9th يـوم البحث العلمي بكلية الصيدلة
College of Pharmacy Research Day

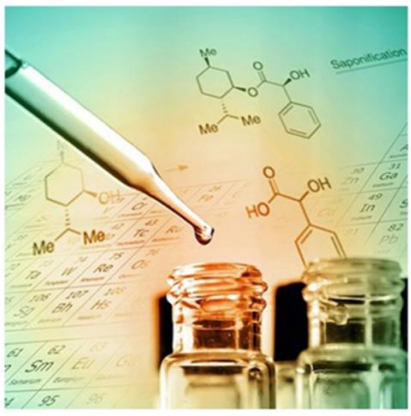
جـامـعـة الملك سعود
King Saud University
كلية الصيدلة



COPRD 2019

9th College of Pharmacy Research Day

April 11, 2019

Abstract Booklet




بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

Content

Welcome to COPRD 2019

9th College of Pharmacy Research Day

The College of Pharmacy Research Day is an annual forum to highlight research projects of final-year undergraduate and post graduate students.

The primary goals of the Research Day are to showcase the various types of research in the College of Pharmacy, share our mutual interests, and develop intra- and interdepartmental collaborations.

The conception of this Research Day was created in year 2007 with the aim of preparing Pharmacy students for presenting their studies at scientific conferences. Thereafter, this effort has continued in which it became mandatory for all final-year students in the College of Pharmacy to participate in this Research Day by presenting their work.

Research Day provides a great opportunity to learn about diverse research ideas being conducted within the College of Pharmacy.

Message from the Dean

To coordinate coursework with research is not an easy task. Yet, KSU Pharmacy students are dedicated to manage their time effectively and actively participate in research activities.
In our BPharm and PharmD curricula, graduation research project is mandatory to final-year students. In this course, our students undergo structured and supervised training on multiple techniques relevant to their areas of interest, where they gain academic and critical skills along with lab and field experiences.
Research quality is ever evolving during the years! This indicated the level of trust that our faculty members have in their trainees. Such as parameter reflects the mentorship skills of our staff as well as the professionalism level of our students.
At the end of each academic year, students participate their research through poster and oral presentations in the Annual College of Pharmacy research Day, which is in its 9th versions today in 2019. And it is not uncommon to see some of the presented research accepted for presentation or winning awards at national, regional, or international conferences, or ending up published in peer-reviewed journal.
The unambiguous collective and collaborative effort of students and faculties makes me thankful and proud to be part of this event!

Dr. Aws Alshamsan
Associate Professor of
Nanobiotechnology
King Saud University

Sincerely,

Aws Alshamsan, BPharm, RPh, PhD
Dean and Associate Professor

Message from the Vice Dean

On the occasion of the scientific researches' Day for the College of pharmacy 55th graduates, I would like to congratulate our students for all their outstanding achievements on this day which considered a chance to present researches and an add to innovation creativity and creation of knowledge in our leading University. I would like also to extend my thanks and appreciations to all the faculty members for their priceless help to the student in their initial steps in searching

Nourah Alzoman, PhD
College of Pharmacy Vice Dean

Committees

The 9th College of Pharmacy Research Day Executive Committee

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Abdulmalik F. Rasheed
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Booklet Editorial Board

The Abstract booklet of the 9th College of Pharmacy Research Day, published every year, has been distributed since 2011. The electronic PDFs can be downloaded from the research day website www.pharmacy.ksu.edu.sa/en/coprd

Editors

Maha Meshal AlRasheed, PhD
Lama Fahad Alkhader, MSc

Awards and Prizes

The college of pharmacy is pleased to announce the 9th College of Pharmacy Research Day Competition. The competition is open to all COPRD presenters.

Process:

- Oral presentations will be evaluated by a panel of eight distinguished professors chosen by the research day committee.
- Each poster will be judged by a panel of three judges selected by the research day committee.
- Reviewed COPRD criteria will be used to evaluate poster and oral presentations.
- All abstract presentations will be given marks and the top scoring abstracts will be selected as winners.
- Awards will be presented to the winners during the research day. Awards categories are as follows:

Best innovation Award

Three abstracts (oral/poster) will be selected for the best innovative idea awards and three awards will be given accordingly.

Best Oral Presentation Award

The top five scoring oral abstracts will be selected as winners and five awards will be given.

Best Presenter Award

One best presenter award will be given to the nominated student among oral presentations presenters.

Best Poster Presentation Award

The top fifteen scoring poster abstracts will be selected as winners and fifteen awards will be given.

Best professional abstract poster presentation award

One best professional abstract poster presentation award will be given to the best selected professional abstract.

Scientific Program

8:00-8:30 **Registration & Reception**

Welcome address and Opening Remarks

8:30-8:40 **Dr. Aws Alshamsan, PhD**
College of Pharmacy Dean

8:40-9:00 **Dr. Badran Al Omar, PhD**
His excellency KSU University Rector

9:00-9:05 **Pharmacy Research Day Documentary**

Session I Student Oral Presentation

9:05-10:25

The Role of *DIO1*, *DIO2* and *TSHβ* Polymorphisms in Differentiated Thyroid Cancer and Patient Response to Therapy in the Saudi Population: A Pharmacogenetic Study
Ashwaq Alanzi, Rawan Alshalhoub

Nano Glutathione and Quercetin Abates the Toxicopathic Effect of a Neonicotinoid- in Rat's Kidneys: Role of DNA Damage and VCAM-1/KIM-1Protein Expressions
Marwah Alharbi, Wafa Alluwaymi, Eman Alnazr, Malak Alanazi, Jawaher Alotaibi

Nanoformulation of Neratinib in PAMAM dendrimer FITC labelled and conjugated with trastuzamab as targeted breast cancer therapy
Sara Al-Jarrah Setó, Nora Al Khalil, Lama Aleshaiwi and Manar Alghamdi

Genetic and epigenetic alterations induced by the small molecule vorinostat in mouse bone marrow cells
Mohammed AlKhalifa

Whole Exome Sequencing Identifies Novel Gene Associated with Hereditary Spastic Paraplegias Among Saudi Patients
Ashwag Alyousef, Lama Aldawsari

Pharmacy Students' Perceptions and Attitudes Towards Professionalism on Social media: A Cross-Sectional Study
Ghaida Alahmari, Nada Alnahdi, Fatmah Aljamil

Determination of estrogen residues in chicken and meat products collected from the Saudi market using HPLC with diode array detection
Deema Bin Humaid, Sadeem Alqais, Sabreen Alshail, Dalal Alshammari

The Financial Burden of Cancer on Patients
Jeelan Alghaith, Latifa Almosabh

10:25-10:40 ***Coffee Break***

Scientific Program

Session II Student Oral Presentations

10:40- 12:00

Development of nanocrystals to promote percutaneous penetration and permeation of meloxicam through skin: In vitro and ex vivo studies
Abdulrahman Albilali

Knowledge and attitudes of the general population toward the use of paracetamol in Saudi Arabia
Ahmed Ayidh Alshalawi, Saeed Abdullah Bawazir

Awareness of Counterfeit Medicine in Saudi University Students
Ameera H. Alnahdi, Shadia M. Alharbi and Rawan A. Al-ahmari

Antimicrobial resistance pattern and phenotypic characterization of carbapenemases in Klebsiella
Yahya Ali Laghbi

Cardiotoxicity and Cardiac Monitoring Among Anthracycline-Treated Cancer Patients, A Retrospective Cohort Study in Riyadh, Saudi Arabia
Nora Alorf, Ward Alessa

Evaluation of Different Factors on INR Levels Among Saudis In Outpatient Settings: A Cross Sectional Study
Talal Tmesh Alanazi, Megren Sulaiman Alhatem

Assessment of Switching Appropriateness Between DOACs and VKAs
Faisal Saad Aljadhae

Production of a Biopesticide Based on Host and Non-Host Serine Protease Inhibitors for Red Palm Weevil in Palm Trees
Arwa Bin Swuilih, Hanan Abu Al-Ala'a, Saja Banejamea, Nada Zaidan

12:00-13:00 ***Lunch and Prayer***

13:00-14:00 **Poster viewing session and evaluation**

Session III Student Oral Presentations

14:00-14:40

Evaluation of the impact of point of care testing (POCT) device on quality of anticoagulation management in a teaching hospital
Nourah Abdulaziz Bin Eydan, Norah Saud Bin moaiqel

Facilitators and Barriers Towards Participating in Continuing Education (CE) Activities: A Cross-Sectional Survey on Pharmacists and Pharmacy Technicians
Wasmeah Alsamti, Rand Alturki, Hadeel Alharbi

Scientific Program

14:00-14:40

Quality of Diabetes Care Among Patients with Schizophrenia in a Tertiary Hospital, Riyadh, Saudi Arabia: A Mixed-Method Study

Khloud Alotaibi, Hanan AlManea

The Current Community Pharmacists' Preferences of Generic Over-the-Counter (OTC) medications in Saudi Arabia

Mohammed Ali Al-zaharani, Nawaf Mohammed Al-tamimi

Keynote Lecture

14:40-15:10

Chloride signalling in the central nervous system: a journey through genes, synapses, and the diseased brain

Dr. Arnuad Ruiz, PhD UCL School of Pharmacy

Awards and Closing Remarks

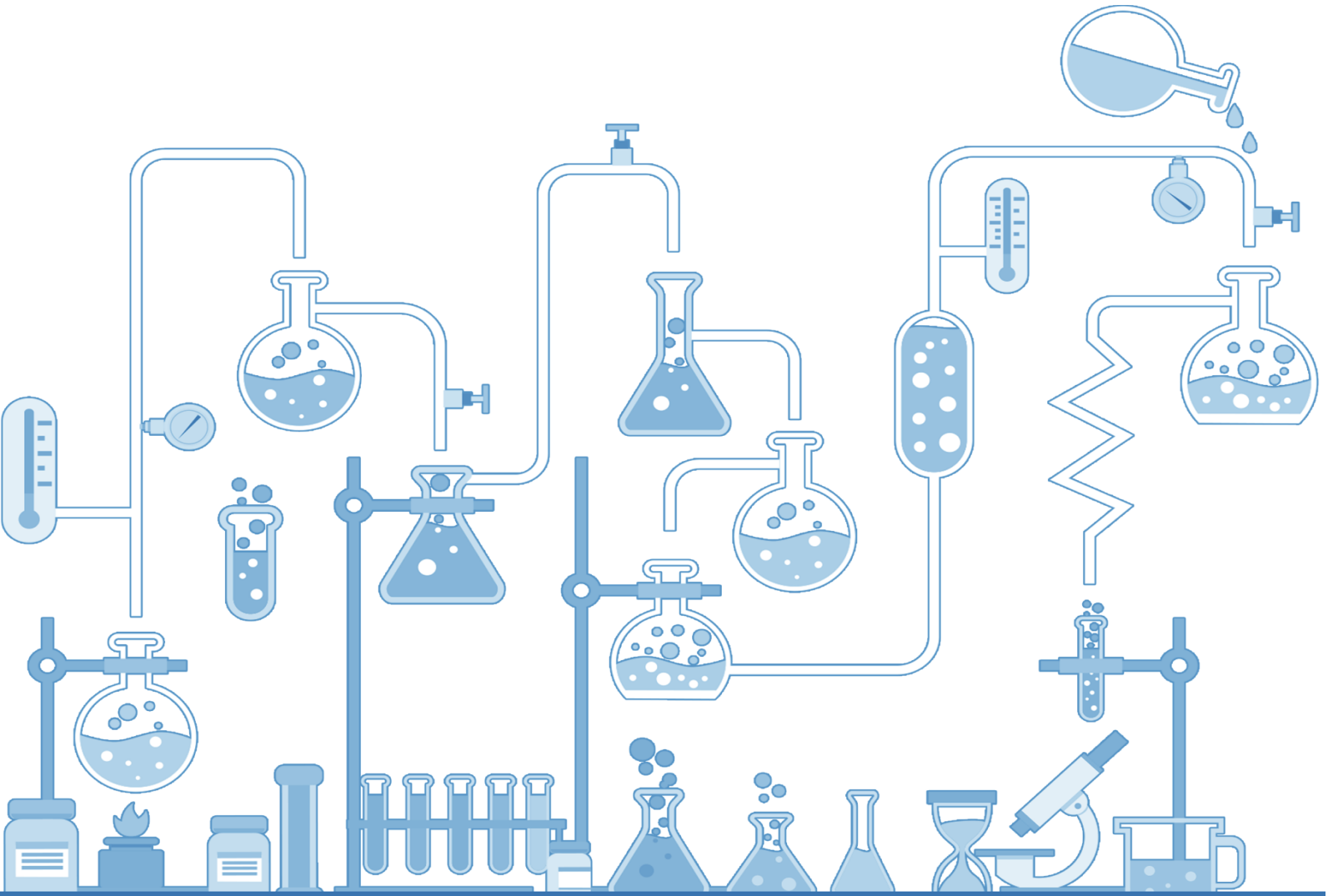
15:10-16:00

Dr. Aws Alshamsan, PhD

College of Pharmacy Dean

Dr. Maha M. AlRasheed, PhD

RD Committee Chairperson



Keynote Speaker

Dr Arnaud Ruiz trained as a neurophysiologist specialised in electrophysiology and cellular imaging. His research interests span the basic understanding of neuronal communication and plasticity rules in the cortex, the finding of new cures for inherited epilepsies and various channelopathies, the study of zinc-mediated modulation of neuronal excitability and synaptic function. Dr Ruiz obtained a BSc in life sciences in 1994 and a PhD in neurosciences in 1998 in Marseille, France. His thesis focused on glutamatergic transmission in abducens motoneurones examined in vivo. He also trained at the Institute of Physiology of Aarhus in Denmark and at the Institute for Drug Research in Budapest where he learnt in vitro electrophysiology. In 1999, he joined the laboratory of Prof Dimitri Kullmann for a first postdoctoral position at the Institute of Neurology, University College London. Then he spent two years in Bordeaux to study kainate receptor knockout mice in the laboratory of Dr Christophe Mulle and returned to UCL in 2004 for a third postdoctoral position. During this time he developed powerful approaches for the study of presynaptic receptors including direct recordings from single synaptic varicosities and multiphoton imaging. More recently his laboratory developed techniques for the study of receptors and ion channels in transfected cell lines as well as 2-photon uncaging for the study of circuits in brain slices. Milestones publications highlight the discovery of presynaptic $GABA_A$ receptors in the cortex; the demonstration of central co-transmission via the release of glutamate and GABA; the first evidence of $GABA_A$ receptor inhibition by synaptically released zinc; the identification of new mutations in the KCC2 gene causing epilepsy in children. Dr Ruiz was appointed lecturer at the UCL School of Pharmacy in 2007 and Associate Professor in 2015.

Dr. Arnuad Ruiz, PhD
UCL School of Pharmacy

Oral Presentations

Abstracts

Abstract Code: PP010

Quality of Diabetes Care Among Patients with Schizophrenia in a Tertiary Hospital, Riyadh, Saudi Arabia: A Mixed-Method Study

Student(s) Name: *Khloud AlOtaibi, Hanan AlManea*
Supervisor(s) Name: *Nouf M. Aloudah*

Abstract:

Background Patients with schizophrenia are at high risk of developing diabetes. Our study aims to determine the prevalence of diabetes in schizophrenic patients in a sample of patients in Saudi Arabia. Furthermore, to assess the quality and explore the factors affecting diabetes care provided to schizophrenia patients.

Methods Mixed-method approach was undertaken. Where we conducted a 1-year retrospective review of medical records for patients with schizophrenia as well as conducting semi-structured interviews based on the Theoretical Domains Framework (TDF) to explore health care providers attitudes and perspectives toward care delivered to patients with schizophrenia and diabetes at Al-Amal Complex for Mental Health.

Results The prevalence of diabetes was 3.7%. The annual testing rates were low. It was 8.6% for HgbA1c and 31.4% for LDL-C. Screening for albuminuria, eye examination, and foot examination were not conducted, documentation of smoking status was done infrequently (8.6%). Health care providers interviews demonstrated multiple factors related to issues of identification of diabetic patients, problems with management of these complicated cases, and major consequences of poor monitoring.

Conclusions Patients with schizophrenia have a poor quality of diabetes care. This study used quantitative and qualitative approaches to explore the low quality of diabetes care in the studied sample. The results shed light on the complicated picture for these patients and future research is required to explore these factors and further build interventions targeting improving the quality of diabetes.

Abstract Code: PP011

Pharmacy Students' Perceptions and Attitudes Towards Professionalism on Social media: A Cross-Sectional Study

Student(s) Name: *Ghaida Alahmari, Nada Alnahdi, Fatmah Aljamil*
Supervisor(s) Name: *Mansour Almetwazi, Abdulaziz Alhossan*

Abstract:

Background Social media (SM) use in Saudi Arabia has increased by 32% from Jan 2017 to Jan 2018. Gender and education program year may have roles on the level of engagement in social media. The objectives of the study were to determine the perceptions and attitudes towards SM professionalism among pharmacy students at King Saud University (KSU), and to assess differences in perceptions and attitudes according to gender and program year.

Methods A cross-sectional study using an online survey was sent to undergraduate pharmacy students at KSU. The survey contained two sections: demographics, and the assessment of attitudes towards professionalism and accountability in using SM. Fisher's exact test was used to determine the differences between genders. Frequency and percentages were used to present the categorical variables, and the mean was calculated to present age variable. Statistical analysis was conducted using Stata software.

Results A total of 239 completed the survey. The results showed that 35% of males agreed on using SM for hiring decision. About 41% of females agreed on the importance of editing SM profile prior to applying for a job compared to 38% of the males. Male agreed (11%) on taking pictures of others without their knowledge. 5th year students disagreed (85%) most on posting descriptions of how to break school or job rules on SM.

Conclusions Perceptions and attitudes towards SM professionalism appeared to be affected by gender and program year. Increased use of SM among students necessitates the emphasis of adding rules and regulations of using SM in school curriculum.

Abstract Code: PP012

The Role of *DIO1, DIO2* and *TSHβ* Polymorphisms in Differentiated Thyroid Cancer and Patient Response to Therapy in the Saudi Population: A Pharmacogenetic Study

Student(s) Name: *Ashwaq AlAnzi, Rawan AlShalhoub*
Supervisor(s) Name: *Maha M. AlRasheed, Norah Abanmy, Dana Bakheet*

Abstract:

Background Patients with differentiated thyroid cancer (DTC) are managed with total thyroidectomy and radioiodine ablation. L-thyroxine (L-T4) therapy (about 2 µg/kg) is required for life, with a wide variation in dose requirement. The iodothyronine deiodinases (*DIO1* and *DIO2*) regulate the activity of the thyroid hormone via removal of iodine moieties from T4. Thyroid stimulating hormone (*TSHβ)* regulates the secretion of thyroid hormone and therefore thyroid function, but its role in thyroid cancer is not yet fully understood. Therefore, the aims of this study are to identify and evaluate the association of polymorphisms in *DIO1, DIO2* and *TSHβ* genes involved in thyroid hormone pathways with DTC risk and L-T4 dose requirement.

Methods A total of 1067 (560 controls and 507 DTC thyroidectomized cases) Saudi Arabs were included. We genotyped one *DIO1* variant rs2294512, three *DIO2*

variants, rs1388378, rs12885300, rs225013, and two *TSHβ* variants, rs201857310 and rs7530810 by Taqman assay.
Results The *DIO2* variant, rs1388378 was associated with L-T4 dose requirement. Patients carrying the rs1388378_T allele required a lower L-T4 dose (145.91±33.31) P=0.035. On the other hand, the *TSHβ* variant rs201857310_G was strongly related to the DTC risk [0.512(0.362-0.724); p=<0.0001] in the univariate analysis, and retained this association following the correction for confounders [0.47(0.68-0.33); p=<0.0001].
Conclusions The study has revealed that *TSHβ* gene constitutes a risk for thyroid cancer manifestation in Saudi population. Changes in *DIO2* may be important with respect to the requirement of altering thyroxine dose in therapy of DTC thus providing evidence in favor of personalized treatment of hypothyroidism in athyreotic patients.

Abstract Code: PP013

Knowledge and attitudes of the general population toward the use of paracetamol in Saudi Arabia

Student(s) Name: *Ahmed Ayidh Alshalawi, Saeed Abdullah Bawazir*
Supervisor(s) Name: *Ziyad Alrabiah*

Abstract:
Background Non-prescription OTC drugs are commonly used by public. One of the mostly used medication is paracetamol. The aim of the study was to estimate the knowledge and attitudes of the general population toward the use of paracetamol in Saudi Arabia.
Methods A cross sectional survey was conducted utilizing a questionnaire that was designed based on different studies. It was distributed among the general population of Saudi Arabia. The survey asked questions about paracetamol usage and safety.
Results A total of 380 participants responded to the questionnaire. The majority were Saudi female (n=245). Most of them were holding a bachelor degree (58.15%). Only two third of participants know that Adol, Fevadol, Panadol contain paracetamol. In contrast, the other products such as Flutab, Dolo-fast, Emidol and Fludrex were not commonly known. About one third of the participant abused paracetamol as a sleeping pills. A large number used paracetamol by their own decision (61%), furthermore 13% used it more than a week. Surprisingly, only 17 % know the correct maximum daily dose of paracetamol. Majority did not experienced any side effect however; the common reported side effects were nausea and vomiting (15%), peptic ulcer (13%) and dizziness (12%). Unfortunately, less than 15% get the knowledge about paracetamol from their pharmacist or physician.
Conclusions Paracetamol was misused or unidentified by significant number of respondents. Respondents underutilize healthcare provider, because they think that they had enough knowledge about the drug.

Abstract Code: PP014

Evaluation of Different Factors on INR Levels Among Saudis In Outpatient Settings: A Cross Sectional Study

Student(s) Name: *Talal Tmesh Alanazi, Megren Sulaiman Alhatem*
Supervisor(s) Name: *Abdulaziz Al Hossan - Mansour Almetwazi*

Abstract:
Background Warfarin is an essential medication for coagulation disorders with a narrow therapeutic index. Many factors may interfere with warfarin use and expose patients to coagulation disorders including different types of foods, adherence. Saudis has unique food habits that may interfere with warfarin that never been tested. Study objectives are to assess the impact of different food types on INR, and reasons of non-adherence that can impact INR level.
Methods A cross-sectional study was conducted on Saudi patients using warfarin in anticoagulation clinics. Inclusion criteria: Saudi patients aged ≥ 18 years on warfarin for at least 4 weeks. An interview-based survey was used to collect data about specific food types. Also, adherence was assessed using self-reported-medication-non-adherence. Paired T test was used to measure the INR change and chi square test was used to detect associations between demographic characteristics and adherence.
Results One hundred and eighteen patients were interviewed. The mean age is 51 years,63(53%)of them were male. 40% of them reported consuming liver and garlic, and 19% drinking green tea. For adherence assessment, 39(33%) were classified non-adhere patient mainly due to forgetting the dose. Paired T test showed significant association between drinking green tea and INR change (P=0.049) Also, there was a significant association between non-adherence and change in INR (P=0.029). Chi square test showed no association between any demographic characteristics on adherence level.
Conclusions The study shows significant association between some foods and INR changes, Also, level of adherence is critical factor in keeping INR within target levels.

