COMSATS' International Thematic Research Group on Natural Products Sciences

Presented by
Farzana Shaheen and M. Iqbal Choudhary
International Center for Chemical and Biological Sciences, University of Karachi
Karachi-75270, Pakistan

22nd MEETING OF COMSATS COORDINATING COUNCIL
Hosted by

Tianjin Institute of Industrial Biotechnology (TIB), Tianjin, China,
16 – 17 April 2019

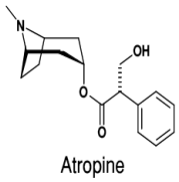
COMSATS' ITRG on Natural Products Sciences

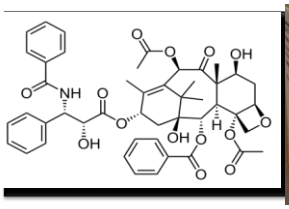
Natural Product based Drug Discovery

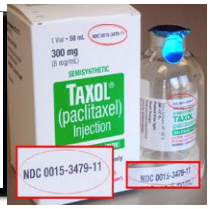
- **The use of natural products, especially plants, as medicines is ancient and universal.**
- **About 88 per cent of the world's population, rely mainly on traditional medicine for their primary health care.**
- **In modern drug discovery process, natural products play an important role at the early stage of 'lead' discovery.**
- **Over the last century, a number of top selling drugs have been developed from natural products.**

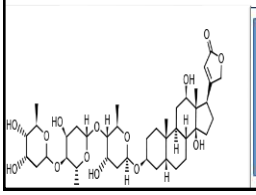
Natural Product based Drug Discovery

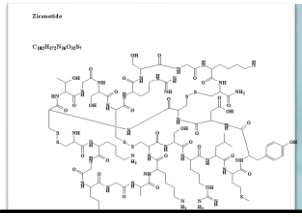
- Atropine obtained from *Atropa belladonna,*
- *Strychnine* a CNS stimulant,
- *Ziconotide* identified from a cone snail*, Conus magus*, (non- NSAID analgesic drug)
- Taxol® obtained from the bark of the Pacific yew tree











Natural Product based Drug Discovery

Drug discovery using natural products is a big challenging task:

- **Collect source**
- **Crude Extracts**
- **Bioassay Screening**
- **Separation of constituents: HPLC, HPTLC, GC**
- **Finding lead molecules**
- **Structure Elucidation**
- **New drug discovery (Publications, patents)**
- **Development phase , Clinical Trials, Phase I, II, III**
- **Approval process, marketing….Phase IV**

HERBAL PLANTS REPRESENT AN IMPORTANT SOURCE OF LEAD MOLECULES TO DISCOVER NEW DRUGS.

- **Major population in developing World rely on herbal medicine for their healthcare needs.**
- **Herbal medicine contain a large variety of different compounds.**
- **The active principle present in small amount, so herbals are expected to be less active than pure compound.**

Why Joint Efforts are required in Natural Product based Drug Discovery

- **Infectious diseases, malaria, dengue and cancer are more prevalent in developing countries.**
- **Developing countries are rich in medical plants which have been used by folk people for the treatment of various diseases.**
- **Effective, safe, and affordable modern medicines are not available to poor population living the developing world.**
- **For example the cost of newer antimalarial drugs is unaffordable sometimes unavailable to local population where malaria is endemic.**

Why Joint Efforts are required in Natural Product based Drug Discovery

- Collaborative research to identify active principle of medicinal plants and their development as medicine should be carried out in order to achieve self reliance .
- There is strong need of training of manpower in the key aspects of natural product research and its applications to make drug discovery programs stronger in developing countries.

