can be repurposed as an antimicrobial agent to enable effective use of the aerial part of *C. sanguinolenta*.

Keywords: *Cryptolepis sanguinolenta*, Antimicrobial, Total alkaloids, Inhibition zone

Anti-malaria Effect of Standardized Ethanol Leaf Extract of *Annickia polycarpa*, (DC.) Setten and Maas ex I.M. Turner. (Annonaceae), in *Plasmodium berghei* Infested Mice

Emmanuel Kofi Kumatia^{a*}, Frederick Ayertey^a, Regina Appiah-Opong^b, Godfrey Kyaakyile Bagyour^c, Kenneth Opare Asare^d, Valentine Chi Mbatcho^c,

^aPhytochemistry Department, Centre for Plant Medicine Research, Mampong-Akwapim, Ghana.

^bClinical Pathology Department, Noguchi Memorial Institute for Medical Research, Legon, Accra, Ghana.

^cChemistry and Applied Biochemistry Department. University of Development Studies. Navrongo-Campus, Tamale. Ghana.

^dClinical Research Department, Centre for Plant Medicine Research. Mampong-Akwapim. Ghana.

Abstract

This study investigated the anti-malaria properties of the standardized leaf extract of *A. polycarpa* (APLE) in *Plasmodium berghei* infected mice. Malaria was induced by inoculating female ICR mice with 1.0×10^7 *P. berghei*-infected RBCs in 0.2 mL (i.p.) of blood. Treatment was commenced 3 days later with APLE 50, 200, 400 mg/kg p.o., Quinine 30 mg/kg i.m. (Standard drug) or sterile water (Negative control) once daily per group for 4 successive days. Hematological indices were determined in the healthy mice before infection and on day 3 and 8 after inoculation. Standardization was achieved by UHPLC-MS chemical fingerprint analysis and quantitative phytochemical tests. APLE (50 – 400 mg/kg p.o.) standardized to its total alkaloids, phenolics and saponin contents, produced significant ($P < 0.05$) dose-dependent clearance of hyperparasitemia of $22.78 \pm 0.93\%$ with the minimum parasitemia level of $2.01 \pm 0.25\%$ at 400 mg/kg p.o. on day 8, anti-malaria activity of 89.22 – 95.50%, inverse dose-dependently promotes weight gain ($P < 0.05$ at 50 mg/kg p.o.) and 100% survival of malaria infested at 400 mg/kg p.o. Quinine 30 mg/kg i.m. achieved a minimum parasitemia level of $6.15 \pm 0.92\%$, 86.22% anti-malaria activity and 100% survival of the mice but did not promote ($P > 0.05$) weight gain. Hematological studies revealed the development of leukocytopenia, erythrocytosis, microcytic anemia and thrombocytopenia in the malaria infected mice which were reverted with the treatment of APLE 50 – 400 mg/kg p.o. or Quinine 30 mg/kg i.m. The UHPLC-MS fingerprint analysis of APLE led to identification of one oxoaporphine and two aporphine alkaloids (1 – 3). These results indicate that APLE possessed significant anti-malaria, immunomodulatory, erythropoietic and hematinic actions against malaria infection. APLE could therefore, be explored for the treatment of malaria.

Keywords: Malaria, *Annickia polycarpa*, Anemia, hematology, alkaloid, standardization of medicinal plant extracts.

Antimicrobial Potential of Extract from a *Pseudomonas aeruginosa* Isolate.

Francis Kwaku Dzideh Amankwah¹, Stephen Yao Gbedema², Yaw Duah Boakye², Marcel Tunkumgen Bayor², Vivian Etsiapah Boama²

¹Department of Pharmaceutics, School of Pharmacy and Pharmaceutical Sciences, UDS Tamale.

²Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, KNUST Kumasi.

Abstract

Microorganisms are one of the main sources of antimicrobial agents and over 50% of antibiotics currently used in hospitals are metabolites from microbes. This study aimed to isolate microorganisms from the Dompooase landfill site, Kwame Nkrumah University Physics Garden, Kosiko River, and Ada Foah seashore of Ghana and screen their metabolites for antimicrobial activity. Forty-eight (48) microorganisms were isolated and their metabolites were screened against *Staphylococcus aureus*, *Enterococcus faecalis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Vibrio cholerae*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Streptococcus pyogenes*, *Proteus mirabilis*, and *Candida albicans* using the agar well diffusion method. Ten (10) of the isolates exhibited antimicrobial activity. Isolate DO5, identified as *P. aeruginosa* isolate, from the Dompooase landfill site was selected for fermentation because it exhibited the highest activity against all the test organisms. DO5 produced optimum antimicrobial activity when fermented for 11 days at 30°C. In the agar diffusion method, the extract of isolate DO5 recorded zones of inhibition ranging between 11.67 ± 0.23 and 21.50 ± 0.71 mm. The MIC and MBC recorded for the DO5 extract ranged from 3.13–25.0 mg/mL and from 6.25–50.0 mg/mL, respectively. Column chromatography analysis yielded eight (8) subfractions from the DO5 extract. IR analysis revealed the presence of functional groups such as alcohols, esters, and hydrocarbons in the fractions. GC-MS analysis identified nine compounds that have been reported to have antimicrobial agents. The DO5 metabolites stand the chance to be developed into potent antibiotics for infection treatment.

Keyword: *Pseudomonas aeruginosa*, *Salmonella typhi*, antimicrobial, IR analysis

Parallel Session 2B

Spatio-temporal Dynamics; Monitoring Vegetation, a Medicinal Plant Conservation Strategy

Peter Atta-Adjei Junior¹ and Allotey Albert Nii Moe²

¹Centre for Plant Medicine Research, P. O. Box 73, Mampong Akuapem, Ghana.

²Institute for Scientific & Technological Information, Council for Scientific & Industrial Research, P.O. Box CT-2211 Cantonments, Accra, Ghana.

Abstract

Anthropogenic activities have resulted in spatio-temporal dynamics of landcover and climate change, directly and indirectly negatively impacting vegetation cover and hence medicinal plants. The Shai-Osudoku district which is enriched with a wide range of medicinal plants species spanning from forest to savannah species was studied to ascertain the rate of landuse/landcover change over the past two decades. Using mango plantations as a model, a survey was conducted to verify spatio-temporal dynamics on mango farming in Shai-Osudoku district and images were downloaded from the internet (United States Geological Survey/Global Land Cover Facility) to cross-check survey results. The survey data were analyzed using IBM SPSS 20 and images downloaded were classified using first, ISODATA algorithm with 25 classes and later knowledge-based supervised classification. The results indicated that land use/land cover change has occurred, most of the farmers were between the ages of 20 to 80 but had few years of experience in mango production (43%), 51.7% had lived in the area for 30 years, 71.7% stated commercial cultivation as the main driving factor for change in lands use/landcover change. The results showed that areas of ‘waterbody’ and mango plantation increased by 35.62% and 72.14% respectively as ‘vegetation and ‘built-up’ decreased by 35.20% and 39.55%. Farmers agreed their standard of living became better at the advent of mango production and the prices or marketing of mango was not affected by Spatio-temporal dynamics but were ignorant about the long-term economic effects of their activities on the increasing depletion population of some medicinal plant species. The results warrant further investigation into the increased areas of waterbodies in the districts and its implication on medicinal plants population and the environment as a whole.

Keywords: Spatio-temporal dynamics; Commercial cultivation; Medicinal plants; Depletion population

Ethnobotanical Features of Plant Species used for Formulation of Herbal Products against Liver Diseases in Ghana; A Field Survey and Review.

Dongsogo Julius¹, Larbie Christopher², Idrissu Abdul Mumeen³, Abera Ataanya Daniel⁴, Daniel Turriso⁵

1. Department of Biochemistry and Molecular Biology, Faculty of Biosciences, University for Development Studies, Ghana.

2. Department of Biochemistry and Biotechnology, Faculty of Biosciences, Kwame Nkrumah University of Science and Technology, Ghana. E-mail: elarbie@gmail.com

3. Department of Biochemistry and Molecular Biology, Faculty of Biosciences, University for Development Studies, Ghana. E-mail: iabdulmumeen@uds.edu.gh.

4. Department of Medical Laboratory Technology, Kumasi Technical University, Ghana. E-mail: aberadaniel@rocketmail.com

5. Laboratory Department, Tamale Teaching Hospital, Ghana. E-mail: tuudan2010@gmail.com

Abstract

Hepatic disorders are conditions that affect the structure or function of the human liver. Causes include microbes and their toxins, ionizing radiations and abuse of drugs. Medicinal plant products have been an alternative for the management of these diseases due to the expensive, unavailability and harmful side effects of pharmaceutical drugs. The aim of this study was to determine whether plant species used in preparing herbal medicinal products for treatment of liver diseases have reported hepatoprotective activity. An ethnobotanical survey was conducted using information from television, radio, market vans to identify the medicines and purchased them from the herbal shops. The plant species and parts used in manufacturing were extracted from the manufacturer's guidelines and the Traditional and Alternative Medicine Council log book. A search was conducted on google scholar, PubMed, Elsevier databases on hepatoprotection activity of the plant species. In all, 56 plants species were used by 20 manufacturing companies in producing 25 herbal medicinal products. *Khaya senegalensis* was the most predominant plant species used 9/25 (36.0%) products whereas leaves 40/56 (71.4%) of plant species was the most prevalent part used. Leaves and roots were the most frequently combined parts 11/25 (44%) in a herbal product. On databases, 41/56 (73.2%) plant species had hepatoprotective activity while 15 (26.8%) had no data for hepatoprotective activity. *Cratagus oxyacantha* was the plant species with most parts reported parts (7 different parts) while *Moringa oleifera* was most extracted (7 different solvents) and most tested against hepatotoxicity induced with 20 different toxicants. There is sufficient scientific data on hepatotoxicity activity of plant species and Practitioners use literature databases for selection of their raw plant materials.

Keywords: Field survey, hepatic disorder, *Khaya senegalensis*, herbal medicinal products

Effects of climate change on potential geographic distributions of some African medicinal plants

Alex Asase^a Daniel Jiménez-García^b, A. Townsend Peterson^c

^aCentre for Plant Medicine Research, P. O. Box 73, Mampong-Akuapem, Ghana

^bCentro de Agroecología y Ambiente, Instituto de Ciencias, Benemérita Universidad Autónoma de Puebla, Puebla, Puebla, México ^cBiodiversity Institute, University of Kansas, Lawrence, Kansas, USA

Abstract

Although climate change is projected to have significant impacts on medicinal plant distribution and populations the likely effects of climate change on geographic distributions of many African medicinal plants have not seen detailed analysis. We investigated the anticipated climate change effects on the geographic distributions of four commonly used African medicinal plants (*Alstonia boonei*, *Garcinia afzeli*, *Khaya ivorensis*, and *Khaya senegalensis*). We characterized the potential geographic distribution of these species using primary biodiversity data records from GBIF and interpolated climate data from the WorldClim archive. Modelled present-day suitability for *A. boonei* was lower at the northern and southern extremes of the species' known geographic distribution, whereas broader areas in the eastern half of the species' distribution were identified as suitable. The modelled present-day distribution generally showed more suitable habitats in the south-eastern parts of the known distribution for *G. afzeli* and *K. ivorensis* whereas that of *K. senegalensis* was similar to its known distribution. Future potential geographic distributions for *A. boonei* were similar to present-day distributional patterns such that in the face of changing climate, the geographic distribution of *A. boonei* is likely to remain largely stable. However, our results showed drastic range reductions and shifts, and only modest gains for *G. afzeli*, *K. ivorensis*, and *K. senegalensis* under future climate change. This study serves as an example of how ecological niche modeling can be used to evaluate probable effects of future climate change on invaluable natural medicinal resources, implications for healthcare, livelihoods, and conservation practice.