Abstract Code: PP015

The Financial Burden of Cancer on Patients

Student(s) Name: *Jeelan Alghaith, Latifa Almosabhi*
Supervisor(s) Name: *Sinaa Alaqeel, Lamya Alnaim*

Abstract:
Background There is a scarcity of costing studies conducted from the patient's perspective. The objectives of this study were to: i) determined the cancer related patients out of pocket expenditure ii) calculate the major contributing costs domains of these expenditure, iii)

explore the impact of cancer on patient time and working days lost.
Methods This is a cross-sectional study. A self-completed questionnaire was developed based on previous literature and patient interviews. The questionnaire was tested for face and content validity. The target population are cancer patients with solid tumors who are on chemotherapy for at least three months. The data were collected from November 2018 to March 2019 at King Khaled University Hospital. All costs are reported in Saudi Riyals.
Results 160 patients were included (67.5% females). The majority were breast or colon cancer patients (52.8%). The major costs domains were transportations, hotel accommodations and medical costs. Patients travel on average 109.969 KM (one way) to get to the hospital and the mean cost of transportation for those who used Taxi is SR 70.18 per visit. The mean cost of accommodation for those non-Riyadh residents is 328.485 Riyal per day. The average spending on medications, supplements and visiting private clinic is SR 661.167 per month. Over a 4 weeks period the average number of days absence from work due to cancer was 23.6 days.
Conclusions Cancer impose a considerable economic burden on patients. Future studies calculating the overall cancer costs should include costs incurred by the patients.

Abstract Code: PP016

Whole Exome Sequencing Identifies Novel Gene Associated with Hereditary Spastic Paraplegias Among Saudi Patients

Student(s) Name: *Ashwag Alyousef, Lama Aldawsari*
Supervisor(s) Name: *Maha M. AlRasheed, Mohammad AlMuhaizea, Namik Kaya*

Abstract:
Background Hereditary Spastic Paraplegias (HSP) are diverse group of neurodegenerative disorders characterized by progressive dysfunction in the lower extremity and spasticity. In this study, we aimed to identify disease causing mutations in Saudi HSP patients.
Methods Two consanguineous families with three affected individuals sharing the classical symptoms of HSP were included in the study at King Faisal Specialist Hospital & Research Centre. Peripheral blood samples were collected from patients and family members. DNA was isolated and used for comprehensive genetic analyses include targeted gene panel screening, whole exome sequencing (WES), confirmatory Sanger sequencing for family segregation and comprehensive in silico bioinformatics analyses.
Results We applied WES on the DNA from the index cases in each family. Our comprehensive filtering of WES coupled with autozygome and in silico bioinformatics analyses resulted in a few putative pathogenic variants in genes that were not previously linked to HSP. Segregation analyses using Sanger sequencing confirmed the likely involvement of the variants. In family 1, a missense variant (c.2324 C>T, p.P775L) was identified in *KIAA1024* gene whereas in family 2, another missense variant was found in *SQSTM1* gene (c.571 G>A, p.G191R) which has been previously linked to ataxia but not to HSP.
Conclusions We discovered likely disease-causing novel genes and variants that were not previously associated with HSP. Our work will create opportunities for genetic testing useful in diagnostic screenings of HSP in Saudi Arabia and may also facilitate gene therapy and drug development in the future.

Abstract Code: PP017

Evaluation of the impact of point of care testing (POCT) device on quality of anticoagulation management in a teaching hospital

Student(s) Name: *Nourah Abdulaziz Bin Eydan, Norah Saud Bin moaiqel*
Supervisor(s) Name: *Ghadah Bawazeer, Abdulaziz Alhossan*

Abstract:
Background Routine monitoring of warfarin therapy is essential to ensure safe and effective therapeutic outcomes. Studies had shown that point-of-care testing (POCT) device improved clinical efficiency and patient satisfaction. This project aims to evaluate the impact of POCT on clinic process, patient satisfaction and its accuracy compared to venipuncture.
Method This is a prospective, cross-sectional, survey-based study. Patients aged >18 years and on chronic warfarin therapy attending KSUMC anticoagulation clinic were included. Following ethical approval, patients had their INR measured by venipuncture and POCT (Siemens®). Patient demographics, clinic process and patient satisfaction were collected. Descriptive analysis was performed, and t-test was used to compare continuous data.
Results Of the 153 patients participated, the majority were in the age group 41-64 years, and more than half were females. There was significant concordance in INR readings between the two methods (0.5±0.67, $p < 0.0005$) in the majority of patients. The average time to complete the clinic visit was 107.63+6.4 min per patient by doing venipuncture with an additional downtime of 45.3+7.4 min awaiting venipuncture results. Average time spent inside the clinic was 21.6±2.0 min including performing POCT. Patients favored POCT over venipuncture for comfort (53.59%) and convenience (56.86%). Reasons for preferring POCT were the timeliness of results (71.9%), allow for more time with the physician (66.2%) and bypassing the lab (63.4%).
Conclusion POCT is associated with high patient satisfaction compared to venipuncture. Using POCT to monitor warfarin therapy will reduce overall waiting time, enhance patient's comfort and improve quality of care.

Abstract Code: PP019

Facilitators and Barriers Towards Participating in Continuing Education (CE) Activities: A Cross-Sectional Survey on Pharmacists and Pharmacy Technicians

Student(s) Name: *Wasmeah Alsamti, Rand Alturki, Hadeel Alharbi*
Supervisor(s) Name: *Hadeel alkofide, Ghadah Bawazeer*

Abstract:

Background In KSA, continuing education (CE) is a random approach and not generated from a personal development plan. Since pharmacists and technicians' roles are evolving, an educational needs assessment is essential to guide CE programming in KSA. The study aims at identifying the current status, and the perceived barriers and facilitators of CE activities among pharmacists and technicians.

Method A multi-theme survey was developed and emailed to all pharmacists and technicians' in KSA through professional organizations after ethical approval. Survey tool collected participant's demographics, CE activities preferences. Participants were asked to identify the most significant barriers and facilitators affecting pursuance of CE using a 5-Likert scale. Descriptive analysis was performed; chi-square was used to compare categorical variables.

Result Out of 543 surveys received, the completion rate was 54.0% (n=295). Half of the respondents were males and in the age group of 30-39 years. The majority were pharmacists (86.4%), while 13.6% were pharmacy technicians. In the past year, conferences were the most common type of CE activity participants engaged in (54.1%), followed by seminars (31.7%), and internet-based learning (21.7%). Technicians were less satisfied with current CE activities compared to pharmacists (63.6% vs 41.3%, p=0.009). Only 36.0% of pharmacists completed >20 CE hours per year. Job constraints, cost, and lack of recognition were common barriers, whereas, personal motivation, license requirements, and social networking were common facilitators to seeking professional development.

Conclusion The practice of CE activities in KSA needs re-evaluation to meet the needs of pharmacists, technicians and the ever-evolving pharmacy field.

Abstract Code: PP020

The Current Community Pharmacists' Preferences of Generic Over-the-Counter (OTC) medications in Saudi Arabia

Student(s) Name: *Mohammed Ali Al-zaharani, Nawaf Mohammed Al-tamimi*
Supervisor(s) Name: *Yazeed M. Ghawaa, Zuhair Alqahtani, Bander Balkhi*

Abstract:

Background Generic over-the-counter (OTC) medications are believed to have the equivalent efficacy and safety as branded medications. Nevertheless, there is a controversy regarding the use of such drugs. This research assessed community pharmacists' preferences of brand versus generic OTC medications for different health conditions and examined their recognition of brand and generic OTC medications.

Methods A cross sectional study was conducted by using a validated survey across Riyadh region that was administered to licensed community pharmacists between October 2018 and March 2019.

Results A total of 332 licensed community pharmacists were approached to participate in this study, of which 302 surveys were completed (response rate was 90.9%). According to the 11-point rating scale, over 60% of pharmacists preferred to take the brand OTC medications over generics for their health problems. The cost was one of the main factors for selecting generic over brand. However, nearly 64% have a doubt about the effectiveness of generic over brand medicines and this in turn have a significant impact on their trust of local manufacturer with only 5% prefer using local manufacturer medications. Moreover, FDA withdrawal of generic medications has a negative impact on pharmacists' confidence toward those products. Although, over 90% of respondents believe they can recognize the brand OTC medications, our findings indicated that more than 40% cannot recognize the brand from generic.

Conclusions Study findings demonstrate that community pharmacists more likely to choose brand over generic OTC medications for various diseases. Policy makers should pay more attention to promote the use of generic OTC medications.

Abstract Code: PP021

Cardiotoxicity and Cardiac Monitoring Among Anthracycline-Treated Cancer Patients, A Retrospective Cohort Study in Riyadh, Saudi Arabia

Student(s) Name: *Nora Alorf, Ward Alessa*
Supervisor(s) Name: *Hadeel Alkofide, Lamya Alnaim*

Abstract:

Background Anthracyclines are potent antineoplastic agents with proven efficacy in the treatment of many hematologic and solid organ cancers. Cardiotoxicity is a known complication associated with the use of anthracyclines. Little is known regarding the rate of chemotherapy-related cardiotoxicity and adherence to recommendations for cardiac monitoring among anthracycline-treated cancer patients in Saudi Arabia.

Methods A single-center retrospective cohort study on patients with cancer, 18 years of age and older, on anthracyclines from the period of 2015-2018. Data on cardiovascular events, comorbidities, monitoring

parameters, and treatment details were obtained. The primary outcome was to determine rate of adherence to guideline recommendations for monitoring anthracyclines-related cardiotoxicity based on the American Society of Clinical Oncology (ASCO) clinical practice guidelines. The secondary outcome was incidence of anthracyclines-related cardiotoxicity. Analyses included descriptive statistics and logistic regression. Institutional review board approval was obtained.
Results In a total of 235 patients identified, adherence to guideline recommendations was only achieved in 25.0% of the population. Using multivariate regression analysis, only male gender predicted adherence to monitoring guidelines (Odds ratio [OR]=1.2, p-value=0.01). Echocardiography was the most common monitoring method used. The incidence of early cardiotoxicity was 27.2%, while delayed cardiotoxicity was 8.9%. Only one third of the study subjects who developed cardiotoxicities had optimal monitoring performed. Patients with diabetes had statistically significant higher odds of developing cardiotoxicities (OR=1.1, p-value=0.03).
Conclusions In this study, there was poor compliance to cardiotoxicity monitoring guidelines set by the ASCO, which underscores the detection of early and delayed cardiotoxicity in 75% of the population.

Abstract Code: PP022

Assessment of Switching Appropriateness Between DOACs and VKAs

Student(s) Name: *Faisal Saad Aljadhae*
Supervisor(s) Name: *Ahmed Aldemerdash*

Abstract:
Background Anticoagulants are the mainstay of stroke prevention with atrial fibrillation (AFib) venous thromboembolism (VTE). Direct oral anticoagulants (DOACs) are comparable to warfarin without the need for monitoring making them attractive switching-options. Currently, there is no consensus on the switching method. The study aimed to evaluate the appropriateness of the switching between DOACs and warfarin, and safety.
Methods A retrospective chart review between 6/2015 and 1/2018 at KSUMC. Variables include demographics, indication, comorbidities, thromboembolism and/or bleeding and labs. The inclusion criteria were age ≥18 years, had prescriptions for both DOACs and warfarin indicated for AFib or VTE. Incomplete records were excluded. Data presented as number (percent) or mean ± standard deviation or median [Interquartile Range].
Results Of 1,070 screened records, 274 were included. The average patient was 57-year-old female with AFib, diabetes mellitus, hypertension and dyslipidemia. The median anticoagulation use before switching was 21[19] months. The majority switched from warfarin to rivaroxaban (84%) and had median INR 2.2[1.1] with CHA_2DS_2-VASc and HASBLED scores of 3[3] and 1[3], respectively, for AFib patients (40.5%). Switching of 97 patients didn't follow the US nor European recommendations. Post-switching, thrombotic and bleeding events were 3.6% and 9.8%, respectively, in those who followed the recommendations versus 1.8% and 4.4% in those who didn't.
Conclusions Switching in most patients was from warfarin to rivaroxaban although the median INR was within target. Interestingly, the thromboembolic and bleeding events were doubled when following the published recommendations. Analysis of those patients' characteristics and reason for switching is warranted.

Abstract Code: PP023

Awareness of Counterfeit Medicine in Saudi University Students

Student(s) Name: *Ameera H. Alnahdi, Shadia M. Alharbi and Rawan A. Al-ahmari*
Supervisor(s) Name: *Bushra T. AlQuadeib*

Abstract:
Background lack of knowledge and awareness of the society is one of the major contributing factor to the prevalence of counterfeit medicines in a country. Information on university student's awareness and vulnerability towards counterfeit medicines in developing countries is limited. The aim of to assess how the university student either in medial or non-medical colleges identify counterfeit and substandard medicines and to evaluate their vulnerability level toward counterfeit drugs.
Methods Structure electronic questionnaire was distributed out in Saudi Arabia, between December 2018 till February 2019. The sample included 304 respondents selected conveniently from two distinct groups: Student in either medical or non-medical colleges. 301 participants who were fluent in either English or Arabic were included. The aim of this study is to point out the era of drug counterfeiting so that a better understanding can provide solutions to fight more efficiently against it.
Results From three hundred four questionnaires were distributed to university student both medical college or non-medical college, only 3 were refused to participate, which indicate higher in response rate. 85% of the answers were female, 36% below 20 and 92% of them were Saudi citizen wit 67% single state. Most of the results of the survey (52 items) were significant (p-value>0.05). So, more awareness towards counterfeit medicines, in the level of university student will needed reduce the knowledge difference between student in medical or in non-medical colleges.
Conclusions Overall findings suggested low-level of knowledge, vulnerability to counterfeit were estimated in non-medical college student.

Pharmacology and Toxicology

Abstract Code: PT100

Genetic and epigenetic alterations induced by the small molecule vorinostat in mouse bone marrow cells

Student(s) Name: *Mohammed Al-Khalifa*
Supervisor(s) Name: *Sabry Attia*

Abstract:
Background There is a growing body of evidence that both genetic and epigenetic alterations play a crucial role in a wide variety of human diseases such as cancer. Therefore, assessing epigenotoxic/genotoxic alterations is essential for expecting human exposure hazard of pharmaceutical compounds. Vorinostat has been recently approved by FDA for therapy of a certain type of tumor. Vorinostat was the first approved histone deacetylase inhibitor for the treatment of lymphoma. However, the in vivo epigenotoxical and genotoxical studies of vorinostat are not available. Thus, the current work was designed to assess the epigenotoxic/genotoxic properties of vorinostat in vivo; additionally, the molecular mechanisms underlying these alterations were explained by standard techniques.
Methods 24 h after the last treatment with vorinostat (30, 60, or 100 mg⁄kg, i.p., daily for five days) then isolated bone marrow cells were used for assessment of clastogenicity and, aneugenicity by MN/FISH test; oxidatively damaged DNA and DNA methylation by modified comet assay; and DNA repair gene expression by RT^2 Profiler PCR Array and confirmed by the RT-PCR and blotting techniques.
Results Mice treated with the human recommended doses of vorinostat developed chromosomal damage, numerical chromosomal abnormalities, oxidative DNA damage, and DNA hypomethylation dose-dependently. Furthermore, the expression of several genes implicated in DNA repair were altered after vorinostat treatment.
Conclusions Considering the potential genetic/epigenetic toxicity of vorinostat-exposure, the medical use of vorinostat should be weighed against the hazards of carcinogenesis. Additionally, the demonstrated toxic profile of vorinostat may encourage further development of innovative chemotherapies with lowered toxicity.

Abstract Code: PT101

Nano Glutathione and Quercetin Abates the Toxicopathic Effect of a Neonicotinoid- in Rat's Kidneys: Role of DNA Damage and VCAM-1/KIM-1 Protein Expressions

Student(s) Name: *Marwah Alharbi, Wafa Alluwaymi, Eman Alnazr, Malak Alanazi, Jawaher Alotaibi*
Supervisor(s) Name: *Layla Fadda*

Abstract:
Background Pesticides are systemic toxicants that arouse ecological dramatic health problems. The widespread increase of their appliance in crop protection and pests control induce a hazardous effect to all living organism. The current study is focused on the prophylactic impact of Quercetin and/or Nano glutathione as well as their combination to counteract the harmful effect of Mospilan-induced reno toxicity.
Methods Rats were administered toxic dose of Mosp along with Qrct and or N- Glta or a mixture of them for one month.
Results Serum urea creatinine and uric acid, TNF α, IL-1β as well as renal nitric oxide (NO), lipid peroxides (MDA) were increased whereas reduced glutathione (GSH) level and super oxide dismutase (SOD) were declined. More over protein expression of vascular adhesion molecule-1 (VCAM-1), kidney injury molecule-1 (KIM-1) were upregulated. DNA damage was also increased. Histopathological examination of renal tissues revealed that animal treated with Mosp showed few of the glomeruli corpuscles as obliterated, diminished and destructed and cellular hyperplasia of epithelial cells lining the partial layer of Bowman's capsule. Proximal convoluted tubules showed destructed epithelial lining with moderate dilatation, destructed epithelial lining of distal convoluted tubules with proteinaceous debris in the tubules and congested blood vessels.
Conclusions Treatments with Qrct or N- Glta either alone or in combination ameliorated all the previous measured parameters or improved kidney's architecture. Interestingly the combination of Qrct and or N- Glta was the most effective regimen to counteract Mosp reno toxicity and can be considered as a promising candidate for renal therapy.

Physical Pharmacy & Pharmaceutics

Abstract Code: PH201

Nanoformulation of Neratinib in PAMAM dendrimer FITC labelled and conjugated with trastuzamab as targeted breast cancer therapy

Student(s) Name: *Sara Al-Jarrah Setó, Nora Al Khalil, Lama Al-Eshaiwi, Manar Alghamdi*
Supervisor(s) Name: *Fadilah Aleanizy*

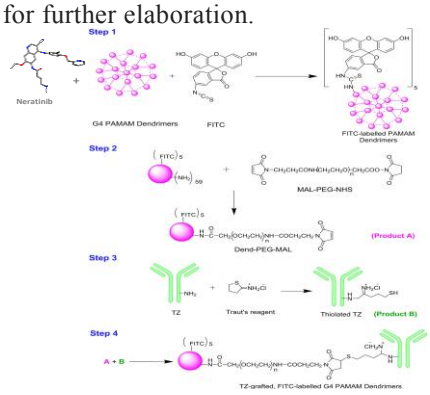
Abstract:
Background Human epidermal growth factor receptor-2 (HER2)-positive cases represent approximately 30% of breast cancer occurrences. This type of cancer is more

aggressive and tends to develop resistance against most chemotherapy. Neratinib, a tyrosine kinase inhibitor for treatment of breast cancer, is associated with crucial side effects with available tablet formula. Trastuzumab is also a successful targeted therapy for breast cancer treatment; unfortunately, it is associated with increased risk of cardiotoxicity and resistance. Generation-4-Pegylated-Poly-amidoamine-dndrimers (G4-PEG-PAMAM) are branched synthetic polymers used as carriers in several promising biomedical applications. The research aim is to formulate neratinib in G4-PEG-PAMAM dendrimers FITC-labelled conjugated with Trastuzumab as targeted therapy for breast cancer to overcome the related side effect and resistance.

Methods Neratinib was encapsulated in dendrimers, labelled with FITC, heterocross-linked with MAL-PEG-NHS and conjugated with thiolated trastuzumab. *In vitro* studies include: testing neratinib encapsulation, activity and release; morphological characterization by TEM; Bradford assay and SDS-PAGE for protein detection. *In vitro* cytotoxicity studies were conducted using Almar-blue kit on human breast cancer cell lines SKBR-3 (HER2-positive) and confocal microscopy used to evaluate cellular uptake.

Results Neratinib-loaded dendrimer revealed 96.2% encapsulation efficiency validated by TEM imaging comparing blank sample to encapsulated ones. Thiolated trastuzamab activity was proved by Bradford assay and intact structure was confirmed by SDS-PAGE. Neratinib targeted nanoformula showed enhanced cellular uptake and cytotoxic activity against SKBR-3 cells.

Conclusions Neratinib-dendrimer nanoformula conjugated with trastuzamab evidenced successful targeted effective formula with enhanced activity against breast cancer cells. Future *in vivo* studies are planned for further elaboration.



Abstract Code: PH202

Development of nanocrystals to promote percutaneous penetration and permeation of meloxicam through skin: *In vitro* and *ex vivo* studies

Student(s) Name: *Abdulrahman Albilali*
Supervisor(s) Name: *Abdullah Alomrani, Mohamed Badran*

Abstract:

Background Meloxicam (MLX) is an effective nonsteroidal anti-inflammatory drug (NSAID). MLX, like other NSAIDs, has gastrointestinal side effects. Therefore, this study aims at developing topical preparation of MLX using nanotechnology to enhance transdermal delivery of MLX.

Methods Nanocrystal form of MLX was prepared using nanoprecipitation technique. Acid-base neutralization method was applied to obtain MLX nanocrystal by the aid of homogenization and stirring based on alteration of the surface tension of the medium. Surface tension of the medium was controlled by Tween 80 and ethanol using different concentrations. The prepared nanocrystals were evaluated for their physicochemical characteristics such as particle size, morphology, degree of crystallinity, and melting point. *Ex vivo* permeation studies using rat skin were performed to explore the impact of nanosized crystal on the transdermal permeation of MLX.

Results MLX nanocrystal formulations (MLXF1, MLXF2, MLXF3 and MLXF4) were prepared. The size of the crystals were affected by the surface tension and the sonication power. It was found that nanosized MLX crystals were obtained when surface tension of the precipitation medium is decreased by Tween 80. The FTIR spectroscopy confirmed compatibility to exclude any possible interactions between MLX and components. According to DSC and X-ray powder diffraction, the crystalline structure of MLX nanocrystals was confirmed. *Ex vivo* studies revealed that the skin permeation of MLX increased when it is administed as nanocrystals form.

Conclusion Nanocrystals of MLX were successfully prepared. Nanocrystal form might be an effective tool for enhancing skin penetration of MLX.

Medicinal Chemistry & Natural Products

Abstract Code: MN301

Production of a Biopesticide Based on Host and Non-Host Serine Protease Inhibitors for Red Palm Weevil in Palm Trees

Student(s) Name: *Arwa Bin Swuilih, Hanan AbuAl-Ala'a, Saja Banejamea, Nada Zaidan*
Supervisor(s) Name: *Raha Orfali, Dr. Razan Orfali*

Abstract:

Background Serine proteases are essential metabolic enzymes in the midgut of many pests, including the red palm weevil (RPW), which has a significant impact economically, environmentally and socially worldwide especially in Saudi Arabia. Some methods have been used to manage this pest such as trapping of RPW with pheromones, chemicals, and X-rays. However, these

methods are costly, not effective and negatively impact the human. The main objective of this study is to contribute to the discovery of an eco-friendly pesticide to eradicate this infection by using serine protease inhibitors (SPIs) extracted from different parts of plant resources.

