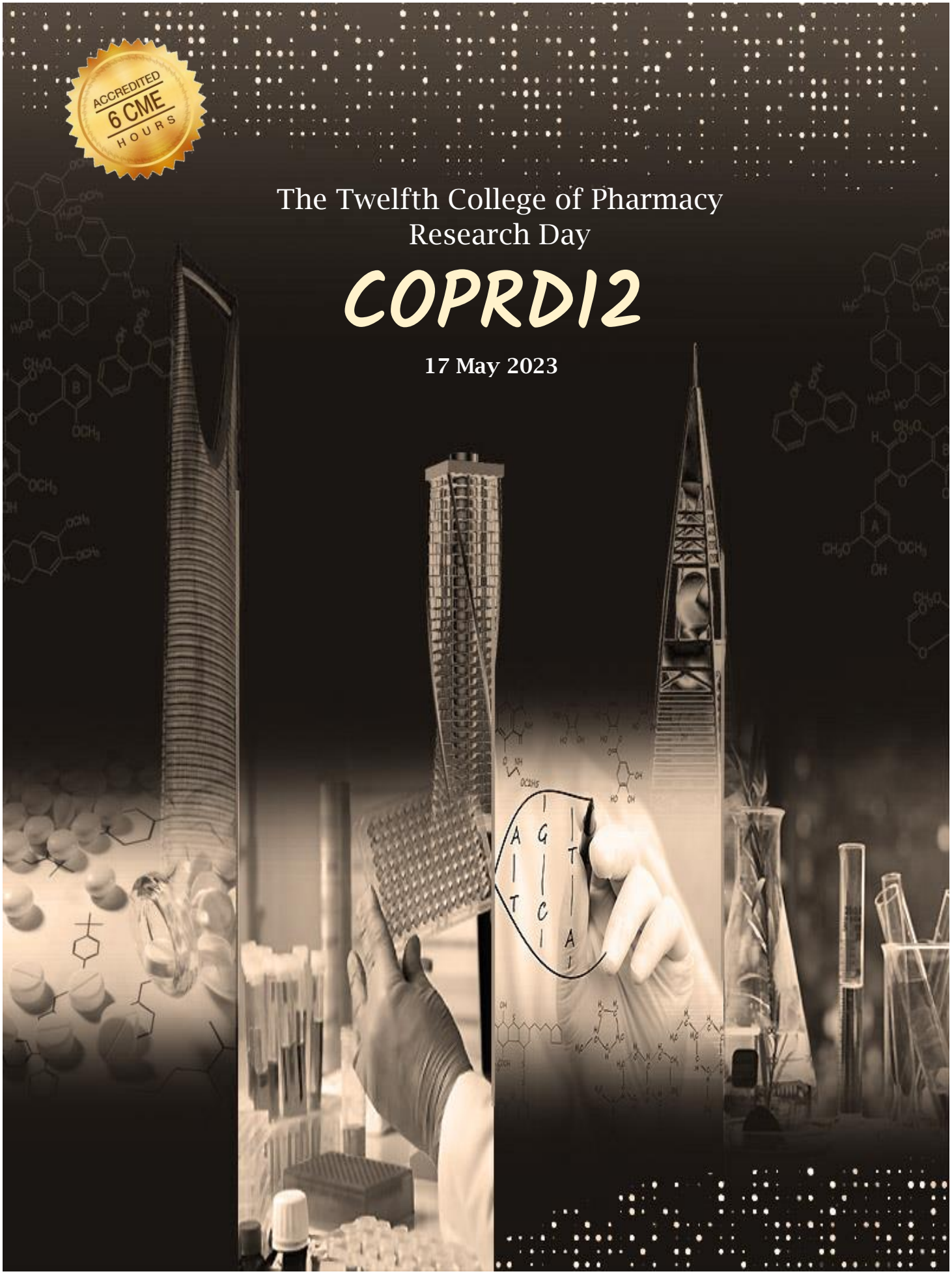
The Twelfth College of Pharmacy
Research Day

COPRD12

17 May 2023



The Twelfth College of Pharmacy Research Day

COPRD12

17 May 2023


بسم الله الرحمن الرحيم

Contents

Welcome COPRD 12

2023

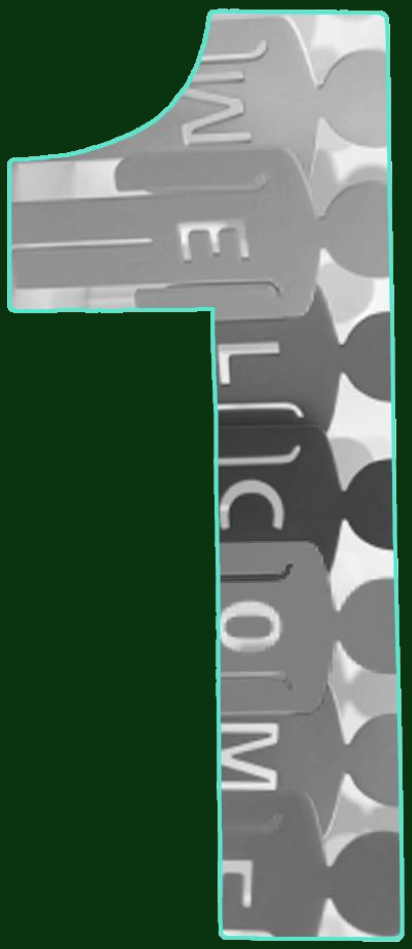
About the College of Pharmacy Research Day

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.



Welcoming

Message from the COPRD12 Head

On behalf of the twelfth College of Pharmacy Research Day (COPRD12) Advisory Committee, it is my great pleasure and honor to welcome you to our 12th COPRD Research Day.

After long and tiresome nights, a page has been turned by the grace of God, his success, and his care, and here we are to celebrate today, the twelfth anniversary of the COPRD.

COPRD12 focuses on the Pharmacy graduation research, postgraduate research, and other Pharmacy-related disciplines from KSU and other institutions, as well as a broad range of issues and challenges, weaving them through our creative students, the keynote speaker, special moderators, and potential judges.

We received 144 submissions, 18 of which were selected for regular oral presentation, and 126 for poster presentations.

With this exciting program, COPRD12 hopes to bring together a rich diversity of research ideas spearheaded by our talented and very competent faculty members and collaboratively share ideas and new perspectives with researchers from other institutions.

The popularity of COPRD as the premier forum for students has started to grow exponentially, and it aims to become a prominent forum where Pharmacy students, researchers, and practitioners openly exchange ideas and report progress in the exciting areas of pharmaceutical sciences.

The credit for this distinction goes to the persistence of the existing team, the distinguished committees, the wonderful students, and the support of our distinguished college which was led by our Dean, Professor Amer Alanazi.

I would also like to express my gratitude and appreciation to all those that have dedicated their time, energy, and ideas to assist in organizing this event, including all the members of the organizing committee, moderators, judges, project supervisors, and our distinguished keynote speaker, H.E. professor Hisham Aljadhey. It is through the concerted collective efforts of these individuals that we can bring you a great event today.

We hope that the day's event will be an enjoyable and fulfilling experience for all participants and attendees.

Maha Meshal AlRasheed, MSc, PhD

COPRD12 Advisory Committee Head,
Associate Professor of Pharmacogenomics

Message from the Dean

We are celebrating at the college of pharmacy another nice memorable research day in its 12 edition. Graduation project course in our Pharm D curriculum program has become by now a defining step in every alumni at our college and an event that we all proud of and seek its advancement year over year. We believe in scientific research in all its forms, types, or shapes that it is a key differentiator not only for our outstanding undergraduate students but also for our distinguished faculty members and researchers. Moreover, we believe that our students should be exposed to all levels of research: laboratory, field trips, surveys and all other studies where this will empower them with the needed 21 century skills anchored by our 2030 national vision focused on the research, development and innovation ecosystem. I express my deep gratitude to all supervisory committee members, faculty members and researchers who are sparing their precious time to evaluate, assess, and support the success of this remarkable event. I hope this informative and scientifically rich abstract book of a great value to you to get more insights about COPRD.

Lastly, I invite you all to celebrate with us this research festival with its carefully and thoughtfully designed program.

Amer M. Alanazi
Dean and Professor of Pharmaceutical Biotechnology

Message from the Vice Dean for Girls

الحمد لله والصلاة والسلام على رسول الله

تمر الأيام سريعاً ويعود لنا يوم البحث العلمي الثاني عشر في حلة جديدة يبهرنا بالتنظيم والاحترافية. ونعيش ساعات مكثفة من الأبحاث العلمية والمحاضرات والعروض لطلاب وطالبات كلية الصيدلة مليئة بالأفكار والمشاريع الجذابة حصيلة ثلاثة فصول دراسية من الجد والاجتهاد قضاها الطلاب في البحث واكتسبوا من خلالها الكثير من المهارات والمعارف ليصلوا في نهاية المطاف ليوم البحث العلمي ليشاركوا الجميع في أفكارهم البحثية ومشاريعهم في حضور متميز.

ولا يخفى علينا جميعاً لما للبحث العلمي من أهمية قصوى حيث يمثل البذرة الأولى في سبيل توطين المعرفة وتعزيز الاقتصاد المعرفي ويعتبر مؤشر حقيقي لقياس تقدم المجتمعات ورقيها.

لذا أولت كلية الصيدلة اهتماماً كبيراً في هذا الجانب وسعت لتبني شغف البحث العلمي في طلابها وتكسبهم مهارات البحث وتحفيزهم وعرض أبحاثهم في يوم البحث العلمي.

واليوم تجدوا بين أيديكم كتاب الملخصات البحثية لطلاب كلية الصيدلة وبإشراف نخبة من أساتذة كلية الصيدلة فكل الشكر لهم وللجنة يوم البحث العلمي المنظمة والمشرفة على هذا الحدث العظيم.

وشكراً لكم

وكيلة كلية الصيدلة

أ.د نورة بنت زومان الزومان

Keynote Speaker

Since October 2016, Dr. Aljadhey has been appointed as an Executive President of Saudi Food & Drug Authority (SFDA), based in Riyadh. He is leading his energetic team to achieve SFDA vision to be a leading international science-based regulator to protect and promote public health. He worked with stakeholders to develop and execute SFDA strategy. In his role in SFDA he is responsible for observing the safety, and effectiveness of food and drug for humans and animal, cosmetics and pesticides and the safety of medical devices and its impact on public health in the Kingdom of Saudi Arabia. In addition to his leadership responsibilities at SFDA, he is member of several boards including: Saudi Health Council, Saudi Standards, Metrology and Quality Organization, Saudi Center for Disease Prevention and Control, National Unified Procurement Company, Saudi Patient Safety Center and National Institute of Health Research. He received his baccalaureate degree from King Saud University and his doctor of pharmacy (PharmD.) and master from Purdue University. He completed an ASHP accredited residency at Winchester Medical Center, Virginia. In 2008, Dr. Aljadhey earned his Doctor of Philosophy in Health Policy specialized in pharmacoepidemiology and medication safety from the University of North Carolina at Chapel Hill in the United States of America. Dr. Aljadhey is Associate Editor for Pharmacoepidemiology and Drug Safety journal and reviewer for several international scientific journals. He is the founding chair for the Gulf Chapter of the International Society for Pharmacoepidemiology. Dr. Aljadhey supervised more than 25 graduate students and published more than 100 scholarly research and over 80 lectures in scientific conferences.

Dr. Aljadhey is a member of several committees in patient safety at the World Health Organization. Dr. Aljadhey served as consultant to several colleges of pharmacy and universities and was a member in the Board of Directors of the Asian Association of Schools of Pharmacy. He received several awards including the Andrew McAfee Award presented by the International Society for Pharmacoepidemiology. Before joining SFDA, he has built both a scientific and managerial career at KSU and KSU Medical City, which included Dean of the College of Pharmacy, Supervisor of Pharmacy Services at KSU Medical City and Vice Dean for Graduate Studies and Research at the College of Pharmacy, where he also served as Director of Medication Safety Research Chair. He was the Vice Dean for Academic Affairs at the same college for four years. He had adjunct appointment in the University of North Carolina, University of Aberdeen, and University Science of Malaysia.

H.E. Prof. Hisham Saad Aljadhey
Executive President of Saudi Food & Drug Authority (SFDA)


خمسون عاماً من العطاء
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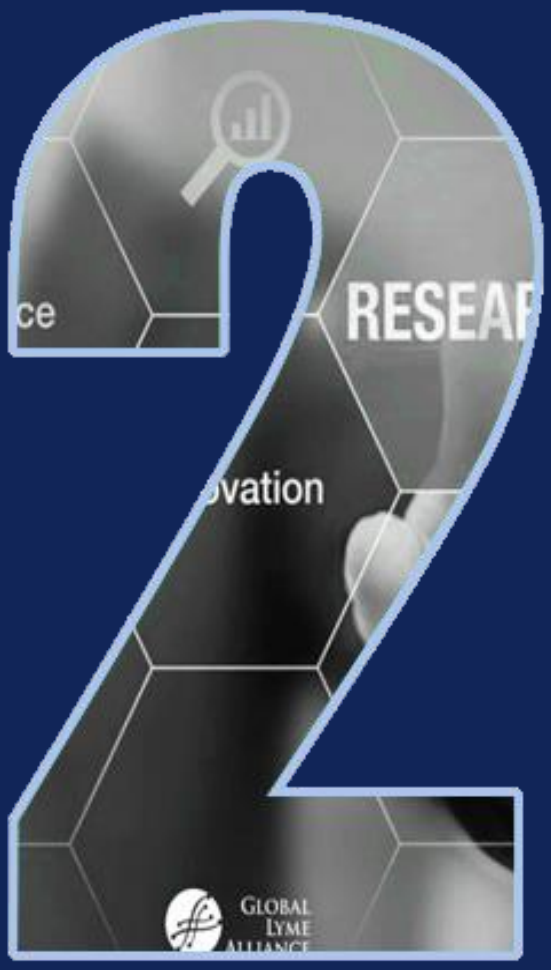


Scientific Program

Event title: The 12th College of Pharmacy Research Day (COPRD12)
Date: Wednesday 27/10/1444 – 17/05/2023
Venue: Hamad Al-Jasser Hall, Male Students Campus, King Saud University.

Event Program:

08:00-8:20	Registration
8:20-8:30	Welcoming Attendees

Live Oral Presentation (Session I):
Session Moderators: Dr. Moneerah J. Alqahtani& Prof. Adnan A. Kadi
Interns – College of Pharmacy

08:30- 08:40	Macrophage-mediated inflammation and expression of FABP4 in a diabetic heart: A potential molecular target in Diabetic Cardiomyopathy *Students: Sara A. Alrasheed, Atheer A. Alhuntush* *Supervisors: Prof. Nouf M. Alrasheed and Dr. Asma S. Alonazi*
08:40- 08:50	Evaluation of the Diabetic Wound Healing Properties of Bio-Nanofibers Incorporating Alkanna tinctoria and Dragon's blood: In Vitro and In Vivo Experimental Studies *Students: Rana Y. Almotawa, Ghadeer A. Alhamid* *Supervisors: Dr. Raha S. Orfali, Dr. Mohamed M. Badran and Dr. Essam Tawfik*
08:50- 09:00	The Impact of Prior Use of Cardioprotective Agents on Cardiotoxicity in Subjects with Cancer: an Observational Study *Students: Reema F. Alsahil, Shahad Y. Altuwijri* *Supervisors: Dr. Lamya S. Alnaim and Dr. Hadeel A. Alkofide*
09:00- 09:10	The protective efficacy of acetyl-L-carnitine and liposomal-coenzyme Q10 against propionic acid-induced liver injury *Students: Rahaf H. Alsoghayer, Lina M. Alhushan* *Supervisors: Dr. Ahlam M. Alhusaini*
09:10-09:20	Liver Metabolomics Analysis in Mouse Model of Fentanyl Overdose Treated with Beta-Lactams *Students: Abdulrahman I. Alhumaydhi, Bandar I. Arif* *Supervisors: Dr. Fawaz F. Alasmari*
09:20-09:30	Factors Influencing Saudi Parents' Decision-making About the Use of Stimulants for Their Children With Attention-Deficit Hyperactivity Disorder: A Pilot Study *Students: Alanood H. Alghannam, Manal S. Alkahtani* *Supervisors: Dr. Ghadah A. Assiri, Dr. Turki H. Albatti and Dr. Jamilah A. Alsaidan*
09:30-09:40	Studying Antivirulence Activity of Meta-bromo-thiolactone Nanoparticles Against Staphylococcus aureus and MRSA *Students: Bashayer M. Alfayez, Amjad S. Abo Hamad* *Supervisors: Prof. Fadilah S. Aleanizy*
09:40-09:50	Revisiting the Flora of Saudi Arabia: Phytochemical and Biological Investigation of the Endangered Plant Species *Euphorbia saudiarabica* *Students: Menwer F. Alrashidi, Abdulaziz A. Binawad* *Supervisors: Dr. Omer I. Fantoukh and Dr. Gadah A. Alhamoud*

09:50-10:00	**Coffee Break**	
10:00-10:50	**Opening Ceremony**	
10:00- 10:02	The National Anthem	
10:02- 10:03	The Holy Quran	
10:03- 10:15	Introductory Remarks	COPRD12 Advisory Committee Head
10:15- 10:25	Welcome Speech	Dean – College of Pharmacy
10:25-10:35	Opening Remarks	Vice President for Graduate Studies and Scientific Research
10:35-10:40	Visual Presentation	All About Pharmacy Research Day
10:40-10:50	Honoring Success Partners	
10:50-11:00	**Coffee Break**	
11:00-11:20	Keynote Lecture	Executive President of the Saudi Food & Drug Authority

Live Oral Presentations (Session II)
Session Moderators: Dr. Abdulaziz M. Alhossan & Dr. Noha A. Alaloola

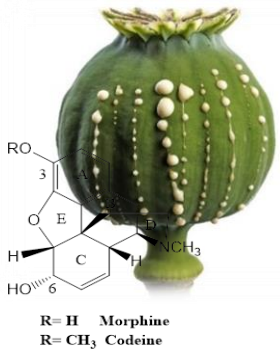
11:20-11:30	Impact of Mobile Application Implementation on Diabetic Patient's Management Outcomes: A Pilot Randomized Control Trial *Students: Reema S. Alhoutah, Reema A. Alorf* *Supervisors: Dr. Abdulaziz M. Alhossan and Dr. Mohammed A. Alessa*
11:30-11:40	Identifying the Potential Risk of Coronavirus COVID-19 on Electronic & Conventional Cigarette Smokers: A New Challenge in Public Health *Students: Reem B. Almuneef, Haneen S. Alotaibi* *Supervisors: Dr. Musaad A. Alshammari and Dr. Fawaz F. Alasmari*
11:40-11:50	Identification of Mutations in the LAMA2 gene in Merosin-deficient congenital muscular Dystrophy (MDC1A) patients *Students: Lamia A. Almuhareb, Abeer W. Almubarak* *Supervisors: Dr. Maha M. AlRasheed, Prof. Namik Kaya and Dr. Ghada I Aboheimed*
11:50-12:00	Study the effects of Agomelatine on rat's liver during chronic restraint stress (CRS) models *Students: Latifah S. AlRasheed, Reem E. Alsharidah* *Supervisors: Dr. Wedad S. Sarawi*
12:00-12:10	Fluoropyrimidine-Associated Cardiotoxicity: A Retrospective Cohort Study *Students: Nouf S. Alfagih, Hanin H. Alharbi* *Supervisors: Dr. Mohammad H. Aljawadi, Dr. Nora A. Alkhudair, Dr. Wael A. Algarawi and Dr. Abdullah Alhammad*
12:10-13:00	**Lunch and Prayer**
13:00-14:00	**Poster Viewing Session** Interns – College of Pharmacy

Live Oral Presentations (Session III)
Session Moderators: Dr. Homood M. As Sobeai & Prof. Sara T AlRashood.

13:40-13:50	Proton Pump Inhibitors use evaluation among older patients in the ambulatory care setting: A retrospective cohort study *Students: Lujane S. Alsaqer, Nouf A. Alkhalaf* *Supervisor: Dr. Tariq M. AlHawassi*	
13:50 -14:00	A Content Quality and Optimization Analysis for a YouTube as a Source of Patient Information to Bipolar Disorder in Arabic Language *Students: Yara I. Aljadeed, Reema H. Alhassan* *Supervisor: Dr. Jawza F. Alsabhan*	
14:00- 14:10	Formulation and evaluation of Sylimarin inclusion complex using TPGS as auxillary substance *Students: Abdulkarim A. Alotaibi* *Supervisors: Dr. Sultan M. Alshehri and Dr. Syed S. Imam*	
14:10- 14:20	In Vitro and in Silico Studies of the Anticancer Potential of Terpenoid Compounds Isolated from Commiphora opobalsamum (L.) *Students: Shahad A. Buali, Razan S. Almufleh* *Supervisors: Prof. Shaza M. Almassarani and Prof. Ali A. El Gamal*	
14:20-14:30	Ceftolozane-tazobactam versus ceftazidime-avibactam for the treatment of infections caused by multidrug-resistant Pseudomonas aeruginosa: A multicenter cohort study *Students: Dareen N. Alassiri, Alanoud F. Aljurbua* *Supervisors: Dr. Thamer A. Almangour*	
14:30-14:40	**Coffee Break**	
14:40-15:10	**Interactive Break**	
15:10-16:00	**Prayer**	
16:00-17:00	**Awards and Closing Remarks**	**College of Pharmacy Dean** **COPRD12 Advisory Committee Head**


KNOWLEDGE
ANALYZE
DATA
FACT
RESEARCH
PRACTICE
100 %
SUPPORT
TESTING
DEVELOPMENT

M.Sc. in Pharmacy (Pharmacognosy)



Program Highlights

Program Beneficiaries	Graduates holding bachelor degree in pharmaceutical sciences or Pharm. D, Teaching assistants, and Pharmacists working in hospitals, drug manufactures and research centers and authorities.
Employment Opportunities	Lecturer job in universities, Researcher job in universities, Leader administrative job in ministry of health, hospitals, drug manufactures and authorities

Application

In addition to the prerequisites listed in the Saudi university unified regulations for graduate studies and the King Saud University organizational and executive rules and procedures for postgraduate studies, the department requires:

1. Applicant must have a bachelor's degree in pharmaceutical sciences or a Pharm.D. from an accredited university with a minimum "Good" GPA.
2. A TOEFL score of 480 or above or equivalent.
3. Certificates of equivalency must be submitted in case certificates were non-Saudi.
4. Passing a written test.
5. Passing an interview.

About the Program

❖ **Program's Vision**

Regional excellence in drug discovery from natural sources in alignment with King Saud University's 2030 vision.

❖ **Program's Mission**

Graduate well-qualified pharmacists and researchers with advance research techniques in Pharmacognosy field, through high quality education and research environment that contribute to community awareness and education.

❖ **Program's Objectives**

1. To give the opportunity to continue higher education to obtain master degree
2. To prepare highly qualified teachers in the field of Pharmacognosy.
3. To supply governmental and private health sectors with highly qualified researchers and teachers.
4. To enhance the scientific research in the field of Pharmacognosy.
5. To activate the scientific and training reciprocity conventions with local and international universities and centers.

Contact Us

Pharmacognosy Department, College of Pharmacy, King Saud University
Tel.: 011-4673741, 011-4673742
Email: alalqahtani@KSU.EDU.SA

Master of Clinical Pharmacy

Program Highlights

Length of the program	2.5 years as follow: 1.5 year: didactics 1 year: clinical training
Program structure	**54 redit hours:** 1-27 didactic lectures and seminar courses; 2-24 experimental clerkship training courses 3-3 for a research project

Application Requirements

* In addition to the University requirements:
- BSc degree in Pharmacy, or equivalent
- Minimum of a 3.25 GPA
- examination and an interview

About the Program

This program is a five-semester full-time post-baccalaureate degree. Individuals completing the program will be capable of fulfilling advanced clinical and hospital pharmacy practice roles in hospitals, ambulatory care sites, primary care setting, academia, governmental sectors, consulting and other health care agencies.

Contact Us

cpd@ksu.edu.sa

Saudi NIH
المعهد الوطني لأبحاث الصحة

Overview

Saudi Arabia Health Transformation:

Saudi Arabia has seen a remarkable transformation in its public, private, and non-public sectors, all of which have worked towards developing the infrastructure necessary to achieve Vision 2030's goal of elevating standards of living and improving economic enablers through eight strategic themes, including healthcare reform.

Establishing the Saudi National Institute of Health:

As part of the Saudi Ministry of Health's healthcare strategic goals of Vision 2030, the Saudi National Institute of Health (Saudi NIH) is being established as a key reform initiative. According to its mandate, the Saudi National Institute of Health strives to be one of the world-class entities in health research assuring the quality and efficiency of its outputs in terms of proficiency, competitiveness, and impact on community health.

Saudi NIH in Strategy:

Vision:

A healthy and thriving population through health research excellence.

Mission:

Enhancing health well-fare and economic prosperity through development of world-class health research and transferring knowledge.

Objectives:

Improving Health: Contribute to improving society's health, well-being, and quality of life.

Research Funding: Fund transitional research and clinical trials and ensure the quality and efficiency of their outputs.

Unifying efforts: Consolidate efforts among stakeholders involved in transitional research and clinical trials in the field of health.

Translating knowledge into useful applications: Transform transitional research outputs and clinical trials into results of health and economic benefit.

Duties:

1. Identification of R&D and innovation areas and programs for the health sector.
2. Fund and oversee the implementation of transitional research and experience.
3. Develop policies and possible acceleration programs for transitional research and clinical trials.
4. Developing human resources professionally, technically, and academically and establishing specialized training programs to build outstanding competencies in the field of transitional research and clinical trials.
5. Enabling investment opportunities in transitional research and clinical trials.
6. Develop appropriate professional, ethical, organizational, and environmental standards for transitional research and clinical trials.
7. Translate the results of transitional research, clinical trials, and related infrastructure.
8. Conducting studies on transitional research and clinical trials.

Saudi NIH Core Business Departments

- Research: Developing health funding strategies and partnerships, managing grants, programs, and data.
- Education: Providing educational programs, micro-credential degrees, coaching and monitoring, policy making and on-demand activities.
- Knowledge Translation: Develop toolkits to utilize translating research, convening with stakeholders, establish partnerships the premise of improving the research, development, and innovation pipeline within the country.
- Ethics &Compliance: Disseminating policies that governs funded research, IRB operational excellence certification program. Audit and enhance the integrity of a research and manage any misconducts.
- Clinical Trials: Gaining insights and answers about the safety and effectiveness of treatments and procedures through clinical trials. Groundbreaking scientific advances in the present and the past were possible only because of participation of volunteers, both healthy and those with an illness, in clinical research.