Keywords: climate change, geographical distributions, *Khaya. Senegalensis*, biodiversity

Plants Used for the Treatment of Skin Diseases by some Herbalists in Ghana

Asafo-Agyei Tonny^a, Seyiram Kumordzie^a and Alex Asase^b

^aPlant Development Department, Centre for Plant Medicine Research, Ghana

^bDepartment of Plant and Environmental Biology, School of Biological Sciences, University of Ghana.

Abstract

The use of medicinal plants for the treatment of diseases including skin diseases is a common practice in Ghanaian traditional medicine. The objective of this study is to document traditional knowledge of medicinal plants used for the treatment of skin diseases through ethno-botanical studies to enhance the search for new sources of drugs. The study was carried out in 2021 at the Centre for Plant Medicine Research (CPMR) among 30 registered herbalists of the Traditional herbalists Association of Ghana (THAG) which is a branch of the Ghana Federation of Traditional and Alternative Medicine (GHAFTRAM). Data was collected based on oral interview with each of the 30 herbalists using a well-structured questionnaire. Only data from willing herbalists were documented after obtaining their consent to participate in the study. 24 different plant species belonging to 17 families and 24 genera were identified as being used by THAG herbalists in treating skin diseases. Among the various plant parts used, the leaves were the most reported (67%) followed by seeds (11%) and fruits (8%). The plant parts used was mostly dried, grounded into powder and made into a paste. Most of them administered their herbal remedies externally by smearing on the body and also by applying on the affected area twice daily. Majority of the herbalists collected species from their home gardens (38.2%) and their farms (20.6%). Major threats to the continuous availability of medicinal plant species as indicated by the respondents included: bushfires (39%), farming activities (30%), over-harvesting (14%), excessive application of weedicides (22%) and over-harvesting (9%). The results of the study suggest that medicinal plant species especially those for the treatment of skin diseases need to be conserved and sustainably harvested to preserve plant wealth in Ghana.

Keywords: Herbalist, Skin disease, Traditional knowledge, Medicinal plants

COA Mixture in Literature: Gathering Evidence In Support Of General Wellbeing

C.M Agbale, F.O Brenya, P.J Agyiadu, I Baidoo, E.H Donkoh, S.A Duncan

Centre of Awareness Research and Manufacturing Company Limited (COA RMCL)

Abstract

COA Mixture® (formerly COA-FS) is a highly popular herbal medicine registered by the Food and Drugs Authority of Ghana and indicated for general wellbeing. The drug is produced from the leaves of *Azadirachta indica*, *Ocimum viride*, *Spondias mombin*, *Vernonia amygdalina*, *Persea americana*, and *Carica papaya* through a novel biotransformation process which exploits the biosynthetic activity of endogenous microflora and enzymes associated with these materials. We discuss the findings of work published in peer reviewed journals to show the diverse role of COA Mixture® in the treatment/management of several conditions including viral infection and malignancies. Toxicological reports indicate that COA Mixture® is neither hepatotoxic nor nephrotoxic. Gas chromatography-mass spectroscopy-aided phytochemical screening revealed that COA Mixture® contains over 160 bioactive compounds including triterpenes, short chain fatty acids, esters and organic acids. Some of these bioactive compounds have been confirmed by *in silico* screening to act as natural inhibitors of proteases and secreted glycoprotein of HIV and Ebola viruses respectively. The potential antiviral activity has been confirmed by retrospective studies conducted on clinical data on HIV and Hepatitis B infected individuals. We also provide evidence based on *in vitro* studies to show that COA Mixture® displays potent activity against breast, blood and prostate cancer cell lines. In addition to providing a scientific basis to support the indication of general wellbeing, these findings show that COA Mixture® can be used to complement orthodox medicine in the management of many chronic conditions.

Keywords: COA Mixture, protease inhibitors, secreted glycoproteins, triterpenes, *Spondias mombin*

Assessment of Medicinal Plants used among Idoma Inhabitants during SARS-Cov-2 Pandemic in Nigeria

Agboola OO^{1,2*}, Olowoyo JO², Okopi JO³, Unazi EI⁴ and Ijimbili SB¹

¹Department of Biological Sciences, Federal University Health Sciences Otukpo, Benue State, Nigeria.

²Department of Biology and Environmental Sciences, Sefako Makgatho Health Sciences University, Pretoria, P.O.Box 139, Medunsa, 0204.

³Department of Microbiology, Federal University Health Otukpo, Benue State, Nigeria.

⁴Registry Department, Federal University Health Sciences Otukpo, Benue State, Nigeria.

Abstract

The use of medicinal plants in Africa has been in existence since the creation of man and has increased rapidly with the spread of SARS-COV-2 pandemic. Web-based survey was used to collect primary data related to the usage of medicinal plants during SARS-COV-2 by 590 respondents from different households in Idoma, Benue State. Relative frequencies of usage were evaluated for the documented medicinal plants. The relationship between the information sources people follow and the respondent characteristics was assessed using chi-square test. The study revealed that the use of medicinal plants has increased during SARS-COV-2 and most of the respondents recommended medicinal plants to prevent SARS-COV-2. This study recorded a total of 83 plants commonly used by the participants belonging to 44 families. The plant leaves were the most frequently used part (40.38 %) and most of the people (60.34%) obtained medicinal plants from retail stores. Based on the relative frequency of usage, the most frequently used medicinal plants were ginger (81.86%), lemon (63.39%), turmeric (58.31%) and garlic (54.36%). Many households indicated that they used medicinal plants during the SARS-COV-2 pandemic period with the belief that they could prevent or cure SARS-COV-2. We recommend further investigation into the validity of these medicinal plants.

Keywords: Leaves, Markets, Medicinal Plants, Ginger, Frequency of Citations

Day 3 Plenary Session

Revisiting the Dependence on Indigenous Plant Resources to Inform Interventions for the SARS-COV-2 Pandemic

Sonia Peter

Executive Director, Biocultural Education and Research Programme, 59 Meadowvale, St. James, Barbados.

Abstract

Over the period of the Atlantic Slave Trade, it is documented that approximately 12.5 million men, women and children were forcibly transported from Africa, with an estimated 85 % landing in the Americas. Barbados was the most easterly of the islands in the Caribbean archipelago and became a key site of the economic activity associated with the use of forced labour for sugar cane production. The Caribbean received a population of West Africans, whose traditions continue to permeate our culture. The horrific Middle Passage saw the ancestors arriving in a poor state of health which was further exacerbated by the inhumane working and living conditions. West African biocultural traditions would have been vital for the resilience of the enslaved population in Barbados during the 17th to early 19th centuries. Historians report that a ‘Slave Medicine’ emerged based on the knowledge of healing plants and traditional practice. Common illnesses, due to lack of proper nutrition and harsh working conditions, included skin lesions, convulsions, beriberi, pellagra, and kwashiorkor. Of the 60 plants featured in the Slave Medicine Pharmacopoeia, wound healing plants belonged to families including Euphorbiaceae (*Croton flavens*), Asteraceae (*Chromolaena odorata*), Lamiaceae (*Ocimum campechianum*) and Peperomiaceae (*Peperomia magniliifolia*). Natural products from these plants, including flavonoids, are implicated in the anti-inflammatory response that promotes healing. In the modern application of the traditional knowledge that has been passed on through time, plants used to promote healing as vulneraries are now used for respiratory symptoms of colds and flu. Preliminary screening of selected plants belonging to the Lamiaceae family, involving structure elucidation and computer modelling of compounds, demonstrated the potential of flavonoids for hindering the SARS-COV-2 virus based on functional group interactions.

Keywords: Traditional knowledge, Wound healing, Anti-inflammatory response, Flavonoids, SARS-COV-2

The antiviral effect of Ghanaian Herbal Extracts and Isolated Compounds on SARS-CoV-2

Sylvester Kaminta^{1,4*}, Prince Peter Wormenor¹, James Odame Aboagye^{1,6}, Araba Abaidoo-Myles^{1,3}, Christopher Zaab-Yen Abana^{1,3}, Anthony Twumasi Boateng^{1,3}, Character Forfoe¹, Prince Adom Nartey¹, Charlotte Borteley Bortey¹, Dzidzor Attah¹, Kofi Donkor⁴, Helena Lamptey², Evelyn Yayra Bonney¹, George Boateng Kyei^{1,5,6}

¹Department of Virology, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana

²Department of Immunology, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana

³West African Centre for Cell Biology of Infectious Pathogens (WACCBIP), University of Ghana

⁴Department of Microbiology, Centre for Plant Medicine Research, Mampong-Akuapem

⁵Department of Medicine, Washington University School of Medicine in St Louis, MO, USA

⁶Medical and Scientific Research Directorate (MSRC), University of Ghana Medical Centre (UGMC) Limited

Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), causes the coronavirus disease 2019 (COVID-19), and threatens human health and public safety. Available SARS-CoV-2 vaccines reduce disease severity; however, effective drugs against SARS-CoV-2 infection are lacking. Since antiquity, medicinal plants have been used to prevent and/or treat infectious diseases. In Ghana, claims of herbal plants' curative, preventative, and immune-boosting potentials against COVID-19 were reported but with limited scientific data. We, therefore, screened 11 herbal extracts and 7 isolated compounds for their ability to inhibit SARS-CoV-2 replication *in vitro*. Vero TMPRSS2 cells propagated in Dulbecco's Minimum Essential Medium containing 10% Fetal Bovine Serum, 1% L-Glutamine, sodium pyruvate and penicillin-streptomycin were infected with SARS-CoV-2. The MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide) assay was used to determine cytotoxicity levels of the test products, and TCID₅₀ of virus isolate was determined. Test products were then added in varying dilutions to SARS-Cov-2 infected cells and incubated for 72h at 37°C with 5% CO₂, alongside cell and virus controls. To determine virus inhibition, the culture supernatant was harvested for RNA extraction and RT-qPCR analysis in duplicates. The neutralization effect was assessed via crystal violet staining of infected cells in triplicates. Six extracts (CPM01, CPM02, CVD2, Y1, MABP+, MACP+, and MAFP+) and 2 compounds (C3 and C4) showed inhibition of virus replication with a 2-6 log reduction in viral copies. The highest inhibitory activity of 6 log reduction was observed with MACP+, and CPM01 neutralized SARS-CoV-2 at titre 1:512. Our study provides evidence of antiviral activity of herbal extracts against SARS-CoV-2.

Keywords: SARS-CoV-2, antiviral, herbal extract, neutralization, inhibition, *in vitro*, cytotoxicity

Preliminary Safety Evaluation of Immunim Used as an Immune Booster

O. Quasie, S. Antwi, O. Martey, J. Yeboah, K. Donkor, A. Asase

Center for Plant Medicine Research, Mampong Akuapem, Ghana.