Foundation of COMSATS' International Thematic Research Group on Natural Products Sciences

Under the leadership of Director ICCBS, Prof. M. Iqbal Choudhary, *H.I., S.I., T.I.*, COMSATS' International Thematic Group on Natural Products Sciences was launched during the Foundation meeting at the ICCBS on 26th November, 2010 through a Memorandum of Understanding signed by several COMSATS countries

COMSATS' International Thematic Research Group on Natural Products Sciences
Objectives

- **To promote research collaboration among the members.**
- **To plan joint research projects.**
- **To train students, technicians and senior professionals.**
- **To share expertise and lab resources.**

Members of COMSATS' ITRG on Natural Products Sciences

- ICCBS is the designated Lead Centre for this thematic research group.
- **During the foundation meeting, five collaborating institutions were selected as its members**
  - **National Research Centre (Egypt);**
  - **Industrial Research and Consultancy Centre (Sudan);**
  - **Tanzania Industrial Research and Development Organization (Tanzania);**
  - **Royal Scientific Society (Jordan)**
  - **Iranian Research Organization for Science & Technology (Iran).**

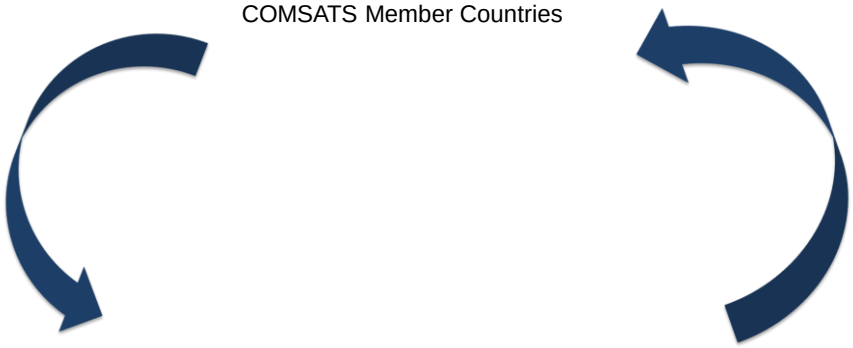
Members of COMSATS' ITRG on Natural Products Sciences

Nineteen participants from eight countries, Bangladesh, Egypt, Iran, Jordan, Nigeria, Pakistan, Sudan, Turkey, attended the meeting.

Other participating institutions of the meeting included:

- **Department of Science Laboratory Technology of the Federal Polytechnic (Nigeria)**
- **Institute of Fundamental Studies (Sri Lanka)**
- **Department of Biochemistry and Molecular Biology, University of Dhaka**
- **Department of Biology, Ege University (Turkey)**
- **Lorestan University of Medical Sciences (Iran)**

COMSATS' ITRG on Natural Products Sciences



Main Activities
Capacity Building and Joint Research Project

SCIENTIST FROM COMSATS MEMBER COUNTRIES VISITED ICCBS IN 2018

Name	Country	Duration
Mr. Ahmed Agiba	Egypt	3 Months
Dr. N. Goren	Turkey	3 Months
Miss Iman Ibrahim	Lebnon	
Dr. Haroon	Srilanka	3 Months
Mr. Hasitha Weeratunge	Srilanka	3 Months
Mr. Hasitha	Srilanka	One Year
Ms. Zehra Moslemi	Iran	One Week
Mr. Peiwu Cui	China	3 Months

SCIENTIST FROM COMSATS MEMBER COUNTRIES VISITED ICCBS (2018)

Name	Country	Course Duration
Ms. OwoolaAzeezat	Nigeria	6 months
Mr. Yeye Emmanuel	Nigeria	4 years
Mr. Onoja Ojogbane Joel	Nigeria	6 months
Mr. Oluwatoyin Babatunde	Nigeria	6 months
Mr. Okoro Emeka Emea	Nigeria	6 months
Ms. Opeyemi Balogun	Nigeria	6 Months
Mr. Ogunlakin Akingbolabo Daniel	Nigeria	6 months
Mrs. Oyetoro IdayatAdeola	Nigeria	6 months
Mr. KayodeMuritalaSalawu	Nigeria	6 Months
Ms. Mojisola Olajumoke Salami	Nigeria	6 Months
Mr. OkpalaEjike	Nigeria	3 months

Collaboration between ICCBS and Research Institutions of Sri Lanka in Natural Products Sciences

[Sachindra Melshandi Perera, and Sachini Jayawardana]

Industrial Technology Institute (ITI), Bauddhaloka Mawatha, Colombo, Sri Lanka,visited ICCBS during 2017-2018 .

They received training in immunomodulatory assay, enzyme inhibition studies and cell culture techniques at the ICCBS.