Committees

Committee

COPRD12

COPRD12 Abstract Book Editorial Board

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Book formating
Maha M. AlRasheed, Ph.D.
Mahera Shinwari, MSc

Abstracts Reviewers
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Fadilah S. Aleanizy, Ph.D
Rana A. Almohaimeed, PharmD, BCACP
Ghada I. Abohemid, Ph.D
Mahera Shinwari, MSc
Reem A. AlShammari, PharmD Candidate

Book Designers
Maha M. AlRasheed, PhD
Mahera M. Shinwari, MSc

The 12th College of Pharmacy Research Day Advisory Committee

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17.	Nawaf E. Abualreesh, PharmD Candidate	Member
18.	Ibrahim M. Alsultan, PharmD Candidate	Member

Students

Taskforce

Design Team

1. Reyoof I. Alnajashi⋆
2. Lamya S. Alzkeri
3. Turki M. Almoraekhi
4. Raghdah A. Alobaid
5. Fatimah M. Alsulais
6. Abdulrahman A. Almadi
7. Reema A. Abuthnain
8. Mohammed F. Alhamdan
9. Sara Z. Almutairi
10. Najd B. bin Nassar
11. Amenah M. Alkaf
12. Sarah O. Abaalala

Backstage Team

1. Ziyad A. Aldirgham⋆
2. Reem S. Aldemikhi ⋆
3. Manar S. Alowaisi
4. Rema O. Alharbi
5. Najod A. Alsohaibani
6. Rana A. Alamri
7. Njood A. Alkhalifa
8. Lulu M. Alkaff
9. Raneem Z. Alhubaysh
10. Sarah MN. Alseeni
11. Abdulmalik S. Alshammri
12. Rahaf A. Alhussainan
13. Shmoukh S. Aldosari
14. Sara Z. Almutiri
15. Samaa A. Alotaibi
16. Mona S. Alsofaei
17. Ahad T. AlRashed
18. Bader K. Alkadhi
19. Lamya S. Alzkeri

Interactive

1. Aljoharah A. Alsheikh⋆
2. Shooq M. Alali ⋆
3. Shahad M. bin Rusaies
4. Aliah O. Alshabanah
5. Lara A. Alsuhaibani
6. Lubna M. Alfae
7. Sadeem S. Alwetaid
8. Sara M. Aljabr
9. Sarah Y. Alzahrani
10. Horiyah alhajri
11. Deema S. Aldeekl
12. Lama A. Alamri
13. Lamees S. Alamri
14. Manar Y. Alaseeri

VIP Team

1. Deema S. AlNassar⋆
2. Raghad A. Alzahrani
3. Ranad K. Alahmadi
4. Noor N. Mukhtar
5. Rand A. alharbi
6. Dana A. Aljubeiri
7. Bandar A. Alyousef.
8. Bushra S. Albugami
9. Reema A. Alabdani

Media Team

1. Ohud S. Alsudyyes⋆
2. Munira A. ghazwani⋆⋆
3. Feras S. Aldawsari
4. Bandar A. Alazmi
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2. Fay S. Aldayel⋆
3. Yazeed S. Algifari⋆⋆
4. Sarah A. Alahmed⋆⋆
5. Alhanouf S. Bin Osfur⋆⋆

⋆ Indicate's Team's Leader
⋆⋆ Indicate's Team's Leaders Deputy

Students

Taskforce

Judges Guidance Team

1. Reem A. AlShammari⋆
2. Ghina S. Alshayeqe ⋆
3. Rana M. Aldigi
4. Sara M. Almodawah
5. Mashael F. Albishi
6. Lina A. Alsaweed
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27. Mohammed M. Alshammari
28. Reema K. Alshubaily
29. Nouf S. Alhaqbani
30. Osama T. Alotaibi
31. Reema S. Alrefaei
32. Abdullah S. Alshahrani
33. Ranim F. Alshahrani
34. AbdulSalam M. Alqhtani
35. Ghada S. Barwaished
36. Sultan F. Alotaibi
37. Rawabi H. Althubaity
38. Gala M. Alkasim
39. Rasha M. Alqahtani
40. Omar M. Almutairi
41. Taghreed S. Aldlaikan
42. Maryam M. Alaseem
43. Albatool A. Alzahrani
44. Ebtisam M. Alqhtani
45. Rana M. Aldigi
46. Raghad D. Alqahtani
47. Abdulaziz B. Alqahtani
48. Lateyfah M. Alswoaiegh
49. Fares A. Almarshad
50. Wesal S. Alghamdi
51. Shahad F. Alharbi
52. Reem Q. Alqahtani
53. Sultan M. alamri
54. Sara A. Alfadhel
55. Njoud M. Alshamran
56. Anfal A. Alghadhfan
57. Hammam F. Alaklabi
58. Najd B. Alnassar
59. Majed A. Alhussain
60. Abdulaziz M. Al Zahrani
61. Rahaf M. Alharbi
62. Alwaleed A. Alabdulkarim
63. Azzam A. Neyaz
64. Nadin A. Alatrouzi
65. Sara A. Abdullah
66. Shatha A. alruwaite
67. Wesam Y. Alzahrani
68. Rami R. Alosaimi
69. khalid Mhzari
70. Bandar A. Alyousef
71. Naif A. ALOTIBI
72. Abdulaziz I. Almuhanna
73. Ghada H. Almojathel
74. Abdullah A. Alameer
75. Amira M. Alaezi
76. Amirah M. Almutairi
77. Asail Y. Bubshait
78. Reema M Alotaibi
79. Abdullah M. Almousa
80. Mashael M. Alshammari
81. Sadeem D. Alshehri
82. Renad S. Alarifi
83. Maha Aloraini
84. Lama F. Albawarrdy
85. Abdulrahman A. Aldraiweesh

Guidance Team

1. Munirah M. Alqahtani⋆
2. Raja R. Jamalaldeen⋆
3. Dalia H. Almasud
4. Aseel F. Alotaibi
5. Noura S. Alhabdan
6. Reham M. ALQahtani
7. Abdullah A. Alabudi
8. Sarah A. Alaqeel
9. Ali M. Awaji
10. Meshal S. Alsahli
11. Norah A. Alsabih
12. Reema A. Bin Klaib
13. Maisa S. Alqarni
14. Lama A. Alduhayshi
15. Bayan A. Alhaidal
16. Nouf R. Essa
17. Latifa A. Al-Zaid
18. Norah B. Alosami
19. Heba F. Alokayli
20. Sarah O. Alshabanah
21. Wed S. Alobaidi
22. Zainab K. Alnakhli
23. Nora H. Alatiyyah
24. Reema S. Algwainem
25. Abdulaziz H. Alowshywi
26. Shaykhah A. Almuhaini
27. Arwa S. Alanazi
28. Eyad M. AlGhamdi
29. Saad S. Albawardi
30. Aliah A. Algami

⋆ Indicates team's leader

Students

Taskforce

Logistic Team

1. Rayan B. Alanazi⋆
2. AbdulSalam M. Alqhtani
3. Fahad M. Alsaif
4. Nawaf B. Alzahrani
5. Abdulaziz A. Aloraini
6. Reem A. AlShammari
7. Hattan Y. Alfaqeeh
8. Sara T. Alshaibani
9. Nawaf I.S. alsayali
10. Bayan R. Alqwizany
11. Abdulhamid H. Alsomali
12. Amira M. Alanezi
13. Aryam Y. Akkam
14. Nebras A. Alsuqayran
15. Bdour S. Alshalawi
16. Khaled F Alkahtani
17. Raghad M. Alshehri
18. Lujain B. Almuneef
19. Eid A. Alotaibi

Registration Team

1. Reema A. Bawazir⋆
2. Saleh A. Alaraj⋆
3. Renad A. Alsudais
4. Sarah A. Alshehri
5. Rana R. Alotaibi
6. Lama A. Almuthnabi
7. Renad I. Alraqibah
8. Sarah A. Alkhaldi
9. Lames M. Abuhadi
10. Shahad A. Aldablan
11. Bashayer A. Alsaeed
12. Salman Y. Alfarraj
13. Alanoud S. Alabdullah
14. Atheer A. Alnasiri
15. Shahad M. Alotaibi
16. Aryam F. Alnukhailan
17. Abdulrahman S. bin Habjar
18. Renad S. Alarifi
19. Abdulaziz M. Hussain
20. Razan N Alothman

Post Event Team

1. Shahad E. Al-Ammr ⋆
2. Sultan A. Alali⋆
3. Nujud G. AlGhamdi
4. Haifa H. Algazlan
5. Deema N. Alsultan
6. Rahaf M. Almutairi
7. Khalid A. Altulihe
8. Norah S. Alsaad
9. Saba S. Alkathiri
10. Alwaleed S. Al-Qifari
11. Hatim O. alharbi
12. Abdullaziz S. Alyhyan
13. Feras S. Albasha
14. Shahad O. Almadhi
15. Raghad A. Alzahrani

Certificates Preparation Team

1. Khalid F. Alonazi⋆
2. Fay H. Alawaji⋆
3. Lena N. Alsulami
4. Bashayer A. Alkhathlan
5. Deema N. Alsultan
6. Hessah F. Al dawood
7. Yara A. Alrabiah
8. Lian M. Al-Abkka
9. Raghdah A. Alobaid
10. Norah S. Alsaad
11. Salman N. Alanazi
12. Firas J. Alotaibi
13. Horiyah A. lhajri
14. Abdullilah Aljhani.
15. Hessa bin Hithiayn
16. Salsabil A. Alhaddad

Poster Organizer Team

1. Nasser M. Khodah⋆
2. Abdullah M. Aljuraybah⋆
3. Ahman I. Alshehab
4. Meshari A. Hadadi
5. Shatha F. Alotaibi
6. Haya A. Al-Tamimi
7. Bandr K. Alfadhil
8. Shahad M. Alnassar
9. Nawaf M. Abu Qays
10. Abdullah S. Alali
11. Abdulmalik H Alomran
12. Naif B. Alhakami
13. Haya M. Alsharif
14. Reem Ali AlShammari
15. Reouf A. Almousa
16. Azzam A. Neyaz

⋆ Indicates team's leader

Talent Lens Episods Team

Episode One

Scientific Hustle (صخب علمي)

Idea creator
Meshari A. Alwehaibi

Guests
Prof. Ahmed Bahammam
Bandar ibrahim arif
Nawaf abualreesh

Presenter
Waleed Bawazeer

Participants
Atheer Almutairi
Sara Alahmed
Reema Bawazeer
Albtol Alzahrani

Episode writers
Meshari A Alwehaibi
Yara A Alrabiah
Manar S Alowaisi
Norah B Alosaimi

Director
Meshari A Alwehaibi

Assistant director
Bandar Alshammari

Casts
Rakan Althaqafi
Fahad Alrasheed

Camera crew
Salman Y Alfarraj
Bandar A Alazmi
Bandar S Alshammari
Aseel F Alotaibi
Fahad Alrasheed
Norah B Alosaimi

Voiceover
Meshari A Alwehaibi
Waleed Bawazeer
Lena N Alsulami

Montage maker
Meshari A Alwehaibi
Waleed Bawazeer
Bandar Alshammari
Reema A Abuthnain

Designer
Meshari A Alwehaibi
Waleed Bawazeer
Bandar Alshammari
Reema A Abuthnain

Episode Two

Inspirational Mark (بصمة ملهم)

Idea creator
Noura S Alsaad
Reem S Aldemikhi
Rana M Aldigi
Danah A Albuaijan
Sara Y Almodawah
Rima S Almutairi

Guests
Alal Alqahtani
Meshari Alqahtani
Lara Almutabagani
Abdullah Alghamdi
Nouf Almutairi

Presenter
Waleed A Bawazir

Participants
Saad Alsulim

Episode writers
Noura S Alsaad
Reem S Aldemikhi
Sara M Almodawah
Rima S Almutairi
Rana M Aldigi
Danah A Albuaijan

Directors
Noura S Alsaad
Reem S Aldemikhi
Sara Y Almodawah
Rima S Almutairi

Assistant director
Abdulaziz Z Alanazi
Rana M. Aldigi

Casts
Fahad K Alswailem
Abdulaziz Z Alanazi
Rana M Aldigi
Sara Y Almodawah

Camera Team
Fahad K Alswailem
Meshal M Alsukireen
Abdulaziz Z Alanazi
Ahmad I Alshehab

Voiceover
Waleed A Bawazir

Producer
Rima S Almutairi
Fahad K Alswailem
Meshari A Alwehaibi

Designer
Noura S Alsaad
Rima S Almutairi

Episode Three

Beehive of researchers (خلية الباحثين)

Idea creator
Saud T Aleied

Guests
D.Sary I Alsane
Abdullah F Aldosari
Yazeed F Alqudayri

Presenter
Feras S Aldawsari

Episode writers
Saud T Aleied

Director
Saud T Aleied

Camera crew
Abdulrahman M AL-Abkka

Montage maker
Abdulaziz A Almutairi

Assistant director
Abdulrahman M AL-Abkka

Designer
Abdulaziz A Almutairi

Abstracts Judges

COPRD12

Prof. Abdlatif A. Alghaiheb
King Saud University

Dr. Abdullah M. Almohaizeie
King Faisal Specialist Hospital & Research Center

Dr. Ali A. Alshamrani
King Saud University

Dr. Haya I. Aljohar
King Saud University

Dr. Khalid A. Alhazzani
King Saud University

Prof. Khalid M. Alkharfy
King Saud University

Dr. Khalifah M. Althiab
The Ministry of National Guard Health Affairs

Dr. Lubna Y. Ashri
King Saud University

Prof. Maha S. Almutairi
King Saud University

Dr. Mai M. Aloqail
King Saud University

Prof. Nawal M. Almusayeib
King Saud University

Prof. Nourah Z. Alzoman
King Saud University

Prof. Yazeed S. Alruthia
King Saud University

Dr. Faisal A. Alqarni
Security Forces Hospital

Dr. Lina I. Alnajjar
Princess Nourah Bint Abdul Rahman University

Prof. Fatmah A. Alomary
King Saud University

Dr. Ali M. Alaseem
Imam Mohammad Ibn Saud Islamic University

Dr. Mashal M. Almutairi
King Saud University

Dr. Reem M. Abohujel
King Saud University

Dr. Ahmed A. Albassam
Prince Sattam Bin Abdulaziz University

Dr. Nora A. Kalagi
King Saud University

Dr. May K. Almukainzi
Princess Nourah Bint Abdul Rahman University

Dr. Leen E. Ghenem
King Saud University Medical City

Dr. Azher M. Arafah
King Saud University

Dr. Jawaher H. Alqahtani
King Saud University

Dr. Abdulrahman A. Almehizia
King Saud University

Dr. Abeer A. Alsmari
The Ministry of National Guard Health Affairs

Dr. Omar A. Alshaya
King Saud bin Abdulaziz University for Health Sciences

Dr. Badriyah S. Alotaibi
Princess Nourah Bint Abdul Rahman University

Dr. Sakra S. Balhareth
King Faisal Specialist Hospital & Research Center

Dr. Essam A. Tawfik
King Abdulaziz City for Science and Technology (KACST)

Dr. Ghadah H. Alshehri
Princess Nourah Bint Abdul Rahman University

Dr. Numan A. Alabdan
The Ministry of National Guard Health Affairs

Dr. Bahauddeen M. Alrfaei
Ministry of National Guard - Health Affairs

Dr. Hussam M. Albassam
King Saud University

Dr. Sumaiah J. Alarfaj
Princess Nourah Bint Abdul Rahman University

Dr. Nouf A. Alturki
King Saud University

Dr. Reem I. Alwabli
King Saud University

Dr. Hanan K. Alghibiwi
King Saud University

Abstract Judges

COPRD12

Dr. Marwan M. Alrasheed
King Saud University

Dr. Amal M. BinDos
King Fahad Medical City

Dr. Faizah A. Binjubair
King Saud Medical City

Dr. Hind M. Alosaimi
King Fahad Medical City

Dr. Hend A. Alrasheedi
King Saud University

Dr. Amsha S. Alsegiani
King Saud University

Dr. Bashayr M. Alsuwayni
King Saud University Medical City

Dr. Ghalia H. Shamlan
King Saud University

Dr. Mona S. Alwahibi
King Saud University

Dr. Hanadi H. Asiri
King Saud University

Dr. Huda S. Alsalem
King Saud University

Dr. Safar A. Alshahrani
King Fahad Medical City

Dr. Khalid A. Alsulaiman
King Saud bin Abdulaziz University for Health Sciences

Dr. Muneera A. Albabtain
Prince Sultan Cardiac Center

Prof. Ahmed Y. Mayet
King Saud University

Dr. Lamya S. Alnaim
King Saud University

Dr. Njoud A. Altuwaijri
King Saud University

Dr. Norah O. Abanmy
King Saud University

Dr. Fawaz F. Alasmari
King Saud University

Prof. Sinaa A. Alaqeel
King Saud University

Dr. Samar Z. Alshawwa
Princess Nourah Bint Abdul Rahman University

Dr. Gadah A. Alhamoud
King Saud University

Dr. Lubna A. Aljaffali
King Saud University

Dr. Wael H. Mansy
King Saud University

Dr. Omer I. Fantoukh
King Saud University

Dr. Thamer A. Almangour
King Saud University

Dr. Tawfeq A. Alhowiriny
King Saud University

Dr. Tariq M. Alqahtani
King Saud bin Abdulaziz University for Health Sciences

Dr. Basmah H. Alfageh
King Saud University

Dr. Nouf M. Aloudah
King Saud University

Dr. Wael A. Mahdi
King Saud University

Dr. Monira M. Alwhaibi
King Saud University

Dr. Jamilah A. Alsaidan
King Saud University

Dr. Samiah A. Alhabardi
King Saud University

Dr. Eman A. Alturki
King Saud University

Dr. Moneerah J. Alqahtani
King Saud University

Dr. Mohammad A. Altamimi
King Saud University

Dr. Nora A. Alkhudair
King Saud University

Dr. Haya M. Almalag
King Saud University

Dr. Shiekha S. Alaujan
King Saud University

Dr. Noha A. Alaloola
King Saud University

Dr. Fakhr Z. Alayoubi
King Saud University Medical City

Session Moderators

COPRD12

Dr. Abdulaziz M. Alhossan
King Saud University

Dr. Noha A. Alaloola
King Saud University

Prof. Adnan A. Kadi
King Saud University

Dr. Moneerah J. Alqahtani
King Saud University

Dr. Homood M. As Sobeai
King Saud University

Prof. Sara T. AlRashood
King Saud University

Supervisors

Graduation Research

Prof. Nouf M. Alrasheed
King Saud University

Dr. Musaad A. Alshammari
King Saud University

Dr. Sarah I. Bukhari
King Saud University

Dr. Raha S. Orfali
King Saud University

Dr. Omar A. Almohammed
King Saud University

Dr. Ahmed F. Aldemerdash
King Saud University

Prof. Yazed S. Alruthia
King Saud University

Dr. Mohammad H. Aljawadi
King Saud University

Dr. Mohammed A. Altamimi
King Saud University

Dr. Yousef A. Bin Jardan
King Saud University

Dr. Anfal F. Bin Dayel
King Saud University

Dr. Hala A. Attia
King Saud University

Dr. Omer I. Fantoukh
King Saud University

Dr. Ghadah A. Assiri
King Saud University

Dr. Jawza F. Alsabhan
King Saud University

Prof. Fahad I. Aljenobi
King Saud University

Dr. Ahlam M. Alhusaini
King Saud University

Dr. Nouf M. Aloudah
King Saud University

Dr. Wedad S. Sarawi
King Saud University

Prof. Fulwah Y. Alqahtani
King Saud University

Dr. Shiekha S. Alaujan
King Saud University

Dr. Abdullah K. Alshememry
King Saud University

Dr. Wael H. Mansy
King Saud University

Dr. Norah O. Abanmy
King Saud University

Supervisors

Graduation Research

Prof. Sinaa A. Alaqeel
King Saud University

Dr. Lamya S. Alnaim
King Saud University

Dr. Ali S. Alqahtani
King Saud University

Dr. Thamer A. Almangour
King Saud University

Dr. Khalid A. Alhazzani
King Saud University

Dr. Saeed A. Alqahtani
King Saud University

Dr. Abdullah F. Alasmari
King Saud University

Prof. Gamaleldin I. Harisa
King Saud University

Dr. Salmeen D. Babelghaith
King Saud University

Dr. Sultan M. Alshehri
King Saud University

Dr. Homood M. As Sobeai
King Saud University

Dr. Perwez A. Shaikh
King Saud University

Prof. Gamal M. Mahrous
King Saud University

Dr. Shaza M. Almassarani
King Saud University

Dr. Tariq M. Alhawassi
King Saud University

Dr. Saad E. Alobid
King Saud University

Dr. Tahani K. Alshammari
King Saud University

Dr. Faleh M. Alqahtani
King Saud University

Dr. Ahmed L. Alaofi
King Saud University

Dr. Fawaz F. Alasmari
King Saud University

Dr. Mohamed M. Badran
King Saud University

Dr. Ibrahim A. Alswaidan
King Saud University

p. Abdlatif A. Alghaiheb
King Saud University

Dr. Asma S. Alonazi
King Saud University

Dr. Alanood S. Almurshedi
King Saud University

Dr. Basmah N. Aldosari
King Saud University

Prof. Ramzi A. Mothana
King Saud University

Dr. Ahmad M. Shaman
King Saud University

Dr. Hanan Y. Aati
King Saud University

Dr. Yasser T. Albogami
King Saud University

Dr. Adel F. Alghaith
King Saud University

Dr. Jamilah A. Alsaidan
King Saud University

Dr. Afraa A. Alsafadi
King Saud University Medical City

Dr. Abdulaziz M. Alhossan
King Saud University

Dr. Mohammed A. Alessa
King Saud University

Dr. Hadeel A. Alkofide
King Saud University

Dr. Basmah H. Alfajeh
King Saud University

Dr. Mohammed S. Aldosari
King Saud University

Dr. Saja H. Almazrou
King Saud University

Supervisors

Graduation Research

Dr. Sultan M. Alghadeer
King Saud University

Dr. Ahmed Z. Alanazi
King Saud University

Dr. Iman M. Alfagih
King Saud University

Prof. Mohammed N. Alarifi
King Saud University

Dr. Noha A. Alaloola
King Saud University

Dr. Maha M. AlRasheed
King Saud University

Prof. Namik Kaya
King Faisal Specialist Hospital and Research Center

Dr. Abdulrahman M. Alwihabi
King Saud University

Dr. Ghada A. Bawazeer
King Saud University

Dr. Nora A. Alkhudair
King Saud University

Dr. Wael A. Algarawi
King Saud University

Dr. Ghada I. Abohemid
King Saud University

Dr. Abdulrahman Y. Shreif
King Saud University

Dr. Abdullah M. Al-Hammad
King Saud University

Dr. Awatif B. Albaker
King Saud University

Dr. Njoud A. Altuwaijri
King Saud University

Dr. Lobna A. Aljuffali
King Saud University

Dr. Bushra T. Alquadeib
King Saud University

Dr. Turki H. Albatti
Czech Rehabilitation Center

Dr. Ziyad S. Binkhathlan
King Saud University

Dr. Adel S. El-Azab
King Saud University

Dr. Alaa A. Abdel-Aziz
King Saud University

Dr. Mudassar S. Ahmad
King Saud University

Dr. Miteb A. Al-Anzi
King Saud University

Dr. Saleh A. Alanazi
King Saud bin Abdulaziz University for Health Sciences

Dr. Musaed A. Alkholeif
King Saud University

Dr. Abdullah H. Alomrani
King Saud University

Dr. Essam A. Tawfik
King Saud University

Prof. Fadilah S. Aleanizy
King Saud University

Prof. Ali A. El Gamal
King Saud University

Dr. Amira M. Badr
King Saud University

Dr. Nasir A. Siddiqui
King Saud University

Dr. Afzal H. Mohiuddin
King Saud University

Dr. Abdul A. Shamshad
King Saud University

Dr. Wael A. Mahdi
King Saud University

Dr. Wael A. Alanazi
King Saud University

Dr. Mohammed M. Alanazi
King Saud University

Prof. Ahmed Y. Mayet
King Saud University

Prof. Ramzi A. Mothana
King Saud University

Dr. Fai A. Alkathiri
King Saud University

Dr. Syed S. Imam
King Saud University

Supervisors

Postgraduate Research

Dr. Hussain N. Alhammami
King Saud University

Dr. Mohammed M. Alghatani
King Saud University

Dr. Musaad A. Alshammari
King Saud University

Dr. Wedad S. Sarawi
King Saud University

Dr. Syed F. Adil
King Saud University

Dr. Tahani K. Alshammari
King Saud University

Dr. Ahlam M. Alhusaini
King Saud University

Dr. Nasser B. Alsaleh
King Saud University

Dr. Mohammed A. Assiri
King Saud University

Dr. Alanoud T. Aljasham
King Saud University

Dr. Ahlam Alsaadi
King Abdullah International Medical Research Center

Dr. Abdulrahman M. Alshammari
King Saud University

Dr. Majed F. Alghoribi
King Abdullah International Medical Research Center

Dr. Mohammed M. Almutairi
King Saud University

Dr. Safia Aljedani
King Abdullah International Medical Research Center

Dr. Wael A. Alanazi
King Saud University

Dr. Ghadah A. Assiri
King Saud University

Dr. Khalid A. Alhazzani
King Saud University

Dr. Moureq R. Alotaibi
King Saud University

Dr. Aliyah A. Almomen
King Saud University

Dr. Mashal M. Almutairi
King Saud University

Dr. Alanood S. Almurshedi
King Saud University

Dr. Zuhair A. Osman
King Saud University

Dr. Sarah I. Bukhari
King Saud University

Dr. Monira M. Alwhaibi
King Saud University

Dr. Huda A. Alewairdhi
King Saud University

Dr. Ahmad A. Alghamdi
King Saud University

Prof. Aws I. Alshamsan
Saudi Commission for Health Specialties

Dr. Sultan M. Alshehri
King Saud University

Dr. Basmah N. Aldosari
King Saud University

Dr. Walid A. Alkeridy
King Saud University

Dr. Carmel M. Hughes
Queen's University Belfast

Dr. Heather E. Barry
Queen's University Belfast

Dr. Ali R. Alhoshani
King Saud University

Dr. Homood M. AsSobeai
King Saud University

COPRD12 Awards

Categories

Judging Process

- Oral presentations will be evaluated by a panel of five distinguished professors selected by the research day committee.
- Poster presentations will be evaluated by a panel of three distinguished professors selected by the research day committee.
- Reviewed COPRD12 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.

COPRD12 Awards Categories:

Best Oral Presentation Award
The top seven scoring oral presentations will be selected as winners and eight awards will be given.

Best Poster Presentation Award
The top twenty scoring poster presentations will be selected as winners and twenty awards will be

Best Professional Poster Presentation Award
The top six scoring posters will be selected as winners and three awards will be given.

Young Pharmacist Research Award (YPHRA)
The top seven scoring posters will be selected as winners and three awards will be given.

Best TALENTS LENS Award
The best voted episode will be selected as winner and an award will be given.


