"Recent Trends in Postgraduate Research"

December 5-6, 2015
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Welcome from the Chair

Dear Colleagues,

On behalf of our faculty members, I would like to extend the most cordial welcome to every participant in our ASU Pharmacy (ASUP) Second Symposium. I would also like to welcome our keynote speakers who travelled all the way to Jordan to share with us their knowledge and expertise. In admiration for the valuable research conducted by our postgraduate students in Jordan, we envisaged the importance of bringing the students from the different universities together to share their experience and research. Hence, the theme to our Second Symposium remains "Recent Trends in Postgraduate Research".

We hope that this year’s meeting will succeed again in bringing all disciplines of postgraduate pharmacy research in Jordan together, allowing our postgraduates to present their work, share their new research findings with their peers, experience formal exchange of ideas and set the stage for augmenting collaboration.

The Symposium this year is International, providing a prime networking opportunity for all pharmacy education professionals including the deans, academics and industry representatives.

The comprehensive program is indicative of the breadth and quality of work currently underway in the various schools of pharmacy in Jordan, Iraq and Palestine.

I sincerely thank all participants who facilitated our scientific program. Your oral and poster presentations contribute to conserve a great scientific standard.

Finally, I express my gratitude to all members of the scientific and organizing committees for their dedicated efforts. I sincerely hope that our scientific program meets your expectations, and offers an exciting and rewarding conference for all.

Iman Amin Basheti BPharm, MPharm, PhD
Associate professor in Clinical Pharmacy
Dean of Faculty of Pharmacy
Applied Sciences University
Chairperson of the conference
# Important Information

| **Registration** | Location of conference registration will be at the entrance of the Conference Palace.  
Registration will be open from 8.0 am till 3.0 pm, on both conference days.  
Badges and conference bags will be available at the registration desk. |
| **Prayer** | Coffee breaks are organized to suit prayer times.  
The Conference Palace is very close (1 minute walking distance) from the University Mosque. |
| **Competition** | Each Oral presentation and Poster will be evaluated by three evaluators.  
Evaluators are pharmacy academics from different Jordanian Universities.  
Evaluations are based on detailed pre-specified criteria set by the conference scientific committee. Each participant will receive a final mark based on the three evaluations provided by the evaluators. Finally, marks will be compared and winners determined.  
Announcement of winners will take place during the closing ceremony of the conference. |
| **Workshops** | Workshop registration can be completed during the conference, before the workshop. Fees: Students 15 JD; Academics 20 JD.  
Workshops will be held at the Faculty of Pharmacy, ASU (5 minutes walking distance from the Conference Palace). |
| **Dinner** | Dinner on both days will be served in the Conference Palace, Second floor.  
The dinner will include a buffet. Suitable for vegetarians as well. |
About the Symposium

ASU - Pharmacy First National Conference

ASU - Pharmacy First National Conference, supported by Applied Science University, Amman Jordan, is an annual event introduced in 2014. This unique annual meeting aims at presenting latest developments and advancements in the field of postgraduate research in Jordan and the nearby region. It is also a ground for interaction for pharmacy professionals, including, but not limited to; lecturers, deans, researchers, students, pharmacists, and the wider pharmaceuticals industry.

The Conference provided a competition between all postgraduate students from Jordan, presenting their research work through oral talks or posters.

Last year’s conference was exceptional by the variety of pharmacy research topics it conferred and the large number of attendees it hosted, including students, both undergraduates and postgraduates, academics, deans and industry representatives.

Conference keynote speakers included world renowned pharmacists such as Doctor Alsayed Alarabi, PhD Pharmaceutical Technology, Consultant at Total Quality (TQ) Pharma; Professor Mutasem Taha: lecturer at the University of Jordan/ department of Pharmaceutical Sciences; Professor Mayyada Wazaify: lecturer at the University of Jordan/ department of Biopharmaceutics and Clinical Pharmacy; Dr Adnan Badwan: General Director of The Jordanian Pharmaceutical Manufacturing Company (JPM) in Jordan and the President of the Board of Directors of The Arab Union of The Manufacturers of Pharmaceutical and Medical Appliances (AUPAM).

Following the Conference, great feedback from attendees and speakers was received. It was truly rewarding to see the ASU Faculty of Pharmacy plays an important role in the world of pharmacy in Jordan.
About the Symposium

ASU-Pharmacy Second Symposium

ASU-Pharmacy second symposium (ASUP) to be held on the 5th and 6th of December 2015 is an international scientific gathering aimed at providing exceptional continuing pharmacy information and latest updates in postgraduate research in Jordan, the nearby region and worldwide.

This year, the symposium will host unique Keynote speakers from all around the world, including USA, Australia, Italy, Palestine and our beautiful Jordan. In addition to comprising a unique pharmaceutical exhibition and exciting workshops on Ethics and mini-application challenges in pharmacy practice. Hence, from hands-on workshops to inspiring speeches, the 2015 ASUP Second Symposium comprises more than 40 abstracts covering an extensive range of pharmaceutical research topics suitable for new researchers and supervisors alike.

The Symposium will set the ground for important networking in the field of pharmacy, paving the way for joint collective research projects.

This highly anticipated event will sum up with a formal dinner that will bring together the Deans and respected guests from the world of pharmacy.

As academics and researchers, we hope that you will enjoy this annual must-attend event for education and research leaders of all pharmacy areas.

As postgraduate students, we hope that you will enjoy the company of your peers, share knowledge, learn from each other, and gain tools to help you improve your own skills and knowledge about your field.
Higher Committee Members

Dr. Iman Basheti (Chair of the Symposium)

Dr. Maysoon Baker Saleh (Head of the committee)
Dr. Wamid Talib (Member)
Dr. Adel Ardakani (Member)

Dr. May Abu Taha (Member)
Dr. Rana Abu Farha (Member)
Dr. Lara Fakhouri (Member)

MSc. Samar Khater (Member)
Pharmacist. Ena’m Atieh (Member)
Mr. Fawzi Arini (Member)
**Symposium Agenda**

**Saturday- 5\textsuperscript{th} of December**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>9:00-10:00</td>
<td>Registration</td>
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<tr>
<td>1:00-11:00</td>
<td><strong>Opening ceremony</strong></td>
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<tr>
<td>10:00-10:05</td>
<td>Recitation from the Holy Qur’an</td>
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<tr>
<td>10:05-10:15</td>
<td>Dr. Iman Basheti, Chair of the Conference welcoming words</td>
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<tr>
<td>10:15-10:20</td>
<td>Prof. Mahfouz Joudeh, President of ASU</td>
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<td>10:20-10:25</td>
<td>Dr. Suzan Abed, Dean of scientific research and graduate studies</td>
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<td>10:25-10:30</td>
<td>Dr. Yousef Najajreh, Dean of Pharmacy, Al-Quds University, Palestine</td>
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<tr>
<td>10:30-10:35</td>
<td>Dr. Betty Chaar, Sydney University, Australia</td>
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<tr>
<td>10:35-10:40</td>
<td>Dr. Sarah Alameddine, Nova Southeastern University, USA</td>
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</table>
| 10:40-11:00   | - Exchange of Awards for the MOU established between ASU and Al-Quds University, Sydney University and Nova Southeastern University.  
|               | - Exchange of Awards for the MOU established between ASU and Dawacom Group. |
| 11:00-12:00   | **Opening of Exhibition, Continental Breakfast and Posters session (Poster evaluation)** |
| 12:00-2:05    | **Clinical Pharmacy Session**                                       |
|               | **Moderators:** Prof. Mayyada Wazaify (The University of Jordan), Dr. Iman Basheti (Applied Science University), Dr. Tareq Mukhattash (Jordan University of Science and Technology) |
| 12:00-12:25   | **Keynote Speech: Dr. Betty Chaar:** Ethical Consideration in Professional Practice |
| 12:25-12:50   | **Keynote Speech: Dr. Sarah Alameddine:** Emerging technologies to optimize healthcare |
| Postgraduate Research Competition |                                                        |
| 1:05-1:20     | Omar Abdul Wahid Al Ani: The effect of Glycated Low Density Lipoprotein as Atherogenic Motivator for Type-2 Diabetic Patients, Al-Ahliyya Amman University |
| 1:20-1:35     | Thamer Ali Al khawaldeh: The Identification, Prevention and Management of Preparation and Administration Errors of Chemotherapy- An Observational study from Jordan, The University of Jordan |
| 1:35-1:50     | Nussaibah Al-Hyari: Improving Paediatrics’ Pressurized Metered Dose Inhaler Technique and Asthma Control: Inhaler Verbal Counselling vs. Trainhaler, Al-Ahliyya Amman University |
| 1:50-2:05     | Shorouq Yacoub Al-yacoub: Genetic Polymorphism in Methylene Tetra Hydrofolate Reductase Cytosine 677 Thymine (rs 1801133), and Response to 5-Flurouracil and Capecitabine in Patients with Colorectal Cancer among Jordanian Population, The University of Jordan |
2:05-2:30  **Coffee break and Posters session (Poster evaluation)**

2:30-4:10  **Pharmacology and Natural Product Session**

**Moderators:** Prof. Ahmed Aldisi (ALIsra’a University), Dr. Kenza Mansoor (Petra University), Dr. Ekbal Al-Khateeb (Al-Ahliyya Amman University)

2:30-2:55  **Keynote Speech:** Dr. Samira Goussous – Reshaping the future of the pharmacy profession: threats and challenges

**Postgraduate Research Competition**

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<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Title</th>
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<tbody>
<tr>
<td>2:55-3:10</td>
<td>Shada Y. Elhayek</td>
<td>Assessment of Immunotoxicity of Tigecycline in Balb/c Mice, The University of Jordan</td>
</tr>
<tr>
<td>3:25-3:40</td>
<td>Amani Harb</td>
<td>Hypocholesterolemic Effect of Beta-caryophyllene in Rats Fed Cholesterol and Fat Enriched Diet, The University of Jordan</td>
</tr>
<tr>
<td>3:55-4:10</td>
<td>Islam A. Berdawel</td>
<td>Metformin: Determinants of its beneficial role in ER-positive breast carcinoma growth inhibition, The University of Jordan</td>
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4:10-5:00  **Conference Dinner**

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**Teaching Future Generations of Professional Ethics in Pharmacy Practice**

**Workshop (1:00 – 4:00)**

hosted by

**Dr. Betty Chaar**

Faculty of Pharmacy, The University of Sydney
Symposium Agenda

**Sunday- 6th of December**

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<th>Time</th>
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<td>10:00-10:05</td>
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<td><strong>Dr. Iman Basheti</strong>, Chair of the Conference welcoming words</td>
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<tr>
<td>10:10-10:20</td>
<td><strong>Prof. Palmieri Giovanni Filippo</strong>, Camerino University, Italy</td>
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<tr>
<td>10:20-10:30</td>
<td>Signing the MOU with Camerino University, Italy.</td>
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<td></td>
<td>Exchange of Awards between ASU and Camerino University.</td>
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<tr>
<td><strong>10:30-12:10</strong></td>
<td><strong>Pharmaceutics Session</strong></td>
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<tr>
<td><strong>Moderators:</strong></td>
<td><strong>Prof. Tawfik Alhussainy</strong> (Petra University), <strong>Prof. Ahmed Banijaber</strong> (The University of Jordan), <strong>Dr. Israa AL-Ani</strong> (AL-Ahliyya Amman University).</td>
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<tr>
<td>10:30-10:55</td>
<td><strong>Keynote Speech:</strong> <strong>Prof. Palmieri Giovanni Filippo</strong> - Powder densification characteristics as Process Analytical Technology tool in tablets production.</td>
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<tr>
<td><strong>Postgraduate Research Competition</strong></td>
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<tr>
<td>10:55-11:10</td>
<td><strong>Dr. Tareq Taha Jubeh</strong>: Formulation and in vitro Evaluation of Ferrous Gluconate Gastroretentive-Floating Drug Delivery System, Al-Quds University</td>
</tr>
<tr>
<td>11:10-11:25</td>
<td><strong>Duaa Farah</strong>: Effect of organic anions on the intestinal absorption of metformin HCl, The University of Jordan</td>
</tr>
<tr>
<td>11:40-11:55</td>
<td><strong>Sara AlMarabeh</strong>: A Prodrug Approach to Enhance Azelaic Acid Percutaneous Availability, The University of Jordan</td>
</tr>
<tr>
<td>11:55-12:10</td>
<td><strong>Mohammad Rouhi Sanoufi</strong>: The Use of Design of Experiments to Develop Extended Release Tablets of Diclofenac Sodium by the Hot Melt Extrusion Manufacturing Technique, Applied Science University</td>
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<tr>
<td><strong>12:10-12:40</strong></td>
<td><strong>Coffee Break, Posters Session and Exhibition</strong></td>
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<tr>
<td><strong>12:40-2:05</strong></td>
<td><strong>Medicinal Chemistry and Pharmacokinetics Session</strong></td>
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<tr>
<td><strong>Moderators:</strong></td>
<td><strong>Dr. Maha Habash</strong> (Applied Science University), <strong>Dr. Ashok Shakya</strong> (Al-Ahliyya Amman University), <strong>Dr. Reema AbdelKareem</strong> (Al-Zaytoonah University of Jordan)</td>
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<tr>
<td>12:40-1:05</td>
<td><strong>Keynote Speech</strong>: Dr. Yousef Najajreh - Conducting Research and Supervising Postgraduates under Occupation: a Perspective from Palestine.</td>
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Postgraduate Research Competition

1:05-1:20  Dr. Sajid M. Hameed: Oral Mucositis in Children with Acute Lymphoblastic Leukemia, Iraqi Society of Clinical Oncology

1:20-1:35  Nirmeen Elmadany: Studying Drugs Cytotoxicity in Oxidative Stress Vulnerable and Oxidative Stress Tolerant Breast Cancer Cells by FTIR, The University of Jordan

1:35-1:50  Sahar Al Nabulsi: Investigation of Possible Pharmacokinetic Interaction of Clopidogrel with Pioglitazone and Beverages in Rats Through Determination and Validation of Clopidogrel Carboxylic Acid Using LC/MS, University of Petra

1:50-2:05  Haneen Mohammad: Screening and Size Effect Investigation of Nicotinic Acid Analogues as Potential Carbonic Anhydrase III Inhibitors, The University of Jordan

2:05-2:30  Coffee break

2:30-3:00  Closing Awards Ceremony

3:00-4:00  Conference Formal Dinner

Mini-app Challenge Workshop (1:00 – 2:30)

hosted by

Dr. Sara Alameddine

Faculty of Pharmacy, Nova Southeastern University

Deans Formal Meeting (1:00 – 2:30)

Deans of The Jordanian Faculties of Pharmacy Association

Presidential Building Meeting Room

Posters evaluation committee

- Dr. Nabeel Nuaimi, Applied Science University
- Dr. Wael Abudia, Petra University
- Dr. Qais M. A. Al-Efan, Jordan University of Science and Technology
- Dr. Amal Aqour, The University of Jordan
- Dr. Mahmoud AbuSamak, Applied Science University
- Dr. Rania Hamed, AL-Zaytuna University
- Dr. Abdulrahman Al-Bazzaz, AL-Ahliyya University
Keynote Speakers

University of Sydney, Sydney, Australia
Dr. Betty Chaar, Specialist of Health Law

Past President, Australian Association for Professional and Applied Ethics

Specialist in professionalism in pharmacy and Health Law.