Methods In this research, both *in vitro* and *in vivo* effects of SPIs activity against RPW were examined. The protease inhibitors (PIs) activity was recorded in the crude extract that was isolated from the date's kernel (host) and Calotropis latex (non-host). These PIs were partially purified by Ammonium sulfate precipitation. The midgut tissue of RPW was extracted and analyzed for protases activity assay.

Results PIs assays were consistent with the increased in the inhibitory activity against the midgut proteases after treatment with a date kernel solution and latex. The reduction of gut proteases by kernel solution and latex was 39% ,18%, respectively. Partially purified date kernel solution showed the most prominent inhibition pattern of protease activity of the gut extract.

Conclusions Taken together, these findings provide evidence for the hypothesis that SPIs activity may play an important role in enhancing the mortality of RPW and relieving the toxicity of insecticide in palm trees.

Other

Abstract Code: O400

Antimicrobial resistance pattern and phenotypic characterization of carbapenemases in Klebsiella

Student(s) Name: *Yahya Ali Laghbi*
Supervisor(s) Name: *Mohamed H. Al-Agamy*

Abstract:

Background This study aims to determine the prevalence of carbapenemases in Enterobacterial clinical isolates (ECI) with reduced susceptibility to carbapenems (RSC).

Methods 145 ECI were collected in 2017, with 102 being *Klebsiella pneumoniae,* 31 *E. coli* and 12 *Enterobacter cloacae.* Detection of RSC was screened by imipenem disc diffusion. Carba NP was used to screen carbapenemases activity. Imipenem-EDTA synergy test was used to detect metalo-β-lactamases (MBL). Antibiotics sensitivity testing was done to carbapenemase positive ECI. MIC was determined to two ECI by E test.

Results A total of 68 out of 145 isolates were imipenem insensitive (<27 mm). 50 out of 68 carbapenem insensitive isolates was CPI by using the Carba NP test. 31 out of 50 CPI were MBL producers. Imipenem resistance rate in CPI was 86%. All carbapenem insensitive isolates were resistant to piperacillin, piperacillin/tazobactam, cefuroxime, cefotaxime, and ceftazidime. The resistance rates to aztreonam, cefepime, imipenem, cefoxitin, and cefotetan were 98%, 96%, 90%, and 68%, respectively. The resistance rates to ciprofloxacin, sulphamethoxazole/trimethoprim, gentamicin, amikacin, tetracycline and chloramphenicol were 88%, 86%, 84%, 76%, 78% and 42%, respectively. MIC for MBL positive isolates were investigated high MIC values for tested antibiotics including colistin.

Conclusions Our study recognized high prevalence of carbapenemases in ECI, and high rate of antibiotic resistances in CPI. MBL was the most prevalent carbapenemase in CPI and is the main mechanism of carbapenem resistance in our isolates. Colistin is the last option for treatment of carbapenem resistant isolates therefore MIC of colistin must be screened for the whole collection.

Abstract Code: O401

Determination of estrogen residues in chicken and meat products collected from the Saudi market using HPLC with diode array detection

Student(s) Name: *Deema Bin Humaid, Sadeem Alqais, Sabreen Alshail, Dalal Alshammari*
Supervisor(s) Name: *Hadir Shalaby*

Abstract:

Background The liability of finding estrogens in dietary meat samples is related to the presence of endogenous natural estrogens, estrone (E1), 17-β estradiol (E2), estriol (E3), in meat-producing animals, as well as the external use of estrogens, 17-α ethinylestradiol (E4), as growth promoters. Dietary intake of estrogen-containing food could result in metabolic disorders, autoimmune diseases, and cancer. Thus, estrogen determination-for the first time- in meat products collected from the Saudi market is demanded.

Methods An HPLC-DAD method was developed for the residual analysis of estrogens (E1, E2, E3, and E4) in meat samples of different categories (chicken, n=155, beef, n=124, sheep, n=122, and camels, n=40) available in the Saudi market. Symmetry C18 column (3.5 µm, 4.6×150 mm) was used with a mobile phase consisting of acetonitrile/water mixture (50: 50, v/v). Protein precipitation was used for sample preparation.

Results The method allowed the trace analysis of estrogens with LOD of 0.099 (E3, E4), 0.045 µg/g (E1, E2) and LOQ of 0.188 (E3, E4), 0.135 µg/g (E1, E2). The analyzed samples contained different levels of estrogens. Among the same category, processed products contained the highest levels of E4. Sheep samples showed the most abundance (61%) of E4 with the highest levels (mean 61 µg/g). The internal organs contained the least estrogen content.

Conclusions Although, the use of estrogens as growth promoters in animals is prohibited, the illegal use of E4 is still encountered. This necessitates the residual analysis of estrogens, endogenous or exogenous, in dietary samples for the sake of consumers' safety.

Poster Presentations

Abstracts

Abstract Code: APP050

The Predictors of Tramadol Utilization among Youth with Acute Pain: A Single-Center Cross-Sectional Study

Student(s) Name: *Muhannad A. Bazarah*
Supervisor(s) Name: *Yazed AlRuthia*

Abstract:

Background Tramadol is one of the commonly prescribed opioid analgesics in the management of acute pain with high rates of abuse among youth in the Middle East. However, no study has so far described the utilization pattern of tramadol in the management of acute pain among youth in Saudi Arabia. Thus, the aim of this study was to describe the predictors of tramadol prescription for a relatively long-term pain management among youth patients.

Methods This was a single-center, cross-sectional, retrospective chart review of youth patients (18-30 years) with an acute nociceptive pain at a university-affiliated medical center in Riyadh, Saudi Arabia. Cancer patients and those with chronic neuropathic pain were excluded. Patients' age, gender, number of comorbidities, duration of pain management, number of emergency department (ED) visits for pain, and Numeric Pain Rating Scale (NPRS) scores at rest and with normal activities were collected.

Results The mean age of the 274 patients, who met the inclusion criteria, was 24 years and 63% of them were male. Approximately, 88% and 81% of patients had mild pain scores (NPRS≤4) with normal activities and at rest, respectively. Pain was treated for a short duration (≤14 days) in the majority of patients (77.74%). The number of ED visits was the only predictor of a relatively long-term tramadol use (>14 days) controlling for age, gender, pain scores, and number of comorbidities (β=0.0157, P=0.045, 95%CI=0.00035-0.0311).

Conclusions The unjustifiable long-term management of pain using opioid analgesics, such as tramadol, increases the risk of substance abuse among youth.

Abstract Code: APP051

Self-Medication among Saudi Undergraduate University Students

Student(s) Name: *Asma Alshahrani*
Supervisor(s) Name: *Lamya Alnaim*

Abstract:

Background Acne vulgaris is the most popular skin diseases with inflammation. It mostly affects young people between the ages of 12 and 24 due to hormonal changes at this age. The treatment options are either Over-the-Counter or Prescription Acne Medications. The aim of this study is to evaluate the perceptions and extent of practicing self-medication among undergraduate university students. in addition to their knowledge and pattern of self-medication for acne.

Methods A cross-sectional study was undertaken on Undergraduate University Students aged18 to 25 years. Students were briefed about the the study, and a pretested questionnaire was administered.

The questionnaire consists of 31 questions. The first part included demographic information. The second part included questions relating to severity of acne – type of medication used – dose – duration – result of self-treatment – adverse effect – Knowledge about contraindication and expiry date - type of formulation. Most questions were in the form of Yes/No. Questions about choice of treatment and reason for self-medication provide multiple answer options. Descriptive analysis was performed using SPSS 25.

Results A total of 519 students participated. About 55.3% had used self-medication. About 88.1% were females, and 38.2% of patients use self-medication because they think the situation is simple and does not require a doctor's visit. Adapalene was most commonly used medication (53%). finally, 74.7% said they had improvement after treatment.

Conclusions A high percent of students Self-medicated for acne and others use prescription medication without prescription, inappropriate use of drugs can increase risk of adverse effect.

Abstract Code: APP052

The Public Perception and Attitude Toward Community Pharmacists in Saudi Arabia

Student(s) Name: *Mohammed Fawaz Mohammed Aloshaywi*
Supervisor(s) Name: *Omar A. Almohammed*

Abstract:

Background The public knowledge and awareness about health had elevated over the years, this has created a demand for pharmacists to give their best knowledge, services, and recommendations to the public. Since, community pharmacists are the most accessible health care providers to the public, the study aims to determine the current perception and attitude of the public toward these community pharmacists in Saudi Arabia.

Methods A cross-sectional study was conducted utilizing an online survey for data collection. It included a convenient sample of adults (≥18 years) participants who can read and complete an online survey. The questionnaire composed of 17 questions about the public perception and attitude toward community pharmacists. The statistical analysis was conducted using the SPSS software, version 25.

Results A sample of 387 participants have completed the online survey. A very high internal reliability for the perception and attitude scales were attained with a Cronbach's alpha of 0.857 and 0.848, respectively. The

overall public perception and attitude were positive for 81.4% and 69.8% of the population, respectively, regardless of their age, marital status, region of residence, and the current health status. Females had a better perception about community pharmacists when compared to males (89.3% vs. 77.7%, $p<0.01$). Finally, a strong and positive correlation between the public perception and attitude was identified in the study ($r= 0.71$, $p<0.01$).
Conclusions The current positive perception and attitude from the public creates an opportunity for pharmacists to improve their role as health care providers and a challenge for future pharmacists to keep meeting the public expectations.

Abstract Code: APP053

Interprofessional Education in Undergraduate Pharmacy Students

Student(s) Name: *Badr M. Alenezi*
Supervisor(s) Name: *Abdulatif Alghaiheb*

Abstract:
Background The need for interprofessional education (IPE) in health science disciplines is a current global trend. However, despite international support and demand, IPE is still new to many health professions curricula in Saudi Arabia. Healthcare student integration through IPE activity is considered one way to promote early, and subsequently sustain, the principles of teamwork. The current study was designed to assess IPE perception by pharmacy students in different Saudi Universities.
Methods A cross-sectional survey-based study including 200 pharmacy students from five universities across the country were enrolled and asked to fulfill an electronically submitted structured questionnaire especially designed to obtain the main objectives of the study.
Results Demographically 126 male and 74 female students shared in the study. Most of participants (80%) were from universities in Riyadh (KSU and PNU). Most of students were aware about definition of IPE (78%) and agreed that IPE will make them more knowledgeable (73%), professional (72%) as well as improving their communication skills (55%). However, still about 30% of the participants admitted that IPE is waste of time.
Conclusions It can be concluded that pharmacy students are capable and enthusiastic enough toward IPE but still the culture of IPE need to be raised among pharmacy and other health college students. Implementation of IPE in curricula of different health colleges is recommended to better understand roles and responsibilities within the interprofessional practice and hence improve patient health care.

Abstract Code: APP054

Pharmaceutical Care in Community Pharmacy Settings and possibilities for improvement

Student(s) Name: *Bader Ali Alkhalidi*
Supervisor(s) Name: *Abdulatif Alghaiheb*

Abstract:
Background Community pharmacies are one of important settings where pharmaceutical care can be given. However, published literature indicates that there is a substantial barrier to implementing pharmaceutical care programs in community pharmacies. This study was designed to explore the opinion of undergraduate pharmacy students about the performance of community pharmacies in providing efficient pharmaceutical care.
Methods A cross-sectional survey-based study including 222 pharmacy students from KSU were enrolled and asked to fulfill an electronically submitted structured questionnaire especially designed to obtain the main objectives of the study.
Results Demographically 198 male and only 24 female students shared in the study. Most of participants (68%) were in the last year of the college. Almost all (98%) of the students finished their mandatory training in a community pharmacy. When our participants were asked about services offered by the community pharmacy we found that dispensing medication, customer's vital signs assessment, patient counselling and patient therapy monitoring constitutes 50%, 15%, 10% and 2% of services offered by the community pharmacy. Unfortunately none of our participants indicated any role to the community pharmacy in providing drug information services. All participants admitted that the working hours and language barrier (60%) are the main working barrier in a community pharmacy. The participants suggested providing training programs to pharmacists for patients' counselling and imposing integration between pharmacies and nearby hospitals as main components of improvement in health care provided by community pharmacies.
Conclusions It can be concluded that pharmacy students found that dispensing of medicines is the dominant service provided by community pharmacists and that there was very limited if not a total absence of other pharmaceutical care services. Curriculum of the college of pharmacy yet contains a mandatory training in a community pharmacy setting but still lacking courses regarding improve patient counselling better in a community pharmacy simulator model.

Abstract Code: APP055

Estimating the Direct Medical Costs and Exploring Potentially Unidentified Sources of Middle East Respiratory Syndrome Coronavirus (MERS-CoV): A Case-Control Study

Student(s) Name: *Amal AlKhamali, Ohud Bahari, Raneem AlJuhani*
Supervisor(s) Name: *Yazed S. AlRuthia*

Abstract:

Background The Middle East Respiratory Syndrome Coronavirus (MERS-CoV) has been an ongoing concern to public health in Saudi Arabia since its emergence back in 2012. Many healthcare researchers still believe that there are other sources of transmission that have not been identified yet. Further, no study has so far estimated the direct or indirect medical costs of MERS-CoV. The aim of this study was to explore unidentified transmission sources of MERS-CoV as well as its direct medical costs.

Methods This was a retrospective chart review of confirmed MERS-CoV cases and controls, who were admitted between January, 2015 and October, 2018 at a university-affiliated tertiary hospital in Riyadh, Saudi Arabia. Cases were matched to controls at a ratio of 1(case):2(control). The inpatient costs were obtained from the cost center at the Saudi ministry of health, and the medication costs were obtained from Saudi Food and Drug Authority (SFDA) online drug database.

Results Forty-four MERS-CoV cases and 102 controls were reviewed. The mean age of the cases was significantly higher than their control counterparts (54.36 vs. 42.86 years, P=0.0006). The percentage of MERS-CoV cases who were exposed to MERS-CoV cases prior to infection is significantly higher than their control counterparts (25.00% vs 15.69%, P<0.0001). Only one MERS-CoV case was exposed to camels prior to infection. The mean total direct medical costs of MERS-CoV cases was SR54004.75±76992.71.

Conclusions There is a great deal of inconsistency in the management of MERS-CoV cases (screening and treatment) which calls for urgent action to address this uncontained epidemic.

Abstract Code: APP056

Roles and Barriers among Saudi Clinical Pharmacists in Riyadh Hospitals

Student(s) Name: *Monerah Aloumi, Sana Alanzi*
Supervisor(s) Name: *Lamya Alnaim, Lobna AlJuffali*

Abstract:

Background Many studies prove the role of the clinical pharmacist. There are many potential barriers identified from previous studies that hinder the clinical pharmacist work in the different practice settings. No sufficient evidence is available of regarding the type of barriers facing clinical pharmacists practicing within health team in Saudi Arabia**.**

Methods This cross-sectional study was conducted in January 2018. Pre-validated questioner about clinical pharmacist roles and barriers were administered to the participants. Data were analyzed using SPSS 2013.

Results The total number of participants are 154 (females 81.2%), (38.3%) Saudis. (6.5%) doctors, (57%) nurses, (9.7%) clinical pharmacist, (3.9%) pharmacy resident, (17.5%) Pharm.D interns. The objectives of this study are to assess understanding of the role of the clinical pharmacist, and Identify barriers that hinder clinical pharmacists provision of pharmaceutical care from different health care providers' perspective. More than (69%) of health care providers have corrected understanding of clinical pharmacist roles. The most common barriers were lack of clinical pharmacists in hospital (73.6%), lake of pharmacist confidence (67.1%), lack of experience of applying clinical knowledge to practice (65.2%), lack of opportunities of continuous professional training (61.3%), lack of trained senior pharmacists (61.3%), and lack of space for counseling (52.9%).

Conclusions Saudis health care providers have good understanding of clinical pharmacist roles. We have to overcome the study common barriers to move forward clinical pharmacy practice.

Abstract Code: APP057

Assessing the Adherence of Patients with Systemic Lupus Erythematosus to Their Medications Before and After Using SLEnic Mobile Application: A Randomized Controlled Trial

Student(s) Name: *Dana Almouzain, Raghad Alnasser*
Supervisor(s) Name: *Haya Almalag*

Abstract:

Background Studies suggest poor treatment adherence in subjects with systemic lupus erythematosus (SLE), which leads to unfavorable clinical outcomes. A mobile application (app) called SLEnic was previously developed and tested on a pilot of participants with SLE to better manage their health condition. However, the potential impact of this app on adherence has not been evaluated. This study is aimed to evaluate whether SLEnic app improves adherence and reduces depressive symptoms in subjects with SLE compared to standard treatment.

Methods This is a prospective, randomized controlled trial. Adults with SLE, who use a mobile smartphone, and follow-up at King Saud University Medical City are being recruited. Participants will be randomized to no app (n=150) or SLEnic app intervention (n=150) groups. The app contains Arabic medical content, a medication reminder tool, and an open communication channel with healthcare providers. The primary outcome is adherence measured using the 8-item MORISKY scale, which we successfully obtained its license. Additional outcomes include depression assessed using the 7-Item Hamilton Depression Rating Scale, and health literacy using the single item literacy scale. Ethical approval was obtained.

Results Patients are currently being recruited and initially assessed while the SLEnic app is under the final stages of development. Results will be recorded at baseline, 3-, and 6-months follow-up.

Conclusions To our knowledge, this is the first study to assess the use of an Arabic language mobile application in subjects with SLE. Study results can provide valuable

information on whether such applications can improve patient care.

Abstract Code: APP058

Gene Therapy Knowledge and Attitude among Healthcare Professionals: A Cross-Sectional Study

Student(s) Name: *Suhail Khalaf, Abdulrahman Alsuwaid*
Supervisor(s) Name: *Tariq M. Alhawassi, Maha M. AlRasheed, Sondous Ata, Fowad Khurshid, Hatoon Al Ali*

Abstract:

Background Gene therapy is a medical procedure where new gene is transferred into a patient to replace defective genes. Limited data was found in the Middle East therefore, we aimed to assess healthcare professionals (HCP) knowledge and attitude toward gene therapy.

Methods A cross-sectional online survey using a 33-item questionnaire was designed and its content was validated and piloted. Descriptive statistics were applied, and categorical variables were summarized as frequency and percentages.

Results A total of 419 HCPs (358 pharmacists and 61 physicians) participated in the study. The majority (73.74%) were males and the mean age was 31.98± 7.75 years. The mean knowledge scores of all participants, pharmacists and physicians were (5.25±3.08, 5.31±3.09 and 4.90±3.04 respectively). Knowledge gap between HCPs was not noticed. The majority of the respondents (76.30%) knew that gene therapy is a technique uses genes to treat disease(s) and mostly (81.40%) believed that it will soon become a useful treatment strategy. About half of the respondents (45.35%) were concerned about the safety of gene therapy and agreed that it can have very serious health risks.

Conclusions HCPs showed limited knowledge with positive attitude toward gene therapy. Educational programs about gene therapy need to be considered and should focus on safety and social acceptance of such new therapeutic management.

Abstract Code: APP059

Economic Analysis of Specialty Drugs Used for Rheumatoid Arthritis in Arabic Countries

Student(s) Name: *Fadel S. Alamri, Muath M. Abu Al-Hasan*
Supervisor(s) Name: *Ahmad A. Alghamdi*

Abstract:

Background Specialty drugs have been considered a standard of care in rheumatoid arthritis. However, the constant increase in the cost of these drugs produce a heavy economic burden. The objective of this study was to provide an overview of the prices and annual cost estimates of specialty drugs used for treating rheumatoid arthritis in the four Arabic countries: Saudi Arabia, Jordan, Oman, and Lebanon.

Methods A cross-sectional study that looked at the prices of specialty drugs. 11 biologics and targeted therapy drugs were included. Prices were obtained from ministries of health and food and drug authorities. Retail prices were used as a unit of analysis, and price adjustment were made to account for expected price discounts. Prices were converted to 2019 Saudi riyals (SR). Descriptive statistics, and Kruskal Wallis test were performed.

Results Registration Prices of speciality drugs varied significantly between the countries, the median price ranged from 3937.00 SR in Lebanon to 5197.00 SR in Oman (P <.001). The median monthly cost based on price only at 30% discount rate ranged from 3,008.00 SR in Lebanon, 3,025.00 SR in Jordan, 3,516.00 in Saudi Arabia, and 3,897.00 in Oman (P< .001). The estimated annual cost for 1000 patients were 36.1 Million SR in Lebanon, 36.1 Million SR in Jordan, 42.2 Million SR Saudi Arabia, and 46.8 Million SR in Oman.

Conclusions Specialty drugs used in rheumatoid arthritis are expected to have a heavy economic burden on Arabic countries healthcare systems. Facilitating the approval of biosimilars and utilizing better cost containment approaches would help lowering the economic burden.

Abstract Code: APP060

The description of Clinical Trial Research in Saudi Arabia between 2010 and 2018

Student(s) Name: *Meshal T. Alfawzan, Ibrahim S. Alfunais*
Supervisor(s) Name: *Mohammad H. Aljawadi*

Abstract:

Background The Saudi Food and Drug Authority (SFDA) is responsible for enacting and regulating food and drug-related standards. Clinical trials (CTs) are an essential component in drug registration. The objective of this study describes the nature of CTs in Saudi Arabia during the last eight years.

Methods Using the SFDA website, all CTs posted, until December 30th, 2018, were collected in one file that contains the followings: title, trial phase, protocol number, trial site, medication, the name of the sponsor, Trial status. From the variables above the city and the region were populated.

Results A total of 232 studies were available for download. Around 79.3% were ongoing, 14.2% were completed, 3.5% were rejected, and 3% were terminated. Around 48.7% were phase 4 studies, 36.2% phase 3, 8.1% phase 2 and 7% were bioequivalence studies. Approximately, 76% of studies were sponsored by the pharmaceutical industry, 20% by the Saudi government and 4% by international institutes or universities outside the kingdom. In addition, local pharmaceutical companies constituted 2.16% of all sponsorship during the last eight years. King Faisal specialist hospital and research center were the most used sites for CTs followed by King Fahad medical city followed by King Khalid University Hospital.

Conclusions Similar to the international trend, pharmaceutical companies are the main drivers for clinical research in Saudi Arabia. Post-marketing surveillance was the most common type of research submitted to the SFDA. More efforts should be put on encouraging pharmaceutical companies to recruit more Saudi patients in future efficacy and safety studies.