7.800,00
2.100,00
1100,00
100
300
500
?
!!!
75%
50
10
20
800
700
600
500
400
300
200
100

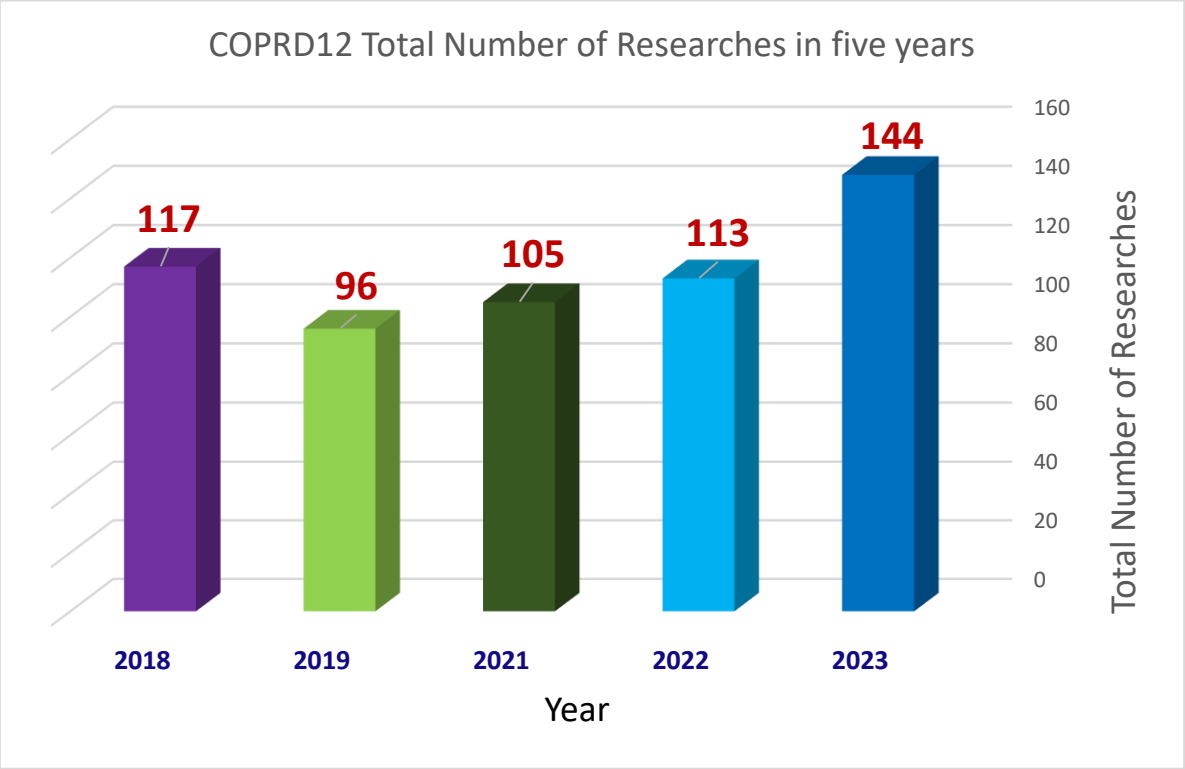
COPRD12

in Numbers

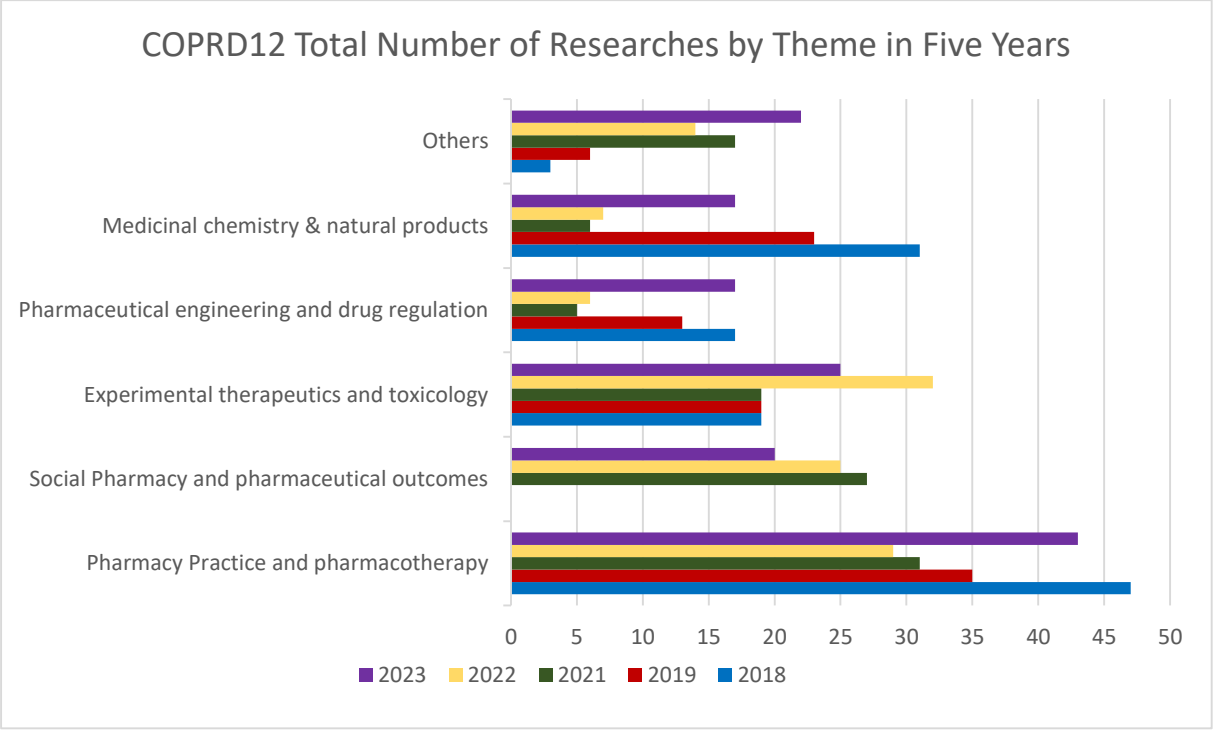
COPRD12 Achievements

2018-2023

Total Number of researches in five years



Total Number of researches by theme in five years



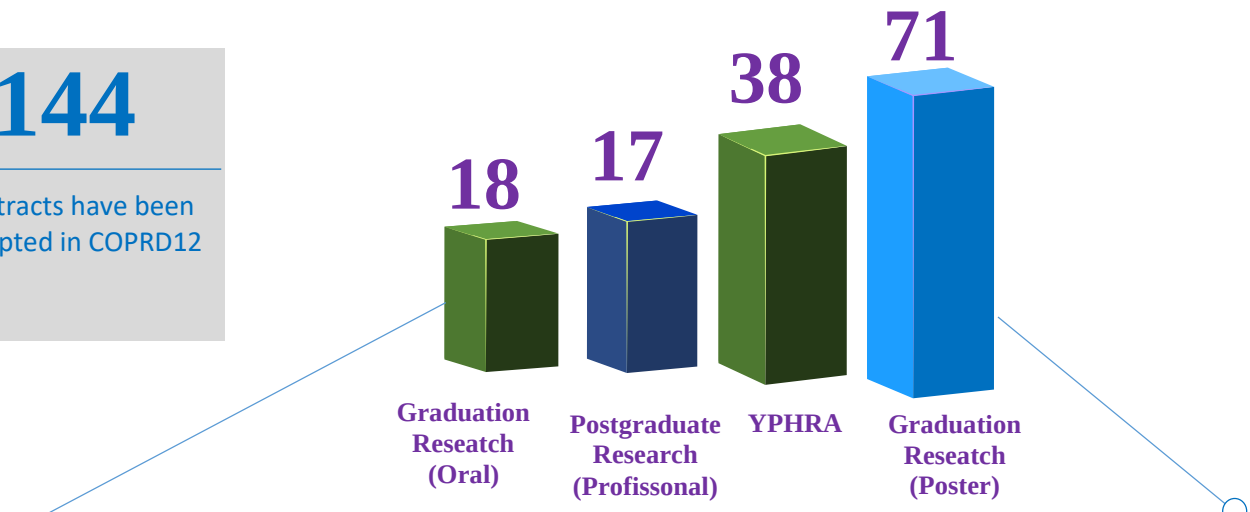
COPRD12 Achievements

Projects Statistics

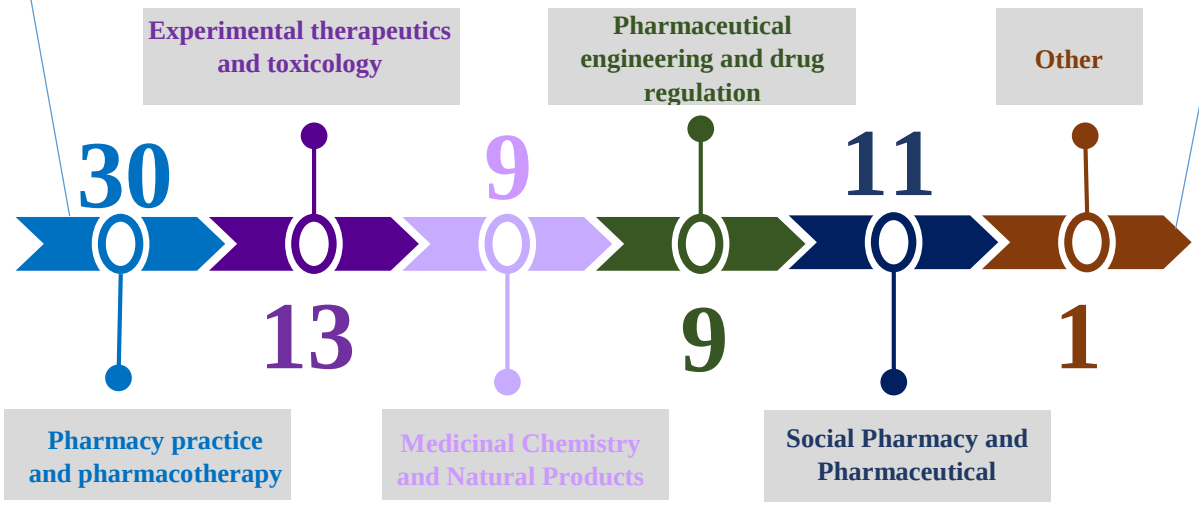
Graduation Research Projects

144

Abstracts have been accepted in COPRD12



Graduation Research Projects per theme



89 Graduation Projects

76 Boys

91 Girls

104 KSU Supervisors

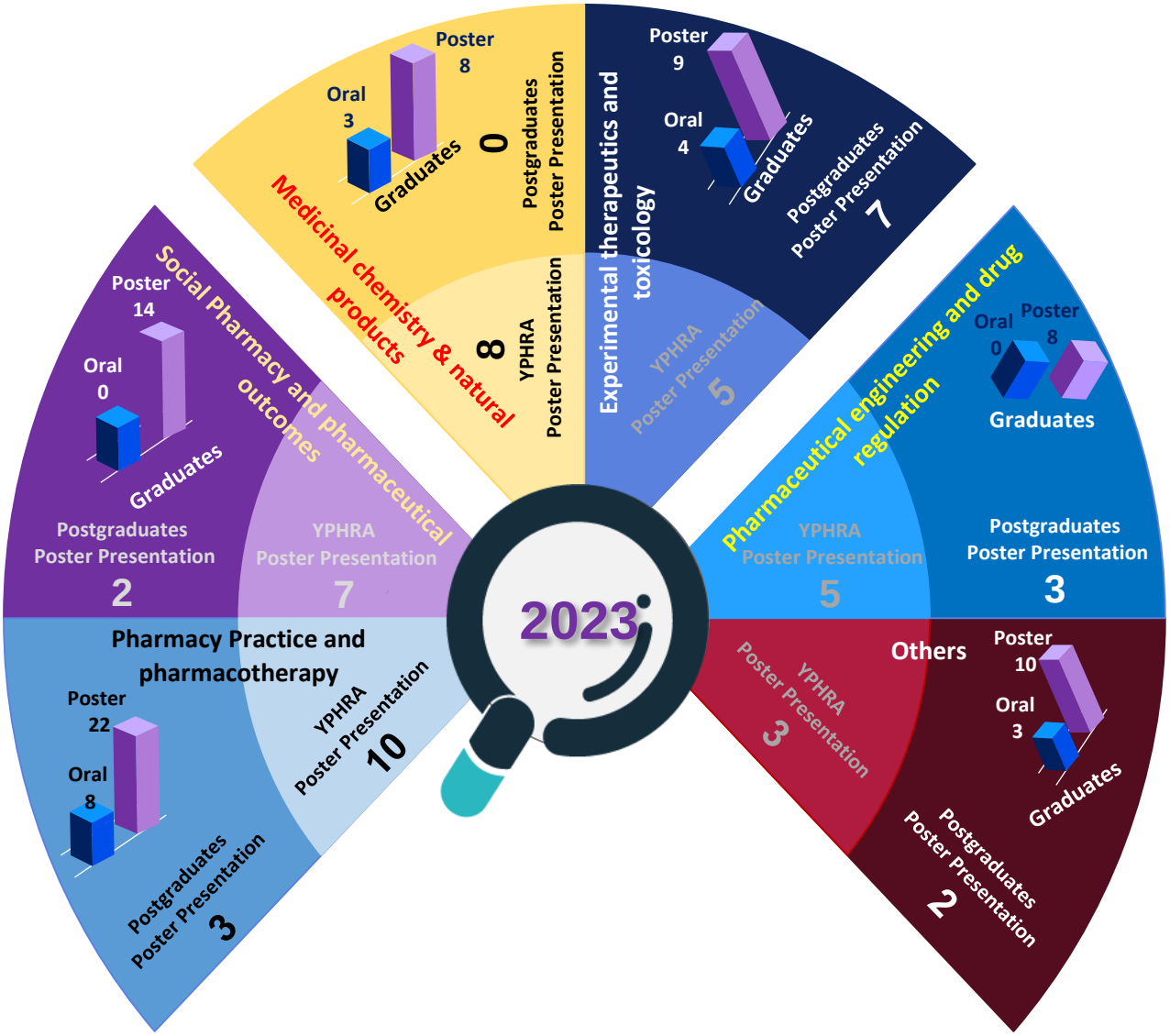
6 Non-KSU Supervisors

6 Practice Sites

COPRD12 Achievements

Projects Statistics

COPRD12 Number of Researches by Theme in Details



COPRD12 Abstracts

Graduation Research
Oral Abstracts

Pharmacy Practice and Pharmacotherapy

Abstract Code: OPP100

A Content Quality and Optimization Analysis for a YouTube as a Source of Patient Information to Bipolar Disorder in Arabic language

Student(s) Name: *Yara Ibrahim Aljadeed, Reema Hamed Alhassan*
Supervisor(s) Name: *Jawza Fahad Alsabhan*

Abstract:
Background: YouTube is the second most popular website as well the common source of medical information for doctors, students and patients, YouTube still contains misleading information and is often not reliable. We aimed to evaluate the content quality of YouTube videos relating to bipolar disorder (BD) in the Arabic language. Since there is no study to assess the reliability and educational value of Arab world YouTube videos on BD.
Methods: A Cross-sectional study of YouTube videos as a source of information for BD patients in the Arabic language, we chose the first 120 videos for four different search phrases and video contents were evaluated using the validated DISCERN instrument by two independent PharmD interns.
Results: A total of 58 videos were included in this study. The most common source or video was others (38%), followed by physician (33%), then education (26%), and finally hospital (3%). Resources varied in the information provided with regard to information related to BD. The DISCERN value was plotted as the dependent variable to predict video type and corresponding quality score. The education and physician had higher quality predicted compared to resources with a beta of (95% confidence intervals-CI) of 0.43 (-5.2−6.1), and 2.1 (-3.2−7.3) respectively.
Conclusions: The bipolar videos' average quality and reliability were poor. We provided a list of top-quality videos that physicians might suggest as a reliable source of health information. Our study highlights the gaps in knowledge surrounding BD content on YouTube. As a result, future educational content can be improved using this information

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Abstract Code: OPP101

The Impact of Prior Use of Cardioprotective Agents on Cardiotoxicity in Subjects with Cancer: an Observational Study

Student(s) Name: *Reema Fahad Alsahil, Shahad Yaser Al Tuwijri*
Supervisor(s) Name: *Lamya Saleh Alnaim, Hadeel Abdulrahman Alkofide*

Abstract:
Background: Cancer patients have an increased risk of developing cardiovascular complications due to the use of cardiotoxic chemotherapy. Studies have suggested that using cardioprotective agents may attenuate chemotherapy-induced cardiotoxicity. However, these studies are limited with small sample sizes and conflicting outcomes. The aim of this study is to investigate whether using cardioprotective agents may impact the rate of cardiotoxicity in cancer patients.
Methods: A single-center retrospective study on adult patients with cancer, using cardiotoxic chemotherapeutic agents from the period of 2015-2022. Data on the use of cardioprotective agents prior to the start of chemotherapy, cardiovascular events, comorbidities, and treatment details were obtained. The primary outcome was to determine whether prior use of cardioprotective agents impacts the development of cardiotoxicity. Statistical analyses included descriptive statistics and logistic regression. Institutional review board approval was obtained.
Results: In a total of 200 patients identified, 40% were male and the mean age was 47.12 and standard deviation (SD) was 17.01 years, and the average cancer duration was 18.09 (12.90) months. The prior use of cardioprotective agents was identified in 24% of the study subjects. Of the 200 patients, 80 developed cardiotoxicity following the use of chemotherapeutic agents. The prior use of cardioprotective agents was not significantly associated with cardiotoxicity in the study subjects using univariable and multivariable regression.
Conclusions: Prior use of cardioprotective agents does not impact the future development of cardiotoxicity in subjects with cancer who are at risk of adverse cardiovascular outcomes. Larger studies are required to confirm the study results

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Abstract Code: OPP102

Impact of Mobile Application Implementation on Diabetic Patient's Management Outcomes: A Pilot Randomized Control Trail

Student(s) Name: *Reema Abdullah Alorf, Reema Saud Alhoutah*
Supervisor(s) Name: *Abdulaziz Alhossan, Mohammed AlessaT*

Abstract:
Background: Poor glycemic control is prevalent in patients with type 1 and type 2 diabetes mellitus (T2DM). Health care by mobile applications (apps) has a great advantage when applied to patients with diabetes; the adherence to self-management activities for diabetes can be improved through mobile apps. The primary goal of the research was to determine the impact of mobile application on patient's HbA1C levels.

The secondary objective was to assess the improvement in fasting and postprandial blood glucose levels.
Methods: A total of 70 adult patients with T2DM who presented to pharmacy-led diabetes clinic at King Khalid University Hospital were randomly distributed by using a computer-based technique (Excel) into two groups. Patients in the intervention group (n=35) were provided with a smartphone application that was created for the study purpose, which contains different features related to diabetes management. Patients assigned to the control group (n=35) received the regular standard care with no additional intervention.
Results: 66 patients were included in both arms of the study. The average age was 58 ± 4.2 years, and 64% of them were females. There was a significant reduction in the HbA1C levels in the intervention group compared to the control group (p- value <0.006, and CI -1.232, -0.2165). Also, there was a significant reduction in the fasting and postprandial blood glucose levels (p- value <0.001, and CI -1.6898, -0.8388).
Conclusions: Introducing technologies in managing diabetes mellitus and other chronic diseases may provide a positive impact and expedite controlling the diseases. These technologies keep the patients attached to their health status and grant them accesses to many reliable health educational resources.

Abstract Code: OPP103

Proton Pump Inhibitors use evaluation among older patients in the ambulatory care setting: A retrospective cohort study.

Student(s) Name: *Nouf Alkhalaf – Lujane Alsaqer*
Supervisor(s) Name: *Tariq Alhawassi*

Abstract:
Background: Proton-Pump inhibitors (PPI's) are a class of medications used to treat a wide range of disorders linked to an increase in stomach acid production. PPIs are prone to be over-prescribed and misused for many reasons. This study is to asses the PPI use or prescription pattern in geriatric patients of Saudi Arabia.
Methods: This study was a retrospective cohort design using medical records at an outpatient setting in a large tertiary referral hospital, Riyadh, Saudi Arabia, between the years 2017 until 2019. Data was collected from Electronic System for Integrated Health Information (eSiHi application).
Results: A total of 48,726 medical records were retrieved, of which 14,011 (28.75%) were prescribed PPIs. In 2017 (26.6%) of geriatric patients were prescribed PPIs, (55.1%) of which were women who had a mean of (9) prescribed medications. In 2018 (30.4%) of geriatric patients were prescribed PPIs, (53.9%) of which were women who had a mean of (11) prescribed medications. In 2019 (28.9%) of geriatric patients were prescribed PPIs, (54.9%) of which were women who had a mean of (11) prescribed medications. Disease of esophagus, stomach and duodenum was ranked among the top five most prevalent diseases.
Conclusions: This study demonstrates that PPIs are frequently prescribed amongst geriatric patients. We found that PPIs were prescribed to many patients inappropriately; not based on FDA approved guidelines. The results show that proper education among healthcare workers is needed.

Abstract Code: OPP104

Fluoropyrimidine-Associated Cardiotoxicity: A Retrospective Cohort Study

Student(s) Name: *Hanin Al-Harbi – Nouf Al-Fagih*
Supervisor(s) Name: *Mohammad Al-Jawadi*

Abstract:
Background: Cardiovascular comorbidities is an alarming complication that has been associated with cancer treatment recently. Several patients undergoing chemotherapy treatment present with various cardiotoxic events. Due to the repeated toxicity, a relatively new field called cardio-oncology focuses mainly on chemotherapy associated cardiac events, which is an innovation needed in the sake of lowering morbidity and mortality. Fluoropyrimidines are antimetabolite drugs that are used mainly to treat solid. Studies and reports widely suggested that 5-FU and capecitabine –an oral 5-FU prodrug– can induce cardiac adverse events. With the recent incidence rates of 0-20% with 5-FU and 3-35% with capecitabine.
The aim in this study is to retrospectively evaluate the incidence and risk factors associated with 5-FU induced cardiotoxicity in the Saudi population.
Methods: This is an observational retrospective cohort study that will take place in Riyadh, KKUH. The study will include patients with solid tumors aged 18 and above receiving 5-fluorouracil and exclude any patient with cardiovascular disease history. The outcome is cardiotoxicity within 21 days of receiving 5-fluorouracil. Patients with 5-FU will be compared to other chemotherapeutic classes in terms of cardiotoxicity. Cox proportional multivariable regression will be used to analyze the data. STATA 17 will be used for all statistical analysis.
Results: Out of the 4,231 cancer patients in KKUH, 2,121 were diagnosed with solid tumors between 2016 and 2022. 538 patients were using 5-Fluorouracil within the 6-year interval, with the average of 89.6 patients per year. The identification of cardiotoxicity is currently under progress by two cardiologists.

Abstract Code: OPP105

Identifying the Potential Risk of Coronavirus COVID-19 on Electronic & Conventional Cigarette Smokers: A New Challenge in Public Health

Student(s) Name: *Haneen S Alotaibi, Reem B Almuneef*
Supervisor(s) Name: *Musaad A Alshammari, Fawaz F Alasmari*

Abstract:
Background: *Euphorbia* plants have a significant place in traditional medicine due to their therapeutic properties including antitumor effects which have been observed in several species. This study investigated the phytochemical and antiproliferative properties of endemic E. saudiarabica.
Methods: Various chromatographic techniques were recruited to isolate secondary metabolites from *E. saudiarabica* aerial parts. Their structures were elucidated by extensive spectroscopic analyses. The anticancer properties of crude extract, fractions, and isolated phytochemicals were examined against different cancer cells. The active fractions were evaluated for their effects on cell-cycle progression and apoptosis induction using flow cytometry. The RT-PCR was employed to estimate the gene-expression levels of the apoptosis-related genes.
Results: Phytochemical investigation of E. *saudiarabica* methanolic extract led to the isolation and characterization of four secondary metabolites (1-4). Among them, saudiarabicain F (2) is an ingol-type diterpenoid that has not been previously reported in nature. Chloroform and ethyl acetate fractions suppressed the proliferation of the cancer cells, especially against the MCF-7 cells with IC50 values of 22.6 and 23.2 µg/mL, respectively. Both fractions caused cell-cycle arrest in the G2/M phase of the treated MCF-7 cells. This inhibition was linked with apoptosis induction which was demonstrated by an increase in the ratio of Bax to Bcl-2, with an increase in the expression of executioner caspase-7. Among the isolates, glutinol (1) showed potent activity against the MCF-7 cell line, with an IC50 value of 9.83 µg/mL.
Conclusion: Our findings suggest that E. saudiarabica has apoptosis-inducing effects and could be a promising source for novel chemotherapeutic drugs.

Abstract Code: OPP106

Ceftolozane-tazobactam versus ceftazidime-avibactam for the treatment of infections caused by multidrug-resistant *Pseudomonas aeruginosa*: A multicenter cohort study

Student(s) Name: *Dareen Alasseri and Alanoud Aljurbua*
Supervisor(s) Name: *Thamer Almangour*

Abstract:
Background: Ceftolozane-tazobactam (C-T) and ceftazidime-avibactam (CAZ-AVI) are two novel antimicrobials that retain activity against resistant Pseudomonas aeruginosa. The comparative effectiveness and safety of C-T versus CAZ-AVI remains unknown.
Methods: A retrospective, multicenter, cohort study was performed in 6 tertiary centers in Saudi Arabia and included patients who received either C-T or CAZ-AVI for infections due to multidrug-resistant (MDR) P. aeruginosa. Overall in-hospital mortality, 30-day mortality, and clinical cure were the main study outcomes. Safety outcomes were also evaluated. Multivariate analysis using logistic regression was used to determine the independent impact of treatment on the main outcomes of interest.
Results: We enrolled 200 patients in the study (100 in each treatment arm). A total of 56% were in the intensive care unit, 48% were mechanically ventilated, and 37% were in septic shock. Around 19% of patients had bacteremia. Combination therapy was administered in 41% of patients. Differences between C-T and CAZ-AVI groups did not reach statistical significance in the overall in-hospital mortality (44% vs 37%; P = 0.314; OR, 1.34; 95% CI, 0.76-2.36), 30-day mortality (27% vs 23%; P = 0.514; OR, 1.24; 95% CI, 0.65-2.35), clinical cure (61% vs 66%; P = 0.463; OR, 0.81; 95% CI, 0.43-1.49) or acute kidney injury (23% vs 17%; P = 0.289; OR, 1.46; 95% CI, 0.69-3.14) even after adjusting for differences between the 2 groups.
Conclusions: Although outcomes numerically favored CAZ-AVI, the two agents are associated with comparable clinical outcomes and serve as potential options for the treatment of MDR P. aeruginosa infections.

Abstract Code: OPP107

Factors Influencing Saudi Parents' Decision-making About the Use of Stimulants for Their Children with Attention-Deficit Hyperactivity Disorder: A Pilot Study

Student(s) Name: *Alanood Alghannam, Manal Alkahtani*
Supervisor(s) Name: *Ghada Assiri, Turki Albatti, Jamilah Alsaidan*

Abstract:
Background: Attention-deficit/hyperactivity-disorder (ADHD) is a common neurodevelopmental disorder that is characterized by inattention, impulsivity, and hyperactivity. Treatment choices may be influenced by parents' experiences with ADHD, their opinions regarding interventions, and some factors that could influence their decision like social stigma, especially when it comes to using stimulant medications. The aim is to identify factors influencing parents' decision-making.
Method: It's a descriptive cross-sectional study using a pretested and validated questionnaire. Participants are eligible if they are Saudi parents with children between 6-17 years old who have a confirmed diagnosis of ADHD. Data collected through an online survey, to assess concerns, knowledge, and attitude. Data were qualitatively analyzed using Excel®.
Preliminary Results: The responses regarding concerns were, between 30-45% of the parents disagree or strongly disagree with being concerned about other people criticizing them, starting medication from early age will result in greater problems in the future, and feeling a sense of failure as parent, as well as ADHD misdiagnosis.

Regarding knowledge assessment results, most parents responded correctly to most of the statements, and the most answered incorrectly statement was "studies show that stimulant medication has a positive effect on academic achievement in the long run" (74.1% were incorrect).
Attitude assessment responses were 48%-70% believe that too many children are medicated for ADHD, they know how to handle their children, and that medication is safe if the doctor recommends it.
Conclusion: Parents have a lower concern, higher knowledge, and a good attitude towards ADHD and medication.

Medicinal Chemistry & Natural Products

Abstract Code: OMN300

In Vitro and *in Silico* Studies of the Anticancer Potential of Terpenoid Compounds Isolated from *Commiphora opobalsamum* (L.)