Abstract

Immunim is a tincture prepared from the leaves of *Azadirachta indica* A. Juss. used as an immune booster prepared (Neem). It has been observed that one way of fighting Covid-19 is to have a robust immune system, hence, the prospect for Immunim in the fight against Covid-19. This study evaluates the safety of Immunim as a new herbal product at the Centre for Plant Medicine Research. The mean lethal dose (LD_{50}) was accessed after a single oral administration of 5000 mg/kg. A daily oral administration of Immunim for a period of 6 months was evaluated for its chronic toxicity at the therapeutic dose (0.8 mg/kg), ten times the therapeutic dose (8 mg/kg) and hundred times the therapeutic dose (80 mg/kg). The health of the animals was monitored by their weekly body weight. The serum biochemical, hematological and urine indices were determined following daily oral administration over 6 months period. The effect of Immunim on CYP450-drug metabolizing enzymes were determined by the Pentobarbital-induced sleeping time at the termination of the study. The LD_{50} was observed to be greater than 5000 mg/kg. There was no significant difference in the growth rate ($P > 0.05$) of the rats. There was no significant difference ($P > 0.05$) between the test groups and the controls in urine and hematological parameters determined. The mean organ weights of the treated animals did not show significant difference when compared to the control groups. There appeared to be no significant difference ($P > 0.05$) in the Pentobarbital induced sleeping time of the Immunim treated groups compared to the control group. Immunim may therefore be safe when administered to laboratory.

Keywords: *Azadirachta indica*, Immunim, Immune booster, Covid-19

An Observational Study on the use of Nibima and Immunim, two Ghanaian Herbal Medicines in the Management of Mild COVID-19

Mavis Boakye-Yiadom¹, David Offei Abrokwa¹, Samuel Anang Darko¹, Ekuwa Baisiwa Wilson¹, Ronald Yeboah¹, Emmanuel Tamakloe¹.

¹*Clinical Research Department, Centre for Plant Medicine Research, Mampong-Akuapem, Ghana*

Abstract:

Coronavirus Disease 2019 (COVID-19) is caused by an infection from “severe acute respiratory syndrome coronavirus-2 virus” (SARS-CoV-2). It can lead to multiple organ distress syndrome (MODS), resulting in high morbidity and mortality in extreme cases. Among the interventions used in the management of COVID-19, drug repurposing has been the key. However, research scientists need to shift their focus on plant medicines with antiviral properties. Hence, Clinical studies of medicinal plants in fighting COVID-19 is an area of research, scientists worldwide need to focus. The study aimed to assess the treatment of mild COVID-19 with a combination of two herbal medications: Nibima and Immunim. An observational study on patients diagnosed of COVID-19 using a SARS-CoV-2 Antigen test was carried out at the Clinic of the Centre for Plant Medicine Research (CPMR), Mampong –Akuapem from December 12, 2021 to July 8, 2022. An herbal treatment plan of Nibima and Immunim, was administered at doses of 60 ml three times daily and 5 ml daily respectively for either 7 days or 14 days. Patients were followed up on Day 7 and/or day 14. Thirty-nine (39) patients comprising 23(58.97%) females and 16 males (41.03%) with a mean age of 41 years who consented to be part of the study were recruited. 8 (21%) participants were lost on follow up with 31(79%) completing the study. SARS- CoV-2 Ag negative results were observed for 28 (90%) participants within 1 week and 3(10%) within 2 weeks. The results in the treatment of COVID-19 suggests that the herbal combination therapy may be effective in the management of COVID-19.

Keywords: COVID-19, Immunim, Nibima, Observational study, Morbidity, Herbal medication

Parallel Session 3A

Levels of Microbial, Heavy Metals, Essential Ions and Organochlorides in Herbal Medicines and Plant Species used for Hepatic Diseases in Ghana.

Dongsogo Julius¹, Larbie Christopher², Idrissu Abdul Mumeen³, Abera Ataanya Daniel⁴, Daniel Turriso⁵

1. Department of Biochemistry and Molecular Biology, Faculty of Biosciences, University for Development Studies, Tamale, Ghana.
2. Department of Biochemistry and Biotechnology, Faculty of Biosciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. E-mail: elarbie@gmail.com
3. Department of Biochemistry, Faculty of Biosciences, University for Development Studies, Tamale, Ghana. E-mail: amumeen@uds.edu.gh.
4. Department of Medical Laboratory Technology, Kumasi Technical University, Kumasi, Ghana. E-mail: aberadaniel@rocketmail.com
5. Laboratory Department, Tamale Teaching Hospital, Tamale, Ghana. E-mail: tuudan2010@gmail.com

Abstract

Herbal medicines are raw or processed plant parts used singly or in combination for management of diseases. Hepatic or liver diseases are among the top ten causes of mortalities in Sub-Saharan African. Herbal medicines have been the primary option for the treatment of liver illnesses because of their cost, safety, availability and less side effects. Inappropriate sourcing of raw plant materials, non-adherence to good manufacturing practices and climate-induced endogenous toxins biosynthesis have resulted in the contamination of herbal products with pathogens and toxins which aggravate liver diseases or induce liver injury. The liver also requires the essential ions calcium and magnesium for catalytic activities. The objective of the study was to determine the levels of pathogenic bacteria, heavy metals, essential ions and organochlorides in common medicinal plants and their medicines. In all, 10 Food and Drugs Authority approved herbal drugs meant for liver diseases were purchased from herbal shops, clinics and practitioners in Tamale, Bolga, Lawra and Ashaiman. Plant species and parts used in manufacturing the medicines were compiled. A database search was conducted on google scholar and PubMed and 10 plant species with hepatoprotective activity selected. The plants were sourced from Parks and Gardens, Tamale and aqueous extraction done. pH, total dissolve solids (TDS), Cadmium (Cd), lead (Pb), Magnesium (Mg), Calcium (Ca), organochlorides, microbial culture and sensitivity were determined. There was no bacteria growth in the plant extracts however, *Klebsiella* species were isolated from 4/10 (40%) of herbal products and were resistant to trimethoxyprinem/sulfohyoxazole. Only two medicine samples were above the WHO recommended level for cadmium and lead. There was no significance of difference between the plant and medicines levels of these analytes except pH ($p=0.032$). Though these analytes levels were within safe and acceptable limits for human consumption, good manufacturing practices including shelving be adhered to avoid contamination.

Keywords: Herbal medicines, Liver diseases, Pathogenic bacteria, Hepatoprotective activity

Chronic Toxicity Evaluation of COA, an Herbal Preparation used for the Management of HIV/AIDS, Hepatitis, Cancer and Blood Related Diseases

Kofi Donkor, Orleans Martey, Steven Antwi, Olga Quasie

Department of Pharmacology/Toxicology, Centre for Plant Medicine Research, Mampong-Akuapem

Abstract

The safety of COA, an herbal medicine used for the management of HIV/AIDS, hepatitis, cancer, and blood related diseases was investigated in male Sprague-Dawley rats (SDRs). A chronic toxicity study (daily oral administration for six months) of COA was evaluated at the therapeutic (TP) dose (0.28 mg/kg), ten times the TP dose (2.8 mg/kg) and twenty times the TP dose (5.6 mg/kg). Growth rate together with serum biochemical, haematological and urine indices were determined following daily oral administration for a six-month period. Pentobarbital-induced sleeping time and histopathological analyses were determined at the termination of the study. The results showed significant reduction ($P < 0.05$) in body weight of COA-treated (0.28 mg/kg and 2.8 mg/kg) animals compared to control. The mean organ wet weights of the treated animals did not show significant differences ($p > 0.05$) when compared to control animals. There were no significant differences ($P > 0.05$) between the test groups and control in urine and biochemical parameters determined. However, there were significant reduction ($p < 0.05$) in white blood cells (WBC's), and lymphocytes at 2.8 mg/kg and 5.6 mg/kg doses of COA-treated rats, compared to controls. A significantly high ($p < 0.05$) MCV at the 5.6mg/kg dose was also observed. The findings of the clinical chemistry and urine parameters correspond to the histopathological findings with no significant morphological changes in the liver, kidneys, lungs and the heart indicating the absence of microscopic damage to the cells of these organs. There was an insignificant decrease ($(P > 0.05)$) in the pentobarbital-induced sleeping time of COA-treated animals compared to controls. COA may not cause deleterious effects upon prolonged administration at the therapeutic dose.

Keywords: COA, HIV/AIDS, Hepatitis, Chronic toxicity, Histopathological, Kidney

Effect of Aqueous Extract of *Cryptolepis sanguinolenta* Administration on the Metabolism of Chloroquine via Cytochrome P450 Isozymes

Maxwell Mamfe Sakyamah, Archibald Ayitey Sittie, Jonathan Adjimani and Augustine Ocloo
Centre for Plant Medicine Research, P.O. Box 73, Mampong-Akuapem, E/R, Ghana

Abstract

Concurrent administration of herbal medicines and conventional drugs is a common practice globally, especially as the patronage of medicinal plants increases across the world. Furthermore, in the era of the CoVID-19 pandemic where self-medication to relieve or prevent the disease is not uncommon, the tendency of concurrent administration of herbal medicines and drugs, touted to have activity against the virus, is high. The aim of this study was to determine the effect of *Cryptolepis sanguinolenta* administration on the metabolism of chloroquine by evaluating specific Cytochrome P450 isozymes. Reconstituted freeze dried *Cryptolepis sanguinolenta* was administered to male Sprague-Dawley rats in drinking water for 2 weeks at a dose of 36mg/kg, followed by a single dose of chloroquine (15mg/kg). All the animals were sacrificed by cervical dislocation after 24 h of final drug administration and liver was excised for hepatic microsomes preparation. Using the microsomes, the PNPH, AmD and NOD activities were determined as a measure of CYP2E1, CYP2B1 and CYP1A activities, respectively. The study showed that concurrent administration of chloroquine and *Cryptolepis sanguinolenta* impaired CYP-mediated metabolism of chloroquine due to competitive inhibition of CYP2B1 by *C. sanguinolenta*. However, *C. sanguinolenta* showed no significant effect on CYP2E1 and CYP1A. Patients should be advised on the clinical consequence of concurrent administering *Cryptolepis sanguinolenta*-based herbal products and chloroquine.

Keywords: Concurrent administration, Chloroquine, *Cryptolepis sanguinolenta*, Cytochrome P450 isozymes, Metabolism

Mycological Safety of Six Powdered Herbal Medicinal Products Sold on the Local Market in Ghana

M. A. Appenteng, I. Ampaw and G. T. Odamtten

Centre for Plant Medicine Research, Mampong-Akuapem, Ghana.

Abstract

The concerns about the safety of herbal medicinal products which have high propensity of fungal contamination during harvesting, processing, storage and marketing and the attendant risk of mycotoxins contamination especially with aflatoxins, necessitated a study into mycological profile of six liquid herbal medicinal products (*TO*, *AS*, *NB*, *MB*, *SO* and *ET*) sold on the local markets in Ghana. The conventional decimal serial dilution technique was employed using four mycological media; Dichloran Rose Bengal Chloramphenicol (DRBC) agar, Dichloran 18 % Glycerol (DG 18) agar, Potato Dextrose Agar (PDA) and Oxytetracycline Glucose Yeast (OGYE) for the enumeration of the resident mycoflora. Cultural, microscopic and morphological characteristics were used together with appropriate keys for the isolation and identification of the fungal species. Endogenous enzyme activity and aflatoxins production were determined by API-ZYM System (Bio Mérieux, Marcy-Etoile, France) and HPLC respectively. The results revealed a total of seventeen (17) fungal species belonging to five (5) genera (*Aspergillus*, *Cladosporium*, *Mucor*, *Penicillium*, *Rhodotorula*) and other yeasts and *Mycelia sterilia* present in the six herbal medicinal products. The fungal populations in the products ranged between 4.42 log₁₀ cfu/g in *NB* on OGYE to 6.93 log₁₀ cfu/g in *MB* on DRBC. High endogenous enzyme activities were found in all the products. Aflatoxin B₁ (6.52 µg/kg) was found in *NB*. The conclusion drawn was that, mycological safety of the products left much to be desired and that their improvement through proper harvesting of plant raw material, processing, storage and marketing was needed to enhance the products quality. It was recommended that a policy regulating mycological safety of herbal medicines in Ghana should be strengthened.