Because it is essential to hear about moral reasoning capabilities and new code of ethics about health care in a world of conflicts and war.

Dr. Betty Chaar is a senior lecturer in Pharmacy Practice and Professional Ethics at the University of Sydney, Faculty of Pharmacy. She holds a Master degree in Health Law and her PhD is about developing moral reasoning capabilities and application in pharmacy practice. Dr Chaar works on promoting moral reasoning in the delivery of healthcare services by pharmacists in all aspects of practice, ranging from the everyday matters of pharmacy practice to considerations regarding issues in the broader domain of bioethics. Betty is Chair of Family Planning NSW Health Human Research Committee, an active member on a number of Human, Research Ethics committees, past President of the Australian Association for Professional and Applied Ethics [AAPAE], member of the Australian Pharmacy Council [APC] Examining Committee, co-chair of the Working Group on Pharmacist Ethics and Professional Autonomy of the International Pharmaceutical Federation (FIP), has recently become a member of the Program Committee of FIP, and member of the Executive Committee of the Social and Administrative Pharmacy Section of FIP.
Keynote Speakers

Nova Southeastern University, Florida, USA
Dr. Sarah Alameddine, Specialist of Pharmacy Informatics

Director - Center for Consumer Health Informatics Research

Specialist in Pharmacy and Consumer Health Informatics.

Because nothing is more trendy than technology. Research leveraging Health information technology is continuously booming. An exciting area for young researchers.

Dr. Sarah Alameddine is a Clinical Assistant Professor within the Department of Pharmacy Practice at Nova Southeastern University College of Pharmacy. Dr. Alameddine is also leading the Center for Consumer Health Informatics Research, a WHO designated research center. Her research evolves mainly around Pharmacy informatics. Whether it is the clinical or operational side of it, her focus is to leverage the use of technology to optimize patient care and improve overall healthcare practice. Dr. Alameddine's main research topics focus on improving medication adherence and reducing preventable medication errors.
Keynote Speakers

Al-Quds University, Al-Quds, Palestine
Dr. Yousef Najajreh
Dean of pharmacy, Al-Quds University

Specialist of Medicinal Chemistry and anticancer drug research.

Because to hear about Medicinal Chemistry and the latest in cancer research from the Dean of Pharmacy at Al-Quds University is truly unique. An opportunity to share research ideas and results.

Dr. Yousef Najajreh an associate professor in medicinal chemistry at the Faculty of Pharmacy, Al-Quds University, Palestine. He graduated in 1999 from Hebrew University with PhD in medicinal chemistry. In 2004 he started his distinguished journey as an academic and researcher at Al-Quds University, during which several researches were conducted in the following areas:

- Rational Development of Allosteric Inhibitors of BCR-Abl Dependent Cells; Novel Strategy for Treatment of Chronic Myelogenous Leukemia (CML)
- Developing of Platinum Prodrugs
- Platinogenomics and Target Identification of Platinum-Based Anticancer Drugs
- Structural Elucidation of Cytotoxic Natural Secondary Metabolites
- Anti-obesity and Cognitive Function Modulators

Dr. Najajreh is currently the head of the Anticancer Drugs Research Lab. Also he is a member of several journals’ editorial boards. He has more than 30 publications published in an international journal, and four registered patents.
Keynote Speakers

University of Camerino, Camerino, Italy
Professor Giovanni Filippo Palmieri

Lecturer and researcher with scientific collaborations with more than 10 international Pharmaceutical Companies.

Specialist in Pharmaceutical Technology.

Because it is fascinating to hear about the latest in powder densification characteristics as Process Analytical Technology tool in tablets production.

Prof. Giovanni Palmieri graduated in Industrial Pharmacy with full marks the 19/10/1989 at the University of Camerino. In October 1990, he began to approach technological problematics of research, such as the use of cyclodextrins, during his post-graduated stage inside the department of Chemical Sciences of Camerino University. From June 1991 to December 1993 he was visiting scientist in the laboratory of Pharmaceutical Technology of Prof. André Stamm in Strasbourg. In the meanwhile he became researcher of Pharmaceutical Technology at the Faculty of Pharmacy of the University of Camerino.

During his permanency in Strasbourg Prof. Palmieri carried out studies concerning:

- Preparation and characterisation of cyclodextrin inclusion complexes
- Use of spray-drying in the preparation of microspheres and microcapsules for the formulation of oral controlled release dosage forms
- Pellets preparation by high-share mixer optimising the process by the Taguchi statistics
- Film coating of pellets in fluid bed in order to obtain oral controlled release dosage forms.

Prof Palmieri started again his research activity at the Department of Chemical Sciences of the University of Camerino in date 01/01/1994. He became Associated Professor of Pharmaceutical Technology in 2002. Research activity in Camerino University:

- Methods for improving water solubility of poorly water soluble drugs such as cyclodextrin inclusion complexes and solid dispersions
- Preparation of microspheres and microcapsules
- Formulation of controlled release dosage forms for oral administration
- Compactability and densification characteristics of pharmaceutical materials during tablets preparation
- Mucoadhesive characteristics of solid and semisolid dosage forms
- Rheological characteristics of liquid and semisolid systems
- Rheological characteristics of solid materials for pharmaceutical use
- Study of the self-assembling and thermogelling mechanism of known block copolymers and their eventual use for the controlled delivery of proteins.
Keynote Speakers

Amman, Jordan
Dr. Samira Goussous

Director at the Arab Drug Store

Because it is imperative to learn about good Pharmacy Practice in Jordan, threats and challenges.

Dr. Samira Shaammas Goussous registered pharmacist with strong commitment to Pharmacy Profession, strong believer and activist to the vital pharmacist role as a health care provider focusing on patient not product.

Her extensive experience in both wholesale and retail business provide her with unique insights into the Jordanian and regional pharma value chain emphasizing on regulatory affairs, pricing, market planning, supply chain management, business development & tendering.

Samira currently heads leading and well established Wholesalers in Jordan representing a portfolio of multinational pharmaceutical companies.

She also owns and supervises a community pharmacy.

This broad range of activities rendered Samira a sought after expert among various local, regional and global industry associations including some:

- Elected member / JFDA Higher Committee responsible on issuing all guidelines pertaining to medicine entry into Jordan.
- Elected twice / Board member to Pharmacists Association (JPA).
- Elected member to International Pharmaceutical Federation (FIP)
- Headed the Board of Good Pharmacy Practices (GPP) as being recommended by the WHO and the FIP for the community pharmacy practice
- Represented JPA to FIP Council meetings several times.
Workshops
Workshop 1

Teaching Future Generations of Professional Ethics in Pharmacy Practice

Dr. Betty Chaar
Specialist of Pharmacy Ethics
University of Sydney, Sydney, Australia

Globally, the pharmacy profession has been in a state of gradual change over the last decades and in many ways. Primarily pharmacy is moving from a fundamentally service-based profession (i.e. providing medications to patients) to one with a more specific and significant clinical or patient focus. Also, many financial and regulatory changes have impacted on the way we interact in pharmacy with patients, employers and staff; as well as conduct the business of pharmacy. Such changes may expose pharmacists to several complex ethical and legal challenges. Whilst the legal framework within which we practice pharmacy could be slightly different between countries – the ethical principles which provide the foundations of professional practice are sometimes surprisingly similar.

Importantly, hand in hand with practice changes, it is vital to educate future generations of practitioners in contemporary standards of practice and ethical principles involved in the practice of pharmacy. However, unlike many other areas of pharmacy education, little attention has been directed towards determining the best way to prepare pharmacy students for the challenges of the legal and ethical complexities faced by modern practice.

The question is whether the current curricula used in pharmacy schools is creating “value literate” practitioners who possess not only the necessary tools to handle the ethical issues that arise, but also the interest to be involved in broader ethical discussions as they relate to the profession. This workshop will aim to explore the teaching of professional ethics in pharmacy curricula, in particular in light of the International Federation of Pharmacy [FIP] recent guidelines on codes of ethics in pharmacy and contemporary standards of professional practice.

OBJECTIVES

After attending this workshop you should be able to

1. Understand basic principles of professional ethics in pharmacy practice
2. Understand the learning and teaching models for training students in ethics in practice
3. Undertake some decision making exercises in the context of case studies
4. Reflect on current curricula and what can be or should be changed
5. Articulate aspirations relating to teaching professional ethics in the future
Workshop 2

Mini Application Challenges

Dr. Sara Alameddine
Specialist of Pharmacy Informatics
Faculty of Pharmacy – Nova Southeastern University, Florida, USA

The use of games or game like functionality to actually improve outcomes, affect health behaviors and improve the efficacy of patient and health professional education has recently become quite a hot topic. Smart pills and wearables linked to mobile applications for diagnostic, monitoring and other purposes are already widely spread. Mobile health (mHealth) power has been proven considering the widespread of smartphones and the huge numbers of health related apps in the mobile marketplace across multiple platforms. At this point, it is foreseeable that these and the ones we mentioned earlier will eventually merge and become more complex offering users a much wider variety of health related data.

OBJECTIVES

After attending this workshop you should be able to

1. Explore current mobile health applications marketplace
2. Evaluate the features and functionalities offered by those applications from user’s perspectives
3. Identify potential gap based on user’s needs for specific features/functionalities
4. Suggest and partially design an application that would provide a solution and fill the current identified gap
Keynote Speakers’ Abstracts
Ethical Consideration in Professional Practice

Dr. Betty Chaar

University of Sydney, Sydney, Australia

ABSTRACT

In the practice of pharmacy, no day goes by without the need for ethical decision making. Hence, it is crucial to be aware of and understand the underpinnings of ethical issues arising in the provision of healthcare, in preparation for ethical decision making in practice. In this context, it is important to understand and differentiate between personal and professional ethics.

Ethical decision making, in context of a profession, is an acquired skill- just like clinical knowledge is acquired. It is not a ‘gut feeling’ nor is it purely a philosophical perspective. There are ethical principles in healthcare that are based on bioethics and the rights of human beings to equitable healthcare. And there are principles of public health ethics that focus on a wider scope of issues. Pharmacists need to be aware of both sets of principles and how to apply them in their daily routines in pharmacy practice.

This plenary will focus on these principles and their role in ethical decision making in pharmacy practice around the globe.
Emerging Technologies to Optimize Healthcare

Dr. Sarah Alameddine
Nova Southeastern University, Florida, USA

ABSTRACT

Emerging technologies to optimize healthcare because it is important to identify the underlying technologies that are driving innovation currently and for the future as they are and will continue to affect health care in general and Pharmacy in specific. Nanotechnology and miniaturization, 3D printing, robotics and gamification are included in the presentation. The smaller things can be, the more flexibility we have in determining where they go and how they get there. Making the base technology smaller and more powerful produces more options. With the capabilities of 3D printing improving and the cost of the equipment decreasing, it will be adopted for more and more technologies (tissue printing and possibly drug printing).

Robots have been used in pharmacy for some time but as the other macro technologies have grown, the possibilities for robotics have grown as well. The use of games or game like functionality to actually improve outcomes, affect health behaviors and improve the efficacy of patient and health professional education has recently become quite a hot topic. Smart pills and wearables linked to mobile applications for diagnostic, monitoring and other purposes are already widely spread. Mobile health (mHealth) power has been proven considering the widespread of smartphones and the huge numbers of health related apps in the mobile marketplace across multiple platforms. At this point, it is foreseeable that these and the ones we mentioned earlier will eventually merge and become more complex offering users a much wider variety of health related data.
Conducting Research and Supervising Postgraduates under Occupation:  
a Perspective from Palestine  

Dr. Yousef Najajreh  

Al-Quds University, Al-Quds, Palestine  

ABSTRACT  

The formation t(9;22) chimaeric bcr/abl fusion gene encodes for the unregulated and 
constitutively active BCR-ABL fusion protein. BCR-ABL, non-receptor tyrosine kinase, was 
identified as the initial inducer of multiple downstream signaling cascades leading to 
leukemogenesis of blood cells. All BCR-ABL inhibitors in clinical use, including Imatinib, 
Nilotinib, Dasatinib, and the recently approved Ponatinib, are ATP competitors. Despite the 
successful application of BCR-ABL inhibitors approximately one third of Imatinib-treated 
patients suffer from cardiotoxicity or irresponsiveness due to resistance associated with Abl 
kinase domain mutations. Thus the need to develop novel agents that are devoid of the 
cardiotoxicity and able to overcome the emerging resistance.  