Abstract Code: APP061

Prescribing Practice of Vancomycin in Hemodialysis Patients: A mixed methods approach

Student(s) Name: *Mamdouh E. Almutairi and Turki A. Helabi*
Supervisor(s) Name: *Hussain A. Al-Omar, Nouf Zain Alddein, Ahmed Y. Mayet*

Abstract:

Background Vancomycin is a widely used antibiotic to treat methicillin-resistant gram-positive bacterial infections in hemodialysis patients. Removal of vancomycin during dialysis is varied depending on the type of filter used which might affect the required therapeutic concentration in the blood. The sub-therapeutic level can increase mortality. We explored the vancomycin prescribing behavior of physicians in patients who underwent high-flux hemodialysis.
Methods The study was conducted by using a mixed method (quantitative and qualitative) approach. For quantitative study, demographic data, prescribing and administrating information were extracted from the electronic medical record. To identify variation in prescribing behavior, we conducted qualitative semi-structured physicians' interviews. Both descriptive and thematic analyses were used to generate the results.
Preliminary Results The study identified 60 samples for 20 patients who were going through high-flux hemodialysis sessions. We observed all patients received vancomycin dose after two hours after starting the dialysis which inconsistent with the hospital policy. We also noted that 41.6% of the sample did not achieve the targeted vancomycin level. During the interview of twelve physicians, four themes were emerged from the thematic analysis, perceptions, knowledge, practice, and barriers.
Conclusions We observed variation in physicians' vancomycin prescribing behavior, primarily due to poor understanding of hospital vancomycin prescribing policy, lack of knowledge on pharmacokinetic of vancomycin and its therapeutic efficacy. All physicians and nurses require education intervention on vancomycin dosing.

Abstract Code: APP062

Saudi Pharmacists perception of their current role, Barriers and Facilitator of expanded pharmacist roles in community pharmacy practice setting

Student(s) Name: *Haya Alturki, Hala Alkhalaf*
Supervisor(s) Name: *Ghadah A. Bawazeer*

Abstract:

Background Fewer graduates seek to work in a community pharmacy setting. Exploring Saudi pharmacists' opinion about their current practice, barriers and facilitators to assume expanded role is an essential step towards resolving this reluctance.
Methods This is a cross-sectional, survey-based study targeting Saudi pharmacists working in a community setting. Following ethical approval, an online questionnaire was distributed to 6 large chain community pharmacies from July 2018-March 2019. Descriptive analysis was performed to summarize the data.
Results Out of 211 surveys received completion rate was 56.9% (n=120). Most of the respondents were in the age group 26-30 years; the majority were males, working for <2 years and 46.7% were PharmD graduates. The most dissatisfying aspects of the practice were working hours, working load, vacation times and work shifts. Respondents were more satisfied with the scope of current practice (55%), public interaction (60.8%), insurance health coverage (67.5%) with only 22.5% satisfied with career advancement opportunities. The most perceived barriers were lack of pharmacists' technicians (84.2%), no access to the patient medical record (92.5%), lack of time for training on new skills (85.8%) and unclear practice regulations (78.2%). Respondents agreed that raising community awareness about pharmacist expertise (93.3%), providing affordable training (90.8%), reimbursement (86.7%), the presence of accreditation system (88.3%) are among the importance facilitators. Expectedly, less than 50% recommended community setting for new graduates.
Conclusions Saudi community pharmacists are motivated to assume expanded activities despite several barriers. Changing current regulations, improving technicians' skills and providing skills training are among critical aspects of the solution.

Abstract Code: APP063

Preferences for Chemotherapy Side Effects in Breast Cancer: A Conjoint Analysis

Student(s) Name: *Rawan Abuzaid, Reem Alsudairi*
Supervisor(s) Name: *Sinaa Alageel, Lamya Alnaim*

Abstract:

Background Choosing among chemotherapy regimens involves making trade-offs between various efficacy, process, and side effects attributes. The objectives of this study were 1) measure whether type and risk of chemotherapy side effects influence breast cancer (BC) patient treatment choice, 2) measure oncologists' preferences for choosing chemotherapy with different side effect profiles for treating BC patients, and 3) To compare preferences of patients and physicians towards chemotherapy side effects.
Methods The study used a choice-based conjoint survey to elicit preferences towards different side effects of

chemotherapy. To determine the attributes and levels, we reviewed the relevant literature and consulted experts. The probabilities of side effects were estimated from sources such as the electronic Medicines Compendium and British Columbia Cancer drug monographs. We presented all side effects in words and graphics. The questionnaire consisted of 12 pairs of hypothetical medicines with seven side effects: alopecia, sensory neuropathy, nausea/vomiting, fatigue, risk of serious infection, mucositis/stomatitis, and diarrhea with varying levels of severity. For each pair, the patients/oncologists were asked to select the medicine profile they preferred. The questionnaire was pretested for face validity by clinical experts and patients. The data collection started January 2019 at King Khalid University Hospital.

Results Forty-eight patients were approached and 33 agreed to participate (mean 47.7 years). The interim analysis shows that the most important side effects for patients are mucositis/stomatitis followed by alopecia. Only 7 oncologists answered the survey. The data collection is in progress.

Conclusions This study demonstrates patients are able to make trade-offs between chemotherapy side effects.

Abstract Code: APP064

Community Pharmacists Involvement in Research in Saudi Arabia

Student(s) Name: *Ayedh Alqarni, Muath Alzurayer*
Supervisor(s) Name: *Mohammed Alarifi*

Abstract:

Background Pharmacy practice-research turned into a critical part in in the pharmacy practice. The aim of study was to assess the engagement of community pharmacy (CPs) in research activity.

Methods A cross-sectional study among community was conducted between November 2018 to February 2019. This study used a validated self-administered questionnaire modified from previous study. The questionnaire was designed to assess the research experience and attitudes about research and the long-term career intentions of community pharmacy Descriptive statistics was applied

Results A total of 200 questionnaire were returned the survey. Almost all of respondents agreed that participate in research pursuing career in research/academic pharmacy (94.8%), majority of CPs (83.9%) believed that there is opportunities for CPs to take part in research. About 80 % of CPs reported that research is fundamental to the future of the pharmacy profession. The majority of CPs (79.3%) stated that research should be a high priority for community pharmacists. However, the most barriers to research were the lack of pharmacy staff support in the workplace (80.7%) daily activities prevent me from engaging in research (74%), no reward is an incentive for me to participate in research (78.3%). It was interesting nearly 49 % of CPs would involve in research if their competitors did.

Conclusions The findings of this study showed that CPs had positive attitudes towards research activities and majority of CPs would like to become more involved in research desired to be involved more in research.

Abstract Code: APP065

Assessment of Saudi Clinical Pratice Utilization and Adherence to Guideline for Bariatric Surgery

Student(s) Name: *Mohammed A. Alkhidhr*
Supervisor(s) Name: *Wael Mansy*

Abstract:

Background Obesity has become an epidemic worldwide. The estimated prevalence of obesity in Saudi Arabia is 28.7%. Bariatric surgery has become one of most adopted modalities of obesity treatment in recent years. Despite clear consensus outlined in clinical guidelines, significant differences were found in the eligibility criteria for bariatric surgery. This study was designed to evaluate adherence to the guideline-recommended to operate on patients asking for bariatric surgery.

Methods A single-center, retrospective, observational study. 95 patients were recruited between August 2018 to Jan 2019 from ward surgeries and uderwent a bariatric surgery.

Results Demographically 39 male and 56 female patients were eligible. All patients underwent sleeve gastrectomy. Diabetes (12%), hypertension (13%) and dyslipidemia (6%) constitute the main comorbidities. Only 64 patients adhere to guidelines while 31 patients are non-adherent to clinical practice guidelines approved by American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic & Bariatric Surgery.

Conclusions Intentional non-adherence might be a conscious choice by either the surgeon or the patient, and is not influenced by external factors. However non-adherence places a significant cost burden on healthcare system by overwhelming the financial resources that may be allocated for other interventions.

Abstract Code: APP066

The extent to which the community pharmacies in Riyadh involved in helping clients to treat minor ailments

Student(s) Name: *Abdulaziz G. Alghaith*
Supervisor(s) Name: *Tawfeeq A. Alnajjar*

Abstract:

Background Minor ailment is defined as those conditions which do not pose a major health risk and can be managed with non-prescription medication bought from a pharmacy or supermarket. The degree to which community

pharmacists in Riyadh is exposed to clients seeking their helps in managing their minor ailments has not been studied before. This research aimed to explore the subject of minor ailments in community pharmacies from the city of Riyadh.

Methods Based on the above definition for minor ailments, a questionnaire was prepared to be filled by a convenient sample of selected community pharmacy in Riyadh. Beside the pharmacy and pharmacist demographics data, the pharmacists were asked to select from a predetermine lists of minor ailments those encountered during the last month, and the top ranked 10. In addition, the pharmacist was asked to reflect on client's reliance on the pharmacists help, and weather they involved in referring some of them to seek medical help.

Results The questionnaire was filled by a 100 community pharmacists. Descriptive analysis of a sample of 25 questionnaire showed the followings. The pharmacies were mainly part of chain pharmacies. All pharmacies are reporting being exposed to the vast majority of the minor ailments with some such as dyspepsia, GERD, insomnia being more frequent than the others. Almost 96% of the pharmacist reported being advising their clients to seek medical help when needed, and almost 84% reported that their clients were moderately rely on pharmacist help to treat minor ailments

Conclusions Community pharmacies in Riyadh as it was represented by this sample are heavily involved in helping their communities to treat their minor ailments. They refer clients when needed and clients were described to be moderately relying on pharmacist help.

Abstract Code: APP067

The extent to which Rheumatoid Arthritis Patients On Methotrexate (MTX) at KKUH adhere to their medications

Student(s) Name: *Sultan D. Alenazi*
Supervisor(s) Name: *Tawfeeq A. Alnajjar*

Abstract:

Background Methotrexate (MTX) is the most widely used co-therapy among Rheumatoid Arthritis (RA) patients using biological disease-modifying anti-rheumatic drugs (bDMARDs), taken as a tablet of 2.5 mg three times a week. Unfortunately, while such therapy worked for many patients, others still had little or no clinical response and continued to disease related symptoms. The effect of MTX will take a minimum of 3-6 weeks and even longer before the patients can feel the changes expected from such therapy. In addition, the use of MTX in this group of patients is not without having side effects such as nausea and vomiting, mouth ulcers, headaches, and fatigue. Furthermore, serious if not a fatal side effects have been reported if taken with the Non-Steroidal Anti-Inflammatory Drugs (NSAID). Because of that this study conducted to evaluate the compliance of this group of patients.

Methods The study recently approved by the Investigational Review Board (IRB) at King Khalid University Hospital. The patients on MTX at the Rheumatology clinks at KKUH will be transferred to be interviewed for data collection followings signing of informed consent. In addition, the patients will be interviewed by phone three weeks later to collect subjectively data that address patient compliance.

Results Eight patients so far been transferred to be interviewed. The results from these eight patients will be taken as a pilot. All patients are female, with average age of 52 years, and only one is elutriate, and he rest educated. They all strongly agree on that they have high confidence on their trading physicians, and follow whatever they decide for them.

Conclusions Data collection and hence definitive conclusion can't be taken at this particular moment.

Abstract Code: APP068

A Systematic Review of Pharmacists' Interventions to Support Medicines Optimisation in Patients with Visual Impairment

Student(s) Name: *Basma Y. Kentab*
Supervisor(s) Name: *Carmel M. Hughes, Heather E. Barry, Sinaa A. Alaqeel*

Abstract:

Background People with visual impairment often report poorer health and encounter many challenges when using medicines. Pharmacists can play a significant role in optimising medicines use for these patients. However, little is known about pharmacists' current practices when providing services to this population nor the impact of such services, if any, on medicines optimisation-related outcomes. A systematic review was undertaken to identify the types, and assess the effectiveness of, interventions provided by pharmacists on medicines optimisation-related outcomes.

Methods Systematic searches of the following electronic databases were carried out from date of inception to March 2018: Cochrane Library; MEDLINE; EMBASE; International Pharmaceutical Abstracts; Scopus; and Cumulative Index to Nursing and Allied Health Literature (CINAHL). Several trial registries and grey literature resources were also searched. Any randomised controlled trials, non-randomised controlled trials, controlled before-and-after studies, or interrupted time series analyses reporting on interventions provided by pharmacists to adult visually impaired patients and/or their caregivers in order to improve medicines optimisation-related outcomes of medicine safety, adherence, patient satisfaction, shared decision making, or quality of life were included.

Results A total of 1877 records were identified from searching all resources. After title/abstract screening, 27 full text articles were assessed for eligibility. On examination of full texts, no studies met the inclusion criteria for this review.

Conclusions This review highlights the need for future research that would be vital for promoting the safe and effective use of medicines and the delivery of pharmaceutical care services to people with visual impairment.

Abstract Code: APP069

Identification and Functional Characterization of Novel Startle Disease Genes and Mutations in Saudi Population

Student(s) Name: *Ghada Aboheimed*
Supervisor(s) Name: *Maha Alrasheed, Arnaud Ruiz*

Abstract:

Background Startle disease is a rare inherited neurological disorder that affects newborn children. The disease characterized by touch-induced non-epileptic seizures. However, cases are often misdiagnosed as spastic quadriplegia or epilepsy. It has a predominant genetic causes as mutations in *GLRA1, GLRB*, and *SLC6A5* genes. Therefore, we aimed to identify causative mutations or genes in startle disease Saudi patients and functionally analyse receptor variants which has not been performed yet to shed light on the pathology of startle disease.

Methods Next Generation Sequencing, homozygosity mapping, Sanger sequencing were conducted in 15 Saudi patients to identify the causative gene mutations. *GLRB, GLRA1* were cloned into PRK5 vectors and mutations were introduced using site directed mutagenesis. Functional analysis was performed using whole cell patch clamp & confocal microscopy in acutely transfected N2A cells.

Results We identified one novel (p.A455P) and two (p.Q195X and p. M177R) recurrent variants in *GLRB* gene. Similarly, one novel frameshift mutation in the *SLC6A5* (p.I692fs) and three recurrent variants (p.G342S, p.R252H, and p.R218Q) in *GLRA1* were also identified. Moreover, four novel startle disease genes *CTSD* p. F389_I390ins MGDV; *SCARB2* p. Arg27Gln *RRM2B* p.E62fs ,*IGFN1* c.10202-7G>A were identified. Cells transfected with mutant *GLRB* showed a reduction in glycine-evoked currents compared to those of wild type. Tagging of glycine receptor subunits further revealed disrupted membrane localisation of the mutated proteins.

Conclusions: Our results uncover novel genes and mutations that are potentially linked to the aetiology of startle disease and hope for further translation of this work into a viable therapeutic approaches.

Abstract Code: APP070

Assessment of N-Acetylcysteine Use for Acetaminophen Overdose in Emergency Department Within a Community Teaching Hospital

Student(s) Name: *AbdulAziz Harb*
Supervisor(s) Name: *Sultan Alghadeer*

Abstract:

Background N-acetylcysteine (NAC) is proved as the most effective and first line medical care treatment for Acetaminophen (APAP) overdose and prevention of hepatotoxicity. However, using NAC inappropriately is associated with raised risk of adverse effects of NAC as well as substantial increase in hospitalization with a further increase in health care costs. Therefore, this study is aimed to assess NAC utilization for acetaminophen overdose in emergency department within a community teaching hospital.

Methods A retrospective chart review in which the patients initiated on a NAC secondary to acute APAP overdose at KSUMC during the period of June 2015 till November 2018 were included and assessed based on developed validated evident-based protocol for administering NAC for acute acetaminophen ingestion.

Results Of the 29 patients who received NAC treatment for APAP overdose, fifteen patients were adults and 14 patients were pediatric. Appropriate prescribing of NAC was observed in 14 patients (48.28%), whereas NAC was inappropriately indicated for 15 patients (51.72%); 9 of them were adults and 6 patients were pediatric. APAP-Ingestion < 150 (< 200 in children) mg/kg was the most common reason for inappropriate use (n = 7, 46.67%) followed by administering NAC < 4 hr post-APAP ingestion (n= 4, 26.67%).

Conclusions The results of utilizing NAC at the emergency department necessitate the need for establishing and implementing a protocol in-place to decrease the inappropriate use of NAC, and therefore decrease the adverse effects and the financial burden of emergency department.

Abstract Code: APP071

Assessing knowledge level regarding biosimilars among healthcare professionals in KKUH

Student(s) Name: *Khalid Alazzaz, Abdulrahman Alsha'ari*
Supervisor(s) Name: *Musaad Alkholief, Aws Alshamsan*

Abstract:

Background A global challenge pertaining to the use of biosimilars is their uptake by physicians and healthcare professionals. Number of reports have concluded that the lack of awareness, and sometimes misconceptions, about biosimilars prevents physicians from prescribing biosimilar drugs to their patients. Thus, having a general understanding about biosimilars is crucial for healthcare professionals, and patients. The aim of this study was to assess the knowledge and awareness of healthcare professionals in Saudi Arabia regarding biosimilars.

Methods A questionnaire was designed by the authors after reviewing previous similar reports worldwide, which was then verified and validated by independent experts. The questions were printed out and distributed to healthcare professionals. The choice of targeted clinics

was based on the assumption of their pre-knowledge about biological drugs. All the filled forms were then compiled and data was extracted and interpreted accordingly.
Results A total of 53 healthcare professional were surveyed, all working at KKUH, Riyadh, Saudi Arabia. The sample characertiscs are illustrated in table 1. When asked to describe their knowledge level regarding biologics, a large fraction of the respondents reported they were either expert, familiar, or neutral. However, only 11.3% correctly identified all the biologics in a given list of drugs. Regarding biosimilars, a major fraction of respondents reported their unfamiliarity with the concept of biosimilars, and some related basic clinical terms including interchangeability and extrapolation of indication.
Conclusions The results of our study demonstrates the urgent need of establishing a healthy conversations with practitioners to raise the awareness regarding biosimilars.

Pharmacology and Toxicology

Abstract Code: APT150

Effect of Apremilast against lipopolysaccharide-induced acute lung injury in rats

Student(s) Name: *Khalid A. houdhan, Talal A. Alrizqi*
Supervisor(s) Name: *Naif Alharbi*

Abstract:
Background Lung is highly susceptible to various types of injury because of large surface area and massive vasculature. In most cases, the response is elicited by inflammatory response. Moderate and controlled inflammatory responses against any unwanted stimuli are protective in nature. It is challenging to the clinician for the management of therapies for different types of diseases including acute lung injury (ALI). The aim of the present study was to investigate the possible protective role of apremilast against LPS-induced lung injury.
Methods Male Wistar albino 30 rats (n=6) weighing 220 ± 20 g were used in this study and kept under ideal laboratory conditions during the experimental period. Animals were treated with apremilast (10 and 20 mg/kg, orally) for seven days and acute lung injury was induced by intranasal (i.n.) administration of lipopolysaccharides (LPS) on day 7.
Results In the present study, administration of LPS resulted, significant increased myeloperoxidase activity and neutrophils infiltration. LPS also increases oxidative stress and stimulates the release of pro-inflammatory cytokines such as TNF-α, IL-1β, and IL-6 by the airway epithelial cells and alveolar macrophages thus serving as a model of ALI. Apremilast reduced lung inflammation in terms of reduction in myeloperoxidase activity and levels of TNF-α and alveolar infiltrating cells. Also mRNA expression and western blot analysis showed that apremilast have protective effect against ALI. In the present study, apremilast ameliorated LPS-induced injury in rats.
Conclusions Thus from above results, we found that apremilast reduces LPS-induced inflammatory response and may prevent acute lung injury. Further study needed to confirm our finding.

Abstract Code: APPT151

Neuroprotective Efficacy of Nano-COQ Against Propionic Acid Toxicity in rats: Role of BDNF and CREB Protein Expression

Student(s) Name: *Bashayer Alrumayyan, Khansa Alanazi, Rawan Almasoud, Sara Almarshad, Marwa Alesikri*
Supervisor(s) Name: *Laila Faddah, Ahlam Alhusaini, Iman Hussein*

Abstract:
Background Propionic acid (PPA) is a metabolic end product of enteric bacteria in the gut used as food preservative. Studies showed that it can cause multiple signs of brain toxicity, these results may direct the investigations of human populations to pinpoint drugs that protect from its neurotoxicity.
Objective To study the neuroprotective effect of Carnitine and liposomal Co-Q on brain intoxication induced by PPA in rats.
Methods Thirty male wistar albino rats were divided into 5 groups, 6 rats/each. Group I: was considered as control, Group II: received PPA (250mg/kg/d; p.o.) for five days, Group III: received Carnitine (100mg/kg/d; p.o.), Group IV: received liposomal Co-Q (10mg/kg/d; p.o.), and Group V: received combination therapy of Carnitine and liposomal Co-Q. All treatments were administered along with PPA for five days.
Results The antioxidants in question markedly ameliorated serum IL-1β and TNF-α, and brain NO, lipid peroxide, GSH and SOD levels as well as protein expression of BDNF and CREB that induced by a toxic dose of PPA. Interestingly the combination therapy of Carnitine and liposomal Co-Q achieved the most neuro-protective effect compared to monotherapies.
Conclusions The current study establishes that liposomal Co-Q is considered as a useful tool to prevent brain injury induced by PPA. BDNF and CREB proteins are involved in both PPA neurotoxicity and treatment.

Abstract Code: APT152

Gold-containing compound A8 (A8GC) Inhibits the growth of MCF-7 estrogen-positive breast cancer

Student(s) Name: *Mohammed Aldajani, Huwaidi albaqami*
Supervisor(s) Name: *Ali Alhoshani*

Abstract:
Background Breast cancer is the most prevalent type of cancer worldwide and in Saudi Arabia. MCF-7 is a cell line that has overexpression of estrogen receptor (estrogen+). A8 is a gold-containing compound (III) (A8GC) with anticancer activities. Therefore, we hypothesize that A8GC induces its anti-tumor effect by DNA damage and apoptosis
Methods MCF-7 cells were cultured in complete media at 37oC, 5% CO2, and 95% humidified incubator. For DNA Damage and apoptosis, MCF-7 seeded in 6 well plate. Then, treated with A8GC (0,1, 5 µM) for 24 h. Then, cells were evaluated using flow cytometry. For autophagy, cells treated as above. Then washed one time by 1X PBS. Acridine Orange solution 1 µg/ml was added to each well and incubated for 30 min at 37º C. Finally, cells were washed with 1X PBS, and the morphological changes of autophagy were detected under a fluorescence microscope.
Results The induction of A8GC (1, 5 µM) apoptosis, DNA Damage and autophagy were compared to the control. The percentage rate of apoptosis was 1.68 %, 56.78%, and 70.1%, respectively. While the DNA damage was 5 %, 8 %, and 27%, respectively. Our data did not suggest that autophagy was promoted upon exposure to A8GC.
Conclusions A8GC is an effective and potent metal-containing compound that has anti-cancer effect against MCF-7. It inhibits the growth of MCF-7 and induces DNA damage and apoptosis.