Keywords: Mycological safety, Fungal contaminants, *Yeasts* and *Mycelia sterilia*

Protection by Naringenin against Cobalt-induced Gastro-toxicity in Rats: The Roles of H⁺K⁺-ATPase Pump Activity and iNOS Expression.

Salami AT¹, Oyagbemi AA², Olaoye MO¹, Orji J, Olaleye SB¹.

¹Gastrointestinal Secretion and Inflammation Research Unit,

Faculty of Basic Medical Sciences, Department of Physiology, University of Ibadan, Ibadan.

² Cardiorenal Laboratory, Department of Veterinary Physiology and Biochemistry

Faculty of Veterinary Medicine, University of Ibadan, Ibadan.

Abstract

In previous studies, high doses of Cobalt were reported to potentiate gastrointestinal secretion and ulceration. In the present study, the protective ability of Naringenin (NAR), a known chelate with anti-inflammatory principles, on Cobalt Chloride (CoCl₂)-induced gastric dysfunction in rats was evaluated. Forty-eight male Wistar rats (weight) were divided into 8 groups of six animals each; Groups A, B (150, 300 mg/kg CoCl₂), C, D (doses of CoCl₂ + 50 mg/kg Naringenin), E-50mg/kg Naringenin (NAR), F- CIME - 40mg/kg; G- Ulcer untreated (Un), H- Control (Con). Animals were pretreated for 8 days after which ulcer was induced via pyloric ligation and thereafter sacrificed. Stomach was carefully excised, gastric effluence and tissue were collected for gastric juice acidity, biochemical assays, histology and immunohistochemistry. Data were expressed as Mean ± SEM and analyzed using one-way ANOVA, p<0.05 was significant. Gastric nitric oxide and H⁺K⁺-ATPase activity significantly increased while mucin, gastric mucosal, submucosa and muscularis length reduced in CoCl₂ dose dependently compared with Un. Cobalt co-administered with NAR significantly decreased gastric acid secretion, concentration and acidity, ulcer index, parietal cell count, H⁺K⁺-ATPase activity, and lipid peroxidation compared with Un. However, CoCl₂+NAR significantly increased gastric nitric oxide, mucin, mucous cell count, carbonyl, sulfhydryl level, pepsin activity, gastric mucosal, submucosal and muscularis length as well as iNOS immunoreactivity compared with Un. Naringenin co-administration ameliorates cobalt toxicity and ulceration probably through reduced gastric H⁺K⁺-ATPase pump activities, but increased iNOS expressions. The reduced toxicity was evident in the activity of pepsin in Naringenin co-administration with cobalt.

Keywords: Naringenin, Cobalt, Gastric ulcer, H⁺K⁺-ATPase activity, pepsin activity, iNOS immunoreactivity.

Parallel Session 3B

Retrospective Case Series Using Traditional Medicine to Treat Recurrent Urinary Tract Infections

F. Afua Bromley

MSOM, L.Ac., NCCAOM (USA)

Abstract

Globally, 50-60% of all women will have a urinary tract infection in their lifetime. Of those, almost one-third will have a recurrence within six months despite antibiotic use, creating a significant physical burden to women and increasing the risk of more serious illness and antibiotic resistance. This paper briefly reviews the current literature on clinical presentation and complications of recurrent urinary tract infection, allopathic clinical guidelines, and common global Traditional Medicine strategies. The author presents three clinical cases involving non-pharmaceutical management of recurrent urinary tract infection using Traditional Chinese Medicine, combined with dietary and lifestyle changes, to demonstrate safe and effective options to significantly reduce the risk of recurrent urinary tract infections and lower long-term antibiotic use.

Keywords: Recurrent urinary tract infection; Bladder infection; Chinese medicine; Traditional medicine; Ghanaian herbs, Dysbiosis

Clinical Evidence of the Efficacy of ArtiCovid (*Artemisia annua* extract) on Covid-19 Patients in DRC.

Jerome Munyangi Wa Nkola

Concession FOMU, Groupement Kingakati Village, Kinshasa

Abstract

The pandemic of COVID-19, a recently discovered contagious respiratory disease called SARS-CoV-2 (Severe Acute Respiratory Syndrome-Coronavirus 2). Majority of people infected with SARS-CoV-2: Asymptomatic or mildly ill 14% of patients will develop severe illness requiring hospitalization and oxygen support, and 5% of these will be transferred to an intensive care unit, Urgent need for new treatments that can be used quickly to avoid transfer of patients to intensive care and death. Administration of 3 times a teaspoon per day by COVID patients (symptomatic, mild or moderate forms) results in disappearance of symptoms and improvement of biological parameters (including viral suppression). Clinical efficacy: disappearance of clinical signs after seven days of treatment; reduction in the rate of patients transferred to intensive care units for mechanical ventilation and a decrease in mortality related to this infection. Paraclinical efficacy: improvement of biological parameters (mainly d-dimer, CRP). Virological efficacy: suppression of the viral load after seven days of treatment (control test on the seventh day is negative). Pilot study using a standardized solution based on *Artemisia annua* (ARTICOVID). Obtaining authorization from the health authorities of the province of Central Kongo. Recruitment of volunteer patients, mainly in the Kinkanda Hospital Carrying out tests before and after treatment as well as analyses before and after treatment. The protocol obtained the approval of the ethics committee. 50 patients who completed the treatment were aged between 2 and 70 years with an average age of 36 years More than half were male (56%). One in four patients was a health professional (25%). Of the 12 health professionals, 4 were physicians. For those who reported the date of onset of the disease, the average duration between the appearance of the first symptoms and the medical consultation was 5 days. The 50 patients put on ARTICOVID were discharged alive with CRP levels substantially normalized. After seven to eight days, the control test came back negative. This pilot study suggests that ARTICOVID may be effective against COVID-19 infection.

Keywords: SARS-CoV-2, ArtiCovid, Viral suppression, *Artemisia annua*, Clinical efficacy

The Effect of a Triad of Herbal Medicines on the Quality of Life of Patients Presenting with Dyspepsia at the Centre for Plant Medicine Research Clinic in Ghana

Mavis Boakye-Yiadom^{1,5}, David Offei Abrokwa¹, Ronald Yeboah¹, Augustine Ocloo^{2,3}, Eric Woode⁴, Priscilla Kolibea Mante⁵

¹ Clinical Research Department, Centre for Plant Medicine Research, P. O. Box 73, Mampong-Akuapem., Ghana

² Pharmacology and Toxicology Department, Centre for Plant Medicine Research, P.O. Box 73, Mampong-Akuapem, Ghana

³ Department of Biochemistry, Cell and Molecular Biology, School of Biological Sciences, University of Ghana, Legon -Accra, Ghana

⁴ Department of Pharmacology and Toxicology, School of Pharmacy, University of Health and Allied Sciences, Private Mail Bag, Volta Region, Ghana

⁵ Department of Pharmacology, Faculty of Pharmacy & Pharmaceutical Sciences, College of Health Sciences. Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Abstract

Patients with dyspepsia may suffer negative effects on their quality of life which involves their physical and emotional status. This study aimed to assess the quality of life of patients presenting with dyspepsia at the Outpatient Clinic of the Centre for Plant Medicine Research (CPMR) before, during and after management with a TRIAD of herbal medicines. Patients completed the Short Form Dyspepsia Questionnaire (SF-LDQ), the Quality of Life in Reflux and Dyspepsia (QOLRAD) questionnaire, the Short Form Health Survey version two (SF-36 v2) and a self-developed basic questionnaire on demographics during visit 1 (baseline). At visit 2 (two weeks), they completed only the QOLRAD. During visit 3 and 4 (three months and six months), all questionnaires except the self-developed one were filled. The medications administered were Mist Dyspepsia®, Mist Enterica® and Natural Pain Killer® (NPK) capsules. A hundred and sixty-two (162) patients (107 females, 55 males) with a mean of 36.79 years of age were recruited. Cronbach's alpha reliability test value was 0.952 indicating a very high internal consistency. A negative correlation existed between the QOLRAD domains and dyspepsia symptoms while a positive correlation existed between the QOLRAD domains and the SF 35 v2 domains. Hence, as the dyspepsia symptoms decrease, the QOLRAD domains as well as the SF 36 v2 domains increase. A comparison of baseline to all the review times showed the Minimum Clinically Important Difference of 0.5 or above indicating that patients treated with the TRIAD had improved quality of life and no adverse drug reactions were observed. Dyspeptic patients reporting at the Centre for Plant Medicine Research Clinic attained an improved quality of life after the herbal triad treatment.

Keywords: Dyspepsia, Quality of life, Herbal medicine

Clinical Implication of Herbal Antihypertensive use Among Patients Visiting an Integrated Herbal Unit: A Pilot Observational Study

Thomford, K.P.¹, Korang, M.A.², Adjei-Yeboah, R.², Thomford, A.K.³, Owusu, M.⁴, Mensah, R.⁵, Yirenkyi, A.⁵

¹ Department of Pharmacognosy and Herbal Medicine, School of Pharmacy and Pharmaceutical Sciences, University of Cape Coast.

² Herbal Medicine Unit, Cape Coast Metropolitan Hospital.

³ Department of Biomedical Sciences, School of Allied Health Sciences, University of Cape Coast.

⁴ Herbal Medicine Unit, Ewim Polyclinic, Cape Coast

⁵ Traditional and Alternative Medicine Directorate, Ministry of Health

Abstract

The clinical application of herbal medicines continues to be of interest because of their potential in disease management. The integration of these health products into the conventional system of healthcare has been advocated by stakeholders. The viability of herbal medicine practice under this model of care is hinged on the safety and efficacy of the products. We highlight the outcomes of an observational study undertaken among hypertensives visiting an integrated facility in Ghana. Cohorts were persons already diagnosed as hypertensives and seeking to complement their standard treatments with herbal medicines. After obtaining their informed consent, potential volunteers were followed-up for a period of 3 months within which they were to report to the physician for scheduled reviews. Data from routine clinical care logs were then retrieved after the last visit for analysis. Information recorded included the demographics, the systolic and diastolic blood pressure, pulse rate and body mass index (BMI). Treatment was made up of 2 herbal products that were to be administered together with the allopathic medicines. A total of 34 volunteers met the inclusion criteria but attrition was high with only 16 (47.1%) of the participants completing the study. Mean age of the participants was 61.75 (± 11.85) vs. males comprised 7 (43.75%) and females 9 (56.25%). Disease indices such as pulse rate [baseline (83.94 \pm 8.66); end-of-study (86.13 \pm 9.51); (CI: -2.15 to 6.52); *p* value: 0.29] and BMI [baseline (24.50 \pm 2.19); end-of-study (24.46 \pm 2.34); (CI: -0.23 to 0.15); *p* value: 0.63] were not significantly affected by the treatment. Declines were observed for both systolic blood pressure [-7.56mmHg (CI: 17.13 to 2.00); *p* value: 0.11] and diastolic blood pressure [-9.81mmHg (CI: -18.45 to -1.17); *p* value: 0.02]. The effect of the treatment on blood pressure indices indicates the prospects of the treatment. An expanded clinical study is however essential to define a context for use to improve disease outcomes.