Using advanced computational chemistry techniques including molecular docking and 
estimations of all free energy components sets of new myristate and pyrimidine analogues 
were designed. Those were synthesized, purified and characterized. The compounds were 
assessed for their ability to modulate BCR-ABL activity in Ba/F3, murine B lymphocytes 
cells transfected with BCR-ABL, in a cell-based autophosphorylation assay. The second part 
of the presentation will focus on recent endeavors for exploring Diazine-cored derivatives for 
modulation the action of key signaling cascades in cancer cells including cyclin-dependent 
kinase (CDKs) and nuclear receptors. The experience and challenges in supervising master 
students conducting drug discovery type of research will be addressed.
Powder Densification Characteristics as Process Analytical Technology Tool in Tablets Production.

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ABSTRACT

The use of process analytical technologies (PAT) to ensure final product quality is by now a well established practice in pharmaceutical industry. To date, most of the efforts in this field have focused on development of analytical methods using spectroscopic techniques. This presentation shows an approach completely different, that is the possibility of using the parameters derived from the processing of in-line raw compaction data (the forces and displacement of the punches) as a PAT tool for controlling the tableting process. To reach this goal, two commercially available formulations were used, varying the quantitative composition and compressing these “varied mixtures” on a fully instrumented rotary tablet machine. The Heckel yield pressure and the compaction energies, together with the tablets hardness and compaction pressure, were selected and evaluated as discriminating parameters in all the prepared formulations.

The apparent yield pressure, as shown in the obtained results has the necessary sensitivity to be effectively included in a PAT strategy to monitor the tableting process. Additional (experiments) investigations were performed to understand the criticalities and the mechanisms beyond this (ese) performing parameter(s) and the associated implications.

Specifically, it was discovered that the efficiency of the apparent yield pressure depends on the nominal drug title, the drug densification mechanism and the error in pycnometric density.

In the study the potential of using some parameters of the compaction raw data has been demonstrated to be an attractive alternative and complementary method to the well established spectroscopic technique to monitor and control the tableting process. The compaction data monitoring method is also easy to set up and very cost effective.
Reshaping the Future of the Pharmacy Profession: Threats and Challenges

Dr. Samira Goussous
Arab Drug Store, Amman, Jordan

ABSTRACT

In any society, the social, economic, political, educational indicators do keep changing.

Globally, developed countries have re engineered the profession to embrace most of the challenges that are facing their societies in their health care reform.

Nationally, are we aware of these trends and challenges? If so, what are they?

Do these changes impact our practice?

Are these trends, opportunities to embrace or threats to face?

My presentation will try to answer on these enquiries and set the path for the track for solutions with set of recommendations.
Abstracts for Oral Presentation
Influence of Genotype and Haplotype of MDR1 (C3435T, G2677A/T, C1236T) on the Incidence of Breast Cancer. Case-Control Study


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ABSTRACT

Background: Breast cancer is the leading cause of cancer deaths among women and the second in humans worldwide. Many published studies suggested an association between the MDR1 polymorphisms and breast cancer risk. Our aim was to study the association between genetic polymorphism of MDR1 at three sites (C3435T, G2677A/T, and C1236T) and their haplotype and the risk of breast cancer in Jordanian females.

Methods: A case-control study involving 150 breast cancer cases and 150 controls was conducted. Controls were age-matched to cases. Polymerase chain reaction/restriction fragment length polymorphism (PCR-RFLP) technique and sequencing were done to analyse the genotypes.

Results: Distribution of MDR1 C3435T genotypes was different in cases and controls [cases CC 45.3%, CT 41.3%, and TT 13.3%; controls: CC 13.4%, CT 43.3%, and TT 30.2%, p < 0.001]. Similarly, the distribution of G2677A/T was statistically different between cases and controls [cases: GG 43.1%, (GT+GA) 50.9% and (AA+TT) 6%; controls: GG 29.6%, (GT+GA) 50.9%, and (AA+TT) 19.4%, p = 0.004]. On the other hand, genotype and allelotype distribution of C1236T was not statistically different between cases and controls (p=0.56 and0.26, respectively). CGC haplotype increases the risk to breast cancer by 2.5-folds compared to others, while TGC and TTC haplotypes carry 2.5- and 5-folds lower risk of breast cancer, respectively compared to others.

Conclusion: Genetic polymorphism of MDR1 C3435T and G2677A/T, but not C1236T is associated with increased risk of breast cancer. In addition, CGC, TGC and TTC haplotypes have different impact on the risk of breast cancer. Future, larger studies are needed to validate these findings.
The effect of Glycated Low Density Lipoprotein as Atherogenic Motivator for Type-2 Diabetic Patients

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ABSTRACT

Background: Glycation and oxidative modification of lipoproteins enhance the uptake of these lipids by macrophages in the early stages of atherogenesis. Measurement of blood levels of modified LDL particles could thus constitute another useful modality in identifying subjects at high risk of coronary atherosclerosis (CHD). So this study aim to measure the Glycated LDL level and assess its associations with other metabolic parameters in diabetic and non diabetic subjects attending a University diabetic center in Riyadh. This study was the first in Saudi & Jordan to measure the concentration of Glycated LDL in the serum of diabetic & non diabetic subjects.

Methods: Thirty one (31) type-2 diabetic patients (DM) and thirty one (31) non-diabetic (hyperlipidemic) subjects had their fasting serum samples analyzed for Fasting blood sugar (FBS), HbA1C, total cholesterol (TC), triglycerides (TG), high density lipoprotein (HDL), low density lipoprotein (LDL) (by routine auto-analyzer methods) and Glycated LDL(Gly-LDL) by ELISA.

• Most of diabetic and non-diabetic (hyperlipidemic) groups taking Atorvastatin (Lipitor) as anti hyperlipidemic drug.
• Most of diabetic group taking Metformin for hyperglycemia.

Results: The serum Gly-LDL level was significantly higher in non-diabetic hyperlipidemic than in diabetic patients (p=0.037). The Gly-LDL level correlated significantly with LDL in diabetic group (p=0.035) and insignificant with other parameters, and also significantly correlated with HDL (p=0.048), TG (p=0.035) and VLDL (p=0.03) in non-diabetic group and insignificant with other parameters. Diabetic group showed significantly higher FBS (177 ± 69.09 mg/dl) in comparison to the non-diabetic group (95 ± 20.2 mg/dl) (p=0.000). Moreover; all of the diabetic patients showed HbA1c >6% which indicate uncontrolled hyperglycemia (mean ± SD = 9% ± 0.018) while the non-diabetic subjects showed HbA1c <6% which indicate controlled glucose level (5% ± 0.009) this difference was significantly (p= 0.000).

Assessment of lipid profile in the two groups showed there are significantly lower LDL, TC and Glycated LDL [(111.7 ± 31.6 mg/dl) (p= 0.018), (169.6 ± 29.1 mg/dl) (p= 0.044), (4.09 ± 1.7 µmol/ml) (p= 0.37) respectively] in diabetic group than in non-diabetic [(131.5 ± 32.5 mg/dl), (185.3 ± 30.7 mg/dl), (5.03 ± 1.6 µmol/ml)]. The levels of HDL and TG/HDL ratio although they are lower in diabetic patient in comparison to the non-diabetic subjects but the differences were insignificant [(42.5 ± 8.2 mg/dl) (p= 0.21), (3.1 ± 1.7) (3.5 ± 2.3) (p= 0.48)]. On the other hand TG and VLDL values were insignificantly higher in diabetic patients [(144.1 ± 77.8 mg/dl) (p= 0.414), (28.43 ± 15.7 mg/dl) (p= 0.468) than in non-diabetic (129.3 ± 61.9 mg/dl), 25.8 ± 12.3 mg/dl)]. In regard to the C-reactive protein (CRP) level in diabetic patients (0.39 ± 0.47 mg/ml) was insignificantly lower than in non-diabetic (hyperlipidemic) (0.59 ± 0.62 mg/ml) (p= 0.32).

Conclusion: Serum Gly-LDL levels are increased in hyperlipidemic patients and are further decreased with diabetes taking statin, suggesting that the significant Glycation of LDL occurs in all hyperlipidemic patients irrespective of their glycaemic status. The significant correlation of Gly-LDL with LDL in diabetic patients would suggest its potential utility as another index of medium term glycaemic control. Gly-LDL is easily measurable and its values could provide additional information in ascertaining an individual’s aggregate CHD risk.
The Identification, Prevention and Management of Preparation and Administration Errors of Chemotherapy - An Observational study from Jordan

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ABSTRACT

Background: Chemotherapy medication errors may lead to potentially harmful effect. Errors can occur at any step of the path from prescription to administration and their rate varies widely due to the error definition and identification methods used in the literature. This study aimed to establish the baseline characteristics of types, frequencies and stages of errors which occur in “preparation and administration” stages of commonly used intravenous (IV) cancer chemotherapy medications inclusive of “aseptic technique”. Another objective included highlighting the main factors that may have affected the error rate. Finally, to develop chemotherapy preparation and stability charts for the most commonly used IV medications in the study setting.

Methods: The study was conducted at King Hussein Medical Centre/Jordan Royal Medical Services (KHMC/JRMS), Amman, Jordan. An observational, cross-sectional study was performed in the hematology and oncology wards of the hospital. A checklist consisting of appropriate process of preparation and administration of injectable chemotherapy agents along with the “aseptic technique” was developed and used.

Results: Overall, preparation processes of 684 chemotherapy medications, consisting of 20850 error opportunities were observed of which 7105 (34.2%) errors were detected. 34.9% (4877/14010) and 32.6% (2228/6840) of the errors were in the preparation process and “aseptic techniques”, respectively. Overall, administration processes of 654 chemotherapy medications, consisting of 15042 error opportunities, were observed of which 4112 (27.3%) errors were detected. 19.9% (2217/11118) and 48.3% (1895/3924) of the errors were in the administration process and “aseptic techniques”, respectively.

Conclusions: Our results revealed a substantial occurrence rate of medication errors during preparation and administration of injectable chemotherapy agents. This confirms that educational programs and advanced pharmaceutical care services are required for safe preparation and administration of IVs chemotherapy agents in Jordan.
Improving Paediatrics’ Pressurized Metered Dose Inhaler Technique and Asthma Control: Inhaler Verbal Counselling vs. Trainhaler

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ABSTRACT

Background: Verbal counselling (VC) is commonly used to train patients on correct inhaler technique. Patients forget the good inhaler use with time. Trainhaler (TH), Clement Clarke International, UK, is a novel pressurized metered dose inhaler (MDI) training tool designed with feedback mechanisms to train patients coordinate releasing the aerosol with using a slow and deep inhalation flow (IF) through their MDI. Our aim was to compare VC with TH in children with asthma.

Methods: Ethical approval was obtained and all children and their parents gave signed consent. At visit 1, asthmatic children, age 7-17 years, with an MDI hand-lung coordination problem including an IF > 60 l/min were randomized into either the VC group that received verbal MDI training with emphasis on using a slow and deep IF; or into the TH group that were trained on- and given TH to practice at home. Children with correct MDI technique and IF ≤ 60 l/min formed the control group (CT). An 11-step MDI technique, peak IF through the inhaler and Asthma Control Questionnaire (ACQ) were evaluated. All subjects returned after 6 to 8 weeks (visit 2) for re-evaluation.

Results: Thirty children (Mean (SD) age 9.6 (2.2) years; 40% females) took part. Median incorrect MDI steps pre-training at visit 1 was 2, 10 and 6 for CT, VC and TH groups, respectively. Whilst, it was 0.5, 1.0 and 0.0, respectively, at visit 2. There was a significant decrease (p < 0.01) in the incorrect MDI steps between visits 1 and 2, within VC and TH. Mann-Whitney test showed a significant difference (p < 0.01) in the incorrect MDI steps between the CT and both intervention groups at visit 1, but no significant difference (p > 0.05) was found at visit 2. Mean (SD) peak IF via MDI (l/min) at visit 1 was 46.7 (8.2), 99.1 (55.4) and 115.8 (24.1) for CT, VC and TH groups, respectively. Whilst, it was 75.0 (34.2), 98.9 (65.8) and 66.1 (19.0), respectively, at visit 2. Paired t-test showed significant reductions (p < 0.01) in peak IF via MDI within TH only. The ACQ scores did improve significantly (p < 0.05) within VC and TH groups.

Conclusions: VC and TH improved the children’s MDI technique which was reflected on better asthma control. VC children could not, however, maintain the acceptable IF through their MDI which is critical for aerosol lung deposition. An inhaler training tool available to patients at any time can be helpful.
Genetic Polymorphism in Methylene Tetra Hydrofolate Reductase Cytosine 677 Thymine (rs 1801133), and Response to 5-Flourouracil and Capecitabine in Patients with Colorectal Cancer among Jordanian Population

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ABSTRACT

Background: Colorectal cancer is a major cause of mortality and morbidity in Jordan and worldwide. Abnormality of DNA methylation is a possible mechanism for the development of cancer. Methylene tetrahydrofolate reductase (MTHFR) is involved in DNA methylation. Genetic polymorphisms in the MTHFR gene may result in altered enzyme function, thus affecting cancer susceptibility and treatment response to antifolate cancer therapeutics. Our aim was to assess the association between the genetic polymorphism of MTHFR C677T and clinical outcomes.