Abstract Code: APT153

The neuroprotective effects of biotin, Co enzyme Q and their combination on aluminum chloride-induced Alzheimer disease in rats: The impact on brain insulin signaling

Student(s) Name: *Shaykhah Albuhayri, Amirah Alotaibi, Sadeem Alaraidh*
Supervisor(s) Name: *Hala Attia, Hazar Yakub*

Abstract:
Background Alzheimer's disease (AD) is a serious neurodegenerative disorder. Insulin is important for neuronal survival via activating insulin receptor substrate-1 (IRS-1) at tyrosine (pTyr) residue. However, IRS-1 is inhibited by phosphorylation at serine (pSer). In AD, oxidative stress and accumulation of amyloid beta (Aβ) induce neuroinflammation, which augments IRS-1 (pSer) and reduces pTyr. This study aims to investigate the role of two antioxidant and anti-inflammatory agents, biotin and coenzyme Q (COQ) on modulating the impaired insulin signaling in aluminum chloride ($AlCl_3$) model of AD.
Methods Rats were treated orally for sixty days as follows: normal control, biotin control (2 mg/kg.) and COQ control (10 mg/kg.), Alzheimer model given $AlCl_3$ only (75 mg/kg.), $AlCl_3$ +biotin, $AlCl_3$ + CoQ and $AlCl_3$ +biotin + COQ. Memory test and histological examination were performed. Brain levels of lipid peroxides, antioxidants (glutathione and superoxide dismutase), inflammatory markers (tumor necrosis factor-alpha, interleukin-6 (IL-6), IL-1 and nuclear factor kappa B) and protein levels of Aβ, IRS-1(pTyr and pSer) were determined.
Results Administration of $AlCl_3$ resulted in impaired memory, significant increase in Aβ, lipid peroxides, inflammatory markers and IRS-1(pSer), with significant reduction of the antioxidants and IRS-1(pTyr) reflecting Aβ-induced inflammation and the subsequent defective insulin signaling. Histological examination revealed focal aggregations of inflammatory cells and degenerated neuronal cells. The biochemical deviations and histological changes were attenuated by the concomitant treatment with biotin and, to greater extent, with COQ and the combination.
Conclusions Biotin and COQ could protect against AD via modulating inflammatory response and hence improving brain insulin signaling.

Abstract Code: APT154

Effect of nicotine on the repetitive behaviors of BTBR T+tf/J mouse model of autism

Student(s) Name: *Zyad AlSaffar*
Supervisor(s) Name: *Shakir AlSharari*

Abstract:
Background Autism spectrum disorder (ASD) is a very complex neurodevelopmental disorder, characterized by repetitive behavior, social interactions abnormality and communication deficits. The recent studies have described that nicotinic acetylcholine receptors (nAChRs) play an important role in modulating behavioral-related problems in the BTBR T+tf/J mice. The inbred BTBR T+tf/J mouse strain have shown most of the symptoms of autism, and mostly this strain has used to investigate the mechanisms underlying behavioral deficits of ASD. The purpose of this study is to investigate the role of nicotine on the repetitive behavior of the BTBR T+tf/J mouse model.
Methods Briefly, the BTBR T+tf/J mice, weighing 22-28 g were divided into control and nicotine-treated groups. In this study nicotine doses were 50, 100 and 400 mcg/ml. The baseline data was collected at the beginning and started nicotine treatment, which was continued for fourteen days. Afterwards, behavioral tests including self-grooming and marble burying tests were performed to determine the effects of nicotine on repetitive behavior in BTBR T+tf/J mice.
Results Interestingly, nicotine significantly decreased the grooming time and number of marble buried in self-grooming and marble burying tests respectively. The nicotine at 50, 100 and 400 mcg/ml attenuated the repetitive behavior in self-grooming test. In addition, it significantly reduced the repetitive behavior in the marble burying test at nicotine dose 400 mcg/ml.
Conclusions Overall, the findings elucidated that the nicotine within certain dose range, remarkably modulated

the repetitive behavior in BTBR T+tf/J mice. Future studies required to determine the complete behavioral pharmacological profile of the nAChRs in autism.

Abstract Code: APT155

Non-targeted metabolomics analysis to evaluate the toxicity of small tyrosine kinase inhibitor

Student(s) Name: *Abdulgadous A. ALmatroudi, Ahmed Abdulaziz Jamaan Ajarim*
Supervisor(s) Name: *Khaled A. Ahazani*

Abstract:

Background Dasatinib (dasa) is a small tyrosine kinase inhibitor, which blocks BCR-ABL, c-Kit, and PDGFR-b kinases activity leading to inhibition of cellular proliferation and tumor progression. Over the last decade, Dasa was very effective as second-generation treatment for chronic myeloid leukemia. However, cases of idiosyncratic hepatotoxicity were reported in human. In this study, we aimed to evaluate the disruption of biochemical pathways caused by Dasa using untargeted metabolomics analysis. The ultimate goal is to highlight metabolites perturbation upon Dasa administration which may be deployed as a potential biomarker for monitoring Dasa induced hepatotoxicity.

Methods To attain this goal, the study was performed in two phases. First phase was a dose escalating trial on small scale of mice to determine the optimal dose since no published animal toxicity studies. In this phase, a total of 15 Balb/c mice were distributed equally in 5 groups and received an i.p injection q.d for 14 days: A (control), B (50mg/kg Dasa), C (100mg/kg Dasa), D (150mg/kg Dasa), E (10 mg/kg cholorquine + 100mg/kg Dasa).

Results The results showed that Dasa significant elevated the biomarkers of liver injury, whereas chloroquine pretreated mice showed no sign of liver injury. Metabolites related to liver function such as L-valine, Urea and 1-Hexadecanol were significantly altered in Dasa treated mice.

Conclusions we concluded that there was a difference between all Dasa groups; whereas, the group which pretreated with chloroquine showed a protective effect. Second phase is underway on relatively large scale on mice (n=9/group) to further investigate the toxicity effects of Dasatinib.

Abstract Code: APT156

CXCR3 antagonist AMG487 attenuates inflammation and joint destruction by regulating Treg/Th17 signaling in DBA 1/J mouse model of arthritis

Student(s) Name: *Bader S. Alrwashied*
Supervisor(s) Name: *Saleh A. Albakheet, Mushtaq A. Ansari, Ahmed Nadeem, Sabry M. Attia, Sheikh F. Ahmad*

Abstract:

Background Rheumatoid arthritis (RA) is a chronic autoimmune disease that is characterized by uncontrolled joint inflammation of bone and cartilage. Chemokine receptors have important roles in RA development and that blocking these receptors effectively inhibits arthritis progression in animal models. This study was undertaken to investigate the role of CXCR3 antagonist (AMG487) in the inflammatory response during the development of collagen-induced arthritis (CIA) in DBA/1J mice.

Method Following induction of CIA in DBA/1J mice, animals were treated with CXCR3 antagonist (AMG487, 5 mg/kg, i.p., every 48 hours for 6 weeks) followed by evaluation for clinical score, and edema of arthritic inflammation. We further investigated the effect of AMG487 on Th1, Th17, and regulatory T cells (Tregs) in CD4+ T cells in the spleen using flowcytometry. We also assessed the effect of AMG487 on T-bet, RORγt, IL-17A, and Foxp3 mRNA and protein expressions using RT-PCR and Western blot in the knee tissues.

Results The severity of clinical scores and edema were significantly reduced in AMG487-treated mice compared with CIA control mice. Moreover, the percentage of Th1, Th17, and Tregs in CD4+ T cells were significantly decreased in AMG487-treated mice as compared with CIA control mice. We further observed that AMG487 treatment downregulated T-bet, RORγt, and IL-17A, and upregulated Foxp3 mRNA and protein expression.

Conclusion This study reveals the antiarthritic effects of AMG487 in the CIA animal model and supports the notion that CXCR3 antagonist could be developed as a novel strategy for the treatment of inflammatory and arthritic conditions.

Abstract Code: APT157

Thymol ameliorates Fluorouracil induced intestinal mucositis; implication of inflammatory pathway

Student(s) Name: *Saba Almazroo, Rehab Allah Al-Azab*
Supervisor(s) Name: *Amira Badr, Layla Alkharashi*

Abstract:

Background Fluorouracil (5-FU) is an effective, widely used anticancer medication. Intestinal mucositis is one of the highest incidence, dose limiting toxicities of 5-FU induced through the activation of oxidative-inflammatory pathway. Thymol is a phenolic compound of thyme oil with powerful antioxidant and anti-inflammatory effects. Therefore, we aimed to investigate the possible protective effects of Thymol on 5-FU induced intestinal mucositis.

Methods Rats were pretreated with 5-FU and/or Thymol (60 and 120mg/kg). Intestinal tissue samples and serum were collected from different groups. Intestinal mucositis was confirmed by histopathological examination using H& E. Lipid peroxides, reduced glutathione, glutathione peroxidase, and superoxide dismutase were assessed spectrophotometrically. Immunoblotting of NF-κB, TNF-α and TGF-β1, in addition to serum analysis of TGF-β1 using ELISA was also performed.

Results In the present work we have shown that oxidative stress and NF_kB/TNF-α/TGF-$_{β1}$ inflammatory loop are critical for 5-FU induced intestinal mucositis. Interestingly, Thymol pretreatment inhibited 5-FU-induced oxidative stress by reducing lipid peroxidation and increasing glutathione, GPx, and SOD. Moreover, Immunoblotting analysis showed that pretreatment with thymol significantly inhibited 5-FU-induced expression of NF_kB, TNF-α and TGFβ-1. As expected, Thymol treatment inhibited the ability of 5-FU to induce secretion of TGFβ-1 in serum. Our results were supported with intestinal histopathology in which thymol treatment inhibited 5-FU-induced sever atrophy of intestinal villi, inflammatory cells infiltration, loss of goblet cells as well as degenerative changes of lining epithelium.
Conclusions The present data demonstrates the protective effect of Thymol in 5-FU induced intestinal mucositis through inhibition of both oxidative and inflammatory pathways.

Abstract Code: APT158

Cytotoxicity and apoptotic Effects of *Dodonaea viscosa* and *Loranthus regularis* in Breast and Lung Cancer Cell Lines

Student(s) Name: *Fahad N. Alhaqbani*
Supervisor(s) Name: *Ahmed Z. Alanazi*

Abstract:

Background *Dodonaea viscosa* and *Loranthus regularis* are a medicinal plants that distributed in different regions of Saudi Arabia and have been used in folk medicine for various purposes. The objectives of this study are to explore the antiproliferative and apoptosis induction of *D.viscosa and L. regularis* ethanolic extracts against lung (A549) and breast (MCF-7) cancer cells.
Methods The plants was extracted with 80% ethanol. Two human cancer cell lines, A549 and MCF-7 growth inhibition was determined using a cell viability MTT assay. Morphological changes of cells were examined using inverted microscope. The apoptosis induction of the extract was assessed by flow cytometry using PE Annexin V detection kit.
Results Our results showed that *L. regularis* causes significant decreases in cell viability and promotes apoptosis in the two cell lines. However, *D. viscosa* does not show any activity. MTT assay revealed that *L. regularis* significantly inhibited cell viability after 48 h in a dose-dependent manner with IC_{50} values of 57 and 194 µg/mL in A549 and MCF-7 respectively. Treated cells showed clear morphological changes in compare to control cells. Moreover, *L. regularis* treatment resulted in higher population of apoptotic cells in compared to untreated cells.
Conclusions We provide preliminary evidence that *Loranthus regularis* may serve as candidates for further investigation with regard to cancer treatment.

Abstract Code: APT159

Role of renin angiotensin-II system in gefitinib-induced cardiotoxicity

Student(s) Name: *Abdulrahman S. Alanazi*
Supervisor(s) Name: *Wael Alanazi*

Abstract:

Background Gefitinib (GEF) is multi-targeted tyrosine kinase inhibitor for treatment of non-small cell lung cancer. Recently, studies have found a positive correlation between gefitinib treatment and cardiac damage leading to cardiotoxicity and cardiac hypertrophy. The mechanistic of gefitinib-induced cardiac hypertrophy is still not fully understood. However, the purpose of the current study is to identity the role of renin angiotensin-II system in gefitinib-induced cardiac hypertrophy through targeting angiotensin-II type 1 receptor (AT1) via valsartan (VAL) treatment.
Methods A group of male Wistar albino rats (n=32) were divided into four groups (n= 8 per group). First and second groups were treated with vehicle and VAL (30mg/kg/day) for 28 days, respectively. Third group was treated with vehicle for 7 days and then received GEF (30mg/kg/day) for 21 consecutive days. Fourth group was treated with VAL for 7 days and continued 21 days with VAL+GEF treatment. On day 28th, all rats were anesthetized for samples collection to be analyzed.
Results In the current study, we found that renin angiotensin-II system has a pivotal role in induction of GEF-induced cardiac hypertrophy through activation of MAP kinase pathway and NADPH oxidase leading to oxidative stress and cardiac injuries. Inhibition of AT1 via VAL treatment successfully attenuated GEF-induced cardiac hypertrophy through deactivation of MAP kinase pathway and NADPH oxidase.
Conclusions In summary, we confirmed that renin angiotensin-II system has a critical role in gefitinib-induced cardiotoxicity and cardiac hypertrophy. However, blocking AT1 receptor via VAL can be considered as a cardio-protective mechanism in prevention of gefitinib-induced cardiotoxicity.

Abstract Code: APT160

Role of carnitine in prevention of apoptosis in blood cells and cardiac tissues during hypoglycemia-induced cardiac hypertrophy

Student(s) Name: *Muath Alshahwan*
Supervisor(s) Name: *Wael Alanazi*

Abstract:

Background In diabetic patients, hypoglycemia is the most common undesired harmful effect resulting from management of diabetes. Numerous studies have found correlation between hypoglycemia and cardiovascular complications in diabetic patients. Long term of hypoglycemia might cause hypertension, cardiac

hypertrophy and cardiac arrhythmia. For management of hypoglycemia-induced cardiovascular complications, we planned to evaluate the role of carnitine supplementation in regulation of apoptosis in blood cells and cardiac tissues during two week of severe hypoglycemic conditions.
Methods A group of Wistar albino rats were divided into five groups and treated for two weeks with several doses of insulin glargine (InG) for finding an appropriate InG dose that producing hypoglycemic-hypertensive rat model. In addition, we produced carnitine-depleted animal model via D-carnitine (DC) treatment. Then, four groups of male rats were treated for two weeks with saline (control group), InG+saline, InG+DC and InG+acetyl-L-carnitine (ALCAR). On day 15th, all animals were anesthetized for blood and hearts harvesting to be analyzed.
Results During animal treatment with different doses of InG, we found that (20U/kg) showed highest elevation in blood pressure and white blood cells (WBCs) death with less mortality in comparison with (25/kg). Carnitine depletion increased InG-induced apoptosis of WBCs and cardiac cells and cardiac hypertrophy as compared with InG+saline treated animals. ALCAR suppressed WBCs and cardiac cells apoptosis leading to attenuation of cardiac hypertrophy during hypoglycemia.
Conclusions Carnitine as a strong antioxidant and anti-apoptotic agent, inhibited hypoglycemia-induced apoptosis in WBCs and cardiac tissues leading to attenuation of cardiac hypertrophy during sustained hypoglycemic conditions.

Abstract Code: APT161

Liraglutide reduces oxidative stress and activates cardio protective pathways against gefitinib-induced cardiotoxicity

Student(s) Name: *Talal AlShaya*
Supervisor(s) Name: *Abdullah Alasmari*

Abstract:
Background Gefitinib is an effective treatment for patients with locally advanced non-small cell lung cancer. However, it is associated with dose-dependent cardiotoxicity which can limit its clinical use. The antidiabetic drug, liraglutide, showed a significant cardio-protective effect in clinical trials with the mechanism is yet to be elucidated. Therefore, this study aimed to determine the liraglutide efficiency in protecting the heart from damage after gefitinib treatment.
Methods Forty male albino rats were divided into 4 groups: control group (received i.p injection of saline), liraglutide group (received i.p. injection of 0.2 mg/kg liraglutide), gefitinib group (received 30 mg/kg gefitinib orally) and liraglutide plus gefitinib group. After 28 days, blood and tissue samples were collected for histopathological, biochemical, gene and protein analysis.
Results Gefitinib treatment resulted in cardiac damage as evidenced by histopathological studies. Furthermore, plasma Creatine kinase-MB (CK-MB), pro b-type natriuretic peptide (Pro-BNP) and cardiac Troponin-I (cTnI) were markedly high in gefitinib group. Pretreatment with liraglutide restored the elevation in plasma markers and diminished gefitinib-induced cardiac damage. Moreover, liraglutide improved the gene and protein levels of anti-oxidants (glutathione, superoxide dismutase and frataxin) and a decrease in the oxidative stress markers (nitric oxide synthase, heme oxygenase 1 and NF-κB). Mechanistically, liraglutide offered protection through up-regulation of the survival kinases (ERK1/2 and Akt) and a decrease in stress-activated kinases (JNK and P38).
Conclusions For the first time, we provide evidence that liraglutide protects the heart from damage in response to gefitinib treatment through its anti-oxidant property and through the activation of survival kinases.

Abstract Code: APT162

Gemfibrozil attenuates Sorafenib-induced hepatotoxicity

Student(s) Name: *Abdulmajeed AlAsmari, Abdulmajeed AlShahrani*
Supervisor(s) Name: *Abdullah AlAsmari*

Abstract:
Background Sorafenib is the most efficacious drug for the treatment of advanced renal cell carcinoma. However, recent studies reported that sorafenib treatment is associated with hepatotoxicity which can limit its clinical application. Therefore, in this study we investigated the efficiency of gemfibrozil in the reversal of sorafenib-induced hepatotoxicity.
Methods 40 male albino rats were divided into 4 groups: control group, which received i.p injection of vehicle (corn oil), gemfibrozil group, where rats were orally gavaged with 100 mg/kg gemfibrozil, sorafenib group received 30 mg/kg sorafenib orally, and gemfibrozil plus sorafenib group, where rats pretreated with gemfibrozil for 1 week then with sorafenib for 21 days. After 28 days, blood and tissue samples were collected for biochemical, gene and protein studies. Also, non-targeted metabolomics analysis was conducted.
Results Sorafenib treatment was associated with marked increase in Alanine aminotransferase and Alkaline phosphatase (ALT and ALP) levels, indicating presence of liver injury. Furthermore, sorafenib-induced hepatotoxicity was evidenced by the significant increase in lactate dehydrogenase (LDH), Thiobarbituric acid reactive substances (TBARS) levels in tissue homogenates and gene expression of NF-κB. Gemfibrozil treatment, however, significantly reduced the plasma levels of ALT and ALP. Furthermore, LDH, TBARS and NF-κB levels were restored after gemfibrozil treatment. Pretreatment of rats with gemfibrozil revealed significant protection against sorafenib-induced hepatotoxicity, as it resulted in increased level of antioxidant enzymes, which were depleted in sorafenib treated group.

Conclusions Our findings suggest that the protective effect of gemfibrozil against sorafenib-induced hepatotoxicity is due to its anti-oxidant and anti-inflammatory effect.

Abstract Code: APT163

Antimicrobial activities of Compounds Isolated from *Loranthus Acaciae*

Student(s) Name: *Abdullah Alharbi*
Supervisor(s) Name: *Mashal Alshazi, Omar Noman, Ali Alqahtani*

Abstract:
Background The *Loranthus* genus has been demonstrated to be used in the treatment of many diseases. Therefore, our study was carried out to investigate the antimicrobial effects of *Loranthus acaciae* Zucc. (Loranthaceae) grown in Saudi Arabia.
Methods The oven-dried and grinded aerial part (500 g) was extracted with 1000 mL ethanol (CH_3CH_2OH) for 4 h utilizing a Soxhlet apparatus. The obtained ethanolic extract was filtered and concentrated under reduced pressure to yield a 10 g of the crude alcoholic extract. The extract was then suspended in distilled water and successively partitioned with *n*-hexane, chloroform ($CHCl_3$) and *n*-butanol (BtOH) . We used disk diffusion assays to test antimicrobial activities of different extracts and pure compounds. Each disk was impregnated with 10mg of extracts or 5mg of pure compounds. The agar plate prepared and streaked with one bacteria and disks placed on the top of agar plate. After that the plate was incubated at 37C for 18 hours. We zone of inhibition measured for each disk as indicator of antimicrobial activities. Ampicillin and kanamycin were used as positive controls.
Results From the dry plant, crude extract was obtained which was further fractionated into hexane, chloroform and butanol extracts. From hexane extract, β- sitosterol was isolated. From chloroform, catechin, quercetin and catechin-3-o-galle were isolated. For the antimicrobial activities, some extracts and compounds showed good activities against.
Conclusions We successfully followed the antimicrobial activities in different extracts of this plant and we were able to isolate pure compounds with activities against Gram positive bacteria.

Abstract Code: APT164

Metabolomic study for the effects of single and co-exposure to cannabis and amphetamine in humans

Student(s) Name: *Ahmed S. Badawood*
Supervisor(s) Name: *Fawaz Alasmari*

Abstract:
Background Studies demonstrated that chronic consumption of abused drugs induced alterations in several proteins that regulate body and brain development. For instance, methamphetamine exposure was found to reduce the level of glucose. Fatty and amino acids levels have been found to be altered in groups exposed to abused drugs. Therefore, in our study, we investigated the effects of chronic exposure to cannabis, amphetamine as well as co-exposure to cannabis and amphetamine on metabolic biomarkers in the serum of addicted patients.
Methods Blood were obtained from subjects (healthy-control, amphetamine, cannabis and amphetamine-cannabis). Detection of serum metabolites was performed using gas chromatography. Peak percentiles for metabolites were analyzed between four groups. Oxidative stress biomarkers were analyzed in the serum using commercial assay kits.
Results Chronic exposure to cannabis and amphetamine induced a reduction in malonic acid, L-valine, n-heptyl proponoate, urea, and glucose. However, cannabis and amphetamine were found to increase the peak percentile of maltose and sorbitol. Butanoic acid and erythrotetrafuranose were decreased in cannabis group as compared to healthy control group. Cannabis was able to increase prostraglandin F1. Cannabis-amphetamine group showed reduced hexadecanoic acid and trans 9-octadecanoic acid as compared to amphetamine group. Additionally, phosphoric acid was decreased in amphetamine and cannabis-amphetamine groups compared to healthy control and cannabis groups, respectively.
Conclusions Our data indicated that chronic exposure to cannabis and amphetamine dysregulated metabolites in the serum. Future studies are warranted to explore the effects of these abused drugs on the metabolic enzymes.

Abstract Code: APT165

Studying the Effect of Valsartan on Gefitinib-induced Lung Toxicity

Student(s) Name: *Radhi Alosaim*
Supervisor(s) Name: *Moureq Alotaibi*

Abstract:
Background Gefitinib, an epidermal growth factor -tyronis kinase inhibitor (EGFR-TKI), has proven efficacy in forms of progression-free-servival (PFS) in patients with non-small cell lung cancer (NSCLC) as first choice of treatment. However, geftinib has been shown to be associated with lung toxicity, which limits its use. Valsartan, an angiotensin II receptors blocker, has shown some of evidence of protection to tissue that is injured by some toxic drugs in several studies. In this study, we sought to study the effect of valsartan on normal lung cell treated with geftinib.
Methods Autophagy, Senescence, and apoptosis have been assessed in CCD-11Lu cells. Cells were exposed to indicated treatment points for 24 hrs. In the following day,

acridine orange staining was performed to assess for autophagy under microscope, β-galactosidase to assess for senescence, Caspase 3/7 to assess for apoptosis, as well as measurement of reactive oxygen species using flow cytometry.
Results Our data indicated that Gefitinib promote autophagy with limited evidence of apoptosis or other cytoxicity markers such as senescence. Moreover, data showed that reactive oxygen species (ROS) level in Gefitinib-treated CCD-11Lu cells increased. On the other hand, pretreatment of cells with Valsartan decreased level of autophagy, apoptosis, and reactive oxygen species, which indicated that valsartan exerts protective effect on lung tissues.
Conclusions Effect of valsartan on normal lung cell seem to have protect effect on gefitinib-induced toxicity primarily inhibition of apoptosis and autophagy which associated with reduction of reactive oxygen species.