BMC Complementary and Alternative Medicine (2018) 18:271
RESEARCH ARTICLE Open Access

In vitro pro-inflammatory enzyme inhibition and anti-oxidant potential of selected Sri Lankan medicinal plants

Hettiarachchige Dona Sachindra Melshandi Perera[1], Jayanetti Koralalage Ramani Radhika Samarasekera[1*], Shiroma Mangalika Handunnetti[2], Ovitigala Vithanage Don Sisira Jagathpriya Weerasena[2], Hasitha Dhananjaya Weeratunga[1], Almas Jabeen[3] and Muhammad Iqbal Choudhary[4]

Abstract

Background: The extracts of the ten selected Sri Lankan medicinal plants have been traditionally used in the treatment of inflammatory mediated diseases. The extracts were investigated for anti-inflammatory and anti-oxidant potential in vitro to identify bio-active extracts for further chemical characterization.

Methods: In vitro anti-inflammatory activities of total ethanol extracts were investigated measuring the inhibitory activities of four pro-inflammatory enzymes, arachidonate-5- lipoxygenase (A5-LOX), hyaluronidase (HYL), xanthine oxidase (XO) and inducible nitric oxide (iNO) synthase. Cytotoxicity of extracts were determined by MTT assay. Oxidative burst inhibition (OBI) on human whole blood (WB) and isolated polymorphoneutrophils (PMNs) was carried out for a selected bio-active extract. Anti- oxidant activities of the extracts were determined by 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging, ferric reducing antioxidant power (FRAP), ferrous ion chelation (FIC) and oxygen radical absorbance capacity (ORAC) assays. Total polyphenol and total Flavonoid contents of the extracts were also determined. The most active plant extract was analysed using Gas chromatography-Mass spectrometry (GC-MS) and High Performance Liquid Chromatography (HPLC).

Results: The ethanol bark extract of *Flacourtia indica* showed the highest A5-LOX (IC_{50}: 22.75 ± 1.94 g/mL), XO (70.46 ± 0.18%; 250 μg/mL) and iNOs inhibitory activities on LPS- activated raw 264.7 macrophage cells (38.07 ± 0.93%; 500 μg/mL) with promising OBI both on WB (IC_{50}: 47.64 2.32 μg/mL) and PMNs (IC_{50}: 5.02 0.38 μg/mL). The highest HYL inhibitory activity was showed by the leaf extracts of *Barathranthus nodiflorus* (42.31 ± 2.00%; 500 μg/mL) and *Diospyros ebenum* (41.60 ± 1.18%; 500 μg/mL). The bark and leaf extracts of *Callophyllum innophyllum* (IC_{50}: 6.99 ± 0.02 μg/mL) and *Symplocus cochinchinesis* (IC_{50}: 9.85 ± 0.28 μg/mL) showed promising DPPH free radical scavenging activities. The GC-MS analysis of ethanol bark extract of *F. indica* showed the presence of two major bio-active compounds linoleic acid ethyl ester and hexadecanoic acid, ethyl ester (> 2% peak area). The HPLC analysis showed the presence polyphenolic compounds.

Conclusion: The ethanol bark extract of *F. indica* can be identified as a potential candidate for the development of anti-inflammatory agents, which deserves further investigations. The bio-active plant extracts may be effectively used in the applications of cosmetic and health care industry.

Keywords: Anti-inflammatory, Enzyme inhibition, Anti-oxidant, Medicinal plants, *F. indica*, Gas chromatography-mass spectrometry, High performance liquid chromatography

Collaboration between ICCBS and Research Institutions of Sri Lanka in Natural Products Sciences

Wageesha *et al. Chemistry Central Journal (2017) 11:2*
DOI 10.1186/s13065-016-0234-4

Chemistry Central Journal

RESEARCH ARTICLE Open Access

Nekadage Don Amal Wageesha, Preethi Soysa, Keerthi Atthanayake, Mahinda Ekanayake

Department of Biochemistry and Molecular Biology, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka

A traditional poly herbal medicine "Le Pana Guliya" induces apoptosis in $HepG_2$ and HeLa cells but not in CC1 cells: an in vitro assessment