Methods: 151 CRC patients were approached and blood samples from 137 were collected. Genotyping analysis of MTHFR C677T was done using polymerase chain reaction (PCR) and RFLP. The outcome measured was “time to relapse or disease progression” (TTR) in response to 5-FU/capecitabine-based chemotherapy.

Results: There was significant difference between MTHFR C677T genotypes (CC, CT and TT) and the response to chemotherapy in the long term (P value 0.048) where CC genotype carriers were 3.3 times more likely to be poor responders.

Conclusion: Genetic polymorphism of MTHFR C677T may have a role in response to 5-FU/capecitabine-based chemotherapy. This effect is influenced by patients’ gender and age. Larger prospective future study is needed to confirm the role of MTHFR C677T in response to chemotherapy.
Assessment of Immunotoxicity of Tigecycline in Balb/c Mice

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ABSTRACT

Background: Tigecycline is a new Glycylcycline antibiotic approved for treatment of complicated skin, intra-abdominal infections and community acquired pneumonia. The FDA announced increasing mortality with its use but there is still no clear explanation for this side effect. Proinflammatory cytokines are released during acute and complicated infections. Several case reports and pre-clinical studies found possible effect of tigecycline on proinflammatory cytokines production and leukocytes proliferation. We aimed to investigate the immunomodulatory effect of Tigecycline in balb/c female mice.

Methods: Twenty eight Balb/c female mice were randomized into 4 groups as follows: control, Tigecycline 178.6µg/kg, 714.3µg/kg and 1428.6µg/kg. The animals received the drug by intraperitoneal injection twice a day for 21 days. Body weight was measured pretreatment and before excision. At day 21, the animals were sacrificed. Spleen and thymus gland weights were compared vs. control untreated animals. Splenocytes, total WBC and lymphocytes were counted. Delayed type hypersensitivity, Hemagglutination titer was tested. Interleukin (IL)-17 levels were determined in vitro.

Results: A significant increase on RBC count was observed in all treatment groups. Relative lymphocyte count increases at 178.6µg/kg and decreases at higher concentrations. Cellular infiltration significantly increased at 1428µg/kg (p= 0.045). The Hemagglutination titer was significantly reduced at 1428µg/kg (p= 0.045). Tigecycline dose dependently decreased IL-17.

Conclusion: Tigecycline is safe at the recommended dose, but increasing the dose elucidates an immunomodulatory effects.
Antitumor activity of Thymoquinone in Combination with Resveratrol to Treat Breast Cancer in Mice

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ABSTRACT

Background: Breast cancer is the second most common cancer with nearly 1.7 million new cases in 2012 and is characterized by high mortality and morbidity. Thymoquinone (TQ), among the active constituents of the volatile oil of black seed (*Nigella Sativa*) was proved to posses anticancer activity. The anticancer activity of TQ was not evaluated in combination with Resveratrol (RES) which is a natural polyphenol, with versatile therapeutic activities including anticancer activity. Hence the aim of our study is to test the anticancer potential of a combination of TQ and RES, *in vitro* against different breast cancer cell lines and *in vivo* against breast cancer implanted in mice.

Methods: The antiproliferative activity for the proposed treatments was assessed *in vitro* against three different breast cancer cell lines (EMT6/P, MCF-7 and T47D) as well as Vero normal cells. Balb/C mice were inculated with mouse epithelial breast cancer (EMT6/P) and *in vivo* antitumor activity was assessed for TQ (50 mg/kg/day), RES (50 mg/kg/day), and a combination of TQ and RES. Changes in tumor size, percentage cured and percentage death of mice associated with each treatment were measured. Histological examination of tumor sections was performed using standard Hematoxylin/eosin (H&E) protocol. TUNEL colorimetric assay was used to assess the degree of apoptosis induction associated with each treatment. ELISA was used to measure the extent of vascular endothelial growth factor (VEGF) inhibition associated with each treatment. As well as to measure serum levels of interferon-gamma (IFN-γ) and interleukin-4 (IL-4) as a biomarkers for the ability of each treatment to stimulate the immune system. Serum levels of Aspartate Transaminase (AST), Alanine transaminase (ALT) and creatinine were measured as biomarkers for hepatotoxicity and/or nephrotoxicity that might arise with the use of each treatment.

Results: The results of the *in vitro* MTT assay part indicates the ability of TQ, RES and their combination to exert antiproliferative activity against study cell lines in a dose dependent manner, IC₅₀ values were lower in combination treatments compared to single treatments and values of CI revealed synergistic activity against all study cell lines. *In vivo* results showed significant decrease in tumor size, percentage of cured mice and percentage death were improved in mice treated with combination therapy compared to mice treated with single therapy and control mice. Also the combination therapy induced extensive necrosis, increased apoptosis rate and decreased VEGF expression. Serum levels of IFN-γ were increased in mice treated with combination therapy, also AST, ALT and creatinine levels were lower in group of mice treated with combination therapy compared to single treatment groups and control group.

Conclusion: The combination TQ and RES act synergistically to inhibit breast cancer implanted in mice. The anticancer effect of this combination is mediated by induction of apoptosis, angiogenesis inhibition, and activation of T helper 1 anticancer immune response.
Hypocholesterolemic Effect of Beta-caryophyllene in Rats Fed Cholesterol and Fat Enriched Diet

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ABSTRACT

Background: Hypercholesterolemia is a major risk factor for cardiovascular diseases. This study was designed to explore the cholesterol-lowering potential of β-caryophyllene and eugenol in a murine model.

Methods: Sixty three male Wistar rats were fed normal diet (7 animals, normal control group; group 1) or high cholesterol and fat diet (56 animals) for 6 weeks. After two weeks of high cholesterol and fat diet feeding, rats that had total cholesterol levels above 200 mg/dl were divided randomly into 8 groups as follows: Hypercholesterolemia control group which received corn oil as vehicle (group 2); hypercholesterolemia group which received the hypocholesterolemic reference drug atorvastatin at a dose of 20 mg/kg body weight (group 3); and the remaining six groups of hypercholesterolemic rats served as experimental groups. Groups 4, 5 and 6 were given β-caryophyllene orally at 30, 100 and 300 mg/kg b.w., respectively. Groups 7, 8 and 9 were given eugenol orally at 10, 30 and 100 mg/kg b.w., respectively. All treatments were given for four weeks on a daily basis. Serum total cholesterol (TC), triglyceride (TG), low density lipoprotein cholesterol (LDL-C) and high density lipoprotein cholesterol (HDL-C) were measured. Moreover, the activities of alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) and lactate dehydrogenase (LDH) as well as the antioxidant enzymes, superoxide dismutase (SOD) and catalase (CAT) were evaluated in serum. Also, the activity of hepatic 3-hydroxy-3-methylglutaryl CoA reductase (HMG-CoA reductase) was indirectly measured in the liver depending on HMG-CoA/mevalonate ratio. A histopathological examination of specimens from livers of the sacrificed animals was also carried out. The weight of whole animal, liver and spleen as well as food intake were measured.

Results: β-caryophyllene and eugenol (30 mg/kg and 10 mg/kg, respectively) significantly lowered serum TC, LDL and atherogenic index compared to the hypercholesterolemic control group. β-caryophyllene significantly increased HDL level. Both compounds ameliorated liver injury as evidenced by decreasing lipid deposition in hepatocytes, decreasing the activity of hepatic marker enzymes, and increasing the activity of antioxidant enzymes. Interestingly, β-caryophyllene significantly inhibited the activity of HMG-CoA reductase. Other doses of the two compounds did not induce significant beneficial effects on the mentioned parameters.

Conclusion: Both β-caryophyllene and eugenol (30 mg/kg and 10 mg/kg, respectively) caused significant hypocholesterolemia and hepatoprotection.

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ABSTRACT

Background: Plant kingdom is a well-known source of useful drugs in many therapeutic fields; such as cancer and bacterial and fungal infections. Elaeagnus angustifolia has a long history of ethnopharmacological use. Some of its parts were studied for their actual biological activity. However, the leaves are poorly investigated and their chemical composition is not well-established. The aim of the current study is to evaluate the chemical composition of E. angustifolia leaves and identify its major compounds. Furthermore, several types of leaves extracts were investigated for their potential biological activities; such as anti-proliferative, anti-angiogenic, anti-microbial and anti-oxidant activities.

Methods: Extract obtained by leaves maceration was further extracted with solvents differing in their polarity then submitted to open column chromatography for fractionation. Isolation of major compounds followed, then they were analyzed using UV-Vis and/or NMR for identification. For biological activities investigation, four extracts of E. angustifolia leaves were prepared using solvents differing in their polarity; ethanol, chloroform, ethyl acetate and water. They were assessed for their potential biological activity in terms of anti-proliferative activity against two breast cancer cell lines (MCF-7 and T47-D) using SRB assay method, anti-angiogenic activity using rat aortic ring model, anti-microbial activity against both bacteria and fungi using agar diffusion method and finally anti-oxidant activity using DPPH assay.

Results: In the phytochemical analysis part, one terpene (β-sitosterol) and four flavonoids (chrysin-7-glucoside, rutin, luteolin and kaempferol) were isolated and identified. For the biological activities, ethyl acetate extract was found cytotoxic against T-47D breast cancer cell line (IC50 = 23.05 μg/mL). Potent anti-angiogenic activity of ethanol- (IC50=3.039 μg/mL), ethyl acetate- (IC50=6.289 μg/mL) and water-extract (IC50=7.153 μg/mL) was reported for the first time. All extracts of E. angustifolia leaves were found inactive against S. aureus, E. coli, C. albicans and A. niger. Finally, ethanol-, water- and ethyl acetate-extracts were found to exhibit anti-oxidant activity.

Conclusion: The present study reported the chemical analysis of E. angustifolia leaves. Chemical classes identified were terpenes and flavonoids. Using NMR, β-sitosterol and chrysin-7-glucoside were identified. Using UV-Vis spectra along with shifting reagents, kaempferol, rutin and luteolin were identified. To the best of our knowledge, these compounds were isolated for the first time from E.angustifolia leaves. Only ethyl acetate extract was found cytotoxic against T-47D cell line with IC50=23.05 μg/mL. Potent anti-angiogenic activity was reported for the first time. All extracts of E. angustifolia leaves were found inactive against microorganisms under study. Finally, the order of anti-oxidant activity matched the order of extracting solvent polarity; water is followed by ethanol, then ethyl acetate and finally chloroform. This indicates that active anti-oxidants found in E. angustifolia leaves are polar flavonoid glycosides.
Metformin: Determinants of its beneficial role in ER-positive breast carcinoma growth inhibition

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ABSTRACT

Background: Breast cancer is considered as the most common cancer occurring in women around the world. In 2012, 1.7 million new cases of breast cancer were diagnosed worldwide. In addition, breast cancer is the most common cause of cancer-related death among women. In Jordan, breast cancer is the most common malignancy afflicting women. According to the latest statistics from the Jordan National Cancer Registry 15th report in 2010, 951 breast cancer cases were diagnosed (19.6 % of total cancer cases) Many studies have focused on the relationship between diabetes and the risk of having cancer which was explained by many mechanisms. Metformin is currently the most widely used drug in the treatment of type-2 diabetes. Phenformin is an old anti-diabetic drug which was withdrawn from the market due to safety reasons. They work by enhancing insulin sensitivity, so called “insulin sensitizer” which results in reducing plasma concentration of insulin and insulin like growth factor-1 (IGF-1). Insulin and IGF-1 can support the cancer cell growth, proliferation, and metastasis. Recently, In vitro studies demonstrate that Metformin and phenformin exhibits steady and persistent anti-proliferative activities against wide range of cancerous cell lines derived from breast, colon, ovaries, pancreas, and lung. The goal of this study is to assess the direct anticancer effects of Metformin and phenformin on breast cancer cells expressing the estrogen receptor, ER-positive cells, and to compare their effect on breast cancer cells that doesn’t express estrogen receptor, ER-negative cells under pharmacological concentration in the presence of different glucose concentrations, and to detect the synergism with a chemotherapeutic agent, Raloxifene

Methods: Cell viability was assessed by the 3-(4, 5-Dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide (MTT) assay method. MCF-7 and T47D cell lines was used as they are ER+ positive cell lines, and MDA-MBA-cell line was used as ER- negative cell line.

Results: Both Metformin and Phenformin induced a significant reduction in breast cancer cell viability; Phenformin was more potent than Metformin on all cell lines.

Both Metformin and Phenformin induced a significant synergism with a chemotherapeutic agent, Raloxifene against Breast cancer cells.

Conclusion: results suggests the possible future use of Metformin and Phenformin in the treatment of breast cancer and for enhancement of the some chemotherapeutic agent anti cancer activity
Formulation and in vitro Evaluation of Ferrous Gluconate Gastroretentive-Floating Drug Delivery System

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ABSTRACT

According to WHO, iron deficiency anemia is the most common form of malnutrition in the world. Common forms of iron supplement available in the market show low bioavailability due to the poor absorption of iron in the GIT, mainly because iron has a narrow absorption window in the GIT — in the upper part of the intestine and because of its oxidation in the intestine so decreasing its absorption. Other problems with iron supplement include its widespread side effects mainly constipation due to its accumulation in the lower GIT. These problems can be solved by using a form of iron that is better absorbed, and by maximizing the localization of iron at the absorption site at the upper part of the GIT.

The main goal of this study was to formulate a Gastroretentive drug delivery system (GRDDS) of ferrous gluconate, which is intended to stay for a long time period in the stomach, meanwhile releasing the iron in a controlled manner to be absorbed in the upper part on the intestine for at least 10 hrs.