Student(s) Name: *Shahad Abdullah Buali, Razan Saad Almufleh*
Supervisor(s) Name: *Shaza Mohamed Al-Massarani, Ali Ali El-Gamal*

Abstract:
Background: Natural products, especially those derived from plants, have offered infinite opportunities in drug development. Commiphora, commonly known as the genus of the myrrhs, has long been used to treat various diseases, such as inflammation, infections, tumor, and gastrointestinal disorders. The current study aimed to investigate the phytochemical composition and anticancer properties of C. opobalsamum stem bark.
Methods: Chromatographic techniques were used to isolate pure compounds. Their structures were characterized by spectroscopic techniques. The percentage inhibition of extracts and isolates on the cancer cell lines MCF-7 and A549 was assessed using the MTT assay. Molecular docking with AutoDock 4.2 was conducted employing the compounds on topoisomerase IIα, lactate dehydrogenase, and dihydrofolate reductase, essential enzymes in the growth and proliferation of cancer cells.
Results: Chromatographic purification led to the isolation of six ursane and oleanane-type triterpenoids. All compounds, especially the ursane type triterpenes, significantly reduced the growth of cancer cells in a concentration-dependent manner. The most effective compounds against both cancer cell lines were -amyrin and 3-O-acetyl--boswellic acid with IC50 values ranging from 7.79 ± 0.17 to 12.65 ± 0.69 µg/mL, respectively. Most compounds exhibited great affinities for the evaluated receptors. Nevertheless, -amyrin and 3-O-acetyl--boswellic acid demonstrated the highest binding affinities towards dihydrofolate reductase with -10.3 and -9.2 kcal/mol, respectively, as compared to methotrexate, which has binding affinity of -10.2 kcal/mol.
Conclusions: Certain identified triterpenes can be considered for further research as potential candidates for creating new anticancer medications, as shown by the outcomes of the in vitro assays and docked conformations.

Abstract Code: OMN301

Evaluation of the Diabetic Wound Healing Properties of Bio-Nanofibers Incorporating Alkanna tinctoria and Dragon's blood: In Vitro and in Vivo Experimental Studies

Student(s) Name: *Rana Y. AlMotawa, Ghadeer A. Alhamid*
Supervisor(s) Name: *Raha S. Orfali, Mohamed M. Badran, Essam A. Tawfik*

Abstract:
Background: Diabetic patients with foot ulcers have a two-fold higher mortality rate. Studies of Dragon`s Blood (DB) and Alkanna Tinctoria (AT) showed an impact in accelerating wound healing, and using nanofibrous membranes (NFM) as a wound dressing promotes skin tissue regeneration. Thereupon, the aim of this study is to investigate the effect of NFM incorporating DB and AT in treating diabetic foot.
Methods: DB and AT were extracted in ethanol and ethyl acetate. In-vitro antimicrobial activity using agar diffusion method and minimum inhibitory concentration (MIC) of DB and/or AT extract or NFM were tested against *S. aureus* and *P. aeruginosa*. For the in-vivo study, Wistar rats were divided into diabetic and non-diabetic groups. Diabetes was induced in rats with STZ 60mg/kg. The wound was prepared with an 8mm biopsy punch and treated with NFM on days 0,3,7,14. Tissue samples were collected for histological examination.
Results: DB and/or AT extract has shown significant antibacterial activity at the concentration of 80mg/ml and 40mg/ml against *P. aeruginosa* and *S. aureus*. MIC for DB, AT, and DB+AT was 1.56mg/ml, 12.5mg/ml, and 1.56mg/ml, respectively. The study results revealed that NFM incorporating DB and AT had increased antibacterial activity. NFM showed a higher inhibition zone on agar plates compared to DB and AT extracts. The DB+AT NFM demonstrated the highest percentage of wound closure compared with DB and AT alone, representing the great healing potential of extracts combination-loaded NFM.
Conclusion: The obtained NFM combined with DB+AT extracts have potential antibacterial activity and promising wound healing in diabetic rats.

Abstract Code: OMN302

Revisiting the Flora of Saudi Arabia: Phytochemical and Biological Investigation of an Endangered Plant Species Euphorbia saudiarabica

Student(s) Name: *Abdulaziz Binawad, Menwer Alrashidi*
Supervisor(s) Name: *Omer I. Fantoukh, Gadah A. Al-Hamoud*

Abstract:
Background: Euphorbia plants have a significant place in traditional medicine due to their therapeutic properties including antitumor effects which have been observed in several species. This study investigated the phytochemical and antiproliferative properties of endemic E. saudiarabica.
Methods: Various chromatographic techniques were recruited to isolate secondary metabolites from E. saudiarabica aerial parts. Their structures were elucidated by extensive spectroscopic analyses. The anticancer properties of crude extract, fractions, and isolated phytochemicals were examined against different cancer cells. The active fractions were evaluated for their effects on cell-cycle progression and apoptosis induction using flow cytometry. The RT-PCR was employed to estimate the gene-expression levels of the apoptosis-related genes.
Results: Phytochemical investigation of E. saudiarabica methanolic extract led to the isolation and characterization of four secondary metabolites (1-4). Among them, saudiarabicain F (2) is an ingol-type diterpenoid that has not been previously reported in nature. Chloroform and ethyl acetate fractions suppressed the proliferation of the cancer cells, especially against the MCF-7 cells with IC50 values of 22.6 and 23.2 µg/mL, respectively. Both fractions caused cell-cycle arrest in the G2/M phase of the treated MCF-7 cells. This inhibition was linked with apoptosis induction which was demonstrated by an increase in the ratio of Bax to Bcl-2, with an increase in the expression of executioner caspase-7. Among the isolates, glutinol (1) showed potent activity against the MCF-7 cell line, with an IC50 value of 9.83 µg/mL.

Experimental Therapeutics and Toxicology

Abstract Code: OET400

Macrophage -mediated inflammation and expression of FABP4 in a diabetic heart: A potential molecular target in diabetic cardiomyopathy

Student(s) Name: *Atheer Abdullah AlHuntush and Sarah Ali Alrasheed*
Supervisor(s) Name: *Nouf M. Alrasheed and Asma S. Alonazi*

Abstract:
Background: Chronic systemic inflammation of the heart caused by macrophages expressing fatty acid binding protein 4 (FABP4) via the TLR4/JNK pathway induces diabetic cardiomyopathy (DCM). We assessed this process as a potential molecular target.
Methods: Forty-eight adult male Wistar rats were divided into eight equal groups. High-fat diet and low streptozotocin doses (30 mg kg^{-1}) induced diabetes. Liposomal clodronate (LEC) (15 mg kg^{-1}) depleted macrophages. For 4 weeks, control groups received 0.9% NaCl or liposomal clodronate; two diabetic and non-diabetic groups received 100 µg kg^{-1} Lipopolysaccharide (LPS); two diabetic and non-diabetic groups received JNK inhibitor (SP600125, 15 mg kg^{-1}) prior to LPS. Heart weight/body weight ratio (HW/BW) identified hypertrophied hearts. Enzyme-linked immunosorbent assay determined cardiac injury, inflammatory, and oxidative stress biomarkers. Immunohistochemical assay identified macrophage phenotypes and FABP4. Western blot molecularly assessed TLR4, p-JNK, and JNK. Heart sections were histologically examined.
Results: Macrophage depletion decreased HW/BW ratio (3.342±0.2016 vs 4.631±0.4530 mg g^{-1}, $p< 0.02$), ($p<0.001$), troponin I **(**5.396±0.176 vs. 8.741±0.967 pg ml^{-1}, $p<0.001$**),** and CK-MB (7.235±0.271 vs. 3.161±0.288 ng ml^{-1}, $p<0.001$); enhanced superoxide dismutase activity ($p<0.001$); and reduced malondialdehyde ($p<0.001$). LEC reduced TNF-α (19.204±0.367 vs. 29.164 ±1.171 ng ml^{-1}, $p<0.001$), IL-6 (0.037±0.006 vs. 0.298±0.086 ng $ml^{-1,}$ $p<0.01$), and IL-1β (18.795±2.897 vs. 39.92±6.677 ng ml^{-1}, $p<0.01$); shifted macrophage polarization toward the M2 phenotype; decreased FABP4 expression; and restored cardiac structures. JNK inhibition shifted macrophage polarization toward M2 and restored cardiac structures.
Conclusions: Inhibiting macrophages from expressing FABP4 mediate inflammation by modulating the TLR4/JNK pathway may halt DCM and avoid heart failure.

Abstract Code: OET401

Study the effects of agomelatine on rat's liver during chronic restraint stress (CRS) model

Student(s) Name: *Latifah S. Alrasheed, Reem E. Alsharidah*
Supervisor(s) Name: *Wedad S. Sarawi*

Abstract
Background: Agomelatine is a unique antidepressant with anxiolytic effects, it acts as an agonist on melatonin MT1 and MT2 receptors and antagonist on serotonin 5-HT2C receptors. The clinical and experimental effects of agomelatine on the liver are highly controversial. Despite its distinguished psychotropic effects, agomelatine causes some liver function abnormalities in humans while exhibiting liver protective effects in rats. Therefore, this study aimed to investigate agomelatine's effects in rat liver after exposure to chronic restraint stress (CRS) as a valid model of depression.
Methods: Thirty-six male Sprague-Dawley rats were allocated into four groups: normal control rats, CRS rats subjected to physical stress for six weeks, CRS rats treated with fluoxetine, or agomelatine for three weeks. Liver enzymes were measured in plasma, while oxidative stress markers were determined in liver tissue.

In addition, apoptotic and proliferative markers were evaluated by immunohistochemistry.
Results: The use of agomelatine for three consecutive weeks in CRS rats showed normal liver transaminases in serum compared to control groups. Similarly, no significant changes were detected in oxidative stress markers; malondialdehyde, reduced glutathione and superoxide dismutase after agomelatine use and between the study groups ($P > 0.05$). Interestingly, significant upregulations of caspase-3 and proliferating cell nuclear antigen were detected CRS rats and this increase was reversed by the use of agomelatine.
Conclusions: This study revealed for the first time the potential role of agomelatine in hepatocyte proliferation and apoptosis during depression model. More studies are needed to further understand agomelatine molecular effects in the liver.

Abstract Code: OET402

The protective efficacy of Acetyl-L-carnitine and liposomal-coenzyme Q10 against propionic acid-induced liver injury.

Student(s) Name: *Rahaf H. Alsoghayer, Lina M. Alhushan*
Supervisor(s) Name: *Ahlam M. Alhusaini*

Abstract:
Background: Propionic Acid (PRA) is a metabolic end-product of enteric bacteria in the gut, and it is commonly used as a food preservative. Although the necessity of PRA for the immunity in the body, the excessive exposure of this product may result in disruptive effects. this study aims to examine the protective effect of Acetyl-L-carnitine (A-CAR) and liposomal Co-enzyme Q10 (L-CoQ10) against PRA-induced liver injury.
Methods: Liver injury in rats was induced by oral administration of PRA, and concurrently treated with A-CAR and/or L-CoQ10 for 5 days. Oxidative stress, inflammatory, apoptotic, and fibrotic biomarkers were analyzed; the histology of liver tissues was assessed as well to further explore any pathological alteration induced.
Results: PRA caused significant increase in serum liver enzymes, and hepatic malondialdehyde (MDA), tumor necrosis factor-α (TNF-α), interleukin-6 (IL-6), and caspase-3 levels along with histopathological alteration. The level of glutathione and the activity of superoxide dismutase enzyme were reduced in the liver tissues of rat that received PRA. Concurrent treatment of A-CAR and/or L-CoQ10 with PRA prevented tissue injury, decreased the levels of oxidative stress, pro-inflammatory cytokines, and apoptotic markers; additionally, A-CAR and/or L-CoQ10 modulated the gene expression of high-mobility group box-1(HMGB-1) and cytokeratin-18 (CK18), and protein expression of transforming growth factor-beta1 (TGF-β1) and SMAD3 in liver tissues.
Conclusion: A-CAR and/or L-CoQ10 showed a hepatoprotective efficacy via improving oxidative stress, inflammatory response, and apoptosis, as well as downregulating the expression of TGF-β1 and SMAD3 in the liver tissue.

Abstract Code: OET403

Liver Metabolomics Analysis in Mouse Model of Fentanyl Overdose Treated with Beta-Lactams

Student(s) Name: *Bandar Ibrahim Arif – Abdulrahman Ibrahim Alhumaydhi*
Supervisor(s) Name: *Fawaz Fayez Alasmari*

Abstract:
Background: Fentanyl is an extremely potent opioid used to treat acute and chronic pain, but recreational use can lead to liver toxicity. Beta-lactam antibiotics have been shown to regulate glutamate transporter-1 expression in various organs, including the liver, and may alleviate hyperglutamatergic conditions associated with opioid use disorders. MC-100093 is a new betalactam compound developed to attenuate glutamatergic dysregulation without antibacterial properties. MC-100093 upregulates GLT-1 expression and can potentially reduce opioidinduced liver toxicity. MC-100093 was previously found to modulate the expression of hepatic GLT-1, resulting in the attenuation of drug-induced fatty liver disease. The aim of the study was to examine the impact of fentanyl overdose on liver metabolites and assess whether ceftriaxone or MC-100093 could reverse these effects.
Methods: We collected liver samples from different groups of mice, control, fentanyl overdose, fentanyl overdose-ceftriaxone- and fentanyl overdose-MC-100093. Metabolomic analysis was performed on these samples using gas chromatography-mass spectrometry.
Results: The findings demonstrated that both ceftriaxone and MC-100093 normalized several metabolites affected by fentanyl overdose in mice. Interestingly, MC-100093 exhibited superior results compared to ceftriaxone. The enriched analysis showed that the altered metabolites were linked to various metabolic processes, including the glucose-alanine cycle, Warburg effect, gluconeogenesis, glutamate metabolism, lactose degradation, and ketone body metabolism.
Conclusion: This study found that fentanyl overdose can damage liver metabolites, and MC100093 has the potential to attenuate opioid-induced liver toxicity by restoring certain metabolites. These findings suggest that MC-100093 may be a useful therapeutic option for treating liver toxicity associated with fentanyl use.

Others

Abstract Code: OOT500

Studying Antivirulence Activity of *Meta-bromo-thiolactone* Nanoparticles Against *Staphylococcus aureus* and *MRSA*

Student(s) Name: *Amjad S. Abohamad– Bashayer M. AlFayez*
Supervisor(s) Name: *Fadilah S. Aleanizy*

Abstract:
Background: Of late, the focus has been shifting toward quorum sensing inhibitors which reduce bacterial virulence, lowering probability of resistance and refining infections.
Methods: In this work, meta-bromo-thiolactone (mBTL), a potent quorum and virulence inhibitor against Staphylococcus aureus and MRSA phenotypes, were formulated in chitosan nanoparticles (ChNPs) using ionic gelation method. mBTL-loaded-ChNPs were characterized for particle size, polydispersity index, zeta potential, morphology visualized by Transmission Electron Microscopy (TEM), drug release profile and antibiofilm analysis using Confocal Laser Scanning Microscope (CLSM) and Scanning Electron Microscopy (SEM).
Results: Synthesized mBTL-loaded-CNPs showed homogenized nano-size particles ranging from 158+1.3 to 284+5.6 nm with spherical particles that exhibited sustainable release profile over 48hrs at 37 °C. These findings revealed successful preparation of mBTL-loaded-ChNPs that further showed effective antibiofilm activity at MIC50 (0.5 mg/mL) were all strains displayed reduced biofilm formation compared to untreated strains. CLSM results showed a significant reduction in the number of viable cells, indicating the effectiveness of m-BTL as an antibacterial agent. SEM analysis permits visualization of biofilm structure in relation to the spatial localization of important biofilm matrix components, the formed biofilms were clearly distinguished in the SEM images. Bacterial cells in the control group were enclosed in thick biofilms. In contrast, there was a considerable reduction in biofilm production when mBTL was present, were bacterial cells seemed less ordered and more scattered with no detectable biofilm.
Conclusion: In conclusion, mBTL-loaded-ChNPs is a potential alternative treatment to overcome antimicrobial resistance is one of the most serious global health issues, MRSA infection.

Abstract Code: OOT501

Identification of Mutations in the *LAMA2* gene in Merosin-deficient congenital muscular Dystrophy (MDC1A) patients

Student(s) Name: *Lamia A AlMuhareb - Abeer W AlMubarak*
Supervisor(s) Name: *Maha M. AlRasheed -Ghada I. Aboheimed-Namik Kaya*

Abstract:
Background: Merosin deficient congenital muscular dystrophy (MDC1A) is an autosomal recessive disorder characterized by mutations in the LAMA2 gene. MDC1A patients experience progressive muscle loss, leading to complications such as scoliosis, joint contractures, or seizures. In this study, our aim was to identify variants in Saudi families with MDC1A, describe their clinical features and understand the pathogenic effect of novel variants through functional characterization.
Methods: Patients with MDC1A confirmed diagnosis at the neuromuscular clinic, KFSH&RC for the period of January 1, 2003, to September 30, 2022, were included. Clinical characteristics were obtained from patient's files. Genetic screening using whole exome and sanger sequencing were done. Functional characterization of novel LAMA2 variant includes cloning into vector for preparation of expression in mammalian cells and further molecular analysis.
Results: Fifty-seven MDC1A patients were included. Cognitive abilities were normal in majority of cases, 77% had delayed motor milestones, 20.9% had seizures, and 36.84% had recurrent hospitalizations due to chest infections. 23 variants were identified in LAMA2, 5 of which were novel. LAMA2 Gene with novel missense variant has been successfully cloned into vector which will be expressed in mammalian cells for further functional studies of variant.
Conclusion: This study presents the genotypes and full clinical features of 57 MDC1A patients which comprises the largest sample of MDC1A cases in the Middle East. Currently, there is no cure for MDC1A, therefore, our results will support future work for targeted gene therapy.

Abstract Code: OOT502

Formulation and evaluation of Sylimarin inclusion complex using TPGS as auxillary substance

Student(s) Name: *Abdulkarim A. Alotaibi*
Supervisor(s) Name: *Sultan M. Alshehri, Syed S. Imam*

Abstract:
Background: Sylimarin is a flavonoid, is not water soluble. It has poor dissolution property due to its low water solubility. The goal of the ongoing research is to develop a ternary inclusion complex using sylimarin-beta cyclodextrin-D-tocopheryl polyethylene glycol succinate.

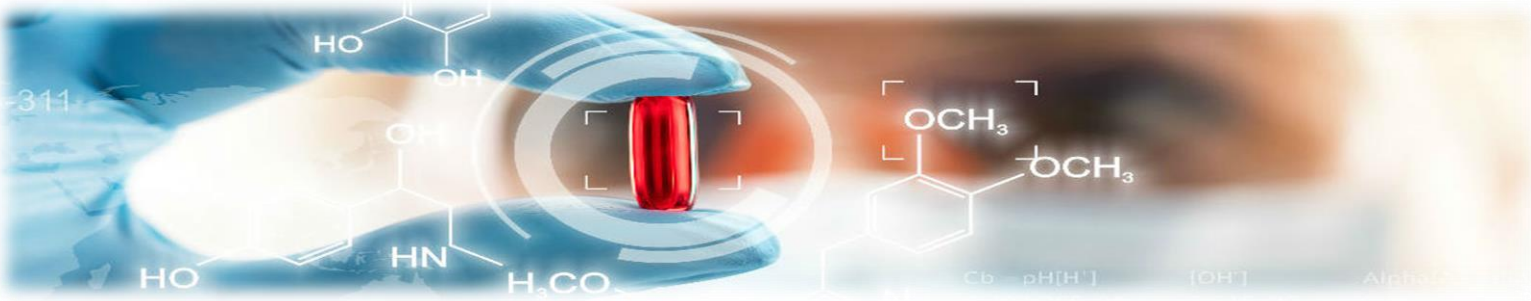
Method: The solvent evaporation approach was used to produce the inclusion complex. Phase solubility study was used to calculate the complexation efficiency and stability constant.

The produced inclusion complex was then tested for antioxidant activity, solid state characterization, and drug release.

Results: The phase solubility findings depicted that the prepared ternary inclusion complex showed high stability constant (602 M-1). The dissolution results showed that prepared ternary inclusion complex showed many fold enhancement in the drug release. The surface morphology evaluated by SEM study and image shows conversion of crystalline to amorphous state. The formation of complex was depicted by IR and NMR study. The antioxidant results revealed improved activity from ternary inclusion complex than the pure sylimarin.

Conclusion: The prepared ternary inclusion complex showed significant effect after addition of auxiliary substance in the formulation.

Master of Science in Pharmaceutics



Program Highlights

Graduates of the master of Science in Pharmaceutics will be able work in different fields such as:

Fields Available to Graduates

- Academic field
- Community pharmacies
- Pharmacies of Public, specialized hospitals, Medical centers, Home health care and long-term care facilities.
- Scientific offices of pharmaceutical companies, especially in the field of regulatory departments Pharmaceutical industry and development factories
- Drug development research centers, Regulatory bodies and authorities such as FDA and the Ministry of Health.

Requirements for Admission

- The admission requirements enumerated in the 15th article of the unified law organizing the graduate studies in Saudi universities.
- Applicant Has an adequate score in the entrance exam
- Applicant should pass successfully the interview in the Department of Pharmaceutics.

The Program and Admission Requirements can be found in the following link:
https://graduatestudies.ksu.edu.sa/ar/node/2064

About the Program

1. Program's Vision

To be a world class university and a leader in building the knowledge society.

2. Program's Mission

To provide distinctive education, produce creative research, serve society and contribute in building the knowledge economy and community through learning, creative thinking environment, the optimal use of technology and effective international partnership.

3. Program's Objectives

The program has been designed to accomplish the following objectives:

- The major goal is to provide graduate instructions and individualized research training of the highest quality leading to the Master of Science degree (M.S.) in pharmaceutics.
- To qualify the recipient for a research-oriented career in industry, academia, government service or health care institutions.
- To strengthen the scientific background of the candidate in all areas of pharmaceutics.
- To fulfill the growing demand for higher education in the Saudi society.

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For further information, we encourage you to explore our website to access a wealth of useful information about the research interests of the individual faculty members and our updated graduate programs.

https://pharmacy.ksu.edu.sa/ar/master-of-pharmaceutics

Tel: +966114676295 (WhatsApp)
E-mail: pharmaceutics@ksu.edu.sa

Master of Science in Toxicology

Program's Vision

To become a top-ranked program in toxicological education and research for preparing students for a professional career in the future with the goal of improving human health and environmental safety.

Program's Mission

To train students to be high-quality toxicologists by providing up-to-date knowledge and rigorous scientific training in Toxicology, with a particular emphasis on utilizing toxicological data to solve toxicology-related health and environmental challenges.

Program's Objectives

1- Acquire Gain knowledge of how molecular mechanisms, biological processes, and chemical reactivity influence possible toxicant targets at the molecular, cellular, organ, and physiological levels.

2- Explain the basic principles of toxicology and their application to human health and the environment.

3- Understand toxicology`s basic techniques and methodologies, as well as the use of laboratory instrumentation, including safety and disposal regulations.

4- Develop the students` research and critical skills to independently analyze, interpret, and critique relevant toxicology research articles.

5- Develop both oral and written presentation skills by communicating original toxicological data findings to various healthcare professionals and the public.

Requirements for Admission

In addition to the requirements stated in the Unified Law of Graduate Studies at Saudi Universities, the student should hold a BSc in Pharmaceutical Sciences with a minimum of a "High Good" GPA.

The Program and Admission Requirements can be found in the following link:

https://graduatestudies.ksu.edu.sa/ar/node/20(

Fields Available to Graduates

Graduates of the Master Program in Toxicology will be able work in different fields for example: Toxicology Researcher, Toxicologist, Researcher/Manager in R&D department of Pharmaceutical Companies, Supply Manager, Drug Regulatory Officer, and Pharmacy Retail Seller … etc

Contact Us

For further information, we encourage you to explore our website to access a wealth of useful information about the research interests of the individual faculty members and our updated graduate programs.

https://pharmacy.ksu.edu.sa/ar/department-of-pharmacology-and-toxicology

Tel: 0114677184 (male section)
Tel: 0118058211 (female section)
E-mail: pharmacology@ksu.edu.sa

Graduation Research
Poster Abstracts

Pharmacy Practice and Pharmacotherapy

Abstract Code: PPP600

Qualitative insights into career perception of female community pharmacists in Saudi Arabia

Student(s) Name: *Shoug Nasser Alhinti, Rayan Brahim Alkhalaf*
Supervisor(s) Name: *Noha A. Alaloola - Lobna A. Al Juffali*

Abstract:
Background: There is a lack of studies assessed the female community pharmacists' perspectives and satisfaction about being worked in Saudi community pharmacies. The aim of this study was investigate the female pharmacists' perception towards working in community pharmacies in Saudi Arabia.
Methods: Qualitative, in-depth, semi-structured interviews with a convenience sample of female pharmacists working in Saudi community pharmacies. Interviews were audio-recorded, transcribed *verbatim*, translated, then, thematically organized and analyzed using NVivo (QSR International) Software.
Results: A total of 20 interviews were conducted and analyzed. Eight themes pertaining to the perception of female pharmacists working in Saudi community pharmacies were identified and grouped into Four major categories: (1) Job Satisfaction, (2) Job benefits. (3) Job barriers; and (4) Areas need improvement. Participants were generally satisfied. They perceived that community pharmacies provide them; a direct contact with the society, a new experience, and help them expanding their knowledge. Moreover; they perceived working in community pharmacy provide them with a family friendly and more stable job. However, participants indicated that high workload, long working hours, poor promotions, low salary, with poor community view are the main barriers preventing them from continue working in this area. Participants highlight the need for improve; training during university study and employment, the security; resources available in community pharmacies with insuring a private area for female workers. Moreover; the need for expanding pharmacist role, Saudization and increasing the number of working staff.
Conclusions: The research provides a deep understanding of female community pharmacists' needs, and providing the stakeholders with areas needs to be improve.

Abstract Code: PPP601

The Current Practice of Diabetic Ketoacidosis Management in Emergency Department in Saudi Arabia

Student(s) Name: *Shahad B. Alqudhibi Mayyadah A. Alnefaie*
Supervisor(s) Name: *Omar A. Almohammed, Sultan M. Alghadeer*

Abstract:
Background: Diabetic ketoacidosis (DKA) is a hyperglycemic emergency associated with major morbidity and mortality. Treating patients admitted with DKA using an integrated care pathway, or protocol reduces time taken for management and optimize care. The objective of this study is to investigate the current practice in the management of DKA cases.
Methods: A retrospective chart review study from electronic medical records was conducted for patients who were admitted to emergency departments and received care for DKA at two centers in Riyadh, Saudi Arabia between 2018 and 2021. Descriptive statistics was used to describe patients' characteristics and care provided to them.
Results: Out of 109 patients with DKA, nine patients (8.3%) were undiagnosed cases of DM prior to admission while 79.8% and 16.5% of total cases were classified to type-1 and type-2 diabetes respectively. Non-compliance was the most reason for DKA admission (n=59; 54.1%) while infection was the major documented predisposing factor (n=22; 20.2%). Insulin as one of hypoglycemia medications was seen in 93 patients (85.4%). Exactly 106 (97.3%) of patients were given the appropriate initial fluid. In contrast, adequate initial rehydration with the recommended initial volume within 90 minutes of admission was seen in only 54 patients (49.5%). Average time to initiate appropriate fluid was 33.9 ±21.1minutes. Despite of laboratory tests were monitored frequently/appropriately (≤6 hours), potassium supplements were dosed appropriately, based on its level, in 61 (56%) patients.
Conclusions: Our study has shown appropriate practice management in terms frequent laboratory monitoring and initiation of different management; however, inadequate initial hydration and potassium dosing were noticeable.