Nekadage Don Amal Wageesha[1,2], Preethi Soysa[2*], Keerthi Atthanayake[1], Muhammad Iqbal Choudhary[3,4] and Mahinda Ekanayake[5]

Abstract

"Le Pana Guliya" (LPG) is a polyherbal formulation which is used to treat different types of cancers in traditional medicine. In this study we describe in vitro efficacy and mechanism of action of LPG on two cancer cell lines ($HepG_2$ and HeLa) compared with a normal cell line CC1. The MTT, LDH assays and protein synthesis were used to study antiproliferative activity of LPG while NO synthesis and GSH content were assayed to determine the oxidative stress exerted by LPG. Rhodamine 123 staining, caspase 3 activity, DNA fragmentation and microscopic examination of cells stained with ethidium bromide/acridine orange were used to identify the apoptosis mechanisms associated with LPG. The LPG showed the most potent antiproliferative effect against the proliferation of $HepG_2$ and HeLa cells with an EC_{50} value of 2.72 ± 1.36 and 19.03 ± 2.63 μg/mL for MTT assay after 24 h treatment respectively. In contrast, CC1 cells showed an EC_{50} value of 213.07 ± 7.71 μg/mL. Similar results were observed for LDH release. A dose dependent decrease in protein synthesis was shown in both cancer cell types compared to CC1 cells. The reduction of GSH content and elevation of cell survival with exogenous GSH prove that the LPG act via induction of oxidative stress. LPG also stimulates the production of NO and mediates oxidative stress. Rhodamine 123 assay shows the mitochondrial involvement in cell death by depletion of $\Delta\psi$ inducing downstream events in apoptosis. This results in increase in caspase-3 activity eventually DNA fragmentation and LPG induced apoptotic cell death. In conclusion the present study suggested that the LPG exerted an anticancer activity via oxidative stress dependent apoptosis. Therefore present study provides the scientific proof of the traditional knowledge in using LPG as an anticancer agent.

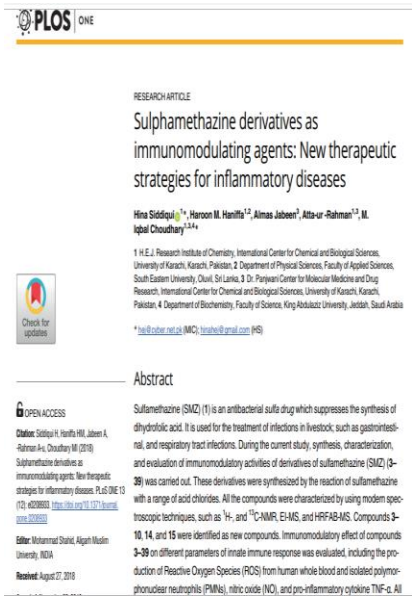
Keywords: Anti-cancer activity, MTT assay, LDH assay, GSH, Rhodamine123, Cytotoxicity

Collaboration between ICCBS and Research Institutions of Sri Lanka

Dr. M. H. Haroon
Senior Lecturer, Department of Physical Sciences, Faculty of Applied Sciences, South Eastern University, Oluvil, Sri Lanka,

VISIT of ICCBS
2017 (1 year)
2018 (2months)

Mr. Hasitha Weeratunge
Spectroscopic Analysis of Natural Products
Duration: Oct 2017 - Jan 2018



PLOS ONE

RESEARCH ARTICLE

Sulphamethazine derivatives as immunomodulating agents: New therapeutic strategies for inflammatory diseases

Hina Siddiqui[1]*, Haroon M. Haniffa[1,2], Almas Jabeen[3], Atta-ur-Rahman[1,3], M. Iqbal Choudhary[1,3,4]*

1 H.E.J. Research Institute of Chemistry, International Center for Chemical and Biological Sciences, University of Karachi, Karachi, Pakistan, 2 Department of Physical Sciences, Faculty of Applied Sciences, South Eastern University, Oluvil, Sri Lanka, 3 Dr. Panjwani Center for Molecular Medicine and Drug Research, International Center for Chemical and Biological Sciences, University of Karachi, Karachi, Pakistan, 4 Department of Biochemistry, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia

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Check for updates

OPEN ACCESS

Citation: Siddiqui H, Haniffa HM, Jabeen A, -Rahman A-u, Choudhary MI (2018) Sulphamethazine derivatives as immunomodulating agents: New therapeutic strategies for inflammatory diseases. PLoS ONE 13 (12): e0208833. https://doi.org/10.1371/journal.pone.0208833

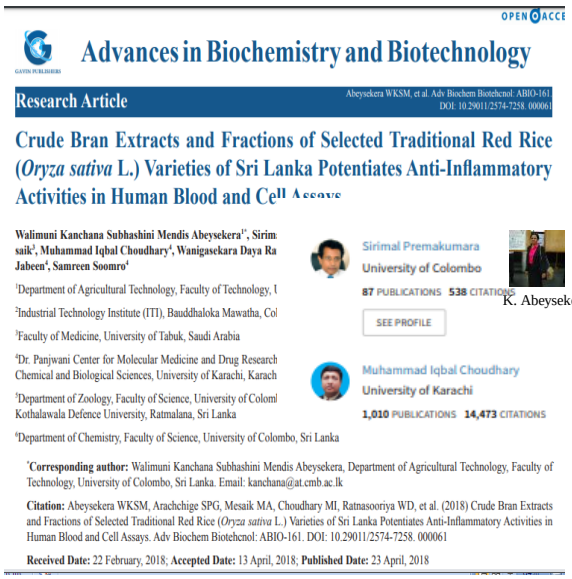
Editor: Mohammad Shahid, Aligarh Muslim University, INDIA

Received: August 27, 2018

Abstract

Sulfamethazine (SMZ) (1) is an antibacterial sulfa drug which suppresses the synthesis of dihydrofolic acid. It is used for the treatment of infections in livestock; such as gastrointestinal, and respiratory tract infections. During the current study, synthesis, characterization, and evaluation of immunomodulatory activities of derivatives of sulfamethazine (SMZ) (**3–39**) was carried out. These derivatives were synthesized by the reaction of sulfamethazine with a range of acid chlorides. All the compounds were characterized by using modern spectroscopic techniques, such as ^{1}H-, and ^{13}C-NMR, EI-MS, and HREAB-MS. Compounds **3–10**, **14**, and **15** were identified as new compounds. Immunomodulatory effect of compounds **3–39** on different parameters of innate immune response was evaluated, including the production of Reactive Oxygen Species (ROS) from human whole blood and isolated polymorphonuclear neutrophils (PMNs), nitric oxide (NO), and pro-inflammatory cytokine TNF-α. All

Joint projects and publication of ICCBS Industrial Technology Institute, and University of Colombo, Sri Lanka



OPEN ACCE

Advances in Biochemistry and Biotechnology

Research Article

Abeysekera WKSM, et al. Adv Biochem Biotehcnol: ABIO-161. DOI: 10.29011/2574-7258. 000061

Crude Bran Extracts and Fractions of Selected Traditional Red Rice (*Oryza sativa* L.) Varieties of Sri Lanka Potentiates Anti-Inflammatory Activities in Human Blood and Cell Assays

Walimuni Kanchana Subhashini Mendis Abeysekera[1*], Sirim saik[2], Muhammad Iqbal Choudhary[4], Wanigasekara Daya Ra Jabeen[4], Samreen Soomro[4]

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[2]Industrial Technology Institute (ITI), Bauddhaloka Mawatha, Col

[3]Faculty of Medicine, University of Tabuk, Saudi Arabia

[4]Dr. Panjwani Center for Molecular Medicine and Drug Research Chemical and Biological Sciences, University of Karachi, Karach

[5]Department of Zoology, Faculty of Science, University of Colom Kothalawala Defence University, Ratmalana, Sri Lanka

[6]Department of Chemistry, Faculty of Science, University of Colombo, Sri Lanka

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University of Karachi
1,010 PUBLICATIONS 14,473 CITATIONS

K. Abeysekera

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Citation: Abeysekera WKSM, Arachchige SPG, Mesaik MA, Choudhary MI, Ratnasooriya WD, et al. (2018) Crude Bran Extracts and Fractions of Selected Traditional Red Rice (*Oryza sativa* L.) Varieties of Sri Lanka Potentiates Anti-Inflammatory Activities in Human Blood and Cell Assays. Adv Biochem Biotehcnol: ABIO-161. DOI: 10.29011/2574-7258. 000061