Tablets were prepared with swellable polymers: HPMC k4, HPMC k15 and HPMC k100 and ethyl cellulose as a floating enhancer. NaHCO3 and citric acid were use as gas generating compounds. Varying amounts of these pre-mentioned agents were tested. Two methods of tablet preparation were tested; wet granulation and direct compression, to examine which method will yield the required properties of a floating-sustained release tablet. The choice of the best formula was based on the results of buoyancy and drug release. Floating properties of the tablets, dissolution tests, swelling properties and physical properties of tablets; weight variation, friability, hardness were done. Physical properties of the powder were also tested, mainly the compressibility index and angle of repose. The kinetics of the release for the chosen formula was elucidated by the DDsolver program.

The results showed that the direct compression method was more suitable in the production of a floating tablet which exhibited a sustained release pattern, using the polymer HPMC k100 with a finely tuned amount of ethyl cellulose and sodium bicarbonate. This formula —H7— could allow the entrance of enough water to initiate gas generation and floating but at the same time, formed a coherent gel that entrapped the gas to from floating and permitted a sustained release of water soluble ferrous. This chosen formula had a floating lag time of 40 seconds and total floating time up to 24 hour, with gradual release of ferrous gluconate up to 10 hours. All tablet and powder physical properties were in agreement with the official requirements of the USP.

The analysis of the release kinetics showed an agreement with kosemeyer Peppas model of release, which describes the release from swellable polymeric matrices. The swelling studies indicated initial swelling of the matrix then erosion. Both the kinetics analysis and swelling index analysis may be interpreted by the conclusion that the mechanism of release is diffusion coupled by erosion. We conclude that we succeeded in formulating a GRDDS of iron gluconate that can be helpful in increasing the bioavailability of iron. Further in vivo studies on human volunteers are recommended.
Effect of Organic Anions on the Intestinal Absorption of Metformin HCl

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ABSTRACT

Background: Metformin HCl (Mtf) is a widely used anti-diabetic drug which has acid dissociation constant values (pKa) of 2.8 and 11.5, and therefore, it exists very largely as hydrophilic cationic species at physiological pH values. Metformin is a sufficiently stronger base with less than 0.01% unionized in blood. Furthermore, the lipid solubility of the unionized species is quite low as shown by its low logP value of -1.43. Due to its inherent hydrophilicity and positive charge in the gastrointestinal tract it is difficult to be orally absorbed by passive diffusion and consequently it is administered in high dose (500-1000mg/tab). Presence of a counter ion has been previously shown to improve the bioavailability of polar ionizable drugs. Seemingly through formation of the more lipophilic ion pair form. The goal of this work is to study the effect of presence of different organic anions (diclofenac sodium, aniline-naphthaline sulfonic acid, hydroxycinnamic acid, citric acid, aspartic acid and trisodium phosphate) which have different sizes and lipophilicities on the permeation of metformin.

Methods: A simple, valid and reliable HPLC method that can be applied for separation and quantification of Mtf in the presence of the selected organic anions was developed. The partition coefficient in chloroform-buffer system was measured in order to confirm the increase in lipophilicity of Mtf in presence of counter ions. Transport across Caco-2 cells grown on Transwells and showing a TEER value larger than 1000 ohm.cm2 is being carried out, and apparent permeability coefficient (Papp) across the cell monolayers will be calculated for Mff in presence of the each organic anion.

Results: Mtf was assayed using a 250 mm×4.6 mm C1 column (Hypersil SAS) with 5 µm particle size, and the temperature of the column was adjusted to 40 C° with UV detection at 230 nm. The mobile phase consisted of 30% methanol 70 in 25 mM sodium phosphate buffer and pH was adjusted at 6, and was pumped in an isocratic manner at flow rate of 1.0 ml/min. For free Mtf, no partition could be measured from aqueous phase into chloroform, and this indicates a very low value of log P. After addition of each organic anion in two different molar ratios, the increase in lipophilicity and solubility in chloroform was only noted with citric acid when used in excess molar ratio (logP -1.12). The biological part (transport across Caco-2 cells) is being carried out, the total permeation of Mtf has been estimated and is being compared to that of Mtf with the corresponding anion, few experiments are to be repeated for confirmation the initial results which shows considerable effect of organic anions on metformin permeability.

Conclusion: in the context of this work, a reliable and validated HPLC methodology was developed that allowed us to quantify and separate Mtf from a wide range of organic anions. The partition coefficient was calculated and permeation across an in vitro biological barrier model is carried out. The present work will shed some light on potential interaction between Mtf and some organic anions at the absorption level.
Development and Evaluation of Resveratrol Loaded Biodegradable Implants for the Treatment of Breast Cancer in Mice

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ABSTRACT

Background: One of the main problems in treating solid tumors is the low penetration of anticancer drugs in such tumors. Thus, an increase in the concentration of the anticancer drug may increase the efficiency of the therapy, but the toxicity associated with the use of high drug concentration is a limiting factor. Local administration of a polymeric biodegradable implant containing an anticancer drug may be an effective method to increase drug concentration in the tumor vicinity. The aim of our study was to develop and evaluate resveratrol loaded polylactic – coglycolic acid (PLGA) implants as an anticancer therapy against breast cancer in mice.

Methods: Melt casting method was used to prepare PLGA implants loaded with various concentrations of resveratrol, along with release modifiers. In vitro release of resveratrol of different formula was measured using UV spectrophotometer. In vitro release patterns of all implants were assessed in phosphate buffered saline and Lipofundin. Morphological characteristics of the implants were examined using scanning electron microscopy (SEM). Forty Balb/C mice were transplanted with EMT6/P cell line and in vivo antitumor activity was assessed for four groups: resveratrol injection treatment, treatment with PLGA implants loaded resveratrol, treatment with empty PLGA implants (vehicle), and untreated mice. Changes in tumor size were measured for each treatment. Histological examination of tumor sections was performed using standard hematoxylin/eosin staining protocol and TUNEL colorimetric assay was used to test the apoptosis induction ability for all treatments. ELISA was used to measure serum levels of Interferon gamma (INF-γ), IL-4, IL-2, and IL-10. Serum levels of the liver enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were used as biomarkers of hepatotoxicity and serum creatinine levels were used to measure nephrotoxicity.

Results: PLGA implants loaded with 40% resveratrol released ideal concentrations of resveratrol compared with other formula. Glycerol Mono Stearate was the release modifier that resulted in the ideal release. In vivo, implants disappeared within 14 days. Compared to other groups, resveratrol implant group showed a significant decrease in tumor size with a percentage cure of 80%. This therapy induced extensive necrosis and increased apoptosis in tumor sections. Serum levels of INF-γ and IL-2 were increased in mice treated with resveratrol implants therapy. AST, ALT, and creatinine serum levels were close to their normal values.

Conclusion: Our data indicate that PLGA implants loaded with resveratrol represent an active and safe option to treat breast cancer. The anticancer effect of resveratrol implants is mediated by induction of apoptosis, inhibition of cell division, and activation of T helper 1 anticancer immune response.
A Prodrug Approach to Enhance Azelaic Acid Percutaneous Availability

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ABSTRACT

Background: Azelaic acid is a dicarboxylic acid compound found naturally in human body, animals and plants. It is used in treatment of acne vulgaris. However, high concentration of it (ca 20%) is needed to guarantee the drug availability in the skin. The latter increases the incidence of side effects such as local irritation. The current study was designed to synthesize a prodrug of azelaic acid (diethyl azelate (DEA)) to improve percutaneous availability of azelaic acid.

Methods: DEA prodrug was synthesized by an esterification process followed by a full physical, chemical and biological characterization. DEA chemical stability was examined in HCL, NaOH and H2O2 solutions. “pH-stat” technique was employed to study the enzymatic hydrolysis of DEA prodrug. In addition, partition coefficient and solubility were measured for both azelaic acid and DEA. Subsequently, DEA and azelaic acid in vitro diffusion was investigated using silicone membrane and human stratum corneum (SC) as a diffusion barrier.

Results: Expectedly, DEA exhibited a significant increase in diffusion compared to azelaic acid through the silicone membrane. In contrast, the diffusion through human stratum corneum (SC) displayed weaker permeation for DEA with significant retention in SC. Therefore, a desorption study of DEA from SC was achieved to examine the reservoir behavior in SC.

Conclusion: A clear sustained release behavior of DEA from SC was observed. DEA as a prodrug might be used to prolong the effect of azelaic acid. Consequently, a significant enhancement of keratolytic effect is expected due to azelaic acid resulted from enzymatic conversion of DEA released from SC.
The Use of Design of Experiments to Develop Extended Release Tablets of Diclofenac Sodium by the Hot Melt Extrusion Manufacturing Technique

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ABSTRACT

Background: Hot melt extrusion (HME) was introduced in the last decade as a new alternative for the manufacturing of extended release drug delivery systems. Regrettably, the effect of formulation and processing parameters on processability and release appears to be API and polymer specific. Accordingly, the aim of this work is to design an extended release formulation of the model drug diclofenac sodium by using hot melt extrusion technique and design of experiment (DOE). It is hypothesized that the use of DOE will allow identification and quantification of the effect of formulation components as well as their interaction on the performance of this new formulation.

Methods: MODDE software (version 11) suggested 16 run, D-optimal mixture design to evaluate and model the effect of diclofenac sodium, Ethyl cellulose and Hydroxyethyl cellulose concentrations on the release profile of extrudates comprising as well fixed amount of PEG 3350 and colloidal silicon dioxide. The extrudates were processed at 50 rpm screw speed using a vertical lab-scale single screw with three heating zones set at 135, 140, and 140 °C. The official USP dissolution test 3 was used to generate release profiles from Extrudates corresponding to 100 mg drug.

Results: The formulation factors that affect drug release at 2, 4, 8 and 16 hours were identified and satisfactorily modeled. The goodness of fit (R²) and goodness of prediction (Q²) parameters obtained for release responses were 0.87 and 0.68 at 2 hrs, 0.92 and 0.67 at 4 hrs, 0.91 and 0.66 at 8 hrs, and 0.83 and 0.67 at 16 hrs, respectively. The design space of optimal fractions of Ethyl cellulose as a release-retarding polymer and Hydroxyethyl cellulose as a release modifier at each diclofenac sodium level between 12.5 – 30% was successfully constructed by response surface methodology (RSM).

Conclusions: A DoE approach helped to identify and quantify formulation variables that affect the release of diclofenac sodium from HME based-formulation.
Oral Mucositis in Children with Acute Lymphoblastic Leukemia

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ABSTRACT

Background: Pathological changes of the oral mucosa defined as oral mucositis are caused by cytotoxic effects of chemotherapy and local radiotherapy of the head and neck region. Oral mucositis symptoms are also observed in 40-100% of patients who have had stem cell transplantation. Oral inflammation caused by stomatotoxic chemotherapy is painful and restricts oral administration of drugs, also increasing the risk of infection of the intrinsic oral cavity flora. It is a serious problem, which results in decreased doses of administered drugs and may increase the cost of tumor treatment. General incidence of mucositis may differ and depends on the diagnosis and the patient’s age, previous condition of the oral cavity, as well as the type, dose and frequency of administration of pharmacological medicines Oral mucositis is the most commonly reported side effect observed in neoplastic patients treated with chemotherapy and radiotherapy of the head and neck region as well as in patients who have received a haematopoietic stem cell transplant. The aim of the study was to assess the oral mucosa status in children with acute lymphoblastic leukaemia (ALL) during antineoplastic therapy.

Methods: The clinical examination included 127 children aged 5-15 with ALL. The clinical examination was conducted using the dental diagnostic instrument. The condition of the oral mucosa was determined using the WHO scale for oral mucositis.

Results: In the first period of antineoplastic therapy the pathological lesions of the oral mucosa of the mucositis type were observed among the examined patients. The lesions had various levels of intensity. Pain was found to be the primary symptom of oral mucositis. In this study the following were observed: local erythema of the oral mucosa in 10%, ulcerative lesions in 5%. The remaining 85% patient who could not eat or drink because of pain and soreness.

Conclusion: Local treatment of oral mucositis with polyantibiotic-antifungal mixture, supporting antifungal systemic treatment, and improving the overall peripheral blood conditions in children suffering from acute lymphoblastic leukaemia improve the condition of the oral mucosa.
Studying Drugs Cytotoxicity in Oxidative Stress Vulnerable and Oxidative Stress Tolerant Breast Cancer Cells by FTIR

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ABSTRACT

\textbf{Background:} Fourier-transform infrared microspectroscopy [FTIRM] has become a valuable technique for examining the chemical make-up of biological molecules by probing their vibrational motions at a microscopic scale \cite{1}. In the presented study FTIRM will be used to detect the changes of the structure-specific IR spectra of breast cancer cells under different oxidative stress levels and after treatment with different concentrations of drugs. Oxidative stress is defined as an imbalance between the systemic effect of reactive oxygen species [ROS] and the ability of the human body to detoxify the reactive intermediates or to counter their damage. These ROS are involved in cancer pathogenesis \cite{2}.

One of the most serious types of cancer among females is breast cancer \cite{3}. Doxorubicin is considered the most commonly used chemotherapy in breast cancer. It induces apoptosis by different mechanisms including the production of ROS. These mechanisms poorly differentiate between normal and cancer cells; leading to serious cardiotoxicity \cite{4}.

The combination between quercetin as a natural antioxidant and doxorubicin successfully protects cardiomyocytes in the doxorubicin-induced heart damage model \cite{5}. However, the challenge is, to assess whether the antiproliferative activity of doxorubicin is affected by its combination with quercetin to protect the heart; or not.

\textbf{Methods:} Two different types of breast cancer cell lines were used; MCF7 are oxidative stress-vulnerable cells, while T47D are oxidative-stress tolerant cells. Control cells, cells treated by doxorubicin alone and cells treated with doxorubicin/quercetin combinations were grown on 96-well plates for routine SRB assay and on CaF\textsubscript{2} slides with 0.5 mm thickness \cite{6} for FTIR microspectroscopy using the Internal light source in EMIRA lab at SESAME international research center.