Keywords: Hypertensives, Allopathic medicines, Herbal medicines, Complement

Ameliorative Effect of Immulate Herbal Supplement on Hepatitis B Virus Infection: Case Report

Kwabena Safo¹, Festus Buobu², Akua Safo¹, Kofi Donkor²

¹Kantanka Herbal Pharmaceutical and Research Centre, Gomoa Mpota, Central Region

²Department of Pharmacology/Toxicology, Centre for Plant Medicine Research, Mampong-Akuapem

Abstract

According to WHO, 296 million people are living with chronic Hepatitis B virus (HBV) infection in 2019, with 1.5 million new infections each year. In 2019, Hepatitis B resulted in an estimated 820,000 deaths mostly from cirrhosis and Primary Liver Cancer. The morbidity and mortality associated with HBV makes it a public health concern. Medical pluralism is high among HBV patients for several reasons. Due to high cost and long-term treatment requirement for HBV infections, as well as treatment-associated adverse effects, many patients choose either to supplement antiviral medications with herbal products or reject conventional therapy and rely solely on herbal medicine as an alternative form of therapy. Resolution of damaged liver functions from HBV infection with significant HB Viral suppression is necessary for improvement in morbidity and mortality associated with HBV. The first study case report is on a 24-year-old sexually active, single female fuel station attendant, who has no history of smoking or alcohol use presented with severe jaundice, fever, and lethargy of over a week duration. Laboratory analysis showed she did not have malaria or typhoid. All liver function indices (BIL, AP, GT, ALT, AST ALB) were extremely high beyond reference range for females. After 4 months of treatment with Immulate Herbal Supplement, her liver enzymes which was between 5 – 10 x upper limit of normal has returned to normal range with a few enzymes around the upper limit of normal. After 12 months of treatment, all markers were normal. The second case is a 35-year-old health personnel (PhD) lecturer who does not take alcohol nor smoke was diagnosed of Hepatitis BV infection through screening. He was asymptomatic and had Hepatitis B virus DNA copies of 55,348 cp/ml. After 6 weeks of treatment with Immulate Herbal Supplement, HBV DNA copies were suppressed significantly to 6,053 cp/ml. It can be concluded that, Immulate Herbal Supplement may be useful in treatment of viral Hepatitis B Infection.

Keywords: Hepatitis B Virus, HBV DNA, Immulate Herbal Supplement, AST, ALT

Parallel Session 4A

***Capparis erythrocarpos* Mediated Synthesized ZnO Nanoparticles and its Therapeutic Potential**

Michael Odoi Kyene^{1*}, Droepenu Eric Kwabena², Frederick Ayertey³, Genevieve Naana Yeboah¹, Mary-Ann Archer¹ Doris Kumadoh¹ Susana Oteng Mintah⁴ and Daniel Boamah⁴

¹Department of Pharmaceutics and Quality Control, Centre for Plant Medicine Research, Mampong, Ghana.

²Resource Chemistry Program, Faculty of Resource Science and Technology, 94300, Kota Samarahan, Sarawak, Malaysia.

³Department of Phytochemistry, Centre for Plant Medicine Research, Mampong, Ghana.

⁴Department of Microbiology, Centre for Plant Medicine Research, Mampong, Ghana.

Abstract

This present study reports the biosynthesis of Zinc oxide nanoparticles (ZnO NPs) using the medicinally active aqueous extract of *Capparis erythrocarpos* Isert for biomedical applications. The synthesized ZnO NPs were characterized with Energy dispersive X-ray (EDX), Transmission electron microscope (TEM), Scanning electron microscope (SEM), Fourier transform infrared (FT-IR) spectroscopy and Ultraviolet Visible (UV-Vis) spectroscopy. TEM analysis revealed an irregular spherical-like shaped nanoparticles with a particle size of 16.13 ± 3.6 nm. Anti-inflammatory activity was investigated using the egg albumin (EA) denaturation assay, whereas antioxidant activity was performed using a DPPH free radical scavenging assay. Antimicrobial activity of the ZnO NPs were tested against *S. aureus* (gram positive), *E. coli* (gram negative), *S. typhi* (gram negative) and *C. albicans* (yeast) by agar well diffusion method. Phytochemical screening of the plant extract revealed the presence of alkaloids, flavonoids, saponins, reducing sugars, triterpenes and polyphenols. ZnO NPs demonstrated moderate antioxidant activity with IC₅₀ value of 0.928 ± 0.001mg mL⁻¹ and excellent anti-inflammatory activity (IC₅₀ = 0.399 ± 0.005mg mL⁻¹) as compared to the standard. In general, ZnO NPs showed good antimicrobial activity. Thus, the synthesized nanoparticles can be used as an alternative therapeutic agent.

Keywords: Nanoparticles, *Capparis erythrocarpos*, anti-inflammatory, antioxidant, antimicrobial

Functionalization of *Parkia biglobosa* – Mediated Gold Nanoparticle for Improved Drug Delivery

Emmanuel Okoampah^{1*}, Joan Davids Shine², and Joseph Payne²

¹University for Development Studies, Faculty of Biosciences, Department of Biochemistry and Molecular Biology, P. O. Box Tl 1882, Tamale, Ghana

²University for Development Studies, Faculty of Biosciences, Department Biotechnology, P. O. Box Tl 1882, Tamale, Ghana

Abstract

Nanoparticles (NPs) have emerged as promising in the pharmaceutical industry due to their intrinsic physicochemical properties, prompting several studies into their potential as drug delivery agents. The inefficiency of antibiotics' bio-distribution to disease sites has resulted in an alarming increase in microbial resistance. Herein this study, we investigated the drug release potential and antimicrobial activity of *Parkia biglobosa*-mediated gold nanoparticles functionalized with a polyethylene glycol (PEG) and a standard drug (lincomycin). Three nanodrug composites were created: PD (PEG conjugated on lincomycin), PN (PEG conjugated on AuNPs), and PND (PEG and lincomycin on AuNPs). The as-synthesized AuNPs and the formulated nanodrug composites were characterized using UV-Vis spectrophotometry, TEM, FTIR, XRD, and EDS. According to the drug release capacity results, the optimal released capacity for all nanodrug composites was 9 minutes. Within 9 minutes, PND had the highest release capacity of 23 mg/ml, followed by PD and PN with 12 mg/ml and 4.8 mg/ml, respectively. From the antimicrobial study, PND inhibited *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Staphylococcus aureus*, and *Escherichia coli* with zones of inhibition of 43.25 mm, 20.25 mm, 33.0 mm, and 28.00 mm, respectively. For PD, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Staphylococcus aureus*, and *Escherichia coli*, the zones of inhibition were 41.75 mm, 19 mm, 30.75 mm, and 23.5 mm, respectively. PND and PD both inhibited *Candida albicans* with zones of inhibition of 50.31 mm and 49.34 mm, respectively. Interestingly, PN exhibited no antimicrobial activity against microbes or fungi, which we attribute to the no inclusion of lincomycin in their formulation. The combined drug release potential and microbial growth inhibition of the as-synthesized formulated drugs provides a new generation technology to improve disease treatment capacity of pharmaceutical drugs.

Keywords: Gold nanoparticles; Antibiotics; Drug release; microbes; Polymer

Investigating the Anthelmintic Potential of *Carica papaya*-Mediated Silver Nanoparticles *in Vitro*

Eunice Quartey¹, Emmanuel Okoampah², Joseph Payne¹, and Joan Davids Shine^{1*}

¹University for Development Studies, Faculty of Biosciences, Department Biotechnology, P. O. Box Tl 1882, Tamale, Ghana

²University for Development Studies, Faculty of Biosciences, Department of Biochemistry and Molecular Biology, P. O. Box Tl 1882, Tamale, Ghana

Abstract

Parasitic nematodes infect a wide range of animal species, including humans. The increasing incidences of nematode effect have sparked public debate due to the impact on human health, livestock production, companion animal welfare, and crop production. The increasing drug resistance attributed to the inefficiencies of conventional anthelmintic drugs necessitates a search for a drug alternative capable of targeting and killing parasitic nematodes. It is against this background herein this study we explored anthelmintic potential of *Carica papaya*-mediated silver nanoparticles (CP-AgNPs) and tested its efficacy against a standard drug (albendazole and piperazine) on earthworm and tapeworm. TEM, FTIR, and UV/Vis were used to characterize the as-biosynthesized CP-AgNPs. The earthworm and tapeworm were exposed to varying concentrations of CP-AgNPs thus, 10, 20, 40, 60, 80, and 100 mg/ml and the time of paralysis and death recorded. Also varying concentrations, 10, 20, 40, 60, 80, and 100 mg/ml of the standard drugs, albendazole, and piperazine were also introduced to the tapeworm and earthworm and time of death and paralysis compared with the results of the as-biosynthesized CP-AgNPs. It was discovered that in the presence of 10 mg/ml CP-AgNPs the earthworms were paralyzed within 3.5 minutes and died after 9.1 minutes, whereas albendazole (indicate the concentration) paralyzed and killed the earthworms after 269 and 400 minutes, respectively. CP-AgNPs (100 mg/ml) caused paralysis and death within 0.5 and 1.5 minutes, respectively, while albendazole (100 mg/ml) caused paralysis and death within 141 and 306 minutes, respectively. The CP-AgNPs solution at 10 mg/ml caused paralysis and death in the tapeworms in 7.1 and 161.4 minutes, respectively, whereas the piperazine took 135.2 minutes to cause paralysis and death in 400 minutes. The CP-AgNPs caused paralysis and death at 2 and 20.7 minutes at 100 mg/ml, while the piperazine caused paralysis and death at 24.2 and 172.4 minutes. Other concentrations (20, 40, and 60 mg/ml) caused paralysis and death in the tapeworms and earthworms. The findings of this study indicate that using NPs in the design of anthelmintic drugs will help to reduce the growing menace of microbial resistance.

Keywords: *Carica papaya*, Silver nanoparticles, Tapeworm, Earthworm, Anthelmintic activity.

Phytochemicals and Biogenic Metallic Nanoparticles as Anticancer Agents in Lung Cancer

Nana Ama Mireku-Gyimah^{1*}, Rex Frimpong Anane² and Louis Hamenu³

¹*Department of Pharmacognosy and Herbal Medicine, School of Pharmacy, University of Ghana, Accra, Ghana*

²*CAS Center for Excellence in Animal Evolution and Genetics, Kunming Institute of Zoology, Chinese Academy of Sciences, Kunming, Yunnan, China*

³*Department of Chemistry, School of Physical and Mathematical Sciences, University of Ghana, Accra, Ghana*

Abstract

The applications of metallic nanoparticles in cancer chemotherapy have increased tremendously due to their unique physical and chemical properties relating to their significant nano size, structure, and shape. Biogenic synthesis of nanoparticles using biological agents such as bacteria, fungi, algae and plants, and their products as reducing, stabilising and capping agents is eco-friendly, cheaper, and a convenient, single step method as compared to chemical synthesis methods which are harmful to human health and the environment. This work discusses the sources of biological agents highlighting some bacteria and focusing on medicinal plants, procedures of biosynthesis, mechanisms of formation of biogenic metallic and metallic oxide nanoparticles derived from them, and their applications and mechanisms of action in lung cancer chemotherapy. In all, twenty-four (24) medicinal plants, their derived silver, gold, zinc, iron and cerium metallic nanoparticles and their anticancer effects in lung cancer cells have been outlined and discussed.