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Joint Publications of ICCBS with Al-Farabi KazNU

Gulnaz Seitimva

KazNU visited ICCBS and worked on Phytochemical studies of medicinal plant

DOI 10.1007/s10600-019-02634-6
Chemistry of Natural Compounds, Vol. 55, No. 1, January, 2019

POLYPHENOLS FROM *Suaeda acuminata*

Yu. A. Litvinenko
Gulnaz Seitimova
4.67 · Al-Farabi Kazakh ...
Gauhar Shahmanovna Bu...
19.1 · Al-Farabi Kazakh ...
. Iqbal Choudhary

The family Chenopodiaceae numbers greater than 100 genera and about 1,500 species in the global flora with 51 genera and 256 species in Kazakhstan. The genus *Suaeda* is one of the richest in biologically active compounds. The flora of the USSR included 27; of Kazakhstan, 17 *Suaeda* spp. [1, 2].

The present research used the aerial part of *S. acuminata* collected during flowering in Almaty Oblast.

Previously, *S. physophora* yielded narcissin, 4′-hydroxy-5,32-dimethoxyflavone 3-*O*-α-L-rhamnopyranoside-7-*O*-β-D-glucopyranoside; *S. microphylla*, quercetin 3-*O*-rutinoside and isorhamnetin 3-*O*-α-L-rhamnopyranoside [3].

Moisture content (5.7%), total ash (23.6%), and amount of extracted compounds (42.4%) were determined using the general methods of the SP, RK, 1st Ed. Analyses of constituents detected amino acids; flavonoids; mono-, oligo-, and polysaccharides; saponins; alkaloids; and traces of coumarins.

The ground aerial part of *S. acuminata* (3 kg) was extracted (2×) with aqueous EtOH (70%) at room temperature for 72 h. The combined extract was concentrated and worked up sequentially with hexane, $CHCl_3$, EtOAc, and *n*-BuOH. Column chromatography of the $CHCl_3$ concentrate over silica gel with elution by $CHCl_3$–MeOH (97:3–85:15) isolated **1**–**4**; of the EtOAc concentrate over Sephadex LH-20 with elution by MeOH–H_2O (1:1, 2:1, 3:1), **5**–**7**. Compounds **1**–**7** were identified as follows using physicochemical data and comparisons with literature data.

Training of Scholars from Al-Farabi KazNU

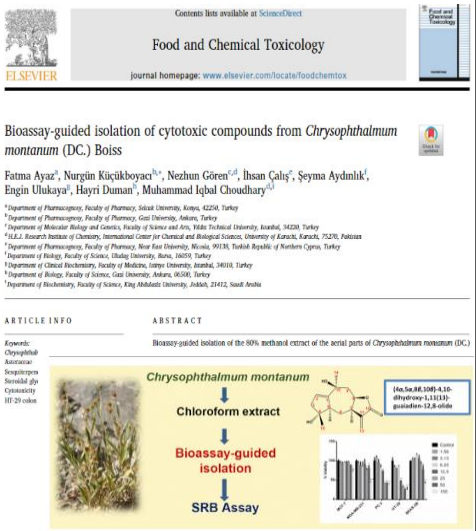
Dr. Bates Kudaibergenova Malikovna, Department of Chemistry, Al-Farabi Kazakh National University, Almaty, Kazakhstan.

During her visit of ICCBS in 2018, she learned to make animal model of burn wounds in rats.

Dr. Bates also analyzed her polymer composites containing Richlokain and Alchidine in these models. The active polymers were later screened in the toxicity assays.