\textbf{Results:} Our results show that quercetin exerts an antiproliferative effect in the oxidative stress-vulnerable MCF7 cells more than the oxidative stress-tolerant T47D cells. It enhances the cytotoxicity of doxorubicin against MCF7 cells but decreases doxorubicin cytotoxicity against T47D cells. Results obtained from both the SRB assay and the FTIR microspectroscopy were consonant, suggesting the FTIR technique to be used successfully as a screening tool for compounds with anticancer activity.

\textbf{Conclusion:} Quercetin affects the antiproliferative activity of Dox, depending on the type of the breast cancer cell line. In addition, FTIR microspectroscopy can be used to assess this effect appropriately.
Investigation of Possible Pharmacokinetic Interaction of Clopidogrel with Pioglitazone and Beverages in Rats Through Determination and Validation of Clopidogrel Carboxylic Acid Using LC/MS

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ABSTRACT

Background: Drug/food-drug interactions is increasingly becoming a major and serious medical and health concern for healthcare providers, responsible for 10-20% of adverse events requiring hospitalization. Although launched in the early 90’s, Clopidogrel is still considered the reference standard for antiplatelets. Recent research has found that several drugs and/or foods, e.g., pioglitazone, pomegranates and licorice root may modulate metabolism and consequently, affect drug bioavailability.

Aim of the study: To develop a valid method for determination of clopidogrel Carboxylic acid (CLP CA) using LC/MS-MS in rats plasma and to investigate the effect of pioglitazone, pomegranate and licorice on pharmacokinetic (PK) parameters of clopidogrel carboxylic acid and interpreting results in terms of possible clinical outcomes.

Methods: Clopidogrel carboxylic acid method validation has been considered in compliance with EMEA 2011 and US FDA 2001. Experiment: 40 Adult healthy Sprague Dawely laboratory rats, randomized over 4 experimental groups, each of which include 10 rats. Rats were administered either, clopidogrel (control), clopidogrel and pioglitazone, clopidogrel and pomegranate or clopidogrel and licorice. Study was designed in a cross over manner, 2 weeks apart. Pharmacokinetics parameters were calculated by non-compartmental analysis (NCA) model using Winnonlin software V 5.1. The following parameters were estimated: AUClast, AUC inf., Cmax, Tmax, t0.5 and Kel.

Results: Method showed significant precision (CV% 5.297-14.584), and proved considerable accuracy (92.57-106.4%). Linearity achieved (R² 0.992-0.999). Clopidigrel CA Cmax was reached 30 minutes beyond clopidogrel administration with an average plasma concentration of (7.408 µg/ml), and then constantly decreased reach a minimum concentration of (3.058 µg/ml) within 24 hours. Compared to clopidogrel CA control, pioglitazone affected clopidogrel CA plasma level. Cmax (8.896 µg/ml) was significantly reduced (6.599 µg/ml), p value <0.05. Pomegranate significantly reduced mean plasma concentration of clopidogrel CA. Both Cmax and AUC for clopidogrel control (8.896 µg/ml and 81.423 µg*hr/ml respectively) were significantly reduced vs. control. Licorice reduced clopidogrel CA Cmax and AUC (8.896 µg/ml and 81.423 µg*hr/ml) respectively, but were not significant.

Conclusions: A successful method for clopidogrel carboxylic acid determination was developed and validated in compliance with EMEA 2011 and FDA 2004 guidelines. Pioglitazone significantly reduced mean plasma concentration and Cmax of clopidogrel CA, resembling a considerable risk and threatened safety when co-administered. Pomegranate had significantly affected clopidogrel pharmacokinetics parameters, indicating a high risk and interaction potential that could affect clopidogrel efficacy. Licorice exhibited no significant effect or interaction potential with clopidogrel. Future human studies shall be conducted to draw conclusive evidence.
Screening and Size Effect Investigation of Nicotinic Acid Analogues as Potential Carbonic Anhydrase III Inhibitors

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ABSTRACT

Background: Nicotinic acid is a hypolipidemic drug with unknown mechanism of action. Nicotinic acid was recently revealed as potential inhibitor for the Carbonic anhydrase III enzyme. CAIII enzyme is highly expressed in adipose tissue and involves in the process of lipogenesis and it is involved in certain cancerous diseases such as acute myeloid leukemia and liver carcinoma. This research was conducted to screen and optimize several nicotinic acid analogues aiming to find potent inhibitors against CAIII as potential drug candidate.

Methods: Several commercially available nicotinic acid analogues were tested against CAIII. Their inhibitory actions were studied using an optimized Hummel-Dreyer HPLC method (HDM) as a tool for drug discovery. Different concentrations of the enzyme were injected in a size exclusion column with a mobile phase containing 0.24 mM of the analogue. The appearance of concentration dependent vacancy peak is indicative for binding. Moreover, Synthetic modification was carried out to produce nicotinic acid analogues with various carbon chain lengths at position 6, and their inhibitory actions were also determined. In order to determine attachment points between the ligands and CAIII and explain the variations in affinity; quantitative structure-activity relationship (QSAR) and docking studies were conducted. Finally an overall SAR was suggested.

Results: It was found that the carboxylic acid group is very essential for binding via coordinate bond formation with Zn$^{+2}$ within CAIII binding site; nicotinic acid analogues that lack the carboxylic acid group or have any substituents capable of decreasing the overall negative charge, such as amino substitution, were weakly bound to the CAIII enzyme. The analogues substituted at position 5 or 6 of the pyridine were highly active. The presence of large hydrophobic substitute at position 5 or 6 increases the activity. QSAR and Docking results supported the results obtained by HDM analysis.

Conclusion: This work introduces new potent nicotinic acid analogues as novel potential in-vitro inhibitors for CAIII enzyme. Additionally, it opens the door for further investigation for more potent potential inhibitors utilizing the SAR obtained from this study.
Abstracts for Poster Presentation
Evaluation of the Association of Oxytocin (OXT) Plasma Levels and Metabolic Syndrome (MS) Biomarkers in Type 2 Diabetes (T2DM) Patients in Jordan: A cross Sectional Study

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ABSTRACT

Background: MS, associated with proinflammatory insulin resistance, contributes to the progression of pre-diabetes status into T2DM disorders. It is important to demonstrate the correlation of MS-biomarkers plasma OXT levels with adipocytokines (resistin, leptin and adiponectin) in an attempt to correct/prevent MS-related cardiometabolic derangements.

Methods: In our observational study 166 MS subjects were either assigned to MS-control group or MS-pre/T2DM group. Plasma OXT, resistin, leptin and adiponectin were measured via enzyme linked immunosorbent assays. Correlations of these MS-biomarkers with patient clinical parameters such as HbA1c, fasting glycemia, systolic/diastolic blood pressure, lipid levels, waist circumference, and BMI were also evaluated.

Results: MS biomarkers were significantly ($p<0.05$) different between study groups; Mean plasma OXT level (pg/mL) was exceptionally higher ($p=0.000$) in MS-control group (2253.71±851.24) than in MS-pre/T2DM group (1206.28±507.68). Conversely; in comparison to MS-controls; MS-pre/T2DM patients had significantly higher adipocytokines plasma levels; namely resistin (pg/mL) (82053.49±32442.36 vs. 6454.73±4392.03); leptin (ng/mL) (42.43±30.44 vs. 22.76±14.19) and adiponectin (ng/mL) (6869.93±1082.23 vs. 1974.39±606.41)

MS-Females were more sensitive to leptin biomarker leading to insignificant change in LAR (leptin/adiponectin ratio) value. MS-males in the study pool were less sensitive to leptin biomarker derangements. Besides LAR value was significantly higher in MS-control patients (0.105±0.008) than in MS-pre/diabetic group (0.00274±0.00270) ($p=0.000$)

Conclusions: Based on a cross sectional observational study we report that creatinine and lipid profile disturbances are closely related to uncontrolled fasting glycemia in MS-pre/T2DM patients. MS-pre/T2DM subjects have higher levels of proinflammatory adipokines (resistin, leptin and adiponectin) and lower OXT concentrations vs. apparently healthy MS-controls, thus indicating the pharmacologic benefit of this hormone in minimization of inflammatory markers chronic deleterious effect.
Evaluation of the Association of Oxytocin Plasma Levels and Metabolic Syndrome Biomarkers (Endothelene-1 and Nesfatin) in Type 2 Diabetes Patients in Jordan

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ABSTRACT

Background: Oxytocin (OXT) is implicated as a novel therapy of obesity-diabetes. Nesfatin is an anorexigenic adipokine linked to improving insulin sensitivity and dysglycemia in obese/T2DM mice, while endothelin-1 (ET-1) is an endothelium vasoconstrictor that is dysregulated in metabolic insulin resistance. However, OXT correlations with both ET-1 and nesfatin have not been investigated in metabolic syndrome (MS)-prediabetes and MS-type 2 diabetic (MS-T2DM) patients.

Methods: In a cross-sectional study, MS-subjects were enrolled (82 MS-apparently healthy (nondiabetic) vs. 89 MS-pre/diabetic patients). Plasma OXT, ET-1 and nesfatin levels were measured by competitive binding and sandwich enzyme-linked immunosorbent assays. The correlations of these MS-biomarkers with patient clinical parameters such as HbA1c, fasting glycemia, systolic/diastolic blood pressure, lipid levels, waist circumference, and BMI were evaluated.

Results: When MS-pre/T2DM patients were compared to MS-controls, plasma OXT concentrations (pg/mL) were decreased (P< 0.001) (mean ± SD; 1206.28 ± 507.68 vs. 2224 ± 871.22); nesfatin plasma levels (ng/mL) were elevated (P< 0.001) (1.04 ± 2.20 vs. 0.31 ± 0.25); while no differences were observed in ET-1 (pg/mL) plasma levels (P> 0.05) (4.21 ± 4.19 vs. 4.01 ± 3.51). In neither study arms; OXT levels were correlated with nesfatin (r= -0.134, P= 0.094) or ET-1 (r= -0.004, P= 0.959). In the total MS-population, oxytocin concentrations were inversely correlated with fasting glycemia (P< 0.01, Pearson correlation coefficient r= -0.224). No gender-based differences in the clinical biomarkers were observed between males and females; either in the MS-control group (P> 0.05) or in the MS-pre/T2DM group (P> 0.05).

Conclusions: No correlation was found between OXT, ET-1 or nesfatin. Further investigations are needed to elucidate the role of these novel biomarkers in patients with metabolic syndrome.
Impact of Pharmacist Admixture Service on Reducing Preparation Errors of Intravenous Medications at Jordan University Hospital NICU

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ABSTRACT

Background: Critically ill patients are a high-risk population for medication errors and neonates represent a more vulnerable group. Medication errors are common in the Neonatal Intensive Care Unit (NICU). Errors can occur in each step of the path from prescription to administration and their rate varies widely due to the error definition and identification methods used in the different studies. Previous studies have identified medication errors in preparing and administering intravenous medicines of 13–84% in hospitals in individual countries. The aim was to study the impact of clinical pharmacist in reducing medication preparation errors. As well as to determine the frequency and the types of errors which occur during the preparations of medication. Furthermore, the study aimed to evaluate the short-term effects of implementing new protocols for the preparation of intravenous drugs.

Method: A disguised direct observational prospective study that was conducted in the NICU at JUH. The study included three stages. During the pre-interventional stage nurses were observed during the process of preparation of intravenous drugs. In the interventional stage, which includes replacing nurses with trained pharmacists to prepare all intravenous drugs and introducing new guidelines for preparation and administrations of intravenous drugs. Post-interventional stage, pharmacists were observed during the process of preparations of intravenous drugs.

Result: A total of 460 cases were observed during the pre and post interventional stages. In the pre-interventional stage 32 nurses were observed, error rates in preparation stage for each cases were (5.7±2.3 errors, range 1-12). While for aseptic technique (6.7±1 errors, range 4-9). These finding led to the development of guidelines for preparation and administration in a form of booklet and poster, and establishment of pharmacist intravenous admixture service. In the post-interventional stage two pharmacist were observed, the preparation error rates were significantly reduced (1.2±1.4 errors, range 0-5) P<0.0001. While for aseptic technique (1.4±0.5 errors, range 1-2) P<0.0001.

Conclusion: The number of errors in the preparation and administration of intravenous drugs is high. This study shows that implementing a protocol for the preparation of these drugs can reduce the number of errors.
The Effect of Atypical Antipsychotics on Platelet Aggregation

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ABSTRACT

Background: Second generation antipsychotics are characterized by relatively potent antagonism of serotonin 5-HT$_{2A}$ receptors which is also present on platelets where it mediates platelet aggregation. As most schizophrenic patients die from ischemic heart disease, the aim of this study was to investigate whether second generation antipsychotics (risperidone, olanzapine and ziprasidone) exert antiplatelet action in the presence of different platelet agonists.

Methods: We performed an in vitro study of different antipsychotics (risperidone, olanzapine and ziprasidone) effect on platelet aggregation induced by different platelet agonists (ADP, collagen, serotonin and epinephrine) when added to blood of healthy volunteers using Multiplate® analyzer.

Results: There was a significant difference between platelet aggregations induced by the different agonists with collagen produced the highest platelet aggregation AUC (112 U) whereas 5-HT and epinephrine produced the lowest platelet aggregation AUC (19.5 and 31 U, respectively). Risperidone and ziprasidone but not olanzapine inhibited platelet aggregation induced by serotonin in dose dependent manner, all tested antipsychotics weakly but significantly inhibited platelet aggregation induced by epinephrine. On the other hand, no remarkable effect of antipsychotics on platelet aggregation induced by ADP or collagen was observed. Marked amplification reaction between serotonin and epinephrine was observed (AUC 66 U). When antipsychotics were added to serotonin-epinephrine combination, all of them produced AUC inhibition in a dose-dependent manner with highest potency for risperidone (IC$_{50}$= 14.86 nM) and the lowest potency for olanzapine (IC$_{50}$= 27.56 nM).