Keywords: Phytochemicals, Biogenic Metallic Nanoparticles, Anticancer Agents, Lung Cancer

Developing Plant Extracts and Essential Oils as Botanical Acaricides for Tick Control: The African Story

Olubukola T. Adenubi^{1*}, Timothy Salihu², Foluke A. Akande³, Oluwatodimu A. Adekoya¹, Lyndy J. McGaw⁴

¹Department of Veterinary Pharmacology and Toxicology, College of Veterinary Medicine, Federal University of Agriculture, PMB 2240 Alabata, Abeokuta, Ogun State, Nigeria.

²Nigeria Natural Medicine Development Agency, 9, Kofo Abayomi Street, Victoria Island, Lagos State, Nigeria.

³Department of Veterinary Parasitology and Entomology, College of Veterinary Medicine, Federal University of Agriculture, PMB 2240 Alabata, Abeokuta, Ogun State, Nigeria.

⁴Phytomedicine Programme, Department of Paraclinical Sciences, Faculty of Veterinary Sciences, University of Pretoria, Onderstepoort 0110, South Africa.

Abstract

Synthetic acaricides have been the most commonly used tick control method in livestock production. However, indiscriminate and unethical use has led to acaricide resistance, environmental pollution and residues in livestock products. Plant extracts, essential oils (EOs) and isolated compounds have potential to be effective and safer alternatives. Extensive literature search/reviews and ethnobotanical surveys were done to collate available information on plants used traditionally to control ticks, and work done so far to evaluate their acaricidal properties globally. Subsequently, crude extracts and EOs of some plant species grown in South Africa and Nigeria were examined for their acaricidal efficacy, chemical composition and safety profile. Acaricidal efficacies against adult and developmental stages of different tick species were tested using the *in vitro* immersion technique. Chemical compositions were evaluated using Gas Chromatography-Mass Spectrometry while acute and subacute toxicities were evaluated *in vivo* according to standard methods. Data were analyzed by descriptive statistics, probit method, regression analysis, one-way analysis of variance, and *p* value ≤ 0.05 was considered significant. Aside from South Africa, Zimbabwe, Kenya, and Ethiopia, information from other African countries was scanty. In addition, over 90% of the studies comprised *in vitro* investigations, and less than 50% of ethnoveterinary plants have been scientifically validated, despite the abundant flora in this continent. Four plant species were found to be as active as the commercial, synthetic acaricide, cypermethrin, causing up to 100% tick mortality, inhibition of oviposition and hatchability. Bioassay-guided fractionation led to the isolation of some acaricidal compounds, such as isorhoifolin from *Calpurnia aurea* and 1,4-cineole, isolated for the first time from *Cymbopogon citratus*. Further *in vivo* and mechanistic studies are on-going in the search for a novel, effective and safe botanical acaricide. This may represent a viable and cost-effective alternative for rural and semi-urban farmers to prevent or treat their livestock against ticks.

Keywords: Synthetic acaricides, Efficacy, Chemical composition, Safety profile, Tick mortality

Parallel Session 4B

The Hydroethanolic Leaf Extract of *Morinda lucida* Reduces PGE₂ and NO Levels in LPS-Activated RAW 264 cells.

F. Ayertey^{1,7}, E. Ofori-Attah², S. Antwi³, J. Yeboah Owusu³, M. Amoa-Bosompem⁴, G. Djameh⁴, N. Lartey Lartey⁵, M. Ohashi⁴, K. Asamoah Kusi⁶, A. Ampomah Appiah¹, R. Appiah-Opong^{2,7}, L. Kenneth Okine⁷

¹Phytochemistry Department, Center for Plant Medicine Research, Mampong, Akwapim, Ghana; ²Department of Clinical Pathology, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Legon, Accra, Ghana; ³Pharmacology, Toxicology Department, Center for Plant Medicine Research, Mampong, Akwapim, Ghana; ⁴Department of Parasitology, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Legon, Accra, Ghana; ⁵Department Chemical Pathology, University of Ghana, Korle Bu, Accra, Ghana; ⁶Department of Immunology, Noguchi Memorial Institute for Medical Research, College of Health Sciences, University of Ghana, Legon, Accra; ⁷Department of Biochemistry, Cell and Molecular Biology, University of Ghana, Legon, Accra, Ghana.

Abstract

The chronic elevation of PGE₂ and nitric oxide is reported to play a major role in several types of cancers and inflammatory disorders. There is evidence to show that, reduction in the levels of PGE₂ and nitric oxide significantly reduces inflammation and may prevent inflammatory associated disorders. The available medications to treating inflammation and related disorders have been fraught with numerous side effects, which makes it necessary to develop new ones. The broad spectrum of phytochemicals in medicinal plants makes them ideal to being potential candidates for treating various diseases with minimal side effects. *Morinda lucida* has been reported to have a good anti-inflammatory activity. The aim of the study was to determine the anti-inflammatory mechanism of action of the hydroethanolic leaf extract of *M. lucida* (EML) in LPS-activated RAW 264 cells. RAW cells were seeded in 96 well plates overnight and treated with 40 μM SFN or 0.62-50 μg/ml EML for 2.5 h followed by exposure to 40 ng/ml of LPS overnight. Levels of PGE₂, nitric oxide and cytokines (TNF-α, IL-1β and IL-10) in culture medium were estimated by ELISA and Griess reagent. The expressional levels of COX-2 and iNOS were assessed by western blot. EML significantly reduced PGE₂, nitric oxide and pro-inflammatory cytokine levels by the inhibition of COX-2 activity and iNOS expressional levels. EML also elevated the levels of the anti-inflammatory cytokine IL 10. The current result shows that EML may prevent the over activation of macrophages to reduce inflammation and hence may serve as a potential candidate to prevent inflammatory related diseases.

Keywords: PGE₂, Inflammation, *Morinda lucida*, Mechanism of action, Hydroethanolic

***Parkia clappertoniana* Keay (Family: Fabaceae) Fruit Husk Extract Demonstrates Wound Healing and Anti-Microbial Effects in Rat Excisional Wound Model**

Alex Boye^{1*}, Orleans Martey², Dominic Nkwantabisa Kuma³, Mainprice Akuoko Essuman¹
Victor Yao Atsubarku⁴

¹ Department of Medical Laboratory Science, School of Allied Health Sciences, College of Health and Allied Sciences, University of Cape Coast, Cape Coast, Ghana

² Department of Pharmacology and Toxicology, Center for Plant Medicine Research (CPMR), Mampong-Akuapem, Eastern Region, Ghana

³ Department of Biomedical Sciences, School of Allied Health Sciences, College of Health and Allied Sciences, University of Cape Coast, Cape Coast, Ghana

⁴ Department of Chemistry, School of Physical Sciences, College of Agriculture and Natural Sciences, University of Cape Coast, Cape Coast, Ghana

Abstract

Folk use of *Parkia clappertoniana* Keay (*P. clappertoniana*) fruit husk for wound treatment is common in northern Ghana, however, this folk claim remains to be validated. This study investigated wound healing activity of an ethanol extract of *P. clappertoniana* fruit husk (PCFHE) by using the excision wound model in rats. After ethanol-based extraction of PCFHE, its phytochemical profile was assessed. PCFHE was reconstituted in purified water and emulsifying ointment to form PCFHE-reconstituted wound healing formula (0.3, 1, and 3%). After establishment of excision wounds in healthy male Sprague-Dawley rats (aged 8-10 weeks; weighing 150 – 200 g), rats were randomly re-assigned into five groups (model group [excision wounds + no treatment], positive control group [excision wounds + treatment + 1% Silver sulfadiazine, SSD], vehicle group [excision wounds + emulsifying ointment], and PCFHE groups [excision wounds + 0.3, 1, and 3% respectively]). Healed wound tissues were histologically analyzed. Period of epithelization, wound contraction, collagen content, erythema index, oedema index, epithelia thickness, vascularization, inflammatory cell infiltration, and anti-microbial activity were assessed for all groups. Also, minimum fungicidal concentration (MFC), MIC, MBC, and time-kill were assessed. Yield of PCFHE was 6.2 % (342.25 g). Alkaloids, glycosides, phenols, flavonoids, terpenoids and tannins were detected. HPLC analysis showed 10 revealing peaks, two of which eluted at retention times corresponding to standards (quercetin and catechin). Compared to model and vehicle groups, PCFHE treatment improved wound healing end points (epithelization, wound contraction, collagen content, erythema index, oedema index, epithelia thickness, vascularization, inflammatory cell infiltration, and anti-microbial activity). PCFHE demonstrated bacteriostatic and fungicidal effects against wound contaminants (*Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Escherichia coli*, and *Candida albicans*). *P. clappertoniana* fruit husk has demonstrated wound healing activity in excisional wounds in rats and have demonstrated Gram-selective bacteriostatic and anti-fungal activity against wound contaminants confirming its folk use.

Keywords: *Parkia clappertoniana*, wound contraction, minimum fungicidal concentration

The Inhibition of Dipeptidyl Peptidase – IV by an Extract of Periwinkle *Catharanthus roseus* (L.) G Don) and its Potential Antidiabetic Effects in a Streptozotocin-Induced Type 2 *Diabetes mellitus* Model in Sprague Dawley Rats

Kim Archer, Ambadasu Bharatha and Damian Cohall

Department of Preclinical and Health Sciences, Faculty of Medical Sciences, Cave Hill Campus, St. Michael, Barbados

Abstract

The treatment of type 2 diabetes mellitus continues to be a global concern with increased cases of the chronic non-communicable disease and its impact on the access to efficacious and safe anti-diabetic drugs. Hence other sources of drugs are critical especially in the developing world which is affected by drug stockouts. The aim of this study is to identify novel inhibitors of Dipeptidyl Peptidase – IV (DPP - IV), an enzyme that deactivates incretin hormones and can down-regulate postprandial insulin levels. *Catharanthus roseus* (L.) G Don was identified at the herbarium at The University of the West Indies, Cave Hill. The dried plant material was extracted using a series of solvents across the polarity series. The acetone extract and two eluted fractions of the acetone extract from a silica column using a 50% hexane: 40% dichloromethane: 10% acetone mobile phase were tested for inhibitory effects on the DPP-IV enzyme *in vitro*. Type 2 diabetes mellitus was induced in Sprague Dawley rats by feeding the animals a high-fat diet and administering streptozotocin at a dose of 40 mg/Kg intraperitoneally. The rats were randomly assigned to three treatment groups in which they were treated with daily doses of 3 mg/Kg Vildagliptin (positive control), 250 mg/Kg acetone extract and vehicle (negative control) for four (4) weeks by gastric gavage. Fasting blood glucose was monitored over the treatment period. The treatment groups were accessed for gross anatomical toxicological features. The acetone and two semi-pure fractions of the acetone extract showed IC₅₀ values of 2.2 µg/ml, 2.1 µg/ml and 2.4 µg/ml respectively against the activity of DPP-IV *in vitro*. Fasting blood glucose levels were significantly lower post-treatment with the crude acetone extract and vildagliptin compared to the baseline readings for the diabetic rats (Student's t-test; $p < 0.05$). The fasting blood glucose values of the diabetic rats in the vehicle-treated group were not significantly different from the baseline values in weeks 2, 3 and 4 (Student's t-test; $p > 0.05$). Gross anatomical assessment of the rats treated with the crude extract highlights possible toxicity in the gastrointestinal tract. The acetone extract and its semi-pure fractions demonstrate inhibition of the DPP-IV *in vitro*. Diabetic rats treated with vildagliptin and the crude acetone extract demonstrated antidiabetic effects. The incretin hormones and insulin levels must be evaluated to confirm the mechanism of the antidiabetic effects in the rats. Toxicological evaluation of the rats is ongoing but gross anatomical observations may be related to the plant's cytotoxicity. Further studies are required to isolate and characterise the anti-diabetic compounds with the DPP-IV inhibition activity.