Abstract Code: PPP602

Cancer therapy-induced Cardiotoxicity in Children: A Multicenter Cohort Study from Saudi Arabia

Student(s) Name: *Lujain A. Alhomaid, Razan A. Albkaili*
Supervisor(s) Name: *Hadeel A. Alkofide, Lamya S. Alnaim, Basmah H. Alfageh*

Abstract:
Background: Many pediatric cancer patients survive their childhood cancer diagnosis; however, they may suffer from short- or long-term cardiotoxic events. Due to limited studies in the middle east on cardiotoxicity during and post-cancer therapy in pediatric patients, this study aims to measure the incidence of cardiotoxicity, investigate the association between clinical characteristics and cardiotoxicity, and describe the cardiac monitoring practices done on pediatric cancer patients.
Methods: A retrospective cohort study using electronic medical records of a tertiary hospital from January 2016 to January 2022. It includes children ≤13 years with any type of cancer and receiving cancer therapy during the study period. Subjects with cardiovascular disease before starting cancer therapy were excluded. Descriptive statistics were used to summarize the study results.
Results: Medical charts from 90 pediatric cancer patients were reviewed in this study. The median age of participants was 4 years, and the interquartile range was 3-7 years. At the end of the study follow-up, 80% of participants had completed their cancer treatment. Almost all patients (88/90) received one or more known cardiotoxic agents. We found that 27.77% (25/90) of the cohort developed cardiotoxicity either during or post-treatment, with most events happening during therapy. Most of the patients had an echocardiogram done before treatment (78.88%), and during treatment (68.88%) while only 4.44% had an echocardiogram done post-treatment.
Conclusions: This study shows a high incidence rate of cardiotoxicity in pediatric cancer patients in Saudi Arabia with suboptimal post-treatment cardiac monitoring, which could impact the reporting of chronic cardiotoxicity.

Abstract Code: PPP603

Real-world experience of anti-TNF (Infliximab and Adalimumab) agents in inflammatory bowel disease management in tertiary care centre in Riyadh city: A cross sectional study

Student(s) Name: *Rawaeb S. Almutairi - Alaa H. Alhussain*
Supervisor(s) Name: *Lamya S. Alnaim, Ahmed Y. Mayet*

Abstract:
Background: Biological therapies, especially tumor necrosis factor inhibitors (anti-TNF), have changed the clinical practice for the management of inflammatory bowel disease (IBD). However, despite the anti-TNFs agents being effective in treating IBD, up to 50% experience secondary loss of response (SLR) during the first year of treatment. However, loss of clinical response is associated with an undetectable concentration of serum of anti-TNF agents. Therefore, variable rates of clinical remission could also occur because of the variable mechanism of clearance of anti-TNF agents, independent from the formation of antibodies. It is suggested that therapeutic drug monitoring (TDM) can reduce failure to optimize treatment outcomes and prevent flares. However, in Saudi Arabia, there is a lack of data about the prevalence of antidrug antibodies (ADAs) and the treatment approaches to optimize the trough level of infliximab (IFX) or adalimumab (ADA) and ADAs to maintain clinical remission. We aimed to assess the prevalence of ADAs and describe the intervention approaches and their clinical outcomes in the real-life clinical setting in one tertiary hospital in Riyadh city.
Methods: We performed a single-center, cross-sectional, retrospective study of 221 IBD patients treated with IFX or ADA as maintenance therapy in King Fahad Medical City (KFMC) hospital. Patients who had trough level and antidrug antibodies (ADAs) measured between 2019 to 2023 were eligible.
Results: Still in Progress
Conclusions: Still in Progress

Abstract Code: PPP604

Assessing Attention deficit and hyperactivity disorder (ADHD) knowledge and awareness among healthcare college students at Riyadh

Student(s) Name: *Osama W. Jameel, Nmshan A. Alnmshan, Abdullah M. Alsahli*
Supervisor(s) Name: *Abdlatif A. Alghaiheb, Wael H. Mansy*

Abstract:
Background: Attention deficit hyperactivity disorder (ADHD) is a common neuropsychiatric disorder, particularly in childhood and can continue through adulthood characterized by a persistent pattern of impulsiveness and inattention, with or without hyperactivity. This study was conducted to explore the knowledge and attitude of senior pharmacy students and pharmacy interns about ADHD in Riyadh, Saudi Arabia.
Methods: A cross-sectional study using an online survey was conducted in 4 universities in Riyadh, Saudi Arabia. A convenience sample of male and female fourth and fifth-year healthcare students and interns from King Saud University, KSAU-HS, Imam Mohammed ibn Saud, Almaarefa university and Princess Nourah Bint Abdulrahman University, Microsoft Excel and the (SPSS) software, version 20, were used to conduct the statistical analyses.
Results: A total of 322 participants were involved in this study, most of participant were < 24 years old, 54% were male, 97% most of participants were Saudi. The majority of 92.9% student demonstrated good awareness about ADHD is one of the most common neuropsychiatric disorders of childhood and adolescence, also students manifested a good knowledge about ADHD symptoms and management depend on their answer which they get 83 complete answer (25.8%) multimodal 157 (48.8%) respectively.

Conclusions: According to our research findings, the vast majority of healthcare students in Riyadh had strong knowledge and awareness of attention deficit hyperactivity disorder (ADHD), and there was very little room for misinterpretation regarding the most crucial principal elements of ADHD.

Abstract Code: PPP605

Assessing the toxicity of adjuvant chemotherapy in treatment of early stage breast cancer women in Saudi Arabia: A cross sectional study 2018-2022

Student(s) Name: *Ohud Alsudyyes, Reema Alkadi*
Supervisor(s) Name: *Lamya Alnaim*

Abstract:
Background: Breast cancer (BC) is the most common cancer among women worldwide. Adjuvant chemotherapy is an additional treatment option used after primary therapy for BC patients to reduce recurrences and overall mortality. However, chemotherapy is associated with short-term toxicities that can have a significant impact on patients' quality of life. This study aimed to examine the prevalence, frequency, and short-term impact of chemotherapy-related toxicities in Saudi Arabia.
Methods: Female patients (≥18 years) diagnosed with early stage BC (I & II) between 2018-2022 were retrospectively sampled from the oncology department at King Khalid University Hospital (KKUH). Data was collected from Electronic medical files (E-Sihi) using a structured and validated assessment tool.
Results: Out of 72 BC patients, n=35 (48.61%) were aged between 30–49 years, whereas n=4 (5.56%) aged from 18-29. Stage II found to be more than stage I (78% vs 22%). The most common types of adjuvant chemotherapy used were Cyclophosphamide (70%), Docetaxel (54%), & Epirubicin (50%). The most common side effects among patients were (Renal failure, Neutropenia, Leukopenia and anemia). The most reported side effects in stage I were seen in (Trastuzumab & Tamoxifen), while (Cyclophosphamide & Docetaxel) in stage II. The results indicate those who didn't have Leukopenia were with high BMI with p-value<0.05 compared to others.
Conclusion: The findings of this study can help healthcare providers in Saudi Arabia to make better decisions when managing the toxicities of adjuvant chemotherapy in BC patients. Further studies are needed to assess the long-term effects of these toxicities on patients' quality of life

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Abstract Code: PPP606

Factors Contributing to Bupivacaine Hydrochloride Effectiveness in Anaesthesia: A Narrative Review

Student(s) Name: *Noura B. Alotaibi - Reema A. Alsuwairi*
Supervisor(s) Name: *Ghadah A. Assiri – Afraa A. Alsafadi*

Abstract:
Background: Bupivacaine is a potent agent for producing prolonged anesthesia. It is commonly used in regional, epidural, spinal anaesthesia, and local infiltration. They generally block the generation of the action potential in nerve cells by increasing the threshold for electrical excitation. It has recently been not effective during surgeries in some patients. We aim in this narrative review to summarize the results from the previous studies that were focused on studying the factors that may contribute to affect the effectiveness of Bupivacaine hydrochloride.
Methods: We searched PubMed, MEDLINE, Google Scholar and British Journal of Anesthesia (BJA) for references to retrieved articles during the last 11c jmn, dvnjmdfn dfcbh vadfd nnvczsf n years, from January 2011 to December 2022.
Results: A total of 12 studies were found. we found that younger age, lower BMI or ≤29.5 kg/m2, gauge needle and chemical instability are factors that may contribute to effecting Bupivacaine effectiveness or lead to aneasthesia failure. Also, low dose Bupivacaine in spinal anaesthesia effects the anaesthetic efficacy despite the benefit of lower side effects. In comparative studies, we found that Articanie and Ropivacaine are better choices for patients who require an aneasthetic agent.
Conclusions: Due to the small numbers of studies included, there is currently a lack of evidence about factors that could effect Bupivacaine efficacy for anesthesia in patients undergoing surgeries. Further research studies and RCTs are needed to assess Bupivacaine efficacy for anesthesia.

Abstract Code: PPP607

Real-world complications associated with the use of immune checkpoint inhibitors in oncology: a retrospective study from an academic tertiary care center in Saudi Arabia.

Student(s) Name: *Ali F. Albokhari, Nawaf E. Abualreesh*
Supervisor(s) Name: *Abdulrahman M. alwihabi, Miteb A. Al-Anzi, Saleh A. Alanazi*

Abstract:
Background: Immune checkpoint inhibitors (ICIs) have changed the landscape of cancer therapy and show promising treatment outcomes. However, new complications emerged with the treatment. Yet few studies have assessed that in Saudi Arabia. This study aimed to determine incidence rate of new complications at two tertiary care centers in Saudi Arabia.
Methods: Medical records of patients at KKUMC and KAIMRC from 2012-2022, who received ≥ 1 dose of ICIs were reviewed retrospectively for any complications documented after ICI initiation. Complications rates and their correlation with patients' characteristics were estimated using SPSS with p<0.05 indicating statistical significance.

Results:503 patients with a mean age of 62 years were identified. Majority were on nivolumab, followed by pembrolizumab, atezolizumab and durvalumab (257, 151, 90 and 5 patients, respectively).
94% had solid tumors, and 75% were at stage IV before starting ICI. 53% had cardiovascular comorbidities, while 30% had other comorbidities. Pneumonia, AKI, neutropenia/thrombocytopenia, hypo/hyperthyroidism, occurred in 9.7%, 8%, 7% and 4.5% following ICIs, without significant difference between ICIs
However, hepatitis, colitis and CVDs occurred in 8%, 3.8% and 1.2%, with a significant difference ($p< 0.001$) between ICIs. Among ICIs, use, nivolumab was significantly associated with arthralgia ($p = 0.003$). History of hepatitis and increased age were significantly correlated with higher incidence of hepatitis and neutropenia ($p < 0.001$).
Conclusion: This study highlights newly diagnosed complications associated with ICIs in a real-world setting, which may lead to treatment interruption or discontinuation. Further strategies should be developed to minimize their impact on patient outcomes.

Abstract Code: PPP608

Pharmacogenomics and genetics knowledge, attitude and perception of nursing and applied medical science students: an observational study in Saudi Arabia

Student(s) Name: *Mohannad Turki Alturki / Salman Nasser Alzeer*
Supervisor(s) Name: *Mohammed Alarifi*

Abstract:
Background: To fulfill their professional commitments in the genomic era as essential healthcare providers, nurses and applied medical science students need genomic competency. The purpose of this study was to assess knowledge, attitude, and perception of nursing and applied medical science student
Methods: A cross-sectional study was conducted on nursing and applied medical science student colleges of kingdom Saudi Arabia.
Results: A total of 1009 students completed the questionnaire. About 59 % correctly defined pharmacogenomics and 72,6% understood that genetic change could lead to adverse reactions. Approximately half of the participants agreed that the FDA recommends pharmacogenomics testing for certain drugs. 78% of students agreed on pharmacogenomics testing for selecting the therapy with the least possible side effect adverse effects. About 30% of nursing and applied medical science students reported that they took course related to Pharmacogenomics and Pharmacogenetics. Only 65.4% of students were interested in attending genetic course
Conclusions: Due to this knowledge gap in pharmacogenomics, nursing and applied medical science students need to be aware of its importance. Some of the critical actions that must be addressed include incorporating full-time pharmacogenomics courses into the nursing and applied medical science curriculum, continuing training modules, etc.

Abstract Code: PPP609

Clinical pharmacokinetics of edoxaban in obese patients

Student(s) Name: *Maram Bin Hazzaa*
Supervisor(s) Name: *Saeed Alqahtani*

Abstract:
Background: Obesity is linked to an increased risk of cardiovascular morbidity and death, including an increase in venous thromboembolism (VTE) and atrial fibrillation (AF). Direct oral anti-coagulants (DOACs) have grown into the recommended antithrombotic therapy for a number of conditions, including primary and secondary stroke prevention in patients with nonvalvular atrial fibrillation, as well as primary VTE prophylaxis. Volume of distribution (Vd) and elimination are the two pharmacokinetic variables most likely to change in patients with high BW/BMI; these patients exhibit considerable PK changes. To review literature on PK profile, efficacy, and safety of edoxaban in VTE and AF patients with morbid obesity and make recommendations regarding optimal dosing regimens in these patient populations.
Methods: We performed a comprehensive literature search (from inception to March 01, 2023) for relevant articles involving PK and clinical data on edoxaban use in morbidly obese patients with VTE or AF, or healthy volunteers.
Results: A total of 6 studies were identified. We have observed variations in edoxaban specific PK and clinical outcomes. Obesity may have a modest effect on PK of edoxaban. The findings of these studies suggested that patients with extreme obesity and receiving edoxaban therapy had edoxaban plasma concentration in the expected range.
Conclusions: Our systematic review study suggests that edoxaban at standard doses appear to have similar PK, efficacy, and safety in obese patients. However, information on patients with extreme body weight was limited and more structured RCTs are required.

Abstract Code: PPP610

Quality of life assessment among Saudi diabetic patients: A cross sectional study

Student(s) Name: *Manolia M. AlKhedr & Raghad S. AlOnazi*
Supervisor(s) Name: *Abdulaziz AlHossan*

Abstract:
Background: Diabetes mellitus is a chronic disease with a high prevalence in Saudi Arabia and has a wide range of effects on the physical, social and psychological aspects of the well-being of a person, and causes a significant rate of morbidity and mortality.

Health-related quality of life (HRQoL) is one of the most widely measured treatment outcomes to self-assess the effects of the management of chronic disease on health, and monitors the physical, psychological and social aspects of personal health. It is influenced by individual expectations, beliefs, perceptions and experiences. The aim of our study is to assess the quality of life among Saudi diabetic patients and to highlight the major quality of life aspects that can affect on patients having diabetes.
Methods: This was a cross-sectional study, conducted between May 2022 and February 2023, Patients who visit the DM clinics and have been diagnosed for >10 years with DM at King Khalid University Hospital were included through online survey. The Diabetic Quality of Life (DQoL) tool was used in this study to measure the quality of life.
Results: Under progress.
Conclusions: Under progress.

Abstract Code: PPP611

Assessing the Knowledge, awareness, attitude, and practice of interns of health colleges toward HBV Disease and Vaccination in KSU

Student(s) Name: *Mamdouh M. Alotaibi, Ibrahim S. Alokail*
Supervisor(s) Name: *Wael H. Mansy*

Abstract:
Background: Interns are exposed to HBV; however, their lack of necessary precaution skills and practical knowledge may contribute to spreading infection among the population. Therefore, our objective is to ascertain the level of knowledge, awareness, attitude, and practice of interns of health colleges toward HBV and Vaccination at King Saud University.
Methods: We conducted a cross-sectional study for all interns from December 2021 to December 2022. The questionnaire was sent as an online survey. It consisted of four parts: sociodemographic details, knowledge, attitude, and practices related to HBV. All statistical analyses were performed using Statistical Package for the Social Sciences 25 version statistical software.
Results: from the participants, 64.4% of them were from pharmacy college, 77.3% were male, 98.5% were Saudis, only 14.5% of interns know all the ways of the disease transmission, and almost most of the interns, 91%, think that Vaccines are effective. 78.4% believe they should take the vaccine before practicing in hospitals, but only 28.9% of them engaged in training education for HBV in the last year. 90.2% stated that they believe that HBV can causes liver cirrhosis, and 84.5% believe that HBV causes liver cancer. 70% reported that patients with HBV can have no symptoms, and 66.5% stated that severe cases should always accompany by symptoms.
Conclusions: Health colleges interns lack more in-depth and essential information about the Hepatitis B virus and its vaccine, despite having adequate knowledge of the disease's fundamentals

Abstract Code: PPP612

Assessing Oncology Practitioners Attitudes and Practices of Utilizing Nonformulary Drugs in Saudi Arabia

Student(s) Name: *Leena H. Alshubaiki, Basha F. Alsubaie*
Supervisor(s) Name: *Nora A. alkhudair*

Abstract:
Background: Formulary drug list is a continually updated list of medications that are routinely stocked by hospitals and other health care facilities and deemed to be effective, safe and cost-saving. Non formulary drug (NFD) refer to medications not on the formulary, due to cost or lack of clinical data. This study aimed to examine the practice of NFD of oncology providers in Saudi Arabia.
Method: A cross-sectional study of health care practitioners working in oncology centers in Saudi Arabia who were included. A surveywas designed with 30 multiple-choice, open-ended, and Likert scale questions. Approval was obtained from King Saud University IRB [E-22-7249].
Results: A total of 93 physicians and pharmacists responded, 57% were pharmacists, 43% were physicians, and 94.6% were working in governmental sector. Around 30% reported that it takes one-week to receive a decision on their NFD request, while 28.0% it takes between two-weeks and one-month. In addition, 35.5% indicated that the entire process of NFD takes 2-4 months, with 8.6% indicating that it takes longer than six months. The common obstacle was requesting NFD, were procurement delays and lengthy processing times. Additionally, 26.9% agreed that formulary restrictions prevented the best medical care, and 40.3% reported delays patient care. While 33.8% were forced to use fewer effective options and 22.1% referred patients to palliative care.
Conclusions: The current practice of NFD has negative consequences on cancer patient outcomes, due to delays in patient care or use of less effective drugs. Thus, we recommend having a national NFD access program.

Abstract Code: PPP613

The association between uncontrolled hyperglycemia and cardiovascular sequelae in patient with and without insulin

Student(s) Name: *Faisal ALMurdhi, Hazim ALMalki*
Supervisor(s) Name: *Sultan Alghadeer*

Abstract:
Background: Diabetes is considered one of the most common chronic diseases in Saudi Arabia. In 2016, the WHO estimated that around 7 million of the population are diabetics and around 3 million consider prediabetics. Type 2 diabetes is the most common type of diabetes.

Long-time exposure to diabetes and elevated blood glucose levels could lead to microvascular and macrovascular disease and premature death. However, introducing insulin as a choice for a patient with uncontrolled diabetes (A1C > 9%) might be associated with cardiovascular sequelae.
Methods: Retrospective observational cohort study was conducted to detect the resulted cardiovascular complications between the two groups (A1C>9% on insulin vs. A1C>9% without insulin) at King Khalid University Hospital (KKUH). Any patient with type-2 diabetes whose A1C>9% and followed at least for 5 years were included in our study.
Results: Of a total of 153 patients with diabetes type 2 and elevated A1C (>9%), 123 (80,4%) were on insulin, and 30 (19.6%) were without insulin. The median age (66 vs. 68), baseline A1C (both 10%), baseline Scr (74 vs. 64), concurrent hypertension (86.2% vs. 83.3%), and dyslipidemia (92.7% vs. 93.3%) between the two groups were comparable. No significant association between the use of insulin and cardiovascular complications were noted (34 (27.6%) vs. 5 (16.7%); p=0.251). Additionally, there was no significant result in the relation between the use of insulin and age or DM complication or HTN or dyslipidemia or smoking or gender.
Conclusions: The wear no significant evidence of an association between use of insulin and cardiovascular complications in type-2 diabetes with A1C>9%.

Abstract Code: PPP614

Reviewing the prescribing pattern of antipsychotic using Total Daily Dose online tool (TDD) for Schizophrenic Patients.

Student(s) Name: *Ghaida S. Almutlaq – Hessa A. Alnughamish*
Supervisor(s) Name: *Jawza F. Alsabhan*

Abstract:
Background: Drug utilization plays a key role for healthcare providers to understand, evaluate, and improve medication prescribing and use. Therefore, it is necessary to utilize drugs with high-risk side effects, such as antipsychotics. This study aims to review the antipsychotic prescribing pattern among schizophrenic patients using a total daily dose (TDD) calculator and discover the need to apply a tool for high-dose antipsychotic prescribing in schizophrenic patients.
Methods: A cross-sectional study conducted among schizophrenic patients. Data was collected from medical records in the primary care of psychiatry clinic at KSUMC. All information was filled on a predesigned data collection sheet then was divided into three sections, demographic data, antipsychotic medication information and BNF factor. The total daily dose was calculated by using an online total daily dose (TDD) calculator. The statistical analysis was done by SPSS program.
Results: The total number of patients who received antipsychotics were 272 patients. In general, most frequently used antipsychotic was Aripiprazole 10 mg tablet (14.0%) followed by Haloperidol 5 mg tablet (11.9%). Most observed BNF averages were ≤1 (93.0%) while BNF averages that exceeded 1 were the least observed (7.0%). Majority of high BNF factors were observed in the inpatient setting, patients with 1-100 Admission days and patients between the ages of 40-69 years old. BNF average mean was 0.599408 (±0.550693 SD).
Conclusions: In general, a total daily dose (TDD) calculator helps to assess the prescribing pattern of antipsychotics. However, BNF averages revealed that most patients were not at high risk of antipsychotics overdose.

Abstract Code: PPP615

Predictors of Response to Antihypertensive Medications Secondary Analysis of SPRINT and ACCORD-BP Trials

Student(s) Name: *Sarah M. Aldakhil, Ghaida A. Alsolaimi*
Supervisor(s) Name: *Ahmed F. Aldemerdash, Hadeel A. Alkofide*

Abstract:
Background: Hypertensive patients are highly heterogeneous in response to treatment. Guidelines recommend first-line management with thiazide diuretics, CCBs, and ACEIs or ARBs with no general preference except for few patients with specific comorbidities. For the remaining majority, the agent of choice is unclear. Therefore, we aim to identify predictors of response to antihypertensive medications depending on the magnitude of BP control to allow us to objectify the initial and appropriate choice of therapy for each hypertensive patient.
Methods: A secondary analysis was performed of all baseline variables, antihypertensive medications used, and BP responses in subjects from the Systolic Blood Pressure Intervention Trial (SPRINT) and the Action to Control Cardiovascular Risk in Diabetes (ACCORD-BP). Data were obtained from the National Heart, Lung, and Blood Institute (NHLBI). The primary outcome is to identify the predictors of response to each antihypertensive medication or combination. Predictors will be identified using regression analysis.
Results: The analysis included 11,723 patients: 9361 from SPRINT and 2362 from ACCORD-BP trials. All major antihypertensive classes and reported agents were included from both studies. Key baseline variables include BP, age, gender, race/ethnicity, BMI, clinical/subclinical CVD history, medications, and BP measurements over time will be assessed. These characteristics along with the response will allow identifying the predictors.
Conclusions: The findings of the prediction model will allow to highlight the most appropriate antihypertensive medications, either individual agent or combination, that is recommended to be used in specific hypertensive patient based on the individual patient characteristics for optimal BP management early on.

Abstract Code: PPP616

Evaluating the effect of Semaglutide on health outcomes among Saudi type II diabetic patients

Student(s) Name: *Bushra H. Alnefaie - Daliah A. Alawbathani*
Supervisor(s) Name: Abdulaziz M. Alhossan

Abstract:
Background: Diabetes mellitus (DM) is a common metabolic disorder that is considered one of the leading causes of morbidity and mortality in Saudi Arabia. Semaglutide is a new antidiabetic medication that has recently been approved in Saudi Arabia. The aim of our study is to evaluate Semaglutide effects in Saudi diabetic patients.
Methods: This is a retrospective chart review study of Saudi T2D patients who received Semaglutide in a tertiary teaching hospital between January 2022 to September 2022. All Saudi patients with type II diabetes who met the inclusion criteria and had received Semaglutide for at least 3 months were included in our study. Data collected include patient's demographics, hemoglobin A1C (HbA1C), body mass index (BMI), blood pressure (BP), lipid panel, and reported Semaglutide side effects.
Results: 507 patients included in the study, in which 415 patients met the inclusion criteria. The mean age was 52.9 ± 14.1 years and the mean baseline BMI was 34.5 ± 3.6 kg/m2. HbA1C levels were significantly reduced after using Semaglutide over the study period compared to the baseline (-1.2% ± 0.42%, $p < 0.001$). Also, the reduction in weight was statistically significant with – 1.6 ± 0.7 kg/m2 ($p < 0.01$). There was no significant reduction in BP readings nor in lipid panel over the study period ($p = 0.08$). 21 patients couldn't tolerate the medication GI side effect and 6 patients discontinued the medication due to hypoglycemia.
Conclusions: Semaglutide showed a beneficial effect for Saudi patients with type II diabetes in terms of A1c and weight reduction. The data is consistent with international published studies

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Abstract Code: PPP617

Cost-Consequence Analysis of Tocilizumab Versus Adalimumab and Etanercept Among Rheumatoid Arthritis Patients in Saudi Arabia: A Single-Center Study

Student(s) Name: *Areej Salem Albahdal, Amjad Mohammed Alotaibi*
Supervisor(s) Name: *Yazed S. AlRuthia*

Abstract:
Background: Given the rising incidence of rheumatoid arthritis (RA) and its high treatment cost, it is crucial to assess the cost and effectiveness of different treatments using real-world data. Therefore, the aim of this study was to assess the treatment costs and effectiveness tocilizumab versus adalimumab and etanercept on reducing the levels of two inflammatory markers (e.g., C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR)) among patients with RA.
Method: This was a single-center retrospective cohort study in which data for RA patients aged ≥18 years and treated with tocilizumab, adalimumab, or etanercept were retrieved from the electronic medical records (EMRs) of a tertiary care center in Saudi Arabia. Patients were followed up for at least 12 months after the treatment initiation. Bottom-up micro-costing was utilized to estimate the direct medical costs. Inverse probability treatment weighting and bootstrapping with 10,000 replications were conducted to generate the 95% confidence levels.
Results: One-hundred and fifty patients (tocilizumab (n=56), adalimumab (n=41), etanercept (n=53)) met the inclusion criteria and were included. Patients on tocilizumab had 3.96 mg/L (95% CI: -0.229 – 4.95) and 11.21 mm/hr (95% CI: 10.28 – 18.11) greater mean reductions in the CRP and ESR levels compared to patients on adalimumab and etanercept, respectively. However, this was associated with mean annual incremental costs of USD 10,087.88 (95% CI: 9494.50 – 11,441.63).
Conclusion: Tocilizumab has shown better effectiveness in reducing the levels of CRP and ESR, but with higher costs in comparison to adalimumab and etanercept among RA patients.

Abstract Code: PPP618

Awareness and Prevalence of Celiac Disease (CD) Among male Saudi high school students in Riyadh City, Saudi Arabia.

Student(s) Name: *Alfaisal T. Asiri – Faris A. Aldammas*
Supervisor(s) Name: *Wael H. Mansy*

Abstract:
Background: Celiac disease (CD) is a small intestinal immune-mediated enteropathy, a long-term autoimmune disorder. Although the prevalence of CD is increasing worldwide, the diagnosis rate is rising more slowly. As a result, many patients with CD remain undiagnosed and are more likely to develop complications of the latent disease. Exploration of the knowledge of CD among high school students in Saudi Arabia remains limited. So, this study aims to assess the awareness and prevalence of CD among high school students in Riyadh, Saudi Arabia.
Methods: A cross-sectional, paper-based, self-administered survey study was conducted between December 2022 and February 2023. The questionnaire consisted of sociodemographic details, prevalence and knowledge related to CD distributed among male high school students, covering all areas of Riyadh city
Results: We gathered 965 responses from male high school students aged 15-20. The results showed that the prevalence of CD among male high school students in the Riyadh region was only 0.7%. In addition, most students (68.15%) needed better knowledge about CD, with only (31.85%) having good knowledge about the disease.