Conclusion: All antipsychotics studied inhibited platelet aggregation induced by a combination of serotonin and epinephrine. This effect could have a therapeutic benefit in patients with concomitant thrombotic diseases as well as be importance in overdose. The novelty of our study is that we established new practice of using Multiplate® method for investigating weak platelet agonists such as 5-HT and epinephrine, evaluating the effect of antipsychotic agents on the platelet aggregation and evaluating the effect of antipsychotics on platelet aggregation induced by platelet agonists combination.
The Prevalence of Fusidic Acid Resistance among Clinical Isolates of Staphylococcus aureus in Jordan

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ABSTRACT

Background: Since the emergence of multidrug-resistant strains of Staphylococcus aureus, treatment of nosocomial infections has become more difficult. Fusidic acid is one of several antibiotics used against Staphylococcal pathogens including methicillin resistant Staphylococcus aureus (MRSA) and it has been used more than 4 decades in clinical practice. Fusidic acid-resistant S. aureus has been reported in many countries with a prevalence ranging from 0.3 to 52.5%. No clinical data has been published on the prevalence of fusidic acid resistant S. aureus in Jordan. The objective of this study was to determine the prevalence of resistance to fusidic acid in clinical isolates of S. aureus in Jordan.

Methods: Samples were obtained from clinical specimens collected from Prince Hamzah Hospital between February and July 2015. Controls were obtained from nostrils of healthy personnel from the community. All specimens were cultured and subjected to identification by morphological and biochemical tests and confirmed as S. aureus by the presence of the encoding thermonuclease gene (nucl gene). All isolates were tested for antibacterial susceptibility using disc diffusion method. Fusidic acid resistance was determined by disc diffusion and minimum inhibitory concentrations (MICs) using E-test.

Result: Thirty three (~ 29%) out of 113 S. aureus isolates collected from clinical specimens were classified as resistant to fusidic acid (MICs ≥ 2 µg /ml), whereas only 3 (~ 5%) out of 61 S. aureus isolates collected from healthy specimens were classified as resistant to fusidic acid.

Conclusion: The numbers of fusidic acid resistant isolates were found to be much higher in clinical isolates compared to healthy isolates.
Antimicrobial Activity of Local Herbal Oils and Extracts against Helicobacter pylori

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ABSTRACT

Background: Gastritis and peptic ulcer are considered major health problems worldwide. It has been reported that more than 80% of chronic active gastritis are due to the pathogenic bacterium Helicobacter pylori where persistent infection remains for decades. The aim of this study is to evaluate the activity of ethanol extracts of selected local medicinal herbs and volatile oils of certain aromatic plants against H. pylori. Plants selection was based on their traditional use among Jordanians for the treatment of peptic ulcer. Plants were selected and evaluated for their inhibitory effects against H. pylori urease. Synergistic effects of selected extract in combination with metronidazole were also evaluated.

Methods: In vitro antibacterial activity of extracted herbs (Cinnamomum cassia, Origanum syriacum, Foeniculum vulgare, Lavandula angustifolia, Coriandrum sativum, Pimpinella anisum, Rosmarinus officinalis, Carum carvi, Syzygium aromaticum, Punica granatum, Artemisia judaica and Aloysia citriodora) was tested using disc diffusion method. Minimal inhibitory concentrations (MICs) for each tested herbal preparation were measured by standard agar dilution method. Furthermore, the potential inhibitory effects of each preparation were tested against the enzyme urease by kinetic colorimetric assay. Synergistic activity of Punica granatum ethanolic extract in combination with metronidazole against H. pylori was explored by checkerboard test.

Results: Among the tested herbal preparations, Cinnamomum cassia oil reported the best MIC against H. pylori with concentration of 0.00122% v/v, followed by Origanum syriacum and Foeniculum vulgare oils (MICs of 0.039% v/v). In addition, ethanolic extracts of the tested plants showed a potent activity as well ranging from (0.01562 - 1.25 g % wt/v). Punica granatum extract showed the best MIC of 0.0156 g%. Furthermore, some of our tested herbal preparations reported a significant urease inhibition while the best activities were reported for Carum carvi (IC50 0.195 % v/v), Cinnamomum cassia and Coriandrum sativum (IC50 0.783 % v/v). For a combination of Punica granatum extract and metronidazole, FIC mean values were (0.0078) for metronidazole and (0.25 ) for Punica granatum, FID index was (0.2578) indicated that this combination was synergic.

Conclusion: The present work reported a remarkable activity of some local herbs against H. pylori. In the light of the results of this study, considerable options of herbal oils and extracts could be used as potential alternative therapies for reduction of H. pylori associated clinical outcomes and diseases.
Thymidylate Synthase Polymorphisms and risk of Lung Cancer among Jordanian Population: a Case Control Study

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ABSTRACT

Background: Lung cancer is a heterogeneous, complex, and challenging disease to treat. Although smoking has been called the chief avoidable cause of lung cancer. Many risk factors are implicated in lung cancer development as less than 20% of smokers develop lung cancer. Cells may predispose to carcinogenesis if genetic alterations occur in any critical regulatory pathway. Abnormality of DNA synthesis and repair is a possible mechanism for the development of cancer. Thymidylate synthase (TS) catalyzes the methylation of deoxyuridylate to deoxythymidylate utilizing 5,10- methylene-THF as a cofactor is involved in DNA methylation, synthesis and repair. The aim of this study to ascertain if the two functionally important TS polymorphisms and their combined effect are associated with an altered risk of developing lung cancer among Jordanians.

Materials and methods: A case-control study 84 lung cancer cases and 71 controls was conducted. Controls were matched to cases with regard to age, sex and smoking status. Polymerase chain reaction/restriction fragment length polymorphism (PCR-RFLP) technique was used to detect the polymorphism of interest.

Results: Individuals bearing ins/ins genotype were 2.5 times more susceptible to lung cancer [2.5 (95%CI: 0.98-6.37), p=0.051]. However the age can modify the influence of TS 3’-UTR 6 bp del/ins genotype on lung cancer susceptibility where individuals who were less than or equal 57 years carrying and ins/ins genotype were 4.6 times more susceptible to lung cancer [OR<57 vs >57years: 4.6 (95%CI: 0.93-22.46), p=0.045)]. Our findings indicated that weak linkage disequilibrium existed between the two loci of interest (Lewontin's coefficient [D']) (LC: D' =0.03, r^2: 0. 001, p= 0.8; Controls: D' =0.29, r^2: 0.08, p=0.02). Carriers of the haplotype 3R_insertion were 2 times more likely to have lung cancer [2 (95%CI: 1.13-3.48), p=0.061].

Conclusion: The findings of the current study suggest that genetic polymorphism of TS at 3’ UTR and its haplotype analysis modulates the risk of lung cancer in the Jordanian population. Polymorphism of TS at 3’ UTR is more informative than TSER polymorphism in predicting Jordanian population at increased risk of lung cancer.
The Study of Correlation between Serum Levels of Oxytocin, Fibroblast Growth Factor-21, and Hepatocyte Growth Factor in Type 2 Diabetes Mellitus Patients with Metabolic Syndrome in Jordan: a Cross-Sectional Study

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ABSTRACT

Background: Oxytocin (OXT), Hepatocyte Growth Factor (HGF), and Fibroblast Growth Factor-21 (FGF-21) were shown to play key roles in different aspects of metabolic syndrome (MS), and Type 2 Diabetes Mellitus (T2DM). Nevertheless, how OXT correlates – if at all - with the plasma levels of both FGF-21, and HGF is still to be investigated in MS-pre/T2DM patients.

Methods: In a cross-sectional study, 85 MS- nondiabetic subjects, and 90 MS-pre/diabetic patients (BMI-, gender- and age-matched) were enrolled. Plasma OXT levels were measured using competitive binding enzyme-linked immunosorbent assay (ELISA), while FGF-21, and HGF levels using sandwich ELISA. The correlations between these biomarkers and between biomarkers and patients’ clinical parameters such as HbA1c, FPG, blood pressure, lipid profile, and body mass index were evaluated.

Results: Mean circulating levels of both HGF and FGF-21 were substantially higher in the MS-pre/T2DM group than in the MS-control group; HGF (pg/mL) means±SD were 98.06±59.78 vs. 58.8±25.51, p<0.001, and for FGF-21 (ng/mL) 0.41±0.33 vs. 0.28±0.25, p<0.05. Conversely, mean OXT plasma levels (pg/mL) were lower in the MS-pre/T2DM group than in the MS-control group; (1231.26±555.91 vs. 2201.54±867.50, p<0.001). In the total pool of MS-participants, plasma OXT levels correlated inversely with both HGF and FGF-21 plasma levels; (Spearman correlation coefficient r = -0.403, p<0.001, N=162) for HGF, and (r = -0.222, p<0.05, N=159) for FGF-21, also HGF plasma levels correlated directly with those of FGF-21 (r = 0.203, p<0.05, N=152). In the total MS-sample, HGF plasma levels correlated positively whereas OXT levels correlated inversely with HbA1c and FPG (p<0.001 for all).

Conclusions: Unlike the decreased OXT levels in MS-T2DM; HGF and FGF-21 were increased. A direct correlation was found between HGF and FGF-21, and an inverse correlation was observed between OXT and these two biomarkers separately. Furthermore, HGF and OXT levels correlated with the degree of glycemic control. Our findings may have potential to be utilized in the therapeutics of MS-pre/T2DM.
Awareness and Knowledge of Health Care Professionals and Obese Adults of Complementary and Alternative Medicine Used to Manage Obesity in Jordan

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ABSTRACT

Background: Complementary and Alternative Medicine (CAM) according to National Center for Complementary and Alternative Medicine (NCCAM 2015) is “a group of different medical and health care systems, practices, and products that are not generally considered part of conventional medicine”. Obesity has become a worldwide epidemic. It affects people in developed as well as developing countries. Obesity is defined as a metabolic disorder characterized by an excessive increase in body mass. It is considered a risk factor for numerous prevalent diseases such as diabetes mellitus type 2, hyperlipidemia, coronary heart diseases, hypertension, gallbladder disorders, osteoarthritis and certain types of cancer. Obesity can be controlled by different methods, dietary intervention and non-dietary intervention. The latter includes medicines and CAMs.

Awareness and knowledge of Health Care Professionals (HCPs) namely physicians, pharmacists and nutritionists as well as obese adults about finished CAMs used to control weight in Jordan were studied. Furthermore, this study aimed to identify the source of information HCPs and obese adults rely on to obtain knowledge on CAMs to control weight.

Methods: A semi-structured, face-to-face interview-based study was conducted in three Jordanian cities: Amman, Zarqa and Irbid. The study setting involved out-patient clinics, community pharmacies and nutrition centers. Four interview guides were constructed, one for each; physicians, nutritionists, pharmacists, and a forth for the overweight/obese adults. This was preceded by a pilot study to test the applicability and feasibility of the study tool (Interview guide). It involved one prominent practitioner from each population; a physician, a nutritionist a pharmacist and an obese adult.

Results: Sixty HCPs as well as 50 obese adults were interviewed in the three cities. More than half of Pharmacists (55%, p <0.05) believed that CAMs could be used effectively to control weight compared to other HCPs.

Ninety five percent of physicians did not prescribe CAMs to control weight due to many reasons. Additionally, more than half of nutritionists (55%) did not recommend CAMs to control weight, while the majority of pharmacists (90%) recommended CAMs to control weight.

HCPs-Patients discussions were also studied. Seventy five percent of physicians, 45% of nutritionists and 5% of pharmacists did not provide their patients with information about CAMs to control weight.

HCPs reported that female adults (62%) were more likely to consult them to control their weight compared to males (2%). In terms of age, most HCPs reported that 87% mid-age adults were more likely to consult them to control their weight compared to other ages. In terms of weight state, 82% of HCPs believed that there was no difference between obese and overweight adults that sought help about CAMs to control weight. In terms of health state, 57% of HCPs stated that there was no difference between ill adults and healthy adults in seeking help about CAMs to control weight. Eighty five percent of physicians used books as references, while 80% of physicians used internet search engines as a reference. Ninety percent of nutritionists used internet search engines as references on CAMs.

All obese-overweight female participants declared they used CAMs to control weight compared to 60% of male participants.

Participants' references were also investigated. It was found that pharmacists and friends (50%) were the main source of information on CAMs.

Conclusion: The findings of this study highlighted the need for more information resources about CAMs. Moreover, there is an obvious need for continuous professional education about CAM targeting physicians, nutritionists and pharmacists. Furthermore, more CAM-related research is needed to understand their use in Jordan and the parameters that impacted them.
Evaluation of Lansoprazole Products Available in the Jordanian Market: Comparing USP versus BP Methodology

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ABSTRACT

Background: Seven lansoprazole (LZP) products, available in the Jordanian market, in the form of capsules and tablets were evaluated according to the USP 2013 and BP 2013 LZP monographs. One major purpose for this project was to know to what extent the analytical results obtained by USP and BP methodologies would agree with each other. Particular emphasis was given to the dissolution methodology recommended by USP (adopts a UV method) which was hypothesized to not agree with that of BP (adopts a HPLC method) as the former is not a stability indicating assay. The use of UV spectroscopy, which is in general a none sufficiently selective technique in the determination of acid labile drugs, such as LZP, was a major motive for this work. One of the main aims of this project was to know whether the adopted USP dissolution method was selective enough and could give a real results regarding the percentage released of LZP in the dissolution media; particularly, in the acid stage where the capsule/tablet is expected to be soaked for 1 hour.