Keyword: Dipeptidyl Peptidase, *Catharanthus roseus*, Streptozotocin-Induced, Sprague Dawley Rats

***Phyllanthus amarus* Extract and Fractions; Anti-Inflammatory, Antioxidant and Hypolipidemic Activities in Mice**

Opeyemi O. Ayodele^{*}, Chidera L. Udeagha, Temitope D. Sangosanya

Department of Biochemistry, College of Basic and Applied Sciences, Mountain Top University, Nigeria.

Abstract

Inflammation and oxidative stress are interlinked pathological conditions that predispose to several chronic diseases. *Phyllanthus amarus* Schum. Thonn. (Euphorbiaceae) is an annual herb used in the ethnomedical treatment of pains, and several disorders. This study evaluated the potential protective effects of *P. amarus* hydroethanol extract and fractions against oxidation, acute inflammation, and hyperlipidemia in mice models. Forty-five albino mice (either sex) were randomly divided into nine groups and orally administered different concentrations of *P. amarus* extracts and fractions (100 & 200 mg/kg b.w) for 7 days prior to induction of inflammation, while the normal and positive control mice were given normal saline and diclofenac. Mice pretreated with the extract and fractions showed significantly reduced ($p < 0.05$) paw edema formation at both concentrations. *P. amarus* caused significant ($p < 0.01$) decrease in serum and liver total cholesterol, triglycerides, very low-density lipoprotein cholesterol (VLDL-C), low-density lipoprotein cholesterol (LDL-C) and atherogenic index (maximum decrease of 36 & 34%, 53 & 46%, 61 & 46%, 67 & 75%, and 42%, respectively) compared with the untreated group, while the high-density lipoprotein cholesterol (HDL-C) increased in this order (80.6 & 66%, respectively). The activities of superoxide dismutase, catalase, and the content of glutathione (GSH) were significantly increased ($p < 0.05$) in the liver and kidney of pretreated mice compared with the control groups, while lipid peroxidation (as quantified by malondialdehyde concentration) reduced significantly. The most effective dose was 200 mg/kg. The GC-MS analysis of *P. amarus* extract showed the presence of Hexadecanoic acid (known as an anti-inflammatory compound), urethane, and other bioactive compounds that may be responsible for the observed activities. Overall, our investigation provides evidence that *P. amarus* possesses strong anti-inflammatory, hypolipidemic, as well as antioxidant properties and as such could be useful in preventing and managing cardiovascular conditions and diseases mediated by inflammation.

Keywords: Antioxidant, Inflammation, Lipid profile, *P. amarus*, Oxidative stress.

Erythropoietic and Spermatogenic Effects of Subchronic Administration of Methanolic Leaf Extract of *dracaena Arborea* in Rats

¹Ekere S.O., ²Dim C.E. and ³Onyesife, C.

¹Department of Veterinary Obstetrics and Reproductive Diseases, University of Nigeria, Nsukka, Nigeria

²Department of Veterinary Obstetrics & Reproductive Diseases, University of Nigeria, Nsukka

³ Department of Science Laboratory Technology, University of Nigeria, Nsukka

Abstract

This study investigated the erythropoietic and spermatogenic effects of sub-chronic administration of methanol leaf extract of *Dracaena arborea* in rats. Acute toxicity was performed. A total of 120 male rats weighing 140 ± 14.14 g were used for the sub-chronic study divided into four groups. The extract was administered using the oral route daily for 91 days at the following dosages: group A, normal saline 10 mL/kg body weight, bw (control group); group B, 50 mg/kg bw of the extract; group C, 100 mg/kg bw of the extract and group D 500 mg/kg bw of the extract. The parameters assessed to determine the effect of sub-chronic administration of the extract were: packed cell volume (PCV), haemoglobin concentration (Hb), red blood cell counts (RBC), testicular weight (TW) and epididymal sperm reserve (ESR). The mean Hb of rats in group D was significantly higher ($p < 0.05$) than that of groups B, C, and that of the untreated group A between days 49 and 77 post-administration of the extract. The mean TW and ESR of group D increased significantly ($p < 0.05$) as from day 35 post-administration of the extract when compared to other groups and this trend of increase continued throughout the duration of the experimental period. Histological evaluation of the testes revealed increased spermatogenesis in group D when compared to other treatment groups and the control group. It was concluded that sub-chronic administration of the extract led to enhancement of erythropoietic and spermatogenic effects in rats.

Keywords: *Haemopoiesis. Spermatogenesis. Methanol leaf extract.*

Parallel Session 5A

The Role of Quality Management Systems in Herbal Manufacturing Companies: The COA-RMCL Experience

C.M Agbale, F.O Brenya, P.J Agyiadu, I Baidoo, E.H Donkoh, S.A Duncan

Centre of Awareness Research and Manufacturing Company Limited (COA RMCL)

Abstract

A major challenge confronting most herbal medicine producers is meeting the expectation of customers whilst adhering to regulatory standards. We discuss, in this presentation, how these challenges can be addressed effectively by the implementation of a robust quality management system (QMS) which meets the requirement of industry regulators like Food and Drugs Authority from our perspective as one of the leaders in the herbal medicine industry in Ghana. Our company, is the producer of COA Mixture, a herbal medicine indicated for general wellbeing which is produced from an in-situ biotransformation of the leaves of *Azadirachta indica*, *Ocimum viride*, *Spondias mombin*, *Vernonia amygdalina*, *Persea Americana* and *Carica papaya*. The operations in the packaging unit are semi-automated and the finished products are held in quarantine pending microbial analysis before release to stores. The entire facility relies on only reverse osmosis treated water for washing of leaves, extractions processes, washing of bottles and cleaning-in-place operations. All waste products generated are disposed of in accordance to EPA standards. COA Mixture is sold through a wide network of distributors across the country. Currently, there are nineteen (19) general Standard Operating Procedures (SOPs) and twelve (12) production SOPs guiding the operations of production and marketing of COA Mixture®. These operations are captured in nineteen (19) general forms and seven (7) production forms. Other components of the QMS include working instructions for machinery, manuals and notebooks for logging of all activities. The effective implementation of QMS therefore ensures operational consistency, ease of traceability of products batches, continuous improvement and evidence-based decision making. We recommend the institution of a robust QMS to ensure that herbal medicine plays a dominant role in the health delivery system.

Keywords: Quality Management System, SOPs, COA Mixture, Quarantine, *Azadirachta indica*

Evaluation of a Tea Bag Formulation of *Tapinanthus bangwensis* (Engl. And K. Krause) Danser Leaves, Meant for the Management of Diabetes

Doris Kumadoh, Michael O. Kyene, Mary-Ann Archer, Genevieve N. Yeboah, Emmanuel Adase, Maxwell Mamfe Sakyamah, Susana Oteng Mintah, Ofosua Adi-Dako, Christina Osei-Asare, Esther Eshun Oppong.

Abstract

The increasing cost of orthodox antidiabetics and their reported side effects from long term use in recent times has contributed to many diabetics searching for herbal remedies as alternatives for treatment. *Tapinanthus bangwensis*, family *Loranthaceae*, is a sycophantic plant commonly found in Africa. The leaves of the plant are used traditionally to treat diabetes. The aim of the study was to formulate tea from the leaves of *Tapinanthus bangwensis* to serve as remedy for the management of diabetes which will help in further studies using a standardized product. For the purpose of product standardization, quality control and authentication, FTIR, HPLC and UV spectrophotometric analysis were conducted. The preliminary safety profile of the tea via determination of median lethal dose (LD_{50}), microbial load, essential elements and toxic metal contents were also assessed. In addition, the pH, uniformity of mass, total water extractive and optimization of extraction method were also investigated. The FTIR showed the presence of alcohols, esters, phenols and aromatic compounds. The HPLC fingerprint also showed 23 peaks with the highest peak having a retention time of 15.4 min. The UV spectrum showed the maximum wavelength of absorption (λ_{max}) at 268 nm. The extract also recorded a pH of 7.43 ± 0.02 at 26.1°C and total water extractive of $39.37 \pm 0.05\% \text{w/w}$. It passed the uniformity of mass test with an average net mass of 3.0 ± 0.02 g. Optimum extraction of the tea was realised with 250 mL of freshly boiled water. The formulated tea was found to be acutely safe since the determined LD_{50} was 50 times more than the daily dose. The microbial load, elemental and toxic metal contents were also within acceptable limits. This study has shown the possibility of introducing this tea as an herbal remedy for the management of diabetes.

Keywords: Antidiabetics, *Tapinanthus bangwensis*, Tea, Optimum extraction

Formulation and evaluation of herbal extract capsules; the case of *Cryptolepis sanguinolenta* used in the treatment of malaria

Genevieve Naana Yeboah^{a*}, Doris Kumadoh^a, Michael Odoi Kyene^a, Mary-Ann Archer^b, Frederick Ayertey^c, Frederick William Akuffo Owusu^d, Daniel Boamah^e, Alex Asase^{f,g}

^a Department of Pharmaceutics and Quality Control, Centre for Plant Medicine Research, Mampong, Ghana

^b Department of Pharmaceutics, University of Cape Coast, Cape Coast, Ghana

^c Department of Phytochemistry, Centre for Plant Medicine Research, Mampong, Ghana

^d Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

^e Department of Microbiology, Centre for Plant Medicine Research, Mampong, Ghana

^f Plant Development Department, Centre for Plant Medicine Research, Mampong, Ghana

^g Department of Plant and Environmental Biology, University of Ghana, Accra, Ghana

Abstract

In the treatment of malaria, medicinal plants have been used traditionally for thousands of years due to their availability, low cost, cultural preferences, efficacy and safety. At the Centre for Plant Medicine Research (CPMR) clinic, an aqueous decoction of the roots of *Cryptolepis sanguinolenta* is used in the management of uncomplicated malaria. Challenges associated with this liquid preparation include dosing inaccuracies, taste associated noncompliance, product bulkiness and decreased potential for modification of drug release. The aim of the study was to develop *Cryptolepis sanguinolenta* immediate release capsules from the aqueous root bark extract using different excipient concentrations to produce a convenient formulation with favourable physicochemical and mechanical properties. The formulations were produced by wet granulation using different proportions of excipients. The fluidity of the formulated granules was determined using Hausner ratio, Carr compressibility index and angle of repose. FT-IR was used to evaluate the compatibility of the extract and excipients. Physical tests like weight uniformity and disintegration tests were used to characterize the formulation. Content uniformity, a quality control parameter was evaluated. Finally, in vitro assessment of extract release from the formulation was done using USP dissolution apparatus 1. All the formulated granules had excellent flow properties. All the formulations had good outcomes on the physical tests as well as the content uniformity. The formulations rapidly dissolved in phosphate buffer (7.2), the simulated gastric fluid achieving >80% extract release after 15 minutes. Immediate release capsules from the aqueous root bark extract *Cryptolepis sanguinolenta* were successfully developed using different proportions of excipients. These formulations had good physicochemical and mechanical properties.