Abstract Code: APT166

The Skull Condition and Sleep Onset Latency after mild Traumatic Brain Injury in Mice Model

Student(s) Name: *Fahad Alshammari*
Supervisor(s) Name: *Faleh Alqahtani*

Abstract:
Background Traumatic brain injury (TBI) is a leading cause disability for the young generation in worldwide. Neuronal death and behavioral deficit are signs of TBI disorders. Emerging an animal model of TBI in our institution is highly demanded which will help to study the molecular and behavioral changes for TBI patients. Our present work aims to establish and validate a mild traumatic brain injury (mTBI) in the mice model. The outcomes of our study will help us to have more information about CNS dysfunctions during TBI disorder. Also, starting the mTBI animal model will assist in developing a new treatment strategy for TBI
Method Swiss Webster mice were anesthetized using isoflurane. After that, mice were placed on the sponge under the mTBI apparatus. The attached weight (50 gm) was dispatched and allowed to hit in the cortex region of mice brain (n=3). The mice in the control group (n=3) were anesthetized for the same period. Sleeping latency time was recorded. Then, the images of the skull were taken using digital x-ray radiography system.
Result The x-ray results show that there is no damage in the brain skull with using 50 gm weight as injury inducer. The sleep latency period (149±23sec) was significantly higher for injured mice compared to control mice(36±1.6 sec), p = 0.0091.
Conclusion Our study allowed us to generate mice model of mTBI which will be utilized in the future for further molecular validation. Also, this model will help to study some medications for TBI disease.

Physical Pharmacy & Pharmaceutics

Abstract Code: APH250

A comparative in vitro dissolution of different brands of carvedilol tablets available in Saudi Arabian market

Student(s) Name: *Naif Abdullah Al-Eid, Abdullah Khalid bin Rabiah*
Supervisor(s) Name: *Abdul Ahad, Yousef Bin Jardan, Mohammed Raish, Fahad Al-Jenoobi, Gamal Ahmed*

Abstract:
Purpose: The main objective of the present study was to evaluate between three different generic brands of carvedilol which are commercially available in the Saudi Arabian market in comparison with innovator product (Dilatrend®, 25 mg tablets). All the marketed brands were evaluated for in vitro dissolution test.
Methods: In vitro release testing of innovator, and generics was carried out as per the USP monograph in 0.7% of hydrochloric acid dissolution medium pH 1.45 ± 0.2 (900 mL) maintained at 37 C° and 50 rpm using Sotax automated dissolution system. The tests were performed according to pharmacopoeial specifications using Apparatus II (paddle method).
Results: Among all the investigated carvedilol brands, Innovator Dilatrend® and brand I, brand II, brand III tablet showed 84.46 ± 0.34% and 83.19 ± 0.74%, 85.95 ± 1.08% , 77.77 ± 2.86% drug release at 60 minutes respectively. All the investigated generic products (except generic brand III) released more than 80% of the drug within 30 minutes. The in vitro drug release result shows, insignificant differences in dissolution behavior between the innovator and investigated generic brands except generic brand III.
Conclusions: Based on the obtained results and in comparison, with the originator product, all the tested brands except generic brand III are assumed to be chemically and pharmaceutically equivalent. Brand I and brand II products can be used as generic substitutes for the originator product.

Abstract Code: APH251

Design and development of orally disintegrating tablets (ODT) of Simvastatin

Student(s) Name: *Ahmed Abdullah Alshehri*
Supervisor(s) Name: *Gamal M Mahrous, Mohamed A. Ibrahim, Awad Radwan*

Abstract:
Background: The present study deals with the design and development of oral disintegrating tablet of Simvastatin by direct compression technique. Simvastatin is lipid lowering agent Its abs. bioavailability is 5% and coming

under the class II of biopharmaceutical classification system. The rate of absorption and/or the extent of bioavailability for such a poorly soluble drug are controlled by rate of dissolution. Hence, to enhance the solubility of drug, a solid dispersion of Simvastatin was prepared with (1:4) drug: polymer ratio by using kneading method.

Methods Preparation of solid dispersion: solid dispersion of Simvastatin was prepared. with (1:4) drug: polymer ratio by using kneading method. The polymers used are; poloxamer 188, PEG4000, and polyvinylpyrrlidone. The prepared solid dispersions were characterized and the one that gives higher dissolution rate was chosen for ODT preparation via direct compression with Pharmaburst 500®. Tablets were evaluated for physical properties and dissolution test.

Results The prepared solid dispersions showed enhancement in dissolution by about 10 folds in comparison with the untreated drug. Solid dispersion of the drug with poloxamer 188 was compressed with Pharmaburst 500® into ODT. The tablets showed acceptable hardness and friability with rapid disintegration and dissolution.

Conclusions The prepared solid dispersions showed enhancement in dissolution by about 10 folds. The prepared tablets showed enhanced dissolution rate with expected better bioavailability.

Abstract Code: APH252

Design and evaluation of a new antibacterial agent into dermal films

Student(s) Name: *Yazeed Alhaj*
Supervisor(s) Name: *Gamal M Mahrous, Awad Radwan, Mohamed A. Ibrahim*

Abstract:

Background The mortality rate due to pathogenic infectious diseases is rapidly increased in the world because of the dramatic increase of the antimicrobial resistance which help the microbes to survive in the presence of an antimicrobial drug. Both longstanding and firsthand infectious diseases remain a challenging community health threat that prompt the search for novel antimicrobial agents that treat new infectious disease and/or combat the old resistant microbes. The aim of this work is to formulate the antimicrobial compound, 3-Hydroxy-3-(2-(2,5-dimethoxyphenyl)-2-oxoethyl)-indolin-2-one ($MIC_{S\ arueus}$ 64 µg/mL), which was prepared in our laboratory and its structure was elucidated, into dermal film for topical use.

Methods Films containing the drug were cast from aqueous solvents using various bioadhesive polymers namely: Chitosan and polyvinylpyrrolidone. The prepared films were subjected to investigations for their physical and mechanical properties, swelling behaviors, in vitro drug release and antimicrobial activity.

Results The λmax (338 nm) and standard curve of the compound were determined by UV spectrophotmetery. The calculated log P was 1.83. The prepared films showed good mechanical properties. The drug released over 2 hours. The film showed activity against gram negative bacteria including E. *coli* and *Pseudomonas aeruginosa* and showed activity against Gram positive bacteria including *Bacillus subtilis* and *Staphylococcus aureus*

Conclusions The dermal films were successfully prepared**.** The prepared films have good physical and mechanical properties, swelling behaviors, in vitro drug release and antimicrobial activity.

Abstract Code: APH253

Antimicrobial activity of chitosan nanoparticles against *Streptococcus Pneumonia*

Student(s) Name: *Asalh Binkeliab, Hessa Alowais, Bdour Alwathllan*
Supervisor(s) Name: *Fulwah Alqahtani*

Abstract:

Introduction *Streptococcus pneumoniae* remains the major cause of community-acquired pneumonia, meningitis and other diseases, contributing significantly to high morbidity and mortality worldwide. Although it responds to B-lactams their use is limited due to the antibiotic resistance which necessitate new treatments. Nanotechnology is used to counteract antimicrobial resistance. In this regard, polymeric nanoparticles made of natural, biodegradable, biocompatible, and cationic polymer such as chitosan (CNPs) exhibited wide spectrum antimicrobial activity. This antimicrobial activity correlate with molecular weight, concentration and pH of chitosan. Therefore, this work aims to prepare CNPs, characterize their physiochemical characteristics: particle size (PZ), poly dispersity index (PDI) and zeta potential (ZP) and investigate their antimicrobial activity against *Streptococcus pneumoniae* TIGR4 and its capsular mutant (Δ cap).

Methods CNPs were prepared at 1, 2.5 and 5 mg/mL concentrations using ion gelation method. Then, PZ, PDI, ZP were characterized using zeta sizer. Transmission electron microscope (TEM) was used to visualize CNPs morphology. Broth dilution method was utilized to assess their antimicrobial activity against tested bacteria.

Results Successful production of CNPs were achieved with PZ ranging from 169 to 369.5 nm, PDI < 0.35, and ZP from 25.9 to 30. TEM images revealed spherical morphology. Highest level of pneumococcal killing was demonstrated by 5 mg/ml CNPs, followed by 2.5 mg/ml then 1 mg/ml. The bactericidal effect of CNPs was not affected by the absence of pneumococcal capsular polysaccharide.

Conclusion These findings suggest exponential correlation between chitosan concentration and antimicrobial activity. The mechanism of bacterial killing observed will be investigated in future.

Abstract Code: APH254

A new concept for enhancing dissolution by combination of self-nanoemulsifying formulations and solid dispersion technique

Student(s) Name: *Ahmad Yousef wadah Tashish*
Supervisor(s) Name: *Ahmad Abdul-Wahhab Shahba, Fars Kaed Alanazi*

Abstract:

Background Bariatric surgery significantly reduces gastric capacity and acidity leading to diminished drug absorption particularly for weakly basic lipophilic drugs. Solid self-nanoemulsifying formulations (S-SNEFs), prepared by adsorption, offer good option to enhance drug dissolution and stability. However, adsorbents such as Neusilin® hinder complete drug release from formulation. The current study aims to design a novel combination of drug-free S-SNEF + solid dispersion (SD) to enhance cinnarizine (CN) dissolution at high pH environment and minimize the adverse effect of adsorbent on its release.

Methods Drug-loaded and drug-free SNEFs were solidified using Neusilin® US2 at 1:1 ratio. Various CN-SDs were prepared using freeze drying and microwave technologies. The developed SDs were characterized by differential scanning calorimetry (DSC) and X-ray powder diffraction (XRD). *In-vitro* dissolution studies were conducted to evaluate various CN formulations at pH 6.8.

Results S-SNEFs showed acceptable self-emulsification and powder flow properties. DSC and XRD showed that CN was successfully amorphized into SDs. The combination of drug-free S-SNEF + pure CN showed negligible drug dissolution due to inability of pure drug to partition into formed micelles. CN-SDs showed only 5% dissolution efficiency (DE) which reflects the insufficiency of SD alone to enhance CN dissolution. Drug-loaded S-SNEF showed 23% DE while drug-free S-SNEF + SD combination showed 8 and 1.5 fold DE enhancement compared to uncombined SD and drug-loaded S-SNEF, respectively.

Conclusions Drug-free S-SNEF + SD combination offer a novel approach to overcome the negative impact of bariatric surgery on drug absorption by enhancing dissolution at elevated pH environments.

Abstract Code: APH255

Effect of different excipients on solubility and dissolution of Erlotinib and Gefitinib

Student(s) Name: *Abdulrahman Alsha'ari, Khalid Alazzaz*
Supervisor(s) Name: *Aws Alshamsan, Musaed Alkholief*

Abstract:

Background Physicochemical properties of orally administered drug play an important role in the oral bioavailability of drugs. Erlotinib and gefitinib are class II drugs that have low solubility and dissolution. Different excipients were selected including β-cd, SLS, TPGS to improve the bioavailability of Erlotinib and Gefitinib via enhancing dissolution and solubility.

Methods The calibration curves of Gefitinib (GEF) and Erlotinib (ERL) were prepared in methanol-water mixture by using UV Spectrophotometer. The phase-solubility studies were performed. Excess amount of GEF or ERL was added in the increasing concentrations of excipients. Around 5 mg of the lyophilized powder was characterized by DSC and FTIR. The dissolution of different formulations was studied in HCL. The lyophilized samples were placed in dissolution tube containing 50 ml of HCL. The samples were filtered suitably and quantified by UV spectrophotometer.

Results The aqueous solubility studies showed that SLS was superior to the other excipients in solubilizing GEF while β-cd was superior at 1:1 molar ratio in solubilizing ERL. Also there were no physicochemical incompatibility of the formulations tested by DSC and FTIR. As for the dissolution profile, TPGS was superior to the other excipients for the initial dissolution of GEF, while for ERL, TPGS and β-cd had higher dissolution rate.

Conclusions TPGS and/or β-cd could be used instead of SLS in the tablet formulation of GEF and ERL due to improvement of both the solubility and dissolution profiles of both drugs. Further studies are needed to confirm the stability of the proposed formulations.

Abstract Code: APH257

Improvement of the transdermal delivery of meloxicam by nanocrystals: Preparation, characterization and *ex vivo* study

Student(s) Name: *Abdulmajeed Alotaibi*
Supervisor(s) Name: *Abdullah Alomrani, Mohamed Badran*

Abstract:

Background The aim of the present study was to develop nanocrystal formulation for the transdermal delivery of meloxicam (MLX) in order to enhance meloxicam skin penetration and permeation.

Methods MLX nanocrystals were prepared by precipitation method utilizing acid-base neutralization technique. the size of the crystal could be controlled by stirring rate and surface tensiton of precipitating medium. The formed MLX nanocrystals were characterized for particle size, zeta potential and *ex vivo* skin permeation. Fourier transform infrared spectroscopy (FTIR), differential scanning calorimetry (DSC), X-ray powder diffractometry and transmission electron microscopy were used to explore the effect of method parameters on the physicochemical properties of of MLX nanocrystals.

Results This study was developed to enhance MLX solubility and its skin permeation based on nanosized form of MLX. Four MLX nanocrystal formulations (NanoF1, NanoF2, NanoF3 and NanoF4) were prepared using Tween80 (74 and 184 mg/mL) and ethanol (4.5% and 9%).

DSC and x-ray diffraction studies supported crystalline structure of MLX nanocrystals. *Ex vivo* permeation studies through rat skin indicated that the cumulative permeation amount of MLX from nanocrystals in 6 h was more than that from MLX suspension.
Conclusions We identified rs4808708 as a risk variant for DTC. The variability in the L-T4 dose requirement does not appear to be related to *NIS* polymorphisms.

Abstract Code: APH258

Design of nanoshuttles for simvastatin repurposing with selective tumor targetability

Student(s) Name: *Abdulraham N. Almutham*
Supervisor(s) Name: *Gamaleldin I. Harisa, Ehab I. Taha, Saeed A. AlQahtani, Mohamed M. Badran, Tarek M. Faris*

Abstract:
Background Cancer is a health threatening problem; it is the first cause of death globally. Drugs repurposing and nanotechnology are promising era for cancer therapy. Drugs repositioning is efficient, economical and riskless. Nanoshuttles drug loaded are secretively accumulated into the tumor tissues by EPR effect. Targeting of cholesterol biosynthesis is considered a novel tactic for treatment of cancer. Statins are HMG-CoA reductase inhibitors; therefore, they decrease cholesterol biosynthesis as essential membrane component. Moreover, statins inhibit biosynthesis intermediates of cholesterol biosynthesis which involve in post-translation modification of G-proteins as regulators of cellular transformation, migration, invasion and proliferation. The aim of this study was to assemble simvastatin (SIM) nanoshuttle as a novel approach to target cancer cells.
Methods Poly (lactic-co-glycolic acid) as copolymer with different surfactants was used in preparation of different SIM loaded nanoshuttles. Then, the nanoshuttles were characterized for hydrodynamic diameter; polydispersity index and zeta potential using a Zetasizer Nano ZS (Malvern Instruments, UK). Percentage of SIM entrapment efficiency and drug release profiles were determined using reverse phase-High Performance Liquid Chromatography (HPLC). Additionally, hemocompatability of the prepared SIM loaded nanoshuttles was investigated spectrophotometry and cytotoxicity effect was investigated using MTT assay.
Results The present results revealed that, the prepared SIM nanoshuttles showed nanosized range (150 –200 nm), negative zeta potential (6 - 20mV), desirable entrapment efficiency, and prolonged drug release pattern compared to free drug. Moreover, SIM nanoshuttles are hemocompatible and cytotoxic to cancer cells.
Conclusions This study demonstrated that SIM loaded nanoshuttles signified as promising tools for tumor targeting.

Abstract Code: APH259

Physicochemical characterization of anticancer drug: Gefitinib utilizing microwave radiation technology

Student(s) Name: *Mohammed Babaeer*
Supervisor(s) Name: *Sultan M. Alshehri*

Abstract:
Purpose Gefitinib is an anticancer medication acts by inhibiting tyrosine kinase, belongs to class II BCSs system. The potential aim of this study is to enhance the solubility of hydrophobic drug (Gefitinib) utilizing microwave radiation technology by change the physical status of drug from crystalline to amorphous one.
Methods Selected polymers like PEG 4000, Kollidon VA 64 and Soluplus with fixed drug load 20% of gefitinib was involved in each formulation (alone or combination). The samples were placed in the center of the microwave one by one. Samples were kept in the microwave until obtaining a homogenous mixture and melted. The melted one was grinded using mortar and pestle then sieved. Thermogravimetric (TGA) analysis technique has been used in the study on pure drug and with other polymers to identify the thermal stability of the new formulations. The solid state of different formulations was characterized by differential scanning calorimetry (DSC) and powder X-ray diffraction (PXRD) techniques. The API and polymer interactions were determined using FTIR.
Results Thermal stability of pure drug and each polymer were confirmed by TGA. DSC studies showed that the corresponding drug melting endothermic peak was absent in all formulations. PXRD revealed that the crystalline form of the drug was totally transformed to the amorphous one by this technique and help of these polymers. The FTIR results confirmed the interaction between the drug and the carrier.
Conclusion The suitable selection of the polymer to use through microwave technology was vital to prepare solid dispersion system.

Abstract Code: APH260

Evaluation of Curcumin Nanoparticles for Topical Wound Healing

Student(s) Name: *Abdullah Mohsen alshammeri*
Supervisor(s) Name: *Mohammad S Alqahtani, Rabbani Syed*

Abstract:
Background Curcumin (diferuloylmethane) is the main curcuminoid present in turmeric with many health benefits. When used topically it has been reported as promising antimicrobial and wound healing agent, however, major drawbacks associated with curcumin administration are its poor water solubility, low stability and photosensitivity. Lignin is the most abundant natural biopolymer and have been isolated from a wide variety of plants. The main objective of this research was to

formulate curcumin loaded nanoparticles using lignin for wound healing application.
Methods The nanoparticles were prepared using modified phase separation method. The size, distribution index, morphology, zeta-potential and encapsulation efficiency of the nanoparticles was evaluated and optimized. Furthermore, the curcumin release study was performed by dialysis in PBS pH 7.4. The antimicrobial activity of the curcumin loaded nanoparticles was tested against three bacterial strains, E. coli, Staphylococcus aureus, Pseudomonas aeruginosa. Minimum inhibition concentration (MIC) method was performed to evaluate the antimicrobial activity of the nanoparticles. Afterward, MIC of each bacterial strain was recoded using ELSIA reader. In vivo wound healing study was approved and conducted using Wister albino rats obtained from in animal house facility in King Saud University.
Results Spherical nanoparticles with optimum size and high %EE were obtained for the encapsulated curcumin. The particles showed a sustained release of curcumin with minimal to no burst release, suggesting that curcumin was encapsulated in the lignin core. Moreover, curcumin loaded nanoparticles demonstrated great antibacterial effects. Nanoparticles treated animals showed a statistically significant decrease of the wound area by day 4, along with 96.07% of wound contraction by day 16.
Conclusions Overall, these findings demonstrate the promising potential of curcumin loaded nanoparticles to promote faster and more effective wound healing.

Abstract Code: APH261

Effects of formulation parameters of luteolin nanodispersion prepared by using high pressure homogenization and planetary ball mill

Student(s) Name: *Majed Almutairi, Abdallah Aldosari*
Supervisor(s) Name: *Wael Mahdi*

Abstract:

Purpose The objective of this study was to evaluate the influence of using high-pressure homogenization and ball milling (wet milling technique) on the formulation parameters of a binary mixture of Luteolin with a selected polymer (Kollidon 64)
Methods Luteolin (LUT) was selected as a model drug due to its poor water solubility. Luteolin nanodispersions were prepared by high-pressure homogenization and planetary ball mill (wet milling technique) at the different drug-polymer ratio of 1:2.5, 1:5 and 1:10 w/w. The resultant nanodispersions were evaluated for particle size (PS) and particle size distribution (PSD) by using ZetaSizer. After freeze-drying, ZetaSizer was carried out to assess particle size (PS) and particle size distribution (PSD). Besides, Thermogravimetric (TGA) analysis was performed on drug and polymer to recognize the thermal stability of each component. Moreover, the solid state of pure drug and each formulation was characterized using powder X-ray diffraction (PXRD) techniques. The API and polymer interactions were determined using FTIR.
Results Using high-pressure homogenization and planetary ball mill showed that an increased polymer concentration resulted in a decrease in the particle size of LUT. PXRD confirmed that the crystalline form of LUT was completely transformed to the amorphous state in binary formulations with this polymer, Kollidon 64, as the corresponding peaks of LUT were disappeared.
Conclusion Under the same LUT-polymer ratio of 1:2.5, nanodispersions prepared using planetary ball mill showed a smaller particle size than did the nanodispersions prepared by using high-pressure homogenization.

Medicinal Chemistry & Natural Products

Abstract Code: AMN350

Unexpected reactive intermediates in nazartinib metabolism identified: phase I metabolic profiling

Student(s) Name: *Mohammed Nasser AlThunayan*
Supervisor(s) Name: *Adnan A. Kadi*

Abstract:

Background Nazartinib (NZB) is a third-generation human epidermal growth factor receptor (EGFR) tyrosine kinase inhibitor. The metabolic pathway and bioactivation mechanism of NZB require clarification. (RLMs). This method was applied in metabolic stability investigation of ROC.
Methods Using mass spectrometry, we screened for in vitro metabolites of NZB formed in human liver microsomal incubations and checked for the generation of reactive intermediates using potassium cyanide as a nucleophile that traps reactive iminium species by adduct formation. The chemical structure of NZB contains five building blocks (isonicotinamide, benzimidazole, azepane, tertiary dimethyl amine, and butanone). Mass spectrometry scans and extracted ion chromatograms of the proposed *m/z* peaks were utilized to find the in vitro metabolites in the incubation mixtures. The fragmentation behavior was utilized to characterize the in vitro and reactive metabolites formed in NZB metabolism and locate the metabolic changes in the NZB structure.
Results Unexpectedly, the azepane ring was not bioactivated. Instead, the carbon atom between the aliphatic linear tertiary amine and electron-withdrawing system (butanone group) was bioactivated, generating iminium intermediates as reactive species. Six NZB phase I metabolites, formed by hydroxylation, oxidation, and N-demethylation metabolic reactions, were characterized. In addition, two reactive iminium ions were characterized and the corresponding bioactivation mechanisms were proposed.