Conclusions: The CD is an autoimmune disorder that is increasing globally. However, this study showed only 0.7% of male high school students in Riyadh have CD, and most needed better knowledge about it. The lack of awareness highlights the need for increased education to promote early diagnosis and prevention of complications

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Abstract Code: PPP619

Pharmacogenomics and genetics knowledge, attitude and perception of medical students in Saudi Arabia

Student(s) Name: *Abdulmohsen Alabdulkareem, Saud Alarifi*
Supervisor(s) Name: *Mohammed Alarif*

Abstract:
Background: Pharmacogenomics (PG) is the study of a person's genetic makeup to ascertain whether they might benefit from a medication, need a different dosage, or experience side effects. It is therefore seen as a crucial tool in personalized medicine. The aim of this study was to assess the medical student's attitudes, knowledge, and perceptions regarding pharmacogenomics.
Methods: A cross-sectional study was carried out among medical students of different medicine colleges in the Kingdom of Saudi Arabia, using an online self-administered questionnaire to collect the data.
Results: A total of 995 participants responded to the survey, with 70.1% of the participants knew the definition of pharmacogenetics. About 90 % of students recognized that environmental factors can affect gene activity. Majority of medical students (86.7%) agreed that genetic changes affect the response to some drugs and 72.8% of them acknowledged that FDA recommends genetic testing for certain drugs. Half of students never had any course related to pharmacogenetics or pharmacogenomics. Only 60 % of medical students preferred pharmacists to explain their genome report to them. About 41% of students said to be interested in taking part in genetic research and o46.1% of students did not want to donate their genetic materials for biobank
Conclusions: Most of the medical students had fair levels of knowledge and attitude. As a result, we advise fundamental pharmacogenomic training be provided at all levels of medical curricula

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Abstract Code: PPP620

Public Awareness, Knowledge, and Engagement Towards Clinical Research

Student(s) Name: *Abdullah F. Alabdulkarim, Abdullah K. Alzeer*
Supervisor(s) Name: *Hadeel A. Alkofaide*

Abstract:
Background: Clinical research is an essential component of healthcare innovation, and public participation is crucial for its success. Limited studies have investigated the understanding of the public towards clinical research participation and engagement in Saudi Arabia. Therefore, the purpose of this study was to assess public awareness, knowledge, and engagement towards clinical research.
Methods: A cross-sectional study was conducted using an online survey. The survey was developed by reviewing the literature. The survey consisted of 30 questions, including demographic information and questions related to awareness, knowledge, and engagement with clinical research. The survey was first developed in English then translated into Arabic. The survey was distributed through social media platforms, targeting a diverse population of individuals aged 18 years and older. Descriptive statistics were sued to describe the study results.
Results: Of the 240 responders of the survey, majority were below the age of 45 years, and 70.8% were females. About 55% hold a bachelor's degree, and 86% do not study or work in the medical field. About 56% of the participants have ever heard of clinical research, and their source of knowledge was mostly the media. The majority did not ever participate in clinical research, and half are willing to participate in the future. More than 68% of subjects prefer participating in survey research. Only 43% of participants are aware of public engagement in clinical research.
Conclusions: The findings of this study may help in developing tactics to improve public participation and engagement in clinical research in Saudi Arabia

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Abstract Code: PPP621

Drug Holiday Practices and Outcomes in Postmenopausal Women with Osteoporosis on Bisphosphonate Therapy: A Single Center Retrospective Study

Student(s) Name: *Abdulhadi Ali Al-Ofair*
Supervisor(s) Name: *Ghada Abdulrahim Bawazeer*

Abstract:
Background: Bisphosphonates (BSP) are well-established and well-tolerated treatment for osteoporosis. Long-term use of BSP has been linked to rare but concerning adverse drug events (ADE) such as osteonecrosis of the jaw and atypical femoral fracture (AFF). Clinical guidelines suggest using drug holiday (DH) in selected patients to reduce such ADE. The present study aims to characterize DH utilization patterns and outcomes in postmenopausal women on BSP therapy.
Method: A retrospective analysis of all medical data from KKUH between May 2015 to September 2022 of women >50 who have osteoporosis, have received BSP for at least one year, and have had at least two BMD measurements. Patients' demographics, comorbidities, concurrent medications, fracture history, BMD data, and BSP data (BSP duration of use, DH initiation and duration, BSP reinitiation, and fracture risk) were collected. The R statistical package was used for statistical analysis.

Results: Out of 901 screened medical records, 807 were included. Mean age and BMI were 60.85+-9.1 years and 28.76+5.37 Kg/m2, respectively. The mean lumbar T-scores were -3.015 before and -2.875 after BSP, about 10% had history of fracture. DH was used in 34% of patients, with a mean duration of 2.18+1.04 years.
There were 122 reported fractures following BSP initiation, 18 were AFF, eight cases occurred in those receiving DH. About 26% of patients were switched to non bisphosphonate therapy. Further analysis on patients' characteristics and DH are underway.
Conclusion: Clinicians should carefully individualize the decisions to continue BSP or institute DH based on postmenopausal women characteristics and risk factors.

Social Pharmacy and Pharmaceutical Outcomes

Abstract Code: PSP700

Public awareness and consumers' experience and satisfaction with online pharmacy services in Saudi Arabia

Student(s) Name: *Shoug K. Aloraini, Reem S. Alqahtani*
Supervisor(s) Name: *Norah O. Abanmy, Omar A. Almohammed*

Abstract:
Background: Online pharmacies (OPs) is a growing field that plays an important role in providing pharmaceutical service in Saudi Arabia. Thus, investigating public awareness of its existence and assessing the consumers' experience and satisfaction with OPs will be the main aim of this study.
Methods: A cross-sectional study using a custom-designed validated questionnaire was conducted including adults (≥ 18 years). The survey consisted of three sections: demographic characteristics, awareness of existence of OPs, and customers' satisfaction level. Data were collected through social media platforms.
Results: We received 487 responses, 65.7% of the respondents were female, and 39.6% were between the ages of 18 and 29 years. Around 90.0% of participants were aware of the existence of OPs and 60.2% of those who were aware had a previous experience purchasing from OPs. The most commonly purchased products were personal care items, herbal supplements, cosmetics, and OTC medications, while prescribed medications were bought by only 22.5% of those who had a previous experience. The majority were satisfied with the products' quality (92.7%), complete delivery of orders (91.2%), product's delivery condition and packaging (89.3%). However, the participant's ability to easily communicate with pharmacists when they had questions was one of the most important reasons for dissatisfaction. Indicating their overall satisfaction with OPs, 99.2% of customers will continue to purchase from OPs.
Conclusions: There is an increasing awareness of OP existence in Saudi Arabia. However, medication, including prescribed ones, was the least ordered. We think that improving customers' communication with online pharmacists might improve the online ordering of medications.

Abstract Code: PSP701

Opportunities and Barriers for Online Pharmacies in Saudi Arabia: A Cross-sectional study

Student(s) Name: *Fatmah O. Ghannam, Rawan A. Alnogaidan*
Supervisor(s) Name: *Norah O. Abanmy, Omar A. Almohammed*

Abstract:
Background: The need for online pharmacies (OPs) became a public health necessity. This study examined opportunities and barriers for OPs in Saudi Arabia (SA) to facilitate public access to OPs in the future.
Methods: A cross-sectional, questionnaire-based study was conducted including adults (≥ 18 years) in SA. The questionnaire examined whether participants purchased from OPs, and it assessed the motivational factors for purchasing among the consumers. As well as, the reasons for currently not purchasing from OPs and services that will motivate non-consumers to purchase.
Results: Overall, 487 residents participated in the study, most of them were females (65.7%) and 18–29 years old (39.6%). Among all, 89.3% were aware of the existence of OPs, and 60.2% of them bought from OPs previously. The customers of OPs' indicated that time saving (85.5%), offers/discounts (83.6%) and the existence of a variety of products (82.1%) are the main motivational factors for them to purchase from OPs. However, non-consumers (46.2%) indicated that the main reasons for not purchasing from OPs are personal preference to visit community pharmacy (87.2%), talk to pharmacists (83.6%), and existence of nearby pharmacy (80.0%). The non-consumers would purchase from OPs if medication consultation (83.1%), delivering products in good condition (66.2%), and ensuring products' compatibility with other medications and health conditions (65.8%) were provided.
Conclusions: The study identified factors that lead participants to be motivated toward using OPs. While non-consumers still need certain services to be provided by OPs. Providing these services may enhance the growth of OP market in SA.

Abstract Code: PSP702

Multinational Pharmaceutical Companies views of Clinical Trials allocation to Saudi Arabia - A qualitative study.

Student(s) Name: *Tareq A. Alshamrani, Osama S. Alamri*
Supervisor(s) Name: *Ahmad M. Shaman, Nouf M. Alodah*

Abstract:
Background: Saudi Arabia (KSA) has the largest pharmaceutical market in the region, but the number of Pharma-sponsored clinical trials conducted in the country is limited.
Identifying barriers and facilitators for conducting Pharma-sponsored clinical trials in KSA can help inform interventions to attract more trials and bring health, economic, and social benefits to the country. However, no previous study has empirically explored these barriers.
Methods: A mixed-method approach was used, consisting of a document analysis of available data related to the factors affecting Pharma-sponsored clinical trials in KSA, followed by in-depth, semi-structured interviews with key personnel from multinational pharmaceutical companies involved in clinical trials in the country.
Results: The document analysis study showed that there were many phase 2 and 3 studies were withdrawn and terminated. The Interviews are ongoing and the preliminary analysis revealed several barriers including lengthy timelines for ethics committees (ECs) approval and variance of the requirements.
Conclusions: The study provided insights into the challenges and opportunities for conducting Pharma-sponsored clinical trials in KSA. The identified barriers and recommendations could inform intervention(s) aimed at improving the country's position as a preferred destination for conducting clinical trials, leading to improved health, economic, and social outcomes.

Abstract Code: PSP703

Knowledge, Attitude, and counselling of pharmacists about topical corticosteroids in atopic eczema among community pharmacy in Saudi Arabia

Student(s) Name: *Muhanad Alrashoud, Sami alshuayb*
Supervisor(s) Name: *Muhammed alarifi, Salmeen Babelghaith*

Abstract:
Background: Although pharmacists play a critical role in patients' safety and appropriate use of topical corticosteroids (TCs), there is a little study on the pharmacist's counseling behavior for TCs in Saudi Arabia. The purpose of this study was to examine community pharmacists' knowledge, attitude toward information provision, and self-reported patient counselling behavior in relation to topical

corticosteroids and adjunct therapy for the treatment of atopic eczema
Methods: A cross sectional study was conducted among community pharmacists at Riyadh city in period of 6 months.
Result: In this study most of the CPs were knowledgeable on how to use emollients to treat atopic dermatitis and demonstrated a thorough awareness of the indications for and applications of TCs in atopic eczema. Only 51.7% of the CPs do not agree that the side effects of corticosteroids occur with proper use. More than half of the CPs advising patients to use emollients on a frequent basis as part of their atopic eczema treatment. Only 62% of CPs said that they often frequently provide counseling on TCs indication
Conclusions: This study revealed CPs had inadequate knowledge on topical corticosteroid safety.

Abstract Code: PSP704

Preparation of topical miconazole-loaded lipid based formulation

Student(s) Name: *Khalid Salem Alrashidi and Mohammed Alghadeer*
Supervisor(s) Name: *Abdul Ahad and Fahad I. Al-Jenoobi*

Abstract:
Background: Fungal infection of the skin is one of the most common dermatological diseases in the world. The aim of present study was to prepare and characterize the topical miconazole-loaded lipid based formulation.
Methods: Miconazole-loaded lipid based formulations were prepared using thin-film hydration method. The vesicles sizes, polydispersity index, zeta potential were evaluated using Malvern zeta sizer. Transmission electron microscopy (TEM) was used for the evaluation of vesicles shape. The entrapment efficiency was assessed by centrifuge technique. The optimum lipid formulation was incorporated into gel using carbopol-934 and evaluated for pH, homogeneity, spreadability. The antifungal activity was determined using the cup plate method.
Results: The optimum miconazole-loaded lipid based formulation showed nano-sized vesicles, negative zeta potential, low polydispersity index, with high entrapment efficiency. TEM image of the selected lipid based formulation demonstrated that the prepared vesicles were sealed and spherical in shape. The gel formulation demonstrated pH values of 5.66 ± 0.015, good homogeneity and spreadability of 6.27 cm, while the marketed cream formulation showed pH of 3.61, good homogeneity and spreadability of 6.70 cm. The gel formulation exhibited comparable antifungal activity as compared to marketed cream against Candida albicans.
Conclusions: Present study revealed that the developed lipid based formulation was found to be a potentially useful drug carrier for miconazole topical delivery with a suitable pH that can lead to a reduction in skin irritation caused by some other similar products. Furthermore, the prepared gel formulation could be a promising alternative to conventional cream for improving the therapeutic efficacy of poorly soluble antifungal agents.

Abstract Code: PSP705

Validation of Type II Diabetes Case Definitions in the Electronic Medical Record

Student(s) Name: *Majidah M. Alotaibi, Shahad A. Alajlan*
Supervisor(s) Name: *Yasser T. Albogami*

Abstract
Background: Accurate identification of Type II diabetes (T2D) cases in electronic health records is critical for effective public health programs. This study aims to evaluate the validity of various case definitions using HbA1c level as the gold standard.
Methods: We identified patients who visited family medicine clinics between 2019-2022, randomly selecting 200 with T2D ICD-10 codes and 200 without, matched on index-date of diagnosis. We collected data on demographics, HbA1c measurements, hypoglycemic agents, and diabetes complications. We applied three T2D case definitions: 1) T2D ICD-10 code on/before index-date, 2) any oral hypoglycemic agent on/before index-date, and 3) T2D ICD-10 code AND any oral hypoglycemic agent on/before index-date. The gold standard definition was HbA1c level >= 6.5 per American Diabetes Association guidelines. We estimated sensitivity and specificity for each definition.
Results: Patients with T2D ICD-10 codes were significantly older than patients without ICD-10 (59 vs. 46) and had higher proportions of retinopathy (15% vs. 11%) and hypoglycemia (30% vs. 15%) cases. Patients without ICD-10 had a significant proportion of heart attack (8% vs. 2.5%) and stroke (9.5% vs. 7%) cases. The T2D ICD-10 code alone identified 77% of true cases with 90% specificity. Oral hypoglycemic prescription alone captured 95% of true cases with 80% specificity. Combining both definitions yielded 75% sensitivity and 95% specificity.
Conclusions: T2D case definition in electronic health records should be multifaceted, as relying solely on ICD- 10 or oral hypoglycemic prescriptions increases the proportion of false positives. Combining both definitions should preserve sensitivity and significantly increase specificity.

Abstract Code: PSP706

Exploring the Burden of Illness Among Spinal Muscular Atrophy Patients and their Families in Saudi Arabia: A Cross-Sectional

Student(s) Name: *Khalid S. Alessa, Mohannad K. Alsuhaibani*
Supervisor(s) Name: *Yazed S. AlRuthia*

Abstract:
Background: Spinal muscular atrophy (SMA) is one of the burdensome rare health conditions with rising incidence rates in Saudi Arabia due to high rate of consanguinity. However, its socioeconomic impact is largely unknown. Therefore, the aims of this study were to evaluate the psychological and financial impact of SMA on patients and their caregivers in Saudi Arabia.
Methods: This was a cross-sectional questionnaire-based study. Snowball sampling was utilized to identify patients with SMA. Caregivers of patients under 18 years of age were used as proxies. Depression, anxiety, quality of life, and out-of-pocket expenditures were assessed using the Arabic versions of the Patient Health Questionnaire (PHQ-9), Generalized Anxiety Scale (GAD-7), EuroQol-5D-5L, and Patient Cost Questionnaire, respectively.
Results: Sixty-four proxy respondents agreed to participate in the study and were interviewed. About 36% of the patients had SMA type I, 31.67% had type II, 31.67% had type III, and 5% had type IV with an overall mean age of 12.96 ±13.44 years. The mean PHQ-9, GAD-7, EQ VAS scores were: 7.64±5.38, 5.52±5.43, and 65%±27.58%, respectively. Most of the patients (69.23%) were unable to walk, 64.71% had moderate to severe problems doing their usual activities, and 66.66% had severe problems washing or dressing themselves. The mean annual out-of-pocket expenditures for SMA patients' caregivers was $15,394.75±$42,367.528.
Conclusions: The social and economic burden of SMA on patients' and their families is enormous. Future studies with larger sample sizes and more robust designs should be conducted to validate these findings.

Abstract Code: PSP707

Characteristics of studies conducted in Saudi Arabia and submitted in the United States National Library of Medicine: A Cross-Sectional Analysis from 2002-2022

Student(s) Name: *Khalid F. Alonazi, Ibrahim M. Alsultan*
Supervisor(s) Name: *Mohammad H. Aljawadi*

Abstract:
Background: Clinical trials play a critical role in the development of new treatments and accessing potentially effective drugs. The current study aims to describe pharmacy related studies conducted in Saudi Arabia and registered in clinialtrials.gov.
Methods: This was a descriptive cross-sectional study, from 2002 to 2022. The analyzed data included the title, phase, protocol number, intervention, study site, number of enrollments, study dates, sponsor, and study status. More variables were created from the aforementioned list including therapeutic category, condition category, city, and province. Data analysis was performed using the Stata software.
Results: A 453 studies were identified. The most studied conditions were oncology (23.62%), infectious diseases (13.25%), endocrine and metabolic disorders (10.38%), and neurology (8.61%). The primary therapeutic areas were anticancer (23.94%), antimicrobial (6.94%), antiviral (5.82%), and antidiabetic (5.37%) drugs.

Phase 3 studies comprised the largest proportion of trials (37.53%), followed by (27%) studies were either interventional or observational without further details reported on the website, and phase 4 studies accounted for 16.34%. Many trials were conducted in Riyadh region (56.07%), followed by Makkah region (21.73%), and Eastern province (13.37%). The top sponsors were King Faisal Specialist Hospital and Research Centre (6.89%), Novartis (5.77%), Bayer (4.01%), King Saud University (4.01%), Hoffmann-La Roche (3.53%), and Pfizer (3.04%).

Conclusions: Considering the growing Saudi population, there is a pressing need to promote clinical studies awareness and research development locally. Furthermore, it is imperative to invest more in facilities and resources to support a diverse range of studies, especially in underrepresented therapeutic areas.

Abstract Code: PSP708

Economic evaluation of interventions to improve medication adherence among patients with chronic diseases: an overview of systematic reviews

Student(s) Name: *Joud F. Alsugair, Ruba S. Alghamdi*
Supervisor(s) Name: *Sinaa A. Alaqeel*

Abstract:
Background: This overview aimed to find, assess and synthesize all systematic reviews that compared the cost effectiveness of interventions designed to improve medication adherence among chronic disease patients.
Methods: PubMed, Web of Science, Cochrane Database of Systematic Reviews and Center for Review and Dissemination were searched to identify systematic reviews evaluating the cost effectiveness of interventions designed to improve adherence to medications prescribed for any chronic disease patients were eligible. The quality of the included reviews was assessed using two validated checklists. Reviews characteristics and findings were summarized narratively.
Results: A total of nine systematic reviews were included. Interventions reported to be cost effective were simplification of medication regimen, financial incentives, improved coverage or reduced out-of-pocket spending and pharmacist care. Patient education and counseling were found to be cost effective or cost saving, but a few studies found no difference in effect between intervention and control. This evidence comes from economic evaluations with varying degrees of quality.
Conclusions: The evidence on cost effectiveness of interventions designed to improve medication adherence is accumulating. However, the limited methodological quality of primary economic evaluations and challenges associated with adherence investigations preclude robust conclusions on the most cost-effective intervention.

Abstract Code: PSP709

Cost of Illness of Fibromyalgia in Saudi Arabia

Student(s) Name: *Haya A. Alnahedh, Lama A. Alfalih*
Supervisor(s) Name: *Shiekha S. Alaujan, Saja H. Almazrou*

Abstract:
Background: Fibromyalgia (FM) is a chronic musculoskeletal syndrome characterized by widespread pain and accompanied with fatigue, stiffness, depression, and anxiety. No specific cure is available for FM. Multidisciplinary interventions which are resource intensive may help alleviate the symptoms. In Saudi Arabia, no published study evaluates the economic burden of FM. Therefore, this study aims to assess the cost of illness of FM among the Saudi population.
Methods: Data of patients who were diagnosed with FM and treated in King Fahad Medical City between February 2021 to February 2022 were included. Using the hospital perspective, data on demographics, healthcare resource use, and costs (price year 2022) were obtained to calculate the direct medical cost (DMC) in Saudi Riyals (SR).
Results: Total of 128 patients were included in the study, 93% were female with mean age of 47.07 years (± 11.91). For annual health care resources use, antidepressants were the most prescribed medications (77.34%), whereas physical therapy visits (42.97%) were the highest among consultations. The total annual DMC of FM was 3,216,232 SR, which is estimated to be 25126.8 SR per patient. Para-clinical tests have the highest impact on costs (2,548,011.2 SR), followed by consultations with healthcare professionals (623390.2 SR), and prescribed medications (44830.92 SR).
Conclusions: High healthcare economic burden of FM was found in Saudi Arabia. Future studies are essential to improve the management of FM in order to enhance decisions and lower the overall economic impact of FM thereafter.

Doctor of Philosophy in Pharmaceutics

Program Highlights

Employment Opportunities

- Academic field
- Pharmacies of Public, specialized hospitals, Medical centers, Home health care and long-term care facilities.
- Scientific offices of pharmaceutical companies
- Pharmaceutical industry and development factories
- Drug development research centers, Regulatory bodies and authorities

Application

In addition to the prerequisites listed in the Saudi university unified regulations for graduate studies and the King Saud University organizational and executive rules and procedures for graduate studies, the department requires:

- Applicant must have a bachelor's degree in pharmaceutical sciences or a Pharm.D. from an accredited university with a minimum "Good" GPA.
- The applicant should hold a master degree in pharmaceutics or any related pharmaceutical sciences.
- A TOEFL score of 550 or above or equivalent (500-549) in the TOEFL test or its equivalent with studying a supplementary course in academic English.
- Certificates of equivalency must be submitted in case certificates were non-Saudi.
- Passing an interview.

About the Program

4. Program Objectives:

The objectives of the program can be summarized as follows:

1. To provide graduate students with instructions and individualized research training of the highest quality leading to the doctor of philosophy degree (Ph.D.) in pharmaceutics.
2. To qualify the graduate students for a research-oriented career in industry, academia, government service and/or health care institutions.
3. To strengthen the scientific background of the graduate students in all areas of pharmaceutics.
4. To fulfill the growing demand for postgraduate study within the Saudi society.
5. To contribute in supporting the national economy through the rehabilitation of national competencies and save on the prohibitive costs of attracting such expertise from outside Saudi Arabia.

The Program and Admission Requirements can be found in the following link:
https://graduatestudies.ksu.edu.sa/ar/node/2067

Contact Us

For further information, we encourage you to explore our website to access a wealth of useful information about the research interests of the individual faculty members and our updated graduate programs.

https://pharmacy.ksu.edu.sa/ar/phd-in-pharmaceutics

Tel: +966114676295 (WhatsApp)
E-mail: pharmaceutics@ksu.edu.sa

PhD in Pharmacy Practice

(Courses and Thesis Option)

Program Highlights

Program structure	- Required units = (40) units (32 core and 8 elective) - in addition to the (12) units for thesis
Requirements for Obtaining the Degree	A- Passing (35) study units of program's courses B- Passing the comprehensive exam C- Completion of doctoral dissertation

Application Requirements

The applicant should hold a master's degree in pharmaceutical outcomes and policy, clinical pharmacy, pharmacy practice or related field with a grade "very good" or higher.

The applicant must pass the TOEFL with a score of 79, or its equivalent.

The applicant must submit a GRE test score prior to admission

The applicant must pass an interview in the clinical pharmacy department

About the Program

The first PhD program in pharmacy practice in Saudi Arabia, the Gulf and the Middle East region. It composed of 2 tracks: Pharmaceutical services, outcomes, and policy; and the precision pharmacotherapy. The program mission is to prepare innovative and collaborative experts in the field of pharmacy practice research with outstanding skills, knowledge, and abilities necessary to assume leadership in scholarship and practice.

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KSU.EDU.SA

cpd@ksu.edu.sa

Abstract Code: PSP710

A systematic review of discrete choice experiments and conjoint analysis studies examining preferences related to epilepsy treatment

Student(s) Name: *Reem Fahad Alotaiwi, Bushra Saad Albugami*
Supervisor(s) Name: *Sinaa Abdulmohsen Alaqeel*

Abstract:
Background: This review aimed to 1) identify and assess the quality of discrete choice experiments examining preferences related to epilepsy treatment; 2) summarize the attributes and attribute levels measured in these studies; 3) identify how researchers selected and developed these attributes; and 4) identify which attributes are most important for epilepsy patients.
Methods: A systematic literature review using PubMed, Web of Science and Scopus databases to identify discrete-choice experiments eliciting preferences for various attributes of pharmacological and surgical interventions in patients diagnosed with epilepsy or the parents/carers of children with epilepsy. The quality of the included studies was assessed using two validated checklists. Study characteristics and findings were summarized descriptively.
Results: A total of seven studies were included in the review. Six studies compared two medications, and one compared two surgical options to continuing medication options. The studies examined 44 attributes: side effects (n=26), efficacy expressed as being seizure free or have fewer seizures (n=8), costs (n=3), dosing frequency (n=3), duration of side effects (n=2), mortality (n=1), long-term problems after surgery (n=1) and surgical options (n=1). The findings indicate that people with epilepsy have strong preferences for improving seizure control, reducing side effects and may be willing to make trade-offs between improved seizure control and reduction of long-term side effects that may impact their quality of life.
Conclusions: The use of DCEs in measuring patients' preference for epilepsy treatment is accumulating. However, inadequate reporting of methodological details may reduce decision-makers' confidence in the findings. Suggestions for future research are provided.

Abstract Code: PSP711

Pharmacokinetics of Oral Dasatinib in Rats: Potential Food/Herb-Drug Interaction with naringenin

Student(s) Name: *Bader M. Alabdulkarim, Ahmad A. Alhulailah, Abdulaziz S. Alotaibi*
Supervisor(s) Name: *Yousef A. Bin Jardan*

Abstract:
Background: Dasatinib (DAS) is a multitarget inhibitor of Bcr-Abl and Src family kinases, licensed for the treatment of chronic myelogenous leukemia (CML) and Ph+ acute lymphocytic leukemia (Ph+ ALL). Naringenin is widely used in traditional and modern herbal medicine due to its therapeutic properties, and DAS is a substrate of CYP3A4. The parallel use of NAR may alter the pharmacokinetics of DAS, leading to possible herb–drug interactions.
Methods: This investigation examined the effects of naringenin (NAR) on the pharmacokinetics of DAS in rats. A single DAS dose (25 mg/kg) was administered orally to rats with or without NAR pretreatment (150 mg/kg). The DAS concentration in plasma samples was estimated using UPLC–MS/MS assay. Pharmacokinetic strictures were calculated using non-compartmental analysis and protein expression of hepatic tissues, evaluated using immunoblot.
Results: The plasma concentration of DAS was higher after NAR pretreatment, and the pharmacokinetics of orally administered DAS were significantly altered. The increases in Cmax, AUC0-t, T1/2, Tmax and MRT of DAS were (103.54 %, 72.64%, 28.40%, 50 %, and 15.18 %) respectively. The Kel, Vz/F and apparent oral CL/F values were significantly reduced in rats pretreated with NAR. The enhancement in Cmax, AUC0-t, T1/2, Tmax and MRT and the reduction in Kel, Vz/F and CL/F values resulted from the inhibition of CYP3A2 mediated metabolism of DAS in the liver and intestine. Further studies are needed to determine clinical relevance.
Conclusions: Therefore, the concomitant consumption of NAR containing food or traditional herbs with DAS may cause serious life-threatening drug interactions.