Keywords: *Cryptolepis sanguinolenta*, malaria, Hausner ratio, immediate release capsule

Parallel Section 5B

Current State of Herbal Medicines Analysis in Africa, and the Way Forward

Emmanuel Orman^{1,2,3}, Samuel Oppong Bekoe³, Jonathan Jato^{1,4}, Verena Spiegler¹, Samuel Asare-Nkansah³, Christian Agyare⁵, Andreas Hensel^{1*}, Emelia Oppong Bekoe⁶

¹ Institute of Pharmaceutical Biology and Phytochemistry, University of Münster, Corrensstraße 48, D-48149 Münster, Germany

² Department of Pharmaceutical Chemistry, School of Pharmacy, University of Health and Allied Sciences, Ho, Ghana.

³ Department of Pharmaceutical Chemistry, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

⁴ Department of Pharmacognosy and Herbal Medicine, School of Pharmacy, University of Health and Allied Sciences, Ho, Ghana.

⁵ Department of Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.

⁶ Department of Pharmacognosy and Herbal Medicine, School of Pharmacy, University of Ghana, Accra, Ghana.

Abstract

In Africa, phytotherapy supplements allopathic medicine's efforts to ensure Universal Health Coverage attainment. This review was conducted to summarise current literature on methodological approaches used for quality control of herbal medicines in Africa, to evaluate the gaps associated with existing strategies within the context of best practices, and make recommendations for future improvements. A systematic search was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Articles were screened and assessed for eligibility. One hundred and eighteen articles (118) were included in the study. There was a high preference for impurity profiling tests (77%) indicating the prioritization for tests that guarantee safety despite the limited analytical resources available. Other classes of tests reported included identification tests (29%), physicochemical tests (18%), and content assays (12%). Although standard methods exist in preparing samples for impurity tests, different techniques were observed in different studies, and this could lead to differences in analytical outcomes. Content assays focused on single marker assessments, which may be inadequate to comprehensively assess the quality of products. For the future, it is recommended to implement more studies on contaminants (e.g., mycotoxins) and pharmaceutical adulterants. The use of chemometrics to develop analytical methods should be promoted. Also, stakeholders in the medicine quality industry in Africa need to effectively collaborate to establish a well co-ordinated and harmonized system to provide a sustainable framework for the quality assurance of herbal medicines.

Keywords: Phytotherapy, Allopathic, Herbal medicines, Systematic search, Meta-Analyses

***Bridelia ferrugenia* Benth. as an Herbal Antidiabetic Agent: Is It Time to Reconsider?**

Thomford, K.P.¹, Yeboah, R.², Thomford, A.K.³, Tetteh, A.E.⁴, Agyemang, A.O.⁵

¹Department of Pharmacognosy and Herbal Medicine, School of Pharmacy and Pharmaceutical Sciences, University of Cape Coast.

² Clinical Research Department, Centre for Plant Medicine Research, Mampong-Akuapem

³Department of Biomedical Sciences, School of Allied Health Sciences, University of Cape Coast.

⁴ Herbal Medicine Unit, Kumasi South Hospital

⁵ Institute of Traditional and Alternative Medicine, University of Health and Allied Sciences, Ho.

Abstract

Diabetes mellitus is a leading cause of mortality and reduced life expectancy across the world. It is an issue of public concern due to its physical, social and economic impact. Medicinal plants such as *Bridelia ferrugenia* have a long history of use as treatment for this condition. This history of use aside, it is imperative to establish the safety and effectiveness of such treatments as traditional medicine takes the scientific approach in its delivery. In this study, we evaluated the benefit of using a product formulated from the dried leaves of *Bridelia ferrugenia* as an anti-diabetic agent. An observational clinical study was undertaken among volunteers diagnosed with diabetes mellitus. Participants were selected according to a prespecified inclusion and exclusion criteria. Follow-up was undertaken for a period of 4 months during which disease relevant indicators: fasting blood glucose (FBS), haematology and blood biochemistry were monitored and documented. A total of 22 participants were recruited for the study. Mean age was 50.68 (\pm 7.17) and comprised 13 (59.1 %) males and 9 (40.9 %) females. The product did not show any signs of toxicity as results from the haematological and blood biochemistry were normal and unaffected after the 4 months of treatment. However, the product did not appear to be effective as an anti-diabetic agent as changes to glycaemia were not clinically significant. Mean FBS at baseline was 9.86 (1.64) and declined to 9.74 (1.82) at month 4 representing a decline of 0.11 mmol/l (CI: -0.36 to 0.13; *p* value 0.34). The use of *Bridelia ferrugenia* as an anti-diabetic agent needs rethinking as poor glycaemic control can have dire consequences.

Keywords: *Diabetes mellitus*, Medicinal plants, Traditional medicine, Anti-diabetic agent, Observational clinical study, Fasting blood glucose, Glycaemic control

***In Vitro* Antibacterial Activity of *Psidium guajava* (Guava) Leaves Extract on Carbapenem-Resistant *Klebsiella pneumoniae* Causing Multi-Drug Resistant Systemic Infections**

Mark Appenteng and Isaac Ampaw

Centre for Plant Medicine Research, Mampong-Akuapem, Ghana.

Abstract

Systemic bacterial infections affect almost all part of the human body systems leading to infections such as urinary tract infections, septicemia, meningitis, pneumonia, peritonitis, and gastritis. Carbapenems have been used as drug of choice in the treatment of systemic infections. Studies have indicated that Enterobacteriaceae produce enzymes such as carbapenemases, which inactivate carbapenems. There is limited treatment option for systemic infections caused by carbapenem-resistant Enterobacteriaceae. Systemic infections keep increasing; hence, the determination of the effective treatment options of carbapenem-resistant Enterobacteriaceae is important for quality healthcare delivery. In this laboratory studies, agar well diffusion and microplate broth dilution assays were used to determine the effectiveness of *Psidium guajava* on carbapenem-resistant *K. pneumoniae*. The active zones of inhibition were observed in *P. guajava* leaves extract concentrations of 50, 100 and 200 mg/ml. The minimum inhibition concentration and minimum bactericidal concentration of ethanolic extract of guava leaves was 6.25 mg/ml indicating significant antibacterial activity against the carbapenem-resistant *K. pneumoniae*. The antibacterial activity of the leaves extract may be attributed to the presence of flavonoids and other antimicrobial phytochemicals in the guava leaves extract. The outcome of this baseline laboratory studies indicates the possibility of producing efficacious antibiotic to treat carbapenems-resistant systemic infections. The determination of the toxicological effect of the isolated active antimicrobial compounds of guava leaves extract is worth following in subsequent studies.

Keywords: *Psidium guajava*, Phytochemicals, Carbapenem, Carbapenem-resistant *Klebsiella pneumoniae*.

An *in vivo* evaluation of the versatility of Cocoa pod husk pectin based formulations for the chronodelivery of hydrocortisone in Sprague dawley rats

Ofosua Adi-Dako¹, Joseph Adusei Sarkodie², Benoit Banga N'guessan³, Doris Kumadoh^{4,5}

¹Department of Pharmaceutics and Microbiology, University of Ghana School of Pharmacy, Accra, Ghana

²Department of Pharmacognosy and herbal Medicine, University of Ghana School of Pharmacy, Accra, Ghana.

³Department of Pharmacology and Toxicology, University of Ghana School of Pharmacy, Accra, Ghana.

⁴Department of Pharmaceutics, Centre for Plant Medicine Research, Mampong-Akuapem, Ghana

⁵Department of Production, Centre for Plant Medicine Research, Mampong-Akuapem, Ghana

Abstract.

An evaluation of of cocoa pod husk (CPH) pectin as a carrier for the chronodelivery of hydrocortisone was conducted in Sprague dawley rats. CPH pectin based modified release capsules were extemporaneously formulated with hydrocortisone (10 mg) and crosslinked with either calcium chloride and labelled as Formulation X or with zinc and labelled as Formulation Y. A commercially available immediate release hydrocortisone formulation was administered orally to Sprague-Dawley rats The pharmacokinetic parameters were evaluated. Formulation X had a 2 h lag phase and elicited a higher serum drug concentration in the treated rats. Peak concentrations (C_{max}) of 21.799 ± 1.993 ng/ml and 20.844 ± 2.661 ng/ml were achieved after 6 ± 0.23 h and 6 ± 0.35 h (T_{max}), respectively, for capsules X and Y. The immediate release formulation had a peak concentration of 15.322 ± 0.313 ng/ml within 1 ± 0.2 h. The relative bioavailability of the CPH pectin-based formulations X and Y was 213% and 274%, respectively. Formulations X and Y had half-lives more than three times that of the commercially available formulation. The formulated modified release preparations exhibited a higher exposure, greater bioavailability, and versatility in release of cortisol than the commercial immediate release formulation and extended drug release. The CPH pectin based formulations hold promise in the management of cortisol/hydrocortisone deficiencies.

Key words: Cortisol, modified release, cocoa pectin, adrenal insufficiency, pharmacokinetics

Closing Ceremony For The First Centre’s Oku Ampofo Memorial Conference

Venue: AH Hotel and Conference, East Legon Date: 3rd November, 2022

Time	Activity	Responsible Persons
4:00pm –	Opening prayer –	Mr. Tonny Asafo Agyei
4:05pm –	Introduction of chairperson –	Mrs. Susan Oteng Mintah
4:10pm –	Chairperson’s remarks –	Dr. Kofi Busia
4:15pm –	A walk through Memorial Lane & Next Steps	Dr. Kofi Donkor
4:20pm –	Funding of plant medicine research	Prof. Gilbet M. Matsabisa / Dr. Kofi Busia
4:40pm –	Publication of Conference Proceedings	Dr. Kofi Busia
4:50pm -	Evaluation of conference -	LOC
4:55pm-	Executive Director’s remarks –	Prof. Alex Asase, Director CPMR
5:00pm –	Chairperson’s closing remarks-	Dr. Kofi Busia
5:05pm –	Vote of Thanks –	Ms. Ama Eunice Oppong
5:10pm -	Closing Prayer	

Thinking about your Printing Problems?

... Don't worry
Presbyterian Press Ltd.
is the solution to all
your printing needs



HIGH
QUALITY
LOW
BUDGET

FLYERS FOLDERS
CALENDARS BUSINESS CARDS
BROCHURES DIARIES POSTERS



📍 Off the Graphic Road,
101 Miamona Close,
South industrial area,
near Agbobbloshie
@ presbypress@gmail.com
☎ 0542 357 118



URO500



YOUR TRUSTED SUPPLEMENT
For The Maintenance of
PROSTATE HEALTH
and improvement in Urine Flow

For Bulk Purchase please contact 0547869574 | 0342195766



P.O.Box 73, Mampong-Akuapem, Ghana
Corporate & media relations: 0242959615

 Officialcpmr  @CPMRGH  www.cmpr.org.gh  info@cpmr.org.gh