Joint Publications of ICCBS with Yıldız Technical University, Istanbul, Gazi University, Ankara, Selcuk University, Konya, Turkey

Nezhun Gören visited ICCBS (2018)
Department of Molecular Biology and Genetics, Faculty of Science and Arts, Yıldız Technical **University, Istanbul, Turkey**



Joint Publications of ICCBS with University Istanbul, Mustafa Kemal University, Turkey

Dr. Fatma Completed her Ph.D. with Prof. Iqbal at the ICCBS

Dr. Fatma Aydoğmuş-Öztürk
Department of Molecular Biology and Genetics, Faculty of Science, Istanbul University, 34134 Istanbul, Turkey.
Köyceğiz Vocational School, Muğla SıtkıKoçman University, 48800-Köyceğiz, Muğla, Turkey

Aydoğmuş-Öztürk F, Günaydin K, Öztürk M, Jahan H, Duru ME, Choudhary MI (2018) Effect of Sideritis leptoclada against HT-144 human malignant melanoma. *Melanoma Research* 28(6):502-509.

Aydoğmuş-Öztürk F, Jahan H, Beyazit N, Günaydın K, Choudhary MI (2019) The anticancer activity of visnagin, isolated from Ammi visnaga L., against the human malignant melanoma cell lines, HT 144. *Molecular Biology Reports* doi: 10.1007/s11033-019-04620-1.

Collaboration between ICCBS and Research Institutions of Nigeria in Natural Products Sciences

TWAS Fellow Akingbolabo Daniel Ogunlakin

Department of Pharmacognosy, Faculty of Pharmacy, University of Ibadan, Ibadan, Nigeria

Visit of ICCBS
6 months (2018)

Project Title

Anti-proliferative effectof *Kigelia africana*(Lam.) Benth.fruit and isolated compounds on cervical and ovarian cancer cells

Collaboration between ICCBS and Research Institutions of Nigeria in Natural Products Sciences

Umeokoli Blessing Ogechukwu

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Contents lists available at ScienceDirect

Fitoterapia

journal homepage: www.elsevier.com/locate/fitote

Bioactive chemical constituents of *Duboscia macrocarpa* Bocq., and X-ray diffraction study of 11β, 12β-epoxyfriedours-14-en-3α-ol

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[c] H.E.J. Research Institute of Chemistry, International Center for Chemical and Biological Sciences, University of Karachi, Karachi 75270, Pakistan
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[f] Institute of Inorganic and Structural Chemistry, Heinrich-Heine-University Düsseldorf, Universitätsstrasse 1, 40225 Düsseldorf, Germany
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[h] Department of Pharmaceutical and Medicinal Chemistry, Nnamdi Azikiwe University, Awka, Nigeria

ARTICLE INFO

Keywords:
Duboscia macrocarpa Bocq.
Triterpenes
Evodoulolide
Duboscic acid B
Molecular structure

ABSTRACT

A new γ-lactone triterpenoid, Evodoulolide (1) and a new triterpenoid Duboscic acid B (2), along with five known compounds, maslinic acid (3), arboreic acid (4), (E)-3-(4-hydroxyphenyl)-N-[2-(4-hydroxyphenyl) ethyl] prop-2-enamide (5), (E)-heptacos-19-enoic acid (6) and 11β,12β-epoxyfriedours-14-en-3α-ol (7) were isolated from the trunk wood of *Duboscia macrocarpa*. Their structures were elucidated from extensive ^{1}D- and ^{2}D-NMR and MS and by comparison of their spectra with published data. Compounds **1**, **3**, **5** and **6** exhibited significant α-glucosidase inhibitory activity. Compound **5** was found to be a potent inhibitor (IC_{50} = 5.1 ± 0.1 μM) of α-glucosidase as compared to acarbose (IC_{50} = 625.0 ± 1 μM) used as standard drug. These compounds did not show anti-glycation activity using the BSA-MG glycation model or inhibition against the α-chymotrypsin enzyme. The chemotaxonomic connotation of the isolated secondary metabolites is also herein described. The single-crystal X-ray and absolute configuration diffraction analysis of 11α, 12α-epoxyfriedours-14-en-3-ol (7) is also described here for the first time.

Prof. Dr. Muhammad Iqbal Choudhary received “Al-Farabi KazNU Honorary Doctor" degree from the University of Al-Farabi Kazakh National University, by the higher official of Kazakhstan's Ministry of Education and Science in recognition of his extraordinary and outstanding scientific achievements in the field of organic chemistry and natural products chemistry.