Abstract Code: PSP712

Qualitatively informed Diabetes medication adherence questionnaire Development and Validation. ASMA Study

Student(s) Name: *Amjad Khalid Alqsmoul – Fatimah Khalid Almusaytir*
Supervisor(s) Name: *Nouf Mohammed Aloudah, Bushra Tawfeeq Alqudaieb*

Abstract:
Background: Adherence to type 2 diabetes is low. Most of the interventions conducted to improve adherence did not show significant improvement. One of the reasons might be that the interventions used were not developed systematically to target factors. Assessing adherence using self-reports methods provide information about such factors. One of its limitations is the developing and validation process. Using theory(s) to understand patient behaviour showed promising results. Thus, due to the lack of a questionnaire developed based on a comprehensive theory application to assess adherence to type 2 diabetes medication, this study aimed to use the identified factors through theoretical domain farmwork to develop a questionnaire to assess adherence to type 2 diabetes medication in Saudi Arabia.
Methods: The questionnaire was developed to assess medication adherence in adult patients with type 2 diabetes. The items were generated from a previous study through theory informed in-depth interviews with patients diagnosed with type 2 diabetes. The questionnaire was tested in a sample of participants recruited from primary care centers around Riyadh.

Results: The testing was conducted in a sample (n=46) and showed a reliability testing of an overall Cronbach alpha of 0.85 but the KMO and Bartlett's Test was 0.387. Thus, we are recruiting more patients to test the reliability in a larger sample (n=152) and the analysis is ongoing.
Conclusions: The developed theory-based questionnaire might help in accurately identify the factors and assist in designing intervention(s) that improves medication adherence in diabetes patients in Saudi Arabia and further improve diabetes managements outcomes.

Abstract Code: PSP713

Public awareness of chronic kidney disease in Saudi Arabia: a cross-sectional survey-based study

Student(s) Name: *Abdulrahman A. Alshamrani, Abdulaziz A. Alqahtani*
Supervisor(s) Name: *Ahmed M. Shaman*

Abstract:
Background: Chronic Kidney Disease (CKD) is a prevalent global disease associated with hypertension, diabetes, hypercholesterolemia, and obesity. Studies conducted in Saudi Arabia indicate a variable prevalence of 5.7% to 13.8%, with a higher prevalence among older adults. The incidence of risk factors and a potential decrease in public awareness of the disease highlight the need for increasing awareness of CKD. This study aims to measure the level of public awareness of CKD, explore the factors influencing awareness and assess the factors influencing awareness.
Methods: This cross-sectional survey will measure knowledge, attitude, and practice (KAP) regarding CKD among the general population of Saudi Arabia using a validated questionnaire. Eligible participants include Saudi Arabian residents aged 18 years or older. The survey will be conducted using online, phone, or face-to-face methods. The study survey will consist of four sections: socio-demographics, knowledge, attitude, and practice. Descriptive statistics, chi-square tests, and multivariable regression analyses will be used to assess the relationship between knowledge, attitude, and practice and other socio-demographic factors.
Results: The study results will include the level of public knowledge, attitude, and practice towards CKD and the factors influencing them.
Conclusions: This study aims to measure public awareness about CKD and its determinants in Saudi Arabia. Raising public awareness about CKD may promote healthy behaviors, improve early detection and management of risk factors, and reduce the burden of the disease.

Medicinal Chemistry & Natural Products

Abstract Code: PMN800

Myrrh: A medical marvel with cytotoxic, antimicrobial, and antioxidant properties

Student(s) Name: *Thamer Turki Alanazi – Khalid Zaid Alharbi*
Supervisor(s) Name: *Ramzi A. Mothana*

Abstract:
Background: Medicinal herbs have been used in the treatment of different diseases in Arab countries including Saudi Arabia for centuries. Traditional uses of myrrh include the treatment of wounds, mouth ulcers, aches, fractures, gastrointestinal problems, microbial infections, and inflammatory illnesses. Thus, this study aimed to evaluate the cytotoxic, antimicrobial and antioxidant activities of one of the drugs purchased in Saudi market namely myrrh.
Methods: Myrrh was purchased from the local market in Riyadh. Myrrh was grinded and extracted with methanol using maceration method. The cytotoxic activity was determined against two cancer cell lines, A549 (lung) and MCF-7 (breast) using the MTT assay. Antioxidant activity was determined using two different methods, 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging, and ABTS assays. The antimicrobial activity was evaluated against two Gram-positive, Gram-negative bacteria, and one yeast species using agar diffusion method and Determination of MIC.
Results: Remarkable anticancer activity was observed for myrrh with IC50 values of 55.1 and 39.8 µg/ml against A549 and MCF-7 respectively. The extract showed high antioxidant potential (60 and 80%) at concentrations of 500 and 1000 µg/ml. Unexpectedly the extract demonstrated only weak antimicrobial action.
Conclusions: In conclusion, the findings of the current study are somewhat consistent with the traditional applications of the myrrh. Our findings support the claim that medicinal plants are still hopeful sources of anticancer, and antioxidant compounds. Our results evident that the extract of myrrh possesses effective anticancer and antioxidant activities. Further work is needed for the isolation and identification of the active compounds in myrrh.

Abstract Code: PMN801

Evaluation of the Chemical Composition and Antidepressant Activity of Ruta chalepensis Essential Oil

Student(s) Name: *Razan Mohammed Babtin, Najla Mutlaq Alqahtani*
Supervisor(s) Name: *Hanan Y. Aati, Dr. Hala A. Attia*

Abstract:
Background: Depression was common among the population during the COVID-19 pandemic lockdown. Ruta chalepensis is one of the commonly herbs used in ethnomedicine to cure various mental disorders.

This study was carried to isolate Ruta oil (RO) and identify its chemical compositions. Finally, to evaluate its antioxidant and antidepressant potencies using in vitro and in vivo studies, respectively.
Methods:RO was extracted from the aerial parts by hydrodistillation (HD) and Hydrodistillation-Solid-Phase Microextraction (HS-SPME) techniques. The chemical composition was identified by Gas Chromatography–Mass Spectrometry.
Antioxidant activity was assessed based on 2,2-diphenyl-1-picrylhydrazyl scavenging, nitric oxide radical scavenging and Ferric Reducing Antioxidant Power assays as well as, Molecular Docking tool. The antidepressant activity was investigated in vivo using social isolation model. The following were performed, behavioral tests including forced swimming, open field and sucrose preference tests; assay of lipid peroxidation, serotonin (5-HT), dopamine (DP) and brain-derived neurotropic factor (BDNF) as well as histological study.
Results: Sixty-eight and twenty-nine components were detected by HS-SPEM and HD, respectively. Among them, six compounds were responsible for the antioxidant activity as indicated by docking. Behavioral tests showed that treatment with RO significantly reduced the depression symptoms including the suppressed exploratory behavior, locomotor activity and sucrose preference. RO markedly reversed the hippocampal neurons damage, the increased lipid peroxidation and the decreased hippocampal levels of 5-HT, DP and BDNF observed in the depressed rats.
Conclusions: RO can be used as a natural remedy for curing the depression either as a single therapy or combined with other current medications.

Abstract Code: PMN802

Concurrent optimization of ultrasonic assisted extraction of total phenolic compounds and in vitro anticancer and antioxidant potential of Pulicaria schimperi (aerial parts) using response surface methodology

Student(s) Name: *Mohammed A Asaker*
Supervisor(s) Name: *Perwez A. Shaikh*

Abstract:
Background: The Saudi Arabian region is home to many Pulicaria species that have been traditionally used to cure conditions like heart disease, inflammation, and gastrointestinal problems. By utilizing traditional extraction techniques such maceration, Soxhlet, and heat reflux extraction, several phenolic and flavonoid components were recovered from P. schimperi. These approaches, however, have a number of drawbacks, including a high solvent consumption rate and a lengthy process. Hence, in order to extract maximum phenolic chemicals, we wanted to apply cutting-edge and effective extraction techniques like ultrasonic-assisted extraction.
Methods: In order to maximize the dependent variables [total phenolic content (TPC), antioxidant (DPPH and ABTS), and anticancer activities (against HepG2 and MCF-7 cells)] from P. schimperi aerial parts, three independent variables of the ultrasound-assisted extraction (UAE) method were optimized using Box-Behnken Design (BBD) of response surface methodology (RSM).
Results: For each of the dependent variables, the projected quadratic models were found to be very significant ($p < 0.001$). The extraction temperature and extraction time had a significant impact on the TPC extraction, antioxidant, and anticancer properties ($p < 0.05$). P. schimperi's antioxidant, anticancer, and TPC extractions performed best under the following conditions: extraction temperature of 54.4 °C, extraction period of 48 min, and liquid to solid ratio of 20.72 mL/g. The experimental results and the expected values agreed under these circumstances.
Conclusions: This improved UAE approach has identified a potential use for the nutraceutical sectors in the effective extraction of polyphenolic antioxidants and anticancer chemicals from P. schimperi aerial parts.

Abstract Code: PMN803

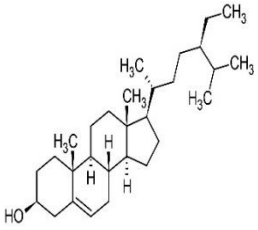
Comparative chemical analysis and biological potential of peel extract of Punica granatum at different growth stages collected from Saudi Arabia

Student(s) Name: *Feras Salah Albasha*
Supervisor(s) Name: *Nasir A. Siddiqui*

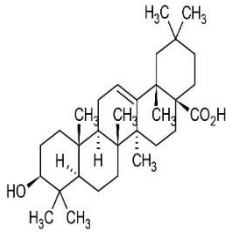
Abstract:
Background: The peel of Punica granatum (Fam. Lythraceae) represents about 50% of total fruit weight and are most often discarded as waste without any valorization. Interestingly, pomegranate peel extract contains the highest concentration of phytochemicals, principally flavonoids and phenolic compounds.
Methods: The ethanolic extract of different growth stages of pomegranate peel was tested for quantification of oleanolic acid and β -sitosterol by HPTLC. Phenolic content is expressed as mg gallic acid equivalents (GAE)/ g of the extract. Antimicrobial potential for the strains S. aureus, L. monocytogenes, E. coli, P. aeruginosa, and C. albicans has been evaluated.
Results: Total flavonoid and total phenolic contents were found to be 7.25 ± 0.01 mg QAE/ gm and 282.15 ± 0.04 mg GAE/g, respectively in Stage III. The β-Sitosterol was found significantly in stage –II and oleanolic acid is more abundant in Stage-III. The antimicrobial results showed the maximum zone of inhibition by stage I (500 µg/ml) against C. albicans (16 mm) followed by stage II (500 µg/ml) against S. aureus (15 mm) and stage III (500 µg/ml) against L. monocytogenes (15 mm). The minimum inhibitory concentrations (mg/ml) for stage III was found to be most effective against S. aureus and L. monocytogenes (0.5 mg/ml) and also stage II against L. monocytogenes.
Conclusions: The phytochemicals evaluated in extract signifies the importance of peel extract in food and cosmetic industries.

The first two stages are more useful as antimicrobial agent against L. monocytogenes otherwise the mature peel extract is more useful than first two stages.

Structure:



Oleanolic Acid



β-sitosterol

Abstract Code: PMN804

Synthesis and Antitumor Activity of *N*-Arylidenebenzohydrazides: Multitarget Mechanisms

Student(s) Name: *Abdulrahman Awadh Alruhaimi*
Supervisor(s) Name: *Ibrahim A. Al-Suwaidan, Adel S. El-Azab, Alaa A.-M. Abdel-Aziz*

Abstract:
Background: Cancer is the most dangerous disease and a leading cause of death worldwide. Using a single compound with multiple molecular mechanisms, which is currently the preferred therapeutic strategy, is more convenient than using drugs in combination. Hydrazone is a bioactive pharmacophore that can be used to design antitumor agents. Therefore, this research work intended to synthesize a series of hydrazones (compounds 2–8) and analyze their potential antitumor activity.
Methods: 4-(Methylsulfonyl)-N'-(substituted-benzylidene) benzohydrazides 2-8 were obtained by stirring an appropriate aldehyde and 4-(methylsulfonyl) benzohydrazide (1) in methanol at room temperature. The antitumor assay was performed for 59 human tumor cell lines. The COX-2 and EGFR/ HER2 tyrosine kinase inhibition assay was measured under the manufacturer's instructions.
Results: Compounds 7 and 8 had the most antitumor activity with a positive cytotoxic effect (PCE) 59/59. Also an enzymatic assay of the COX-2, EGFR and HER2 inhibitory activities of the most promising compounds are evaluated. Compound 8 showed the highest inhibitory activity against COX-2, with a half-maximal inhibitory concentration (IC50) of 6.94 μM. Compounds 6 and 7 significantly inhibited EGFR (IC50 = 0.2 and 0.19 μM, respectively) and HER2 (IC50 = 0.13 and 0.07 μM, respectively).
Conclusions: A series of hydrazones 2–8 was synthesized. The potential antitumor activities of the seven hydrazones using 59 human cell lines were analyzed and performed enzyme inhibition assays using EGFR, HER2, and COX-2. Compound 8 possesses the highest broad-spectrum and potent antitumor activity and the best enzymatic inhibitory activities against EGFR and HER2 kinases

Abstract Code: PMN805

The protective effect of Capparis spinosa L. constituents against vascular endothelial dysfunction

Student(s) Name: *Abdullah A. Biksmawi - Muath Y. Bin Mansour*
Supervisor(s) Name: *Ali S. Alqahtani - Prof. Mohammed S. Al-Dosari*

Abstract:
Background: Cardiovascular disease is the leading cause of mortality worldwide. It is well-known that the pathogenesis of several diseases including cardiovascular diseases is mediated through inflammation. Numerous studies reveled that plants compounds possess anti-inflammatory
properties. Multiple beneficial effects have been reported to Capparis genus. In particular,
Capparis spinosa L. was shown to have several bioactivities. In this work, we aimed to evaluate
the in vitro anti-inflammatory properties of C. spinosa on human derived macrophages and
HUVEC endothelial cells.
Methods: Human monocytic cell line (THP-1) macrophages and HUVEC endothelial cells were used to evaluate anti-inflammatory effects of C. spinosa extracts. cytotoxicity was measured with the MTT assay. The ability of the extracts to inhibit nitric oxide (NO) production in RAW 264.7 cells was evaluated using Griess reagent. RT-PCR was employed to determine the gene expression levels of pro-inflammatory mediators (TNF-α, IL-1β) in lipopolysaccharide (LPS)- activated THP-1-derived macrophages. In addition, PPAR-α, PPAR-ϒ and IL-1β gene expression levels were determined in HUVEC endothelial cells that stimulated by TNF-α.
Results: Our results indicate that chloroform and ethyl acetate fractions of C. spinosa exhibited a remarkable anti-inflammatory activity via in vitro inhibition of NO ($p \leq 0.01$), TNF-α, IL-1beta ($p \leq 0.01$) production in LPS stimulated RAW 264.7 and THP-1 cells. In HUVEC cells, both fractions downregulate the expression of IL-1β ($p \leq 0.05$), upregulate the PPAR-α while no significant impact was observed on PPAR-ϒ gene expression.
Conclusions: These results support the ethnopharmacological usage of C. spinosa as a potent herbal therapy for inflammation related conditions.

Abstract Code: PMN806

Comparative Evaluation of Polyherbal Mouthwash and Chlorhexidine.

Student(s) Name: *abdulaziz bahjat babour, aws loay redwan*
Supervisor(s) Name: *Ahmad L. alaofi, Mudassar S. ahmad*

Abstract:
Background: Background: A healthy microflora of mouth is essential for wellness and better quality of life and preventing chronic disease. With the advent of novel mutagenic resistant bacteria there is increasing demand for effective and safe mouthwash which not only limits the adversity of pathogenic bacteria but also safe and cost effective.
Methods: A poly herbal mouthwash (PHFX) was created and in vitro tested for its effectiveness against the activity of Streptococcus mutans, Staphylococcus aureus, Streptococcus pneumonia, Bacillus subtilis, Escherichia coli and Klebsiella pneumonia. The mouthwash, (PHFX) contained hydroalcoholic extract of curcuma longa and clove oil and tween 80.
The final formulation's minimum inhibitory (MIC) and cytotoxicity was evaluated by microdilution and MTT assay respectively.
Results: The results showed that (PHFX) was effective against the microorganism even at 4-fold lower working concentration. The corresponding zone of inhibition for all bacteria was significantly better than 2% chlorhexidine (standard mouthwash). The IC50 for the PHFX was 26.55 and 40.58 µg/mL for MCF-7 and A549 cells respectively.
Conclusions: PHFX is a potent herb-based mouthwash which was active against both Gram positive and Gram-negative bacteria even at low concentration.

Abstract Code: PMN807

Design, development and optimization of coated and uncoated apigenin loaded gold nanoparticle to control brain cancer: In vitro evaluations

Student(s) Name: *Faisal M. Alshehri, Sulaiman A. Alsharkh*
Supervisor(s) Name: *Wael A. Mahdi, Afazel Husssain*

Abstract:
Background: Gold nanoparticles have innate features for improved drug delivery and drug targeting. Natural apigenin is well explored for multiple therapeutic applications. We explored apigenin loaded gold nanoparticles (ap-AuNPs) to control brain cancer.
Methods: Several ap-AuNPs were prepared and characterized for particle size, polydispersity index, zeta potential, drug loading efficiency, and morphology (electron microscopy). Moreover, compatibility study was investigated using FTIR (Fourier Transform infrared) and DSC (differential scanning calorimeter). Finally, the optimized formulation was subjected for confirming anticancer potential against U87-MG (glioblastoma cell lines).
Results: Series of batches were prepared by varying concentration of gold salt with or without folate as targeting ligand. Results showed that the mean size and zeta potential values were found to be in the range of 20-35 nm and 11 - 32 (-mV), respectively. Compatibility studies negated any possible interaction. Transmission electron microscopy confirmed spherical shape and quite dispersed particle without aggregation. Total drug content was 0.2% for coated and uncoated ap-AuNPs prepared at pH 2.2 and 3.3. The particle size values for coated ACGN3.3 and uncoated AGN3.3 were found as 158 and 31 nm, respectively suggesting successful coating over the explored gold nanoparticles with fold error value (FE) < 2.0. Lower pH based formulations showed high FE value (FE>4.0). In vitro cell-line finding suggested that tailored coated Ap-AuNPs was relatively efficient as compared to free drug suspension as evidenced with in vitro cell line cytotoxicity result (%surviving cells).
Conclusions: The optimized Ap-AuNPs prepared at pH 3.3 could be promising to control brain cancer.

Experimental Therapeutics and Toxicology

Abstract Code: PET900

Mechanism Underlying Triple VEGFR Inhibitor Tivozanib-Induced Vascular Toxicity and Hypertension

Student(s) Name: *Sultan Hassan Alshehri, Alwaleed Khalid Alrumayh*
Supervisor(s) Name: *Wael Abdullah Alanazi*

Abstract:
Background: Tivozanib is a tyrosine kinase inhibitor and the drug of choice for refractory advanced renal cell carcinoma. Its main adverse effects are hypertension and proteinuria. In our study we're trying to investigate the role of losartan as AT1R blocker in attenuation of vascular toxicity and hypertension induced by Tivozanib
Methods: We used forty-eight C57BL/6J male mice and divided into four groups as following; first group received vehicle as control, second group treated with tivozanib (1 mg/kg/day), third group treated with losartan (10 mg/kg/day) plus tivozanib (1 mg/kg/day) and the last group received losartan (30 mg/kg/day) plus tivozanib (1 mg/kg/day) for 3 weeks. During treatment, blood pressure was recorded every 3 days. On day 21, all mice euthanized for plasma and aorta harvesting.
Results: Results showed induction of hypertension in tivozanib alone group until systolic blood pressure reached 163 ± 6.6 mmHg on day 21. Angiotensin-II and endothelin-1, which are well-known as vasoconstrictors, increased in plasma of tivozanib group. In contrast, nitric oxide and antioxidant enzymes (SOD, GSH) decreased except MDA (oxidant) which found to be high in tivozanib group. Both doses of losartan attenuated all these consequences caused by tivozanib and kept blood pressure within normal range.
Conclusions: These findings showed that angiotensin-II and endothelin-1 might be potential targets in management of hypertension induced by tivozanib.

Abstract Code: PET901

Paroxetine attenuates cardiac fibrosis via inhibition of NF-κB signaling pathway

Student(s) Name: *Shaden Soliman AlZayed, Fatemah Mohammed Hakami*
Supervisor(s) Name: *Anfal Fahad Bin Dayel*

Abstract:
Background: Most of cardiovascular diseases (CVDs) are accompanied with cardiac fibrosis (CF). G-protein-coupled receptor kinase 2 (GRK2) is dramatically augmented in CVDs and has a key role in CF by regulating NF-κB signaling.
Many studies have demonstrated that GRK2 could be inhibited by Paroxetine. However, the pathways by which paroxetine can attenuate CF are not yet fully understood. This study aims to investigate whether paroxetine has anti-fibrotic effect by inhibiting NF-κB signaling pathway in experimental rat model of CF.
Methods: Twenty-four rats were divided into four groups, each group consisting of six rats. Control group received normal saline for 4 weeks. Cardiac fibrosis group injected with isoproterenol (5 mg/kg daily) for 4 weeks. Paroxetine treatment group injected with paroxetine (5 mg/kg daily) for 3 weeks and then with isoproterenol (5 mg/kg daily) concurrently with paroxetine for 4 weeks. Fluoxetine treatment group injected with Fluoxetine (5 mg/kg daily) for 3 weeks and then with isoproterenol (5 mg/kg daily) concurrently with fluoxetine for 4 weeks. CF biomarker hydroxyproline was determined using ELISA. Collagen deposition was detected using Masson's trichrome stain. The expression of GRK2, NF-κB, and Smad2 were determined by RT-PCR.
Results: Pretreatment of isoproterenol-induced CF with paroxetine significantly reduced the fibrosis biomarker hydroxyproline ($P<0.01$) as compared with the control group. This biochemical finding was supported by histopathological examination of cardiac tissue. Furthermore, Paroxetine reduced the expression of the NF-κB, and Smad2 as compared to CF group.
Conclusion: Paroxetine can attenuate CF via inhibition of NF-κB signaling pathway.

Abstract Code: PET902

Macrophage-derived angiopoietin-like protein 2 promotes the progression of diabetic nephropathy: A possible mechanism?

Student(s) Name: *Sarah Salah Alkadi, Zenah Khalid Abo Alsamh*
Supervisor(s) Name: *Nouf Alrasheed, Anfal Bin Dayel*

Abstract:
Background: Diabetic nephropathy (DN) contributes strongly to end-stage renal disease. Macrophage expressed angiopoietin-like protein 2 (ANGPTL2) is recruited early in renal damage. Macrophage polarization toward the M1 phenotype activates Janus kinase/signal transducers and the transcription (JAK/STAT) pathway. We hypothesized that macrophages expressing ANGPTL2 mediate DN-inducing inflammation via the JAK2/STAT3 axis.
Methods: Twenty-eight male Wistar albino rats were divided into four equal groups: normal control and liposomal clodronate treated normal control rats; two high-fat diet diabetic groups injected with streptozotocin (30mg kg-1) to induce type 2 diabetes. The diabetic control group received 0.9% NaCl, and the diabetic treated group received liposomal clodronate once weekly (5mg kg-1) for four weeks. Blood glucose levels, kidney/body weight ratio, diabetic nephropathy, inflammation, adhesion molecules, oxidative stress biomarkers were assessed. Western blot and immunohistochemical studies detected macrophage phenotype, ANGPLT2, P-JAK2, and P-STAT3 expression. Histopathological examination of kidney sections was performed.
Results: Clodronate treatment reduced M1 macrophage expression and promoted transition to M2 expression, lowering kidney/body weight ratio (2.85±0.31 vs. 6.09±0.53 mg g-1, $P<0.05$). Macrophage depletion improved kidney function biomarkers (Albumin: 2.10±0.14 vs. 3.18±0.08 mg dl-1, $P<0.01$); (Creatinine: 0.40±0.15 vs. 0.97±0.07 mg dl-1, $P<0.05$); (BUN: 17.63±1.41 vs. 37.24±2.37 mg dl-1, $P<0.001$); (Urea: 37.76±3.01 vs. 79.74±5.08 mg dl-1, $P<0.001$); reduced adhesion molecule expression (ICAM-1 and VCAM-1, $P<0.001$) and M1 phenotype infiltration; lowered ANGPTL2, P-JAK2, and P-STAT3 expression; ameliorated fibrosis and structural kidney damage.
Conclusions: Macrophages contribute to DN by expressing ANGPTL2 which mediates inflammation by modulating the JAK2/STAT3 pathway. Inhibiting macrophages and these pathways can potentially mitigate DN.

Abstract Code: PET903

The protective effects of vitamin B complex on diclofenac sodium induced nephrotoxicity: The role of NOX4/RhoA/ROCK pathway.

Student(s) Name: *Orjuwan Hasan Alshehri, Waad Fahad AlSulaiman*
Supervisor(s) Name: *Hala Abouelfetouh Attia, Amira Mohammad Badr*

Abstract:
Background: Diclofenac sodium (DIC) is a non-steroidal anti-inflammatory drug widely used for its anti-inflammatory and analgesic effect. Unfortunately, its prolonged use is associated with nephrotoxicity due to oxidative stress, inflammation and fibrosis. The exact mechanism underlying these deleterious effects is not fully clear. NOX4/RhoA/ROCK pathway plays an important role in renal pathophysiology, therefore, this study aimed to investigate the possible role of this pathway in the DIC-induced renal injury. Our aim is extended to evaluate the renoprotective effects of vitamin-B1, B6, B12 (Vitamin-B complex).

Methods: Thirty-two rats were divided into four groups, normal control, DIC (10mg/kg, intramuscular), Vitamin-B complex (16mg/kg B1, 16mg/kg B6, 0.16mg/kg B12, intraperitoneal), and DIC plus Vitamin-B complex. After 14 days, kidney weight to body weight ratio (KW/BW) was calculated and the following were assayed; serum renal biomarkers (creatinine, blood urea nitrogen, kidney injury molecule-1), oxidative stress, inflammatory and fibrotic markers as well as the levels of NOX4, RhoA and ROCK. Histological examination was performed using hematoxylin & eosin and Masson trichrome to detect structural changes and fibrosis.
Results: Compared to DIC group, vitamin B complex significantly decreased the KW/BW ratio, renal function biomarkers, oxidative stress, inflammatory and fibrotic cytokines.
Glomerular and tubular damage, inflammatory infiltration and the excessive collagen accumulation were also reduced. NOX4, RhoA and ROCK were significantly elevated by DIC and this elevation was ameliorated by B-complex.
Conclusion: This study indicated the involvement of NOX4/RhoA/ROCK pathway in the DIC-induced renal injury. Vitamin B complex could be a renoprotective approach during treatment with DIC.

Abstract Code: PET904

Protective effect of hydroxychloroquine against Dasatinib-induced hepatotoxicity

Student(s) Name: *Faisal I. Alshiha, Saud A. Aldeealij*
Supervisor(s) Name: *Khalid A. Alhazzani*

Abstract:
Background: Dasatinib is an effective treatment for chronic myeloid leukemia, but it can cause idiosyncratic hepatotoxicity. This study aimed to examine if hydroxychloroquine can prevent Dasatinib-induced hepatotoxicity and evaluate its effect on liver structure.
Methods: Balb/c mice were randomly assigned into four groups; vehicle control (5%DMSO, i.p, n=6), Dasatinib (50mg/kg; i.p., n=6), hydroxychloroquine (10mg/kg, i.p, n=6), and hydroxychloroquine + Dasatinib (10mg/kg + 20 mg/kg; i.p., n=6). Treatments were given once every two days for 14 days. Serum, histopathological assessment of liver architecture and fibrosis were performed using H&E, Masson's trichrome, and reticulin staining. The infiltration of lymphocytes was assessed using immunohistochemistry of hepatic tissues. The gene expression of antioxidant enzymes (CAT, SOD-2, GPX-1) was assessed using real-time quantitative PCR.
Results: Dasatinib caused liver injury with increased lymphocyte infiltration (as indicated by CD3+, CD4+, CD8+, and CD20+ Immunohistochemistry) and downregulation of antioxidant enzyme gene expression. Hepatic tissue of Dasatinib-injected group exhibited significant downregulation in the gene expression (CAT, SOD-2, and GPX-1) compared to the control group.
However, the combination of hydroxychloroquine with Dasatinib showed a slight increase in AST and ALT. Also, hydroxychloroquine + Dasatinib showed a significant reduction in lymphocytes infiltration as compared to Dasatinib. No significant change was observed in hydroxychloroquine + Dasatinib group as compared to Dasatinib group.
Conclusions: Dasatinib leads to an immune response that increases infiltration of lymphocytes, causing hepatocyte destruction and persistent liver injury associated with fibrosis. However, hydroxychloroquine may ameliorate Dasatinib-induced hepatotoxicity by reducing T and B immune cell infiltration in the liver.