Conclusions Bioactivation of NZB can be blocked by small sterically hindering groups, isosteric replacement, or a spacer. This approach can reduce toxicity by stopping the generation of reactive species. The data obtained in this study will contribute towards the development of new drugs with enhanced safety profiles.

Abstract Code: AMN351

Development and Validation of Liquid Chromatography Fluorescence Method for the Quantification of Novel Anti-Chronic Hepatitis C Virus-GT4: Ravidasvir (an NS5A Inhibitor) in Human Plasma

Student(s) Name: *Ali Al-Amri*
Supervisor(s) Name: *Mohamed Hefnawy*

Abstract:

Background Hepatitis C virus (HCV) infection is a major health problem worldwide and no vaccine has yet been developed against this virus. Mortality and morbidity from chronic hepatitis C virus (HCV) infection are increasing in many countries with an aging of the infected population. Ravidasvir is a new, class of agents has recently been developed that are believed to target the HCV protein NS5A, and it is a pan-genotypic anti-HCV NS5A inhibitor direct-acting antiviral drug with powerful inhibitory effect against hepatitis C virus (HCV) genotypes.

Methods Chromatographies separation was performed on Water Symmetry C18 analytical column (100 Å, 150 mm x 3.9 mm, 5 µm). The mobile phase consisted of acetonitrile: 25 mM phosphate buffer (pH 3.5) (60:40, v/v) pumped at a flow rate of 1.0 ml min^{-1} with run time of 5 min. The analyte and donepezil (IS) were detected using excitation and emission wavelengths of 270 and 380 nm, respectively.

Results The method was validated over the concentration range of 1- 50 ng mL-1 for RAV ($r2 \geq 0.999$) in human plasma, with a limit of detection (LOD) of 0.3 ng mL-1. Recoveries of RAV from plasma samples ranged from 94.67 - 99.15 % throughout their linear ranges.

Conclusions In this study, we developed and validated, for the first simple, sensitive and rapid LC–FL method for the quantification of RAV in human plasma. This method shows acceptable precision and, accuracy and adequate sensitivity for use in pharmacokinetic studies and appears to be suitable for use in all laboratories.

Abstract Code: AMN352

Isolation and Identification of Antidiabetic compound from the Saudi Arabian plant Cleome droserifolia (Samwah)

Student(s) Name: *Nader N. Al-Otaibi*
Supervisor(s) Name: *Adnan J. Alrehaily*

Abstract:

Background *Cleome droserifolia (Forssk.) Del.* (*C. droserifolia*), locally known as Samwah, is a medicinal plant grown in Saudi Arabia. *C. droserifolia* belonging to the family of *Cleomaceae* is distributed in flood plains and valleys in the northwest region of the country. *C. droserifolia* is a medicinal plant used in traditional and herbal medicine for the treatment of diabetes, colic and burn conditions. The aim of this study was to isolate, identify the potentially antidiabetic compound from active fraction of the plant.

Methods Dried and finely powdered aerial parts of *C. droserifolia* were defatted with hexane and extracted with CH_2Cl_2, then MeOH. The aqueous fraction (active fraction) of the methanolic extract was separated by C18 column. Subfractions 2 & 3 (active fractions) were combined together and was subjected to repeated column chromatography and HPLC on a RP18 semi-preparative column, resulting in the isolation of compound **1**. The structure of the compound was elucidated from its 1D and 2D spectral data, and by comparison to literature. The compound was tested *in vivo* hypoglycemic and antidiabetic using mice.

Results Roseoside (**1**) was isolated as the active compound. It showed significant *in vivo* hypoglycemic and antidiabetic activities with 34.57%, 51.80%, 28.08% and 48.36% of glucose inhibition at 5 and 10 mg/kg doses, respectively compared to the standard drug glibenclamide (58.57%) and (52.26%).

Conclusions We isolated hypoglycemic and antidiabetic compound from *C. droserifolia* by chromatography. The active compound was identified by its 1D and 2D NMR spectra.

Abstract Code: AMN353

Novel 1,2,4-triazole candidates: synthesis and expected biological evaluation

Student(s) Name: *Abdulelah H. Alharthi*
Supervisor(s) Name: *Abdulrahman A. Almehizia*

Abstract:

Background The chemistry of Hydrazone containing azomethine NHN=CH protons constitute an important class of compounds for new drug development. This work aims to synthesis some novel Schiff bases linked 1,2,4-triazole moiety. Schiff bases have acquired importance because of their pharmacological activities as antitumor, antimitotic, antimicrobial, anti-inflammatory and anticonvulsant activities. In an attempt to find new and potent derivatives of described scaffold, a new series of 1,2,4-triazole hydrazones were synthesized and their pharmacological properties were evaluated.

Methods The title compounds were prepared through the reaction of 3-hydrazinyl-5-phenyl-3*H*-1,2,4-triazole with different ketonic compounds and sugar aldoses. The obtained hydrazones evaluated for their antimicrobial and

anticancer activities against cancer cell line MCF-7 (breast cancer).
Results The synthesized compounds gave satisfactory chemical and spectral analyses consistent with the assigned structures. The pharmacological properties of the new synthesized compounds demonstrated good antimicrobial and anticancer activities.
Conclusions In the present study, a series of novel hydrazones were successfully synthesized and evaluated for their biological activities. The ease of synthesis makes these compounds promising new frameworks for the development of new active compounds.

Abstract Code: AMN354

Evaluation of Microbial Quality of Non-Sterile Oral Products Retailed in Saudi Market

Student(s) Name: *Abdullah A. Alhussain*
Supervisor(s) Name: *Mounir M. Salem-Bekhit*

Abstract:
Background Contamination and spoilage of oral non sterile pharmaceutical (NSP) preparations are a big problem worldwide. The aim of the present study was to evaluate the microbial quality of various NSP brands of cough syrups from herbal origin retailed in Saudi Arabia.
Methods For detection and enumeration of microorganisms, serial tenfold dilutions of the treated sample were done in Tryptone Soy Broth (TSB). Different media were used for the enumeration of bacteria. The Sabaroud Dextrose agar (SDA) was used for determination of total fungal count. Total bacterial and fungal count was determined and the arithmetic mean of the counts was taken and calculated the colony forming units (CFU/mL). Identification of the isolated organisms was completed by conventional method. Toxogenic isolates, types of mycotoxines and mycelial dry weight of fungi were detected.
Results Exhibited different bacterial and fungal contamination of the one hundred twenty tested syrup samples of herbal origin. Out of 120, 64 were microbially contaminated (53.3%). Forty-one were of bacterial origin, representing (34.2%) and twenty contaminated with fungi representing (31.3%). Four different bacterial species were isolated including *Micrococcus spp., Bacellus subtilis, Staphylococcus epidermidis* and Bacellus cereus. With respect to fungi, the isolated species were Aspergillus niger, *Aspergillus flavus, Saccharomyces spp., Penicillium spp.*, *C. albicans* and *Cladosporium spp.* Some of the isolated fungal strains are toxigenic producing aflatoxins that are thermostable nature and can't degrade through manufacturing.
Conclusions The necessity, therefore, for strict control of NSP products should be applied on any herbal materials intended for medical uses.

Abstract Code: AMN355

Synthesis and biological assessments of new peptide derivatives as potential antimicrobial agents

Student(s) Name: *Faisal T. Al-Hedairiss*
Supervisor(s) Name: *Abdul-Rahman M. Al Obaid*

Abstract:
Background Antimicrobial peptides (AMPs) have been tested with respect to their possible application as chemotherapeutic agents. So that, the current study aimed to synthesize and evaluate the potential antimicrobial activity of peptide chain conjugated with nicotinic acid.
Methods The coupling reaction of nicotinic acid with dipeptide such as glycylglycine methyl ester was done by the use of acid chloride method. The product was reacted with hydrazine hydrate 99% to give the corresponding hydrazide. This compound was characterized by means of their FT-IR, ^{1}H NMR and Mass spectroscopy. The *in vitro* antimicrobial activity against Gram-positive, Gram-negative, and fungi by use of the synthesized compound was evaluated by agar well diffusion method.
Results The synthesized compound was biologically evaluated. It showed a strong activity promising as potential antimicrobial agent.
Conclusions In the present work, a dipeptide was conjugated with nicotinic acid using acid chloride method. The synthesized candidate was evaluated for its antibacterial activity by the agar well diffusion method, showing a significant antimicrobial activity.

Abstract Code: AMN356

Quantification of biomarkers by validated HPTLC method in different type of Senna preparations

Student(s) Name: *Nasir S. Alharees*
Supervisor(s) Name: *Nasir Ali Siddiqui*

Abstract:
Background Quantification of biologically active marker compounds in crude drugs facilitates the production of therapeutically effective herbal formulations. The present study is based on the quantification of Sennosides in methanol extract of leaves of two *Senna* species [*S. alexandriana* (SA) and *S. italica* (SI)] and a marketed formulation (MF) by a validated high performance thin layer chromatography method.
Methods Chromatography was performed on precoated HPTLC plates of silica gel F_{254} using mobile phase chloroform: methanol: water (25:20:5 *v/v/v*). The system was found to give compact spot for Sennoside A at R_F = 0.16 ± 0.01 and Sennoside B at R_F = 0.30 ± 0.02. The regression equation for Sennoside A and Sennoside B was found to be Y= 1783.587+ 8.611X and Y= 310.070 + 2.718X, respectively with linearity range of 200-1600 ng/band. The values of correlation coefficient (r^2) for Sennoside A and Sennoside B was estimated as 0.992 and 0.996, respectively which indicates the perfect linearity

among the variables. The scanning was done at optimized wave length of 300 nm. The validation parameters such as accuracy, precision, robustness etc. have also been studied according to ICH guidelines.
Results The yield of Sennoside A in SA, SI and MF was found to be 2.07%w/w, 1.03%w/w and 1.02%w/w, respectively. The concentration of Sennoside B in SA, SI and MF was found to be 11.07%w/w, 5.16%w/w and 2.66%w/w, respectively.
Conclusions Experimental findings suggest that *S. alexandriana* is found to be richest source of Sennosides among the tested samples and can be effectively used as laxative.

Abstract Code: AMN357

Cytotoxic and antimicrobial activities of β-elemene and Curzerene isolated from *Commiphora myrrh*

Student(s) Name: *Ali Ahmad Alghamdi, Abdullah Alanazy*
Supervisor(s) Name: *Ali Saeed Algahtani*

Abstract:
Background Plants have been shown to be a good source of new compounds that have a biological activities. *Commiphora myrrh*, a plant that is known to possess a different therapeutic values. The objective of this study is to isolate some *Commiphora myrrh* compounds and investigate its cytotoxic and antimicrobial activities.
Methods The resin of Commiphora myrrh was extracted with 80% methanol. The crude extract was fractionated with various polarity solvents (*n*-Hexane, Chloroform and *n*-Butanol). Chloroform fraction was selected for further chromatographic purification methods to isolate the promising compounds. Structures of the isolated compounds were elucidated using 1H and 13C NMR spectroscopic analysis. MTT assay was used to evaluate the antitumor activity of chloroform fraction and isolated compounds using two human carcinoma (HepG2 and MCF-7 cells) and one normal cell lines (HUVEC). The antimicrobial effect of the compounds were assessed by disk diffusion method.
Results Chromatographic purification and NMR analysis lead to identifying curzerene and beta-elemene from chloroform fraction. Curzerene exhibited significant cytotoxic activity against HepG2 (IC_{50}: 7 µg/mL) and MCF-7 (IC_{50}: 9 µg/mL); beta-elemene showed toxicity against HepG2 (IC_{50}: 9). Curzerene was also cytotoxic towards the normal cell lines (HUVEC), while beta-elemene showed mild cytotoxicity in terms of IC_{50}. Moreover, microscopic examination revealed a cellular morphological changes in treated cells in compare to control cells. In the other hand, chloroform fraction and its isolated compounds showed slight antibacterial activity against used bacteria.
Conclusions The present study demonstrated the basis for the ethnomedical application of *Commiphora myrrh* in the treatment of cancer.

Abstract Code: AMN358

A validated stability-indicating HPLC method with ultraviolet detection for determination of axitinib

Student(s) Name: *Mohamed M. Alzeer*
Supervisor(s) Name: *Ibrahim A. Darwish*

Abstract:
Background Axitinib (AXT) is a member of the new generation of the kinase inhibitor indicated for the treatment of advanced renal cell carcinoma. It is potent inhibitor of vascular endothelial growth factor-receptor. Its therapeutic benefits depend on assuring its stability and quality of its dosage form. This study was devoted to the development of a stability-indicating high-performance liquid chromatographic method with ultraviolet detector (HPLC-UV) for AXT.
Methods Waters HPLC system was used. The chromatographic separation of AXT, internal standard (olaparib), and degradation were performed on Nucleosil CN column (250 × 4.6 mm, 5 µm). The mobile phase consisted of water: acetonitrile:methanol (40:40:20, v/v/v) with a flow rate of 1 ml/min. UV detector was set at 254 nm.
Results AXT was subjected to different accelerated stress conditions and the degradation products were resolved from the intact drug with significantly different retention time values. The results revealed that AXT was stable in neutral and oxidative conditions; however, it was degraded in alkaline and acidic conditions. The method was linear ($r^2 = 0.9998$) at a concentration range of 5 - 50 µg/ml. The limits of detection and quantitation were 0.85 and 2.57 µg/ml, respectively. The proposed method was successfully applied for the determination of AXT in bulk drug with acceptable accuracy and precisions.
Conclusions A stability-indicating HPLC-UV method has been developed and validated for assessing AXT stability in its bulk drug. The results demonstrated that the method would have a great value when applied in quality control and stability studies for AXT.

Abstract Code: AMN359

The *In Vitro* Anti-Hepatitis B Virus Activity of *Aloe Vera* Derived Anthraquinones

Student(s) Name: *Abdullah Hesn Shaya Al Dhaim*
Supervisor(s) Name: *Mohammed S. Aldosari, Mohammad K. Parvez*

Abstract:
Background While nucleoside analogs (e.g., lamivudine) treatments often lead to HBV drug-resistance, IFN-α causes adverse side-effects. Comparatively, various phytoproducts have shown similar or better efficacy *in vitro* and *in vivo*. Though the antiviral activities of *A. vera* and its constituents are known, their anti-HBV potential remains elusive. We therefore, tested the *in vitro* anti-HBV activities of *A. vera* and its anthraquinones.

Methods *A. vera* (AV) leaves dried gel was extracted in 80% ethanol by standard method. The HBV cell line (HepG2.2.15) were grown (0.5×10^5/well 96-wll plate) in DMEM media containing bovine serum (10%) and antibiotic-antimycotic mix at 37 ^{0}C in a CO_2 (5%) incubator. Stocks of AV-extract (100 mg/ml) and aloe-emodin, chrysophanol and aloin B (1 mg/ml) were prepared in DMSO and media following five working concentrations (2.5-50 µg/ml), including untreated (0.1% DMSO) and standard (2 µM Lamivudine) controls. The cytotoxicity was assayed (MTT kit) at day 2 whereas anti-HBV activities were tested (Elisa kits) in the supernatants at days 1-5.

Results All anthraquinones showed noncytotoxicity and CC_{50} (µg/ml) values were determined (emodin-112.5; chrysophanol-133.2; aloin-135.7). While viral HBsAg production was inhibited by emodin (81.7%), chrysophanol (65.5%) and aloin (62%), suppression of HBeAg was 85.3%, 68.3% and 60.2%, respectively as compared to AV-extract (36-38%). Emodin showed a very high anti-HBV activity close to lamivudine.

Conclusions We for the first time, demonstrated the *in vitro* anti-HBV potential of *A. vera* derived anthraquinones where aloin B exhibited novel antiviral property against any virus, and aloe-emodin appeared as the most effective anti-HBV natural drug.

Abstract Code: AMN360

Anticancer efficacy of potent triple angiokinase inhibitor, BIBF 1120 on Cancer cell lines

Student(s) Name: *Mohammed A. Nafisah*
Supervisor(s) Name: *Amer M. Alanazi*

Abstract:

Background BIBF 1120 (Nintedanib) is a triple angiokinase inhibitor that acts mainly by inhibiting VEGFR, PDGFR and bFGFR. A fast, specific and sensitive MTT method was applied in anticancer investigation of BIBF 1120.

Methods BIBF was examined for its cytotoxicity against HepG2 (human liver hepatocellular carcinoma) and MCF-7 (Breast cancer) cell line using a standard MTT reduction assay. Cells in exponential growth were seeded into 96-well plates at a concentration of 5 x 10^5 cells/200 µl/well and allowed to grow in EMEM medium containing 5% FCS. After 24 h, cells were treated with different concentrations of BIBF at a concentration range of 0–10 µM. Following 94 h incubation, the medium was removed and replaced with fresh medium. MTT reagent (5 mg/ml in PBS) was added to each well at a volume of 1:10 and incubated for 2–3 h at 37 °C. After treatment, 100 µl of DMSO was added to each well after carefully aspirating the supernatants. Absorbance was measured at 620 nm. Triplicate wells were prepared for each individual concentration. Dose–response curve was plotted as percentages of the cell absorbance. Drug sensitivity was expressed in terms of the concentration of drug required for a 50 % reduction in cell viability (IC50).

Results The drug significantly inhibited cancer cell growth in a dose-dependent manner. The drug showed statistically significant ($P<0.05$) anticancer activity in comparison with the vehicle control.

Conclusions The suggested methodology was beneficial in evaluating BIBF anticancer potential. This methodology may be applicable for pharmacokinetic studies.

Abstract Code: AMN361

Design and synthesis of Schiff's bases based on 5,5-diphenylhydantoin (phenytoin) scaffold: Molecular modeling Study

Student(s) Name: *Khalid M. Alshahrani*
Supervisor(s) Name: *Ibrahim Alsuwidan, Alaa A.-M. Abdel-Aziz, Adel S. El-Azab*

Abstract:

Background Anticonvulsant are a diverse group of pharmacological agents used in the treatment of epileptic seizures. Anticonvulsants suppress the rapid and excessive firing of neurons during seizures. Anticonvulsants also prevent the spread of the seizure within the brain. Conventional antiepileptic drugs may block sodium channels or enhance γ-amino butyric acid (GABA) function. Anticonvulsant drugs can be classified into five very similar chemical groups: barbiturates, hydantoins, quinazolinone, oxazolidinediones, succinimides, and acetylureas. Phenytoin sodium is a commonly used antiepileptic. Phenytoin is used to treat various types of convulsions and seizures. Therefore, this study aims to synthesized some Schiff's bases based on 5,5-diphenylhydantoin (phenytoin) scaffold and study the molecular docking into the Voltage-gated sodium (Nav) channels which are the therapeutic targets for neurological disorders.

Methods The target compounds 2-6 were prepared by the reaction of 3-amino-5,5-diphenylhydantoin (1) with an appropriate aldehyde derivatives in ethanol at room temperature. The target compounds were subjected to molecular docking study for the expected anticonvulsant activity of Schiff's bases.

Results Our results revealed that Schiff's bases 2-6 are successfully prepared in high yield and the results were confirmed by spectral analysis and melting point detection. The results of molecular docking revealed that the synthesized derivative have binding mode similar to phenytoin.

Conclusions Schiff's bases 2-6 were prepared using the original anticonvulsant phenytoin scaffold. Molecular docking protocol was conducted and the results confirmed that Schiff's bases 2-6 have binding ability similar to phenytoin.

Abstract Code: AMN362

Further Phytochemical Investigation of *Nuxia congesta* Growing in Saudi Arabia

Student(s) Name: *Mohamed Rajab Taji*
Supervisor(s) Name: *Ali A. ElGamal*

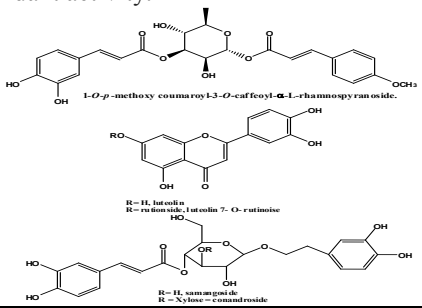
Abstract:

Background *Nuxia congesta,* one of only two *Nuxia* species growing in Saudi Arabia, is used by locals, to cure variety of illnesses. The main purpose of the present study is to further investigate the phytochemical constituents of the titled plant aiming to discover new chemical entities able to cure the common diseases. *N. congesta* was the target of our previous study where several compounds had been isolated including one new flavonoid.

Methods Further chromatographic separation and purification of the remaining fractions of ethyl acetate extract of *N. congesta* aerial parts, using different chromatographic techniques including CC and centrifugal preparative thin layer chromatography (CPTLC) (chromatotron) afforded five compounds. The adsorbents used in CC were normal or reversed phase silica gel and/or Sephadex LH 20. The solvent system used for Sephadex LH 20 was 10% H_2O in MeOH while for Rp-18 was MeOH /H_2O.

Results Chromatographic separation of ethyl acetate fractions afforded five phenolic compounds; two of them are flavonoid derivatives while the other three are phenyl propanoid congers. The verification of the chemical structure of the isolated compounds was achieved using advanced spectroscopic techniques including 1D & 2D NMR. The isolated compounds were identified as luteolin, luteolin 7-*O*-rutinoside, conandroside, samangoside and the new phenylpropanoid 1-*O*-*p*-methoxy coumaroyl-3-*O*-caffeoyl- α -L-rhamnospyranoside.

Conclusion Chromatographic investigation of the ethyl acetate extract of *N. congesta* afforded five phenolic compounds, one of them isolated here for the first time from natural source. Further biological investigation is needed to screen the activity of these compounds including the antioxidant activity.



Abstract Code: AMN363

Synthesis and biological evaluation of cinnamic acid derivatives as antimicrobial agents

Student(s) Name: *Ibrahim Moflih Al Sagr*
Supervisor(s) Name: *Hamad Alkahtani*

Abstract:

Background Cinnamic acid is an organic acid that exists in two isomers: *trans*- and *cis*- cinnamic acid. occurring naturally in plants. It is known to have a wide range of biological activities. This includes antimicrobial activity against pathogenic microorganisms. In addition, cinnamic acid is associated with a low toxicity profile. We herein report the synthesis, antimicrobial activity and structure–activity relationship of analogues of *trans*-cinnamic acid.

Methods Sixteen cinnamic acid analogues were synthesized by Knoevenagel reaction. These derivatives were then tested against some pathogenic microorganisms using cup-plate method. These microorganisms include gram-positive bacteria (*S. aureus* and *B. subtilis*), gram-negative bacteria (*E. Coli* and *P. aeruginosa*) and a yeast (*C. albicans*).

Results The compounds demonstrated varying level of antibacterial and antifungal activities. Compounds 5, 11 and 12 showed weak antibacterial activity against gram-positive bacteria. Gram-negative bacteria, on the other hand, were resistant to the tested compounds. C. albicans, however, was sensitive to the synthesized compounds with compound 4 and 8 being the most active compound (zone of inhibition = 23.5 ± 2.1 and 29 ± 1.4 mm).

Conclusions Sixteen *trans*-cinnamic acid derivatives were synthesized successfully and their antimicrobial activity was evaluated. Only compounds 5, 11 and 12 showed some antibacterial activity whereas all of the tested compounds showed promising antifungal activity.