Prof. Dr. M. Iqbal Choudhary Centre for Natural Product Research (ICC-NPR)

The Edo State Polytechnic, Usen, hosted the most accomplished scientist in Pakistan, Prof. Dr. M. Iqbal Choudhary, to a one-day international symposium entitled, ‘Recent Discoveries in Natural Product Sciences’, and launched a natural product research center “Prof. Dr. M. Iqbal Choudhary Centre for Natural Product Research (ICC-NPR)” at the institution, Benin, Nigeria on December 21, 2018.

Foundation Laying Ceremony / Inaugration of “Prof. Dr. M. Iqbal Choudhary Centre for Natural Product Research” held on December 21, 2018.

First Joint Laboratory for Innovation in Natural Products Research and Development

The first 'Joint Laboratory for Innovation in Natural Products Research and Development', was jointly established by Kazakhstan and Pakistan in the Prof. Dr. Wolfgang Voelter Laboratories Complex of the ICCBS on Mach 05, 2019.

2nd International Symposium on Natural Products for the Future (ISNPF-2)

November 4-6, 2018

This symposium brought together leading experts in the field of natural products sciences from different countries as well to develop global partnerships for sustainable utilization of natural resources for the common benefit of humanity and rapid development of the countries in the south.

Participation of scientist from Al-Qudus University, Palestine

Assistant Professor and Director. Biotechnolgy Research Center, Palestine Polytechnic University, **Dr. Rami Mamdouh Arafeh**y was invited top deliver lecture on "Induction, Elicitation and Determination of Total Secondary Metabolites from *In-vitro*Growing Cultures of *Arbutus andrachne* L"

Inivited lecture of Scientist fro m Tianjin Institute of Industrial Biotechnology, China

Prof. Huifeng Jiang from TIB delivered a lecture in the "2nd International Symposium on Natural Products for the Future (ISNPF-2)" and "14th International Symposium on Natural Product Chemistry (ISNPC-14)" organized by the ICCBS during 2018.

9th Asian Network of Research on Anti-Diabetic Plants (ANRAP) International Seminar

January 25-27, 2019

ANRAP-9 organized by ICCBS provided an opportunity to bring world famous scientists in the multidisciplinary fields of metabolic disorders together and exchange ideas on developing a common strategy towards the science-based development of plant-based medicine against diabetes, and other metabolic disorders.

Visit of Delegation of Al-Farabi KazNU, Kazakhstan Al-Farabi Kazakh National, University, Almaty, Kazakhstan

A delegation of Al-Farabi KazNU, Kazakhstan including Prof. Dr. Tlekkabul Ramazanov, Vice-Rector of Science and Innovations, Prof. Dr. Zharylkassyn Abilov, visited the ICCBS.

- **Joint project submission.**
- **Training of Kazakh research Scholars at the ICCBS**
- **Preclinical studies of hepatoprotective medicinal products**
- **developed by Kazakh scientists at the ICCBS.**

Collaboration between ICCBS (International Center for Chemical and Biological Sciences) and Tianjin Institute of Industrial Biotechnology, China

The Director ICCBs visited TIB, China on January 8, 2019. During his visit to Tianjin Institute of Industrial Biotechnology, many collaborative projects between ICCBS and TIB have been planned. During meetings, ICCBS and TIB signed the MoU on Cooperation of Science and Technology.

ICCBS and TIB Signs the MoU on Cooperation of Science and Technology

Collaboration between ICCBS (International Center for Chemical and Biological Sciences) and Tianjin Institute of Industrial Biotechnology, China

Recently five scientists from TIB joined the ITRG network on natural product sciences.

- **Prof. Meng Wang: Biotechnology/bio-engineering**
- **Asso. Prof. Jinhui Feng: Enzyme catalyzed synthesis of natural products**
- **Prof. Huifeng Jiang (Synthetic biology),**
- **Prof. Tao Liu (Metabolic engineering, Bio-organic chemistry)**
- **Dr.Zhubo Dai: Synthetic biology and metabolic engineering**

Future Work

With focus towards developing more stronger linkages with COMSATS Center of Excellence

Post-doctoral training Opportunities to research scholars at the ICCBS.

Workshop on "Finding remedies for cure of infectious diseases" In November 2019.

Thank you very much for your attention