Abstract Code: PET905

Cardioprotective Effect GRK2 Inhibitor Mediated by NF-κB/Pro-Hypertrophic Genes in Animal Model of Cardiac Hypertrophy.

Student(s) Name: *Danah Adel Albuaijan, Alhanouf Salman Bin Osfur*
Supervisor(s) Name: *Asma Sami Aloneazi*

Abstract:
Background: Cardiac hypertrophy (CH) is one of the common pathological conditions associated with morbidity and mortality in heart failure. Nuclear factor-kappa B (NF-κB) is upregulated and play an important role in hypertrophic heart. Moreover, evidence showed that a high level of G protein coupled receptor kinase 2 (GRK2) is also up regulated in cardiac disease. Published studies showed the potential of paroxetine as a GRK2 inhibitor in reversing cardiac remodeling. However, the effect of paroxetine, as GRK2 inhibitor on NF-κB mediated CH has not been elucidated yet. Therefore, current project aims to investigate its effect on NF-κB/Pro-Hypertrophic Genes.
Methods: 24 male Wister rats (6rats/group) were used. CH was induced by intraperitoneal injection of isoproterenol (ISO) (5mg/kg/day) for 21-days. Rats were pre-treated with either paroxetine or fluoxetine (5mg/day/orally). CH biomarker was assessed by enzyme-linked immunosorbent assay. Morphological changes were assed by hematoxylin and eosin (H&E) stain. Hypertrophic mRNA gene expression in cardiac myocytes were assessed by qPCR. Target proteins expression were evaluated by immunohistochemistry (Ethical approval reference no: KSU-SE-22-61).
Results: H&E staining revealed that paroxetine ameliorates ISO-induced cardiac myocytes hypertrophy. Furthermore, paroxetine significantly attenuates ISO-induced cardiac injury biomarker; Troponin-I level ($p<0.001$). Additionally, it decreases ISO-induced GRK2, pIKB, and NF-κB expressions in cardiac myocytes. Non-significant reduction were seen in gene expression of hypertrophic genes including Mir181b, β-myosin heavy chain, and alpha-smooth muscle actin compared to the control-group.
Conclusions: This study provides evidence that paroxetine has a cardioprotective effect in animal model of CH through GRK2 inhibitory effect, possibly via NF-κB signalling pathway

Abstract Code: PET906

Effects of Synthetic CB1 Receptor Agonist on Astrocyte-like U87-MG Cells

Student(s) Name: *Abdulaziz M. Alshethri and Faisal F. Almohaisen*
Supervisor(s) Name: *Mohammed M. Alanazi*

Abstract:
Background: In the recent years, the adolescents use of synthetic cannabinoids as novel psychoactive substances (NPS) has been noticed markedly. 5F-MDMB-PICA is a NPS that is considered as effective as Δ9 tetrahydrocannabinol, the main psychoactive compound in natural cannabis. Its use has been associated with numerous side effects, like: mood and behavioral changes, aggression, confusion, and even death. The aim of this study is to investigate the effect of 5F-MDMB-PICA on astrocytes-like U87-MG cells, which might explain the mechanisms by which 5F-MDMB-PICA mediates its side effects.
Methods: U87-MG cells treated with different concentrations of 5F-MDMB-PICA for 24 h to find out the optimum concentrations for the subsequent experiments. The viability levels of the cells were evaluated by the MTT assay. While, the effect of 5F-MDMB-PICA-induced ROS generation, was investigated by using H2DCFDA assay. To demonstrate whether 5F-MDMB-PICA-induced mitochondrial dysfunction, we employed the mitochondrial membrane potential DY (JC-1) assay.
Results: Our viability results revealed that 5F-MDMB-PICA significantly in a dose-dependent manner decreased the viability levels of U87-MG cells ($P<0.0001$). Furthermore, the concentrations, 40, 50, 100, and 200 µM of 5F-MDMB-PICA showed significant rise in ROS generation compared to the control group ($P<0.05$, $P<0.01$, $P<0.01$, and $P<0.0001$ respectively). Finally, the JC-1 assay's results demonstrated that 5F-MDMB-PICA significantly and in a dose-dependent manner decreased the mitochondrial membrane potential of U87-MG cells.
Conclusions: This study for first time shed the light on the effects of 5F-MDMB-PICA on astrocytes-like U87-MG cells. This study has proven that 5F-MDMB-PICA is mediated its harmful effects through modulation of cells viability, ROS generation, and mitochondrial function.

Abstract Code: PET907

Protective Role of Liposomal Resveratrol against Kidney and Liver Dysfunction, Inflammation, and Oxidative Stress in Streptozotocin Diabetic Rat Model.

Student(s) Name: *Abdulaziz Alsedrah – Ziad Alkraidis*
Supervisor(s) Name: *Ahmed Alanizi*

Abstract:
Background: Diabetes mellitus is a chronic metabolic disorder associated with various complications, including kidney, liver dysfunction, inflammation. Resveratrol, a natural polyphenol, has shown promising antioxidant and anti-inflammatory effects in different models of diabetes. In this study, we investigated the protective role of liposomal resveratrol against kidney and liver dysfunction, inflammation, and oxidative stress in a streptozotocin-induced diabetic rat model.
Methods: Wistar rats were divided into four groups diabetes was induced by a single intraperitoneal injection of streptozotocin. Rats in the treatment groups received daily oral doses of low dose liposomal resveratrol (150 mg/kg) or high dose of liposomal resveratrol (300 mg/kg) for six weeks. At the end of the study, we evaluated histological alterations in the liver, renal tissues, kidney and liver function, inflammation, and oxidative stress parameters.
Results: Treatment of the diabetic rats with liposomal resveratrol reduced the elevated serum levels of glucose, SGOT, SGPT, GGT, Creatinine, Uric acid, and Urea. Liposomal resveratrol decreased the proinflammatory cytokines levels such as tumor necrosis factor alpha (TNF-α) and interleukin-6 (IL-6), while increased the enzymatic activities of catalase (CAT) and glutathione peroxidase (GPx) in liver and kidney tissues of diabetic animals.
Conclusion: The protective effects of liposomal resveratrol were associated with improved histological hepatocellular integrity and architecture as well as improvement of pathologies in the kidney glomeruli and renal tubules. Our results suggest that liposomal resveratrol therapeutic ability can reduce the development of hepatic dysfunction and diabetic nephropathy by minimizing oxidative injury and inflammation.

Abstract Code: PET908

Modulation of doxorubicin-induced cardiotoxicity by diosmin: A mechanistic approach

Student(s) Name: *Abdullah Saad Alabdulrahim, Ziyad Ali Alzahrani*
Supervisor(s) Name: *Abdullah Fayez Alasmari*

Abstract:
Background: Doxorubicin (Dox) is an effective chemotherapy agent, but its clinical use is limited due to its cardiotoxic effects. Diosmin, a flavonoid found in citrus fruits, has been reported to have cardioprotective effects against various drugs and chemicals. However, the underlying mechanisms of its protective effects against Dox-induced cardiotoxicity are not fully understood. Therefore, this study aimed to investigate the mechanism of cardio protection of diosmin against Dox.
Methods: A 32 Male Wistar rats were randomly divided into four groups; control group, Dox group (20 mg/kg, i.p.), Dox (20mg/kg i.p.) plus low-dose diosmin (100 mg/kg orally), and Dox (20mg/kg i.p.) plus high-dose diosmin group (200 mg/kg orally).

At the end of study, heart tissues and blood samples were collected to perform biochemical assays, western blot, gene expression and histopathological analysis. One-way ANOVA followed by Tukey comparison test was used for statistics.
Results: Single i.p. dose of Dox induced oxidative stress, inflammation, hypertrophy, and cardiac histological changes as evidenced by increased lipid peroxidation (MDA), decreased reduced glutathione (GSH), and catalase activity (CAT), increased inflammatory markers (NfkB-p65, TLR-4, IL-6, TNF-α, Cox-2, iNOS), increased hypertrophic genes (BNP and β-MHC), and heart to body weight ratio. Pre-treatment with diosmin, however, ameliorated the observed effects that induced by Dox. Treatment. Furthermore, diosmin also preserved most histological characteristics of the heart in a dose-dependent manner.
Conclusions: These data suggest that diosmin may protect against Dox-mediated cardiac dysfunction. Nonetheless, more study is needed to understand the mechanisms of protection against Dox. -mediated cardiac dysfunction.

Pharmaceutical Engineering and Drug Regulation

Abstract Code: PPD1000

Pulmonary Delivery of Nanocomposites Microparticles Encapsulating Osimertinib for Lung Cancer Therapy: II. In Vitro Assessment

Student(s) Name: *Sara A. Alhumaidan – Ghaida M. Alharbi*
Supervisor(s) Name: *Alanood S. Almurshedi - Basmah N. Aldosari*

Abstract:
Background: Lung cancer is the second most prevalent cancer, especially non-small cell lung cancer. Traditional treatments by chemotherapy, surgery, and radiotherapy possess off-target effects that could be overcome with targeted therapy. Osimertinib (OSI) is an EGFR-tyrosine kinase inhibitor that binds to the mutated gene for epidermal growth factor receptors in cancer cells. The first study in this series successfully formulated nanocomposites microparticles (NCMPs) encapsulating OSI as a dry powder for inhalation with good physicochemical properties. In this part, we focus on in-vitro assessments of the prepared NCMPs for the treatment of non-small cell lung cancer via pulmonary administration.
Methods: In-vitro release was carried out in phosphate buffer saline (pH 7.4). In-vitro aerosolization performance was evaluated using the next-generation impactor operated at a flow rate of 60 L/min via Cyclohaler®. The fine particle fraction (%FPF) and mass median aerodynamic diameter (MMAD) were determined.
Results: The drug release of PLGA NCMPs and PLGA-C NCMPs presented an initial burst release (15.12±0.6 and 16□2.6%) followed by a continuous sustained release over 24h (69.68±1.3 and 61.76□3.9%), respectively.
Aerodynamic characteristics revealed that the NCMPs capable of delivering efficient OSI deposition in the deep lungs with a %FPF of 66.11±3.9% and 79.1±6.6% and the MMAD of 1.43±0.18µm and 1.09±0.23µm for PLGA NCMPs and PLGA-C NCMPs, respectively.
Conclusions: The results demonstrated that the NCMPs are a promising carrier for pulmonary drug delivery of OSI due to their ability to target the deep lungs. Moreover, NCMPs enhanced sustained OSI release profile. Further studies on the effect on cells viability and uptake are needed.

Abstract Code: PPD1001

Hansen Solubility Parameters and Quality by Design (QbD) Chrysin loaded Topical Elastic Liposomes to Control Breast Cancer.

Student(s) Name: *Saad S. Alhallaf*
Supervisor(s) Name: *Mohammad A. Altamimi and Afzal Hussain*

Abstract:
Background: Chrysin (CHR) has potential to inhibit aromatase enzyme, hormone dependent breast cancer, and an optional adjuvant effective therapy.
Methods: Hansen solubility parameters (HSP) and quality by design oriented elastic liposomes for topical delivery of CHR have not been investigated so far. Therefore, we addressed Hansen solubility (HSPiP) and Design Expert programs to predict suitable excipients and optimization of formulations, respectively. In vitro studies were performed for vesicle size, size distribution, zeta potential, and entrapment efficiency analysis of predicted compositions. Finally, the optimized formulation was characterized for in vitro parameters, morphology (using electron microscopy), compatibility assessment (DSC and FTIR), and % drug release. In vitro cell line (MCF-7) study was conducted to compare efficacy against control at varied concentrations.
Results: Results showed that HSPiP predicted ethyl acetate, tween 80, polyethylene glycol-400 (PEG-400), and Transcutol as the most suitable excipients based on HSP (δd, δp, and δh). Experimental solubility study confirmed the solubility order of CHR as PEG-400>tween-80>ethyle-acetate>span-80. Formulations showed the range values of size, zeta potential, polydispersity index, and %EE as 164–530 nm, 9.9–34 (–mV), 0.254 – 0.926, and 10.99 – 90.95 %, respectively. Compatibility studies exhibited compatibility of the drug with the explored excipients. The optimized product showed convincing in vitro evaluated parameters and in vitro anticancer potential against breast cancer (MCF-7).
Conclusion: CHR loaded elastic liposomes is a promising approach for maximum drug efficacy after topical application to control breast cancer.

Abstract Code: PPD1002

Docetaxel Loaded-Polymeric Micelles: Effect of Molecular Weight and Hydrophilic/Lipophilic Segment Ratio on the Drug's Entrapment Efficiency

Student(s) Name: *Meshari Abdulrahman Alnuwaiser*
Supervisor(s) Name: *Ziyad Binkhathlan*

Abstract:
Background: The aim of this study was to synthesize block copolymers composed of D–α–tocopheryl polyethylene glycol succinate -block-poly(ε-caprolactone) (TPGS-b-PCL) and to investigate the potential of their self-assembled micelles as a nano delivery system for docetaxel (DTX). The effect of the copolymers' molecular weight and hydrophilic/lipophilic segment ratio on the entrapment efficiency and in vitro release of the drug was also studied.
Methods: TPGS-b-PCL copolymers were synthesized via ring opening bulk polymerization. Co-solvent evaporation method was used to prepare the micelles. The micelles were evaluated for their size and polydispersity using dynamic light scattering (DLS) technique. DTX entrapment efficiency (EE%) was estimated using an HPLC-UV assay. The in vitro release profile of DTX-loaded micelles was evaluated in a phosphate-buffered saline solution (pH 7.4; 0.5% Tween 80 at 37° C). The in vitro cytotoxicity of the DTX-loaded micelles was investigated in triple-negative breast cancer cell line model (MDA-MB123).
Results: Five copolymers with different molecular weights were successfully synthesized. The prepared DTX-loaded micelles had diameters in the range of 65–105 nm with narrow distribution. The highest EE% of DTX was achieved with TPGS3.5k-b-PCL micelles (99.74%), which significantly enhanced the solubility of the drug in water from 6–7 µg/mL to reach nearly 1 mg/mL. The in vitro release profile of the DTX-loaded micelles showed a sustained release profile. Finally, DTX-loaded TPGS3.5k-b-PCL exhibited a cytotoxic effect comparable to the marketed product.
Conclusions: Our results point to the significance of the molecular weight and the hydrophilic/lipophilic segment ratio on the properties of the drug-loaded micelles.

Abstract Code: PPD1003

Pulmonary Delivery of Nanocomposites Microparticles Encapsulating Osimertinib for Lung Cancer Therapy: I. Formulation and Characterization

Student(s) Name: *Eman A. Alzahrani – Hadeel H. Altukhaim*
Supervisor(s) Name: *Iman M. Alfagih – Alanood S. Almurshedi*

Abstract:
Background: Osimertinib (OSI) is a third-generation EGFR-tyrosine kinase inhibitor that has been approved by the FDA as the first-line treatment for metastatic non-small cell lung cancer. OSI is administered orally as a tablet, which limits the amount of drug reaching the tumor in the lungs. In this first study of a two-part series, the aim was to formulate and characterize nanocomposites microparticles (NCMPs) encapsulating OSI as a dry powder for inhalation.
Methods: PLGA and chitosan-coated PLGA (PLGA-C) nanocomposites were prepared by the single emulsion technique followed by spray drying to produce NCMPs. The formulations were characterized using TEM, SEM and Zeta sizer. The drug loading (DL) was determined using HPLC. The formulations' yield% and thermal properties were determined. The storage stability was evaluated for up to three months at room temperature (RT).
Results: The results revealed that the PLGA and PLGA-C nanocomposites had a regular spherical shape and particle size of 89.52±0.81 and 107.6±1.02nm, respectively. Coating nanocomposites with chitosan changed the zeta potential from -19.8±0.64 to +25.6±0.1mV. Spray drying of nanocomposites yields 37.9 and 50.9% with DL(µg/mg) 8.5±0.3 and 2.7±0.2 for PLGA and PLGA-C NCMPs, respectively. The morphology was spherical with a corrugated surface. The thermograms indicated a complete encapsulation of OSI. The NCMPs demonstrated physical stability for three months at RT.
Conclusions: The NCMPs may be a promising carrier for pulmonary delivery of OSI due to its good characteristics. Further studies are required to evaluate the in-vitro release profile, aerosol behavior and the effect on cell viability and uptakes.

Abstract Code: PPD1004

MicroRNA loaded nanoparticles as potential treatment for Alzheimer's disease

Student(s) Name: *Asrar Mahmoud Alanazi, Sarah Abdulrahman Altamimi*
Supervisor(s) Name: *Fulwah Yahya Alqahtani*

Abstract:
Background: Alzheimer's disease (AD) is a common neurological disorder typically characterized by extracellular deposition of β-amyloid (βA) plaques. MicroRNA-219 (miR-219) is one of the miRNAs downregulated in AD patients and associated with multiple pathways/cellular dysfunction. The aim here is to transfect synthetic miR-219 mimics to restore the endogenous normal level using chitosan nanoparticles (CNPs) as a gene delivery vehicle due to their low toxicity, low immunogenicity, high biocompatibility, and biodegradability.
Method: CNPs were generated by ionic gelation method. TPP and miR-219 or negative control (miR-NC) mixture was added dropwise to the CS solution at optimum conditions while stirring for 1 hour.

After incubation, NPs were retrieved by centrifugation and reconstituted in RNase free water. SH-SY5Y cells were transfected with different concentrations of CNPs-miR-219 and CNPs-NC for 5 h in serum-free media. Following transfection, cells were incubated with 10M of βA for 24 h. After that, cells viability was evaluated using MTT assay.

Results: The NPs were successfully prepared with particle size ranged from 92.68 to 85 nm and PDI < 0.26. The integrity of miRNA was verified by agarose gel. The results revealed that βA-25-35 decreased the viability of SH-SY5Y cells significantly compared to the control group, P<0.0001. On the other hand, miRNA loaded NPs showed no effect on the cell viability of the SH-SY5Y cells. MiR-219 treated cells showed protection against βA 25-35 induced cytotoxicity which were significantly higher when compared to the matched concentrations of CNPs-NC.

Conclusion: The findings of this study revealed that CNPs loaded with miR-219 have promising potential for AD treatment.

Abstract Code: PPD1005

Development of Poly (lactic-co-glycolide) Nanoparticles for Ocular Delivery of Delafloxacin

Student(s) Name: *Abdulrazzaq Aldaham AND Ziyad BinHudhud*
Supervisor(s) Name: *Abdullah K. Alshememry, Musaed A. Alkhalef*

Abstract:

Background: Delafloxacin (DEL), a novel synthetic anionic fluoroquinolone, is a US-FDA-approved antibiotic for acute bacterial skin infections. However, the low aqueous solubility of DEL results in poor bioavailability. Encapsulation of DEL into poly(lactic-co-glycolide) nanoparticles (PNPs) is believed to improve its solubility, transcorneal permeation, ocular bioavailability, and efficacy.

Methods: PNPs were prepared using a double-emulsion solvent-evaporation technique. The size characterization and structural morphology of the PNPs were determined by Malvern–Zetasizer and scanning electron microscopy (SEM), respectively. Encapsulation (EE%) and loading (DL%) were determined. The in vitro release of DEL from PNPs was compared to that from DEL-aqueous suspension (DEL-AqS). The minimum inhibitory concentration (MIC) of DEL-PNPs and DEL-AqS against some Gram-positive and negative pathogens was tested.

Results: The particle size of Blank-PNPs was comparatively smaller (208.82±12.67 nm) than DEL-PNPs (238.96±10.16 nm). The polydispersity index of Blank-PNPs and DEL-PNPs was 0.348±0.049 and 0.258±0.084, respectively. The zeta potential of Blank-PNPs was low positive (1.27±0.95 mV) compared to DEL-PNPs (4.05±1.36 mV). SEM indicated the smooth-surfaced spherical NPs in both cases (Blank and DEL-loaded). EE% and DL% were 87.96±5.38% and 3.74±0.15%, respectively. In-vitro release studies indicated a sustained drug release behavior, which was approximately 81.94±4.76% and 49.05±4.06% at 96 h. The MICs of DEL-PNPs were 2.500 µg/mL (B. subtilis), 0.625 µg/mL (S. aureus and MRSA-6538), and 0.313 µg/mL (S. pneumoniae, E. coli, and K. pneumoniae).

Conclusion: The developed DEL-PNPs would be a promising nanocarrier to treat ocular infections caused by Gram-positive and Gram-negative pathogens with lower susceptibilities compared to treatment with DEL-AqS.

Abstract Code: PPD1006

Effect of Chemical Modification of PEO-b-PCL Copolymers on The Entrapment Efficiency of Docetaxel-Loaded PEO-b-PCL Micelles.

Student(s) Name: *Abdullah Abdulkarim Alturki*
Supervisor(s) Name: *Abdullah Alomrani*

Abstract:

Background: Polymeric micelles (PMs) are spherical structures with hydrophobic core and hydrophilic shell. This feature makes PMs proper carriers for hydrophobic drugs. Docetaxel (DTX) is an anticancer drug and marketed in ethanol/tween80 solvent mixture due to its extreme hydrophobicity and poor aqueous solubility. The aim of this work is to overcome limitations associated with this solvent mixture. Therefore, DTX-loaded PMs formed of poly (ethylene glycol)-block-poly(ε-caprolactone) (PEG-b-PCL) copolymer before and after chemical modification were used as alternative safe carriers for DTX.

Methods: In this project, DTX-loaded micelles were prepared by the co-solvent evaporation method. Three copolymers, polyethylene glycol-block-poly(ε-caprolactone), D–α–tocopheryl polyethylene glycol succinate -block-poly(ε-caprolactone) (TPGS-b-PCL) and MyrjS100-b-PCL were synthesized using ring-opening bulk polymerization of ε-caprolactone with PEO as the initiator. Comprehensive characterization of the micelles was carried out, including micelle size, entrapment efficiency, in vitro release profile, and in vitro cytotoxic effect via MTT assay.

Results: Three copolymers, PEG-b-PCL, TPGS-b-PCL and MyrjS100-b-PCL were successfully synthesized. The prepared DTX-loaded PMs had diameters in the range of 86–120 nm. PDI of PEG-b-PCL and TPGS-b-PCL showed narrow distribution. The highest EE% of DTX was achieved with TPGS-b-PCL micelles (93.3%), which significantly enhanced the solubility of the drug in water from 6–7 µg/mL to reach nearly 0.93 mg/mL. The in vitro release profile of the DTX-loaded PMs exhibited a sustained release profile. Finally, the cytotoxic effect of DTX-loaded PMs on human glioblastoma cells (U87) after 24hr incubation were comparable to the marketed product.

Conclusions: The presented results revealed the impact of chemical modification on the properties of DTX-loaded PMs.

Abstract Code: PPD1007

Gefitinib-cyclodexterin loaded surface modified-liposomes as a delivery system for lung cancer therapy: In vitro study.

Student(s) Name: *Abdullah Abdulaziz Almufadda, Osama Ali Shaflout*
Supervisor(s) Name: *Mohamed Mahmoud Badran*

Abstract:
Background: Gefitinib (GFT), a tyrosine kinase inhibitor with low water solubility and bioavailability. The study aimed to evaluate gefitinib loaded surface-modified liposomes (GFT-SML) in presence of hydroxypropyl-β-cyclodextrin (HPβ-CD) (GFT-CD-SML) to improve its solubility, bioavailability, and cytotoxic activity against non-small cell lung cancer (NSCLC).
Methods: Solubility studies of GFT with HPβCD in an aqueous system were conducted to characterize the complexes in the liquid state. The complexes in the solid state were prepared by the cosolvent evaporation method and characterized by X-ray diffractometry (XRD) and differential scanning calorimetry (DSC). Different SML containing GFT or GFT-CD were formulated by the thin-film hydration method using TPGS, chitosan (CS), and poloxamer 188. They were evaluated for vesicle size, polydispersity index, zeta potential, entrapment efficiency, in vitro drug release, and in vitro cytotoxicity against lung cancer (A549 cell lines).
Results: HP-β-CD better solubilized GFT based on the concentration of water-soluble GFT/HP-β-CD could reach 44 µg/mL ($p<0.05$). Both DSC and XRD data illustrated that the drug no longer existed in its crystalline form, in GFT/HP-β-CD. The obtained GFT-SML had a diameter of nano-range, polydispersity index less than 0.5, and reasonable values of zeta potential. While GFT-CD-SML exhibited large vesicle diameters. Moreover, GFT-SML displayed high entrapment efficiency in comparison to GFT-CD-SML ($p<0.05$). All formulations exhibited sustained-release profiles. The cytotoxicity study revealed that GFT-CD-SML using TPGS and CS revealed a significant anticancer activity when compared with pure GFT and other liposomes.
Conclusion: These results highlighted the promising therapeutic outcomes of GFT-CD-SML with TPGS or CS for anticancer activity.

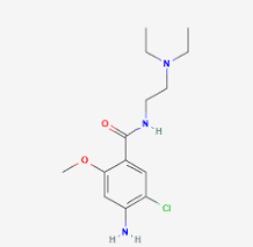
Others

Abstract Code: POT1100

Development and Evaluation of PBPK Models for Metoclopramide in Healthy and Disease Populations

Student(s) Name: *Sultan Abdulaziz Almazroa, Khaled Saleh Alsuhaibani*
Supervisor(s) Name: *Faleh Mushabab Alqahtani*

Abstract:
Background: Metoclopramide (MCP) is an anti-emetic that blocks dopamine D2 and serotonin 5-HT3 receptors. It has many applications such as the prevention of neoplastic drugs-induced nausea and vomiting, as-well-as gastroesophageal reflux disorders. The current study aimed to develop and evaluate Physiologically Based Pharmacokinetic models (PBPK) for MCP for suggesting model-informed dosing in healthy and diseased populations.
Methods: An extensive literature review was performed that includes pharmacokinetic data from healthy and diseased populations. Using PK-sim®, the whole-body PBPK model was created. For model evaluation, visual predictive checks were conducted, and the ratio of observed PK parameters was compared with their predicted values.
Results: The model has successfully described MCP disposition following IV and oral administration in healthy, liver cirrhosis, and renal failure populations. All observed was within the predicted 95% confidence interval. The PK-parameters, mean Robs/Pre and average fold error after IV and oral MCP administration were within the allowed 2-fold error range. A significant increase in plasma concentration of MCP and decrease in clearance was observed in severe liver cirrhosis patients. Whereas more than 50% increase in plasma concentration of MCP and a decrease in clearance was observed in end-stage renal disease.
Conclusions: The model has been successfully used to describe the PK of MCP in healthy and diseased populations. The purpose of this study was to evaluate the causes for differences in the PK of MCP in healthy and diseased populations. The model has many implications in predicting dosing in diseased populations i.e., liver cirrhosis and renal failure population
Structure:



Abstract Code: POT1101

Dissolution enhancement of poorly aqueous soluble drug Gefitinib by solid dispersion and complexation, in vitro testing and anticancer activity on selected tumor cells

Student(s) Name: *Suliaman M. ALMufarrij