Abstract Code: AMN364

Design, synthesis and biological evaluation of 6-anilinopurine derivatives as potential anticancer agents

Student(s) Name: *Meshari Abdullah Alturki*
Supervisor(s) Name: *Mohammed M. Alanazi*

Abstract:

Background Cancer is a group of diseases involving abnormal cell growth**.** Some cancers may eventually spread into other tissues making treatment much more complicated. Anti-cancer or anti-neoplastic drugs are used to control or treat cancerous cell and therefore development of new anticancers is very important to discover drugs that are able to eradicate cancer.

Objective The main aim of this study is to link purine to 3,4,5-trimethoxyaniline and investigate the potential anticancer activity.

Methods 6-chloropurine was refluxed with 3,4,5-trimethoxyaniline in absolute ethanol for six hours. The solid product was then filtered and recrystallized from methanol. The target product was checked for identity and purity by H1 and C13 NMR, IR and high resolution mass spectroscopy. The synthesized compound along with

reference standard (cisplatin) were tested for antiproliferative activity against MCF7 breast cancer cell lines.
Results The IC50 values of the synthesized compound and cisplatin were 82 and 6 µg/ml, respectively.
Conclusions The antiproliferative activity indicate that our synthesized compound has an acceptable anticancer activity and upon synthesis of new derivatives we can obtain new compounds with similar or even better activity than cisplatin.

Abstract Code: AMN365

Estimation of rutin by validated RP-HPTLC method in *Dodonaea viscosa* growing in Saudi Arabia

Student(s) Name: *Ali Mohammed Aleidi*
Supervisor(s) Name: *Nasir Ali Siddiqui*

Abstract:
Background Quantification of biologically active marker compounds in herbal crude drugs facilitates the production of therapeutically effective herbal formulations. Therefore, the present study is based on the quantification of a therapeutically important bioflavonoid rutin in methanol extract of leaves of *Dodonaea viscosa* by a validated reverse phase high performance thin layer chromatography (RP-HPTLC) method.
Methods Chromatography was performed on reverse phase (RP-18) precoated RP-HPTLC plates with solvents acetonitrile: water (4:6 *V/V*) as the mobile phase. The system was found to give compact spot for rutin at R_F = 0.83 ± 0.01. The regression equation was found to be Y= 6655.407 + 778.341 X with linearity range of 100-1200 ng/band and the value of correlation coefficient (r^2 = 0.910) indicates the significant linearity among the variables. The scanning was done at optimized wave length of 360 nm. The limit of detection and limit of quantification was found to be 36ng/band and 112ng/band, respectively. The other validation parameters such as accuracy, precision, robustness etc. have also been studied according to ICH guidelines.
Results The yield of bioflavonoid rutin was found to be 2.43% w/w present in extract of leaves of *D. viscosa*. The statistical data for validation parameters indicate that the proposed method is sensitive, precise, accurate and robust.
Conclusions Experimental findings showed that *D. viscosa* can be used as rich source of rutin and the developed method is validated and can be employed for estimation of rutin in herbal crude drugs, herbal formulations, dietary supplements, cosmetics as well as in plasma samples.

Abstract Code: AMN366

Using Molecular Modeling Tools to Discover Small Molecules Inhibitors of PsaA: A Potential Target for *Streptococcus pneumoniae*

Student(s) Name: *Abdulaziz T. Bin-aqeel, Mishari A. Alangari* **Supervisor(s) Name:** *Ahmad J. Obaidullah*

Abstract:
Background *Streptococcus pneumoniae* is a gram-positive, facultative anaerobic, and pathogenic bacterium that causes many serious infectious diseases such as bacterial pneumonia, otitis media, and others. Motivated by the emergence of multidrug resistance in *S. pneumoniae* over the last few years, research has begun to identify new drug targets for pneumococcal disease therapy. Multiple experiments with *S. pneumoniae* performed by different research groups have identified a lipoprotein called pneumococcal surface adhesin A (PsaA) as an important pneumococcal virulence factor, and hence, as a potentially promising target for pneumococcal disease therapy. PsaA is a high-affinity manganese (Mn^{+2}) transporter that is anchored to the bacterial cell membrane and located in the extra-cytosolic region. We hypothesized that targeting this protein by small molecule inhibitors may offer a new avenue to an effective treatment for pneumococcal infections.
Methods We have employed computer modeling and computational chemistry to virtually screen small-molecule databases for inhibition of PsaA function. We targeted the metal binding pocket and performed structure-based virtual screening using flex search in UNITY OF SYBYL. Then, we performed molecular docking and scoring to the hits using GOLD. After that, we analyzed the result.
Results More than 15 million compounds were screened from different databases based on the constructed pharmacophore template using UNITY. Using virtual filter, about 500 hits were identified and then docked into the binding cavity and scored using GOLD. The best hits were analyzed and then selected.
Conclusions We concluded the virtual screening with 80 compounds that will inhibit *S. pneumoniae* growth. We will next experimentally test the compounds' effect on Mn uptake and their PsaA dependence.

Abstract Code: AMN367

Mechanistic insight into the binding propensity of Azorubine (a food additive dye) with human serum albumin: a multi-spectroscopic and computational study

Student(s) Name: *Meshary Al-medeini*
Supervisor(s) Name: *Mohamed F AlAjmi*

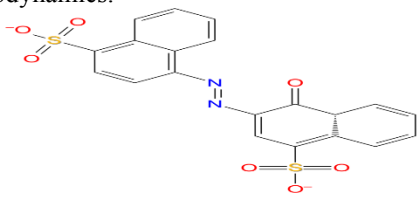
Abstract:
Background Azo dyes are well documented to cause different kinds of cancers. Azorubine is one such type of dye widely used as food additive. Human serum albumin (HSA) is the most abundant protein present in the plasma. It serves as a carrier molecule for various exogenous as well as endogenous molecules, and maintain osmotic blood pressure. The binding of Azorubine to HSA can have physiological significance as it can control their free

and active concentrations and hence influence the duration and intensity of their side effects.

Methods We have investigated HSA-Azorubine interaction through fluorescence spectroscopy and molecular docking techniques. The effect of Azorubine binding on the structure of HSA was monitored by circular dichroism (CD), UV-Vis absorption and 3-D fluorescence spectroscopy.

Results The results suggest that Azorubine quenched the fluorescence of HSA (Trp214) by binding near the Sudlow's site I located in subdomain IIA of HSA. FRET analysis suggests that the distance between Azorubine and Trp214 was 4.49 nm. Molecular docking results indicate that amino acid residues namely Pro152, Ala254, Arg257, Ala258, Asp259, Ala261, Lys262, Cys265, Cys279, Leu283, Leu284, Lys286, Ser287, and Ile290 were predominantly involved in the binding. We found that hydrophobic interactions, hydrogen bonding as well as electrostatic interactions played significant role in stabilizing the complex. Gibb's free energy of interaction showed that the process was spontaneous and most favorable (ΔG = -7.435 kcal/mol). The thermodynamics analysis also reviled that the Azorubine has a binding affinity of 2.94×10^5 M^{-1} towards HSA.

Conclusions Azorubine binds HSA with high affinity at one of the two major drug binding sites. The stable interaction between Azorubine and HSA may affect its bioavailability and hence toxicity. Knowledge of interaction between HSA and food additive dyes will guide us to understand its pharmacokinetics and pharmacodynamics.



Abstract Code: AMN368

Synthesis of ZnO nanoparticles using Pandanus odorifer leaf extract and their biological activities

Student(s) Name: *AbdulMohsen Alseed*
Supervisor(s) Name: *Mohamed F. Alajmi*

Abstract:

Background In the current scenario, the continuous rising incidence of cancer and infectious diseases is an open threat to the sustainable survival of animals and human being. In the last two decades, the demands of nanomaterials increase as a modern therapeutic agent. In this study, biogenic zinc oxide nanoparticles (ZnO NPs) were developed from the aqueous Pandanus odorifer leaf extract (POLE). Characterization of biogenic ZnO NPs using modern methods and tools like electron microscopy, x-ray diffraction (XRD), energy dispersive X-ray (EDX), Fourier transform infrared (FTIR) and UV-Vis spectroscopies. The anticancer activity of ZnO NPs was evaluated using MTT and neutral red uptake (NRU) assay against MCF-7, HepG2 and A-549 cells at different doses.

Methods Preparation of POLE and its phytochemical analysis, Biogenesis of ZnO NPs using POLE, Biophysical characterization of ZnO NP using XRD, EDX, FTIR, UV-Vis. Anticancer activity and cell morphology; through MTT and NRU assay for Cytotoxicity, Morphological examination of cells by phase contrast microscope. Antibacterial activity; though bacterial cell viability in the presence of ZnO NPs. Antibacterial activity of ZnO determination by zone inhibition assay.

Results The formation of highly pure, spherical shaped ZnO NPs of around 90 nm size has been developed using *Pandanus odorifer* leaf extract. The synthesized ZnO NPs inhibited the growth of studying cell lines in 50-100 µg/ml concentration range. Moreover, the biogenic ZnO NPs were analyzed as an antimicrobial agent against pathogenic bacteria. The highest antibacterial activity was observed against Gram-positive Bacillus subtillis (26 nm) and Gram-negative Escherichia coli (24 mm) at 50 µg/well. The total cell growth of both bacteria vanished 100% when treated with ZnO NPs at 85 µg/ml.

Conclusions Overall, POLE mediated ZnO NP is a potential significant anticancer and antimicrobial agent. It represents good lead for novel anticancer and skin care product development.

Abstract Code: AMN369

Design, Synthesis and biological evaluation of 2-anilinopyrimidines as Serotonin/Norepinephrine Dual Reuptake Inhibitors

Student(s) Name: *Shahad Alhogail, Reema Alqahtani, Haya Almuharib*
Supervisor(s) Name: *Sara Alrashood*

Abstract:

Background To improve the in vivo antidepressant activity of previously reported serotonin (5-HT) and norepinephrine (NE) dual reuptake inhibitors, three series of 2-anilinopyrimidines derivatives were designed and synthesized. The in vitro 5-HT and NE reuptake inhibitory activities of these compounds were evaluated, and compound 2-5 was identified as the most potent 5-HT (IC50 = 680 nM) and NE (IC50 = 12 nM) dual reuptake inhibitor. Compound 2-5 exhibited potent antidepressant activity in the rat tail suspension test and showed an acceptable safety profile in a preliminary acute toxicity test in mice. Our results show that these 2-anilinopyrimidines derivatives exhibit potent 5-HT/NE dual reuptake inhibition and should be explored further as antidepressant drug candidates.

Conclusions In this study, we designed and synthesized three series of 2-anilinopyrimidines derivatives to discover potent reuptake inhibitors of 5-HT and NE transporters. Our results showed that series II compounds with a large

aromatic ring exhibited improved in vitro 5-HT and NE inhibitory activity, and compound 2-5 was the most potent dual inhibitor (5-HT, IC50 = 680 nM; NE, IC50 = 12 nM). Compounds 1-19, 2-4, and 2-5 were selected for TST profiling in rats to test the in vivo antidepressant effect. These three compounds reduced the immobility time in the TST, indicating in vivo antidepressant activity. Compound 2-5 showed the most potent in vivo antidepressant activity and had an acceptable safety profile. These 2-anilinopyrimidines derivatives are interesting compounds to explore further as potential antidepressant drug candidates.

Abstract Code: AMN370

Synthesis of novel pyrido-triazolopyrimidines as α-glucosidase inhibitors

Student(s) Name: *Abdullah Mosa Khanjar*
Supervisor(s) Name: *Hatem A. Abuelizz*

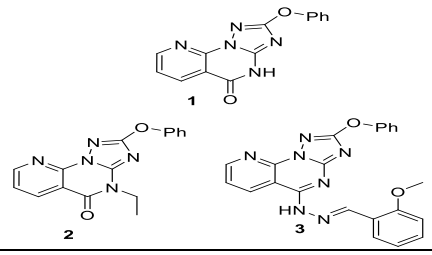
Abstract:

Background Diabetes is an emerging metabolic and the number of people with diabetes has increased worldwide. The inhibition of α-glucosidases is recognized as an essential clinical therapeutic strategy for diabetes mellitus (Type 2). The cyclocondensation reaction of diphenyl-*N*-cyanoimidocarbonate with 2-hydrazino-3-nicotonic acid produced the novel 2-phenoxypyrido[3,2-e][1,2,4]triazolo[1,5-a]pyrimidin-5(4H)-one (**1**). Treatment of the inherent lactam group in (**1**) with multifunctional nucleophiles provided access to derivatives (**2**, **3**).

Methods Using Baker's yeast **α**-glucosidase enzyme to evaluate the *in vitro* **α**-glucosidase inhibitory activity of the target compounds (**2**, **3**). Acarbose was used as reference drug for comparison study.

Results The target compounds were found to possess good inhibitory activity against α-glucosidase enzyme. Compound **3** exhibited the highest inhibition with an IC_{50} for **3** as 104.07 μM and for **2** as 304.14 μM in relation to that of acrabose (143.54. μM). Molecular modelling studies revealed that compound **3** inhibits α-glucosidase due to the formation of a stable ligand–α-glucosidase complex and extra hydrogen bond interactions, and directed in the binding site by Trp329.

Conclusions The pyrido-triazolopyrimidines **3** showed higher inhibitory activity against α-glucosidase comparative to acarbose. The finding of the present investigation indicates the potential of these compounds as potential lead candidates as α-glucosidase inhibitors. The enzyme binding site using molecular modeling confirmed the importance of the binding energy of the stable complex formed between the docked compounds and the amino acids in the active site of the enzyme, and its role in the potency of the newly synthesized inhibitors.



Abstract Code: AMN371

The Phytochemical and Biological Investigation of *Jatropha pelargoniifolia* Root Native to the Kingdom of Saudi Arabia.

Student(s) Name*: Hanan Yahya Aati*
Supervisor(s) Name: *Kayser Oliver, Ali A. ElGamal*

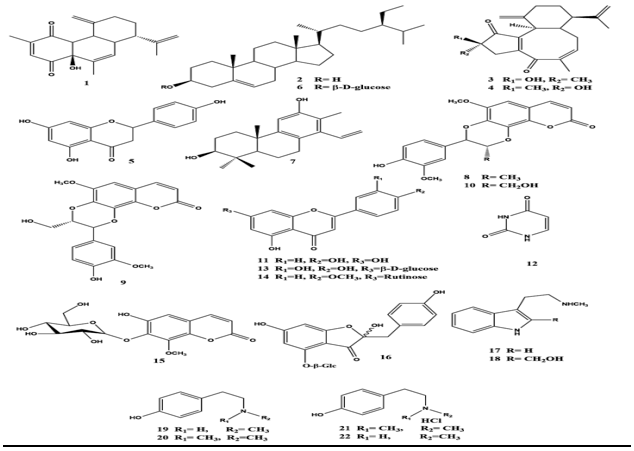
Abstract:

Background *Jatropha pelargoniifolia* (family; Euphorbiaceae) is a shrub growing in Arabian Peninsula especially in KSA and widely known as "Obab". The plant has been used in traditional medicine, sap of the petiole is applied to ulcers, sever skin inflammation and for wound healing. The current study focused on the chromatographic separation and purification of more ultrapure compounds from different extracts of *J. pelargoniifolia* root. Furthermore, anti-inflammatory, antinociceptive, antipyretic and antioxidant activities were evaluated for some isolated compounds which are available in good yields and some showed promising activities.

Methods Using different chromatographic techniques (normal silica/RP open column, HPLC, preparative chromatography) to isolate several compounds belong to different classes. The structures of the isolated compounds have been elucidated by using different spectroscopic techniques including 1&2 D-NMR. Then, biological activities were assessed using different *in vivo* and *in vitro* methods.

Results Overall, isolation and identification of 22 secondary metabolites. 6-hydroxy-8-methoxycoumarin-7-O-β-D-glycopyranoside and 2-hydroxymethyl N-methyltryptamine were isolated and identified as new compounds along with the known diterpenoids, triterpenoids, flavonoids, coumarinolignan, coumarin, pyrimidine alkaloid, indoles alkaloids, and tyramine-derived molecules. Some of tested compounds showed promising biological activities.

Conclusions This work has enhanced our understanding about the phytoconstituents of the selected plant. Furthermore, the roots of *J. pelargoniifolia* showed significant antinociceptive, anti-inflammatory, antipyretic, and free radical-scavenging activities probably because of its content of many bioactive compounds belonging to various chemical classes. These results support the efficient use of this plant in Saudi Traditional Medicine as a remedy for pain and several inflammatory conditions.



Others

Abstract Code: AO450

Effect of Selected Herbal Products on The Pk/Pd of Clopidogrel in an Animal Mode

Student(s) Name: *Khalid Alotaibi, Ayedh Alotaibi*
Supervisor(s) Name: *Khalid M. Alkharfy*

Abstract:

Background Herb–drug interactions are a serious problem, taking into consideration that some drugs are narrow therapeutic indexed and potential side effects associated with their use. This project is aimed to evaluate the effect of commonly used herbs, including black seed (Nigella sativa), garden cress (Lepidium sativum), and fenugreek (Trigonella foenum-graecum) on the pharmacokinetics and pharmacodynamics of clopidogrel in an animal model.

Methods Male Wistar rats (n=24) were use in the study. Group I served as normal control and was treated with normal saline for 14 days. Group II were treated orally with black seed (200 mg/Kg) for 14 days. Group III received garden cress (200 mg/Kg, p.o) for 14 days. Group IV received fenugreek (200 mg/kg) for 14 days. Clopidogrel (6 mg/kg, p.o) was given on the 14th day one hour after herbal treatment in all the groups. Clopidogrel concentrations in plasma were determined and the pharmacokinetic parameters were calculated using a non-compartmental analysis. Clopidogrel pharmacodynamics were assessed by bleeding time as a measure of platelets function.

Results Treatment with black seed and fenugreek lead to an increase in Cmax of clopidogrel of about 31.52% ($p<0.05$) and 21.42% ($p<0.05$), respectively, but not with garden cress (6.48 ±0.15 µg/ml versus 6.12 ±0.21 µg/ml, $p>0.05$). The calculated oral clearance (CL) of clopidogrel in the control group vs. black seed, garden cress and fenugreek groups were 2.52 ±0.04 vs 1.92 ±0.05 vs 2.63 ±0.10 and 2.13 ±0.19 (ml/kg/h), respectively ($p<0.05$). Herbal treatment showed significant increases in the bleeding time from baseline (154.40 ±2.54 sec) to 172.60 ±2.68 sec with black seed ($p<0.05$), 165.80 ±2.15 with garden cress ($p<0.05$) and 170.20 ± 1.46 with fenugreek ($p<0.05$).

Conclusions The concurrent use of black seed, fenugreek or garden cress can alter clopidogrel pharmacokinetic and/or pharmacodynamic behavior in an animal model. This could represent a modulation in drug disposition and/or platelets function.

Abstract Code: AO451

Price comparison of antihypertensive drugs in Saudi Arabia and selected neighbor countries

Student(s) Name: *Khaled Eid Alotaibi, Abdulrahman Saad Alrumaih*
Supervisor(s) Name: *Hamoud Almutairi*

Abstract:

Background Hypertension is among the most common diseases globally. Lack of access or affordability will impact a high number of patients. There is an enormous number of antihypertensives drugs on the market. Saudi Arabia, Oman, and the United Arab Emirates have adopted pricing systems that are slightly different from each other. The primary goal of this study is to compare the prices of antihypertensives and to identify any flaws in the pricing system.

Methods Drug prices were obtained from the official websites in each country. The costs were adjusted to 2019 and converted to Saudi Riyals (S.R). The drugs were categorized into two groups. One included the highest price of each medication in each country while the other included the cheapest. The chi-square test and descriptive analyses were applied.

Results Overall, more than 450 brands were investigated and approximately 32 medications included in the analysis. Among the three countries, three drugs were classified as more expensive in Saudi Arabia than in the other two countries.

In Saudi Arabia, 17 drugs were less expensive than in the other two countries. In addition, for three drugs, the highest price was more than two times the lowest price. Chi-square indicated a significant difference between the drug price and the pricing system ($p<0.05$).

Conclusions This study demonstrated that there are variations of drug prices among these countries. Further investigation is required to address these variations.

Abstract Code: AO452

Method Development and Validation of Ceftobiprole A 5th Generation Cephalosporin in Parenteral Formulation by Rp-Hplc

Student(s) Name: *Walid Tighezza*
Supervisor(s) Name: *Mostafa Saied, Abdullah Alhossaini*

Abstract:

Background Ceftobiprole (Zevtera®, Mabelio®) is a newly introduced parenteral, 5th generation broad-spectrum cephalosporin. The antibiotic has been found to show activity against methicillin-resistant Staphylococcus aureus (MRSA), in addition to broad-spectrum bactericidal activity against other Gram-positive and Gram-negative pathogens. A rapid and sensitive reversed phase high performance liquid chromatographic method (RP-HPLC) has been developed and validated for the determination of the antibiotic ceftobiprole in a prenatal dosage form.

Methods The HPLC method was preformed using a C-18 column (LichroCART® 125x4mm, 5µm) and an isocratic mobile phase consisting of acetonitrile, methanol and distilled water (25%,25%, 50% respectively) at a flow rate of 1.0 mL/min. The drug was detected using UV detector at the wavelength of 254nm

Results The retention time was under 4 minutes. The method was validated and was found to be an accurate, repeatability and consistent.

Conclusions The developed HPLC method can be successfully used for the analysis of the drug in marketed formulations without any alteration in the chromatography conditions.

Abstract Code: AO453

Zika Virus E Protein Dynamic: Impact on ZIKV Vaccine Development

Student(s) Name: *Abdullah Alanizi*
Supervisor(s) Name: *Ahmed Alaofi*

Abstract:

Background The envelope protein domains of zika virus (ZIKV) mediate the membrane attachment to the host cells. This protein participates in the cell receptor recognition and has different ZIKV antibodies epitopes. It considers as an antigenic target for ZIKV vaccine development. The conformational dynamics 'viral breathing' can effect on monoclonal antibodies (MAbs) recognition and potency. We started studying protein structure through the in silico by using NMR and Molecular Dynamics Simulations. We have cleared the importance of the part of K-M biographically. Dihedral angles of phi and psi for residues from 3 to 10 and 108 to 112 were calculated.

Methods NMR technique: Was employed to measure the conformational exchange (*data not shown*). MD Simulations: Was used to evaluate the E protein dynamic and conformations. Ten conformers were selected to further analysis. Analysis: Several methods were used to assess the results validation with experimental assays such as RMSD.

Results The highest flexible protein parts showed an alpha-helix conformation residue Lys-Met-Ser indicated this part is important for the Ab-Ag interaction. The diahedral angles calculation support this conformations. Two parts of the E protein was identified to be potential for the vaccine development. None of these parts showed rigid structures while can be utilized for antiviral agents.

ConclusionsThe conformational changes of zika virus E protein showed functionality importance in ZIKV vaccine and antiviral agents development.

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