Methods: Therefore the 7 products were subjected to the dissolution test. In this test, the capsule/tablet is placed in two successive media: (1) is the acid stage where 0.1 M HCl solution is employed and (2) the buffer stage (pH of 6.8). In the two dissolution stages samples withdrawn were decided to be assayed using a HPLC method in addition to the UV method described by USP monograph.

Results: All products except Takepron® appeared to satisfy the requirements of USP for dissolution i.e. release of not less than 80% in the buffer stage and no more than 10% in the acid stage. For instance, using the UV method Takepron® exhibited a percentage release in acid stage about 3% higher than the maximum allowed limit (10%) and passed the buffer stage requirements with the lowest percentage release (94.5%) at 60 minutes. Using the HPLC method Takepron® appeared to be border line as it released 87% in the buffer stage at 60 minutes and with the lowest percentage released of drug among other products while in the acid stage at 60 minutes it released (3.7%). In comparison to the UV method, the percentage released for Takepron® in the buffer stage was significantly lower by (7.2%), while in the acid stage was lower by (9.4%).

Conclusions: Therefore a borderline product such as Takepron® could have been accepted according to the USP and rejected according to the BP or using a selective HPLC method in the buffer stage while it should not, and vice versa in the acid stage. These findings were attributed to the fact that the non selective UV method does not differentiate between the intact and degraded LZP while the HPLC one does. Thus the Takepron® example stresses the need for a proper analytical method to reflect the extent of dissolution.
Validation and Simultaneous Determination of Warfarin in Rat Plasma using HPLC in Presence of Some Commonly Used Complementary and Alternative Medicines (CAMs).

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ABSTRACT

Background: Complementary and alternative medicine (CAM) and specifically natural products have been used since antiquity for the treatment of different ailments. However, a large number of reports on minor and significant drug–herb interactions have been recently reported since most people believe that “natural products are harmless”. The current study aims to investigate the impact of co-administration of some commonly used CAMs on warfarin i.e. warfarin-CAM interactions. Furthermore, to develop and validate chromatographic methods for the simultaneous estimation of warfarin and some commonly used CAMs in rat plasma.

Method: Both pharmacokinetic and pharmacodynamic interactions were studied. In vivo studies were conducted on Wister laboratory rats which were divided into groups of 8 rats A, B, and C. The first group received multiple doses of warfarin (0.5mg/kg) orally in combination with natural drugs; turmeric, hawthorn and cinnamon. As for the second group, warfarin was administered as a control. Group C received multiple doses of natural drugs only over five days. Another set of animal groups, A and B, were given single dose instead of multiple doses. Blood samples were collected at specific time intervals. Then HPLC method was developed and validated (accuracy, precision, recovery and stability). A calibration curve was plotted over concentration range 100-4000 ng/ml of warfarin. The used column was BDS herpasil C18. A mobile phase consisting of water: acetonitrile(40:60) +1 ml/L triethylamine to adjust pH to 3.00. Warfarin was detected at 310 nm and the injection volume was 20 μl. Moreover, prothrombin (PT) time was also monitored for all combinations.

Results: The three natural drugs have contributed to a significant increase in (PT) when combined with warfarin ($p<0.05$). Pharmacodynamic interaction was as follows: warfarin-turmeric > warfarin-cinnamon > warfarin-hawthorn with percentage of increase 94%, 69%, 42% respectively. As for warfarin maximum plasma concentration (Cmax) and area under the curve (AUC), there was no significant pharmacokinetic interaction. Intra-day and inter-day accuracy and precision showed accepted criteria, the coefficient of correlation was 0.99 with reasonable sensitivity and selectivity.

Conclusion: In conclusion, all combinations have potentiated the anticoagulant activity of warfarin. The type of interaction between warfarin in combination with turmeric, hawthorn and cinnamon is a pharmacodynamic interaction. Therefore, patients using warfarin as an anti-coagulant have to use these natural drugs cautiously. Besides, awareness on this significant interaction has to be spread among the medical team to take it into consideration. Further research has to be conducted on drug-herb interactions especially low therapeutic index drugs with commonly used CAMs.
The Influence of the Chemical Properties of the Dissolution Medium on the Rate of Quetiapine Fumarate Release from HPMC and Compritol® HD5 ATO Matrix Tablets

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ABSTRACT

Background: The choice of dissolution medium is expected to play a very important role in rate of drug release; where dissolution is influenced by a variety of factors throughout the gastrointestinal (GI) tract such as pH, buffer capacity, ionic strength, osmolality, food intake, and volume available for dissolution. The objective of this study was to investigate the effect of pH, ionic strength, and buffer capacity of the dissolution media on the dissolution behavior of QF.

Methods: A unique matrix of quetiapine fumarate (QF) tablets using new polymeric blend of the hydrophilic polymer hydroxypropyl methylcellulose (HPMC, K4M) and a PEGylated glyceryl behenate (Compritol® HD5 ATO) was developed. The rate of QF release from matrix tablets was investigated using dissolution type II apparatus.

Results: QF release was complete (~ 100% released within 8h) in media simulating the gastric fluid (pH 1.2 – 1.6) and relatively low (79 – 89% released within 20 – 24 h) at high pH values (pH 7.2 – 7.8). It was found that the buffer capacity of the dissolution media did not influence the % released of QF. QF dissolution increased with increasing the ionic strength of the dissolution media.

Conclusions: The rate of release of QF from these matrix tablets was influenced by the chemical properties (pH and ionic strength) of the dissolution media.
Direct Medical Cost Associated with Colorectal Cancer in North of Jordan

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ABSTRACT

Background Colorectal cancer (CRC) includes cancerous growths in the colon and rectum. Globally, it is the fourth most commonly diagnosed cancer causing 655,000 deaths worldwide per year. In Jordan, CRC is the most common cancer in men and the second in women. Whereas health care systems all over the world are struggling with the dilemma of limited resources and growing needs, estimates of the costs associated with CRC care are essential both for assessing burden of the disease at the population level and for conducting economic evaluations of interventions to prevent, detect, or treat CRC. Direct medical cost is related to resources that are directly used in treating the patient such as the cost of drugs, diagnostic, treatment, follow up, rehabilitation and hospital admission. In addition to the cost of treating side effects. This study aimed to estimate and analyze the direct medical costs attributable to CRC in North of Jordan.

Methods A retrospective analysis of a cohort of all patients treated for CRC in KAUH has been performed to determine the direct medical costs attributable to CRC in North of Jordan. Demographic, clinical, and economic data has been collected and entered into Excel. Statistical analysis was conducted using SPSS™ for Windows and a p value of < 0.05 was defined as statistically significant.

Results This study quantified the direct medical cost associated with CRC by all treated patients in KAUH from the perspective of health care providers (public sector). It included 97 patients, of which males were 52 (53.6%). The mean age was 57.31 ±13.3. A total of 63 patients had colon as a primary site of tumor (65%), and more than 50% of patients presented at stage 4. Total CRC cancer cost in the year 2014 in KAUH was estimated to JD 695,608. In addition, the most expensive stage for all sites was stage 4 reaching a cost of JD 518,894. Using Kruskal-Wallis and Mann-Whitney tests for comparison between all stages and primary sites of tumor effect on total cost; statistically significant differences in between stages cost was found (p value < 0.05). Advanced disease stages were associated with a higher total cost, and chemotherapy costs, and a decrease in the relative weight of surgical costs. While, no statistically significant differences were found in median costs per patient between sites. Most of the total cost of the disease was attributable to drugs (chemotherapy mainly) followed by laboratory tests and follow up procedures.

Conclusion CRC creates an economic burden on health care services in Jordan. The earlier the stage of CRC, the less is the cost. More efforts should be done for improving the awareness of CRC since most of the patients were presented in the advanced stages, which corresponded to high cost.
Chemical Composition of the Volatile Oil from Leaves of Four Cultivars of Jordanian Olea Europaea L. and evaluation of Antioxidant and Anticancer Activities of the Aqueous and Methanolic Extracts

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ABSTRACT

Background: Olive tree (Olea europaea L.) is an old tree that is widespread in the Mediterranean region, and a principle plant in Jordan. In the present study, chemical composition of the volatile oil hydrodistilled from the dried leaves of four cultivars namely, Roumi (Roman), Baladi (Wild), Nabali, and Barnea K-18 grown in Jordan was analysed using GC and GC-MS. In addition the antioxidant and the anticancer activities were also evaluated using the aqueous and methanolic extracts of the leaves of the same cultivars.

Methods: The essential oil components were identified by GC/ GC/MS analysis, The aqueous and methanolic extracts were essayed for its in vitro scavenging activity using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) method.

Furthermore, the two extracts were evaluated for their in vitro anticancer activity, using MTT assay, against T-47D and CaCo-2 cell lines.

Results: The results showed that the major identified oil phytochemicals are the sesquiterpenes in the four cultivars, with percent contents of 50.7%, 68.8%, 69.5%, and 40.4%, for Roumi, Baladi, Nabali and K-18 oils, respectively. The oils were found to contain moderate amounts of non-terpenoidal hydrocarbons and low levels of monoterpenes. Several major common compounds were found to occur in oil of the four cultivars such as: (E,E)-α-farnesene (11.9%, 26.3%, 19.6%, and 19.8%), (E)-nerolidol (19.8%, 13.0%, 2.5%, and 4.5%), (2E)-decenal (1.99%, 1.3%, 1.7%, and 2.8%), and β-caryophyllene (4.7%, 16.3%, 13.0%, and 3.5%), respectively.

The results showed that the four cultivars possess antioxidant activity in dose dependent attribute, where, in general the methanolic extract has stronger potency than the aqueous extract at 100µg/mL.

Both extracts demonstrated notable anticancer activity, however, they had showed stronger potency against the colon cancer CaCo-2 cell line relative to the breast cancer cell line T-47D.

Conclusion: To the best of our knowledge this report is the first study of the volatile oil composition and the biological activities evaluation of various extracts obtained from the leaves of olive tree grown in Jordan.
Targeting breast cancer in mice using a combination of metformin and curcumin

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ABSTRACT

Background: Breast cancer is the primary cause of cancer mortality in women. Numerous anticancer agents were discovered and tested as single agent therapies against breast cancer. However, combination therapy has been proposed as the ideal approach in cancer treatment, by lowering the toxicity and increasing the efficacy through targeting several mechanisms of cancer progression. Combination of curcumin with different agents caused improved anticancer activity against different cancers including breast cancer. However, the anticancer activity of curcumin was not evaluated in combination with metformin. The aim of the study was to evaluate the therapeutic activity of metformin and curcumin as a combination therapy against breast cancer in mice.

Methods: The antiproliferative activities of metformin, curcumin and their combination were tested against mouse epithelial breast cancer cell line (EMT6/P) using MTT assay. The combination index (CI) was calculated using isobolographic method. Balb/C mice were transplanted with EMT6/P cells and in vivo antitumor activity was assessed for metformin, curcumin and their combination. Histological examination of tumor sections was performed using standard hematoxylin/eosin staining protocol and TUNEL colorimetric assay was used to test the apoptosis induction ability for all treatments. ELISA was used to measure vascular endothelial growth factor (VEGF) expression in tumor cells and to measure serum levels of INF-γ and IL-4, IL-2 and IL-10. Serum levels of the liver enzymes aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were used as biomarkers of hepatotoxicity. Serum creatinine level was measured to assess any nephrotoxicity. Serum blood glucose was monitored using glucometer device. Gene expression of p53 was measured in treated cells using semi-quantitative RT-PCR.

Results: Synergistic anticancer effect was observed between metformin and curcumin with CI value of 0.884. The combination of metformin and curcumin caused a significant decrease in tumor size with a percentage cure of 80%. The combination therapy induced extensive necrosis, increased apoptosis rate, and decreased VEGF expression. Serum levels of AST, ALT, and creatinine of the combination therapy were close to the normal values. Elevated serum levels of IL-4 were detected in mice treated with the combination therapy. Combination therapy did not cause increase in p53 expression.

Conclusions: Combination of metformin and curcumin represents a promising and nontoxic anticancer therapy to treat breast cancer. The anticancer activity of this combination is mediated by proliferation inhibition, apoptosis induction, and inhibition of angiogenesis. Apoptosis was induced by p53-independent mechanisms and no antitumor Th1 immune response was activated by this combination.
Distribution of Breast Cancer Molecular Subtypes among Jordanian Patients

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ABSTRACT

Background: Breast Cancer is a leading cause of death in many parts of the world where the heterogeneity of the disease causes many protocol treatments given to patients to fail. Gene expression profiling of tumors implemented in many treatment protocols would increase the 5 years survival rates of patients.

Methods: In this study, the distribution of molecular subtypes of breast cancer was investigated in 102 samples from Jordanian patients who underwent biopsy or mastectomy at KHCC in 2006 and 2007. After optimization of the experimental conditions using 3 breast cancer cell lines (MCF7, MDA-MB-453, T-47D), gene expression profiles for Prediction Analysis of Microarray (PAM50) assay were obtained using qRT-PCR.

Data analysis and molecular subtypes were obtained by SigClust and GeneFu algorithms.

Results: Gene expression profiles were produced for 54 out of the 102 samples tested and it was found that 28% of the samples were basal like subtype, 16.6% were human epidermal growth factor 2 (HER2) enriched, 27.7% were luminal A, 14.8% were luminal B and 12.9% were normal like.

Conclusion: The data obtained were in concordance with the reported subtypes using PAM50 assay in Caucasian populations, indicating ethnic biological similarities. Future correlation of these molecular subtypes with patients’ immunohistochemical (IHC) profiles, treatment protocol plans applied and 5 years survival rates would help revise and establish new treatment protocols for future breast cancer patients according to their molecular subtype and thus enhance the prognosis of the disease.
Prizes

Prizes for oral and poster competitions are distributed as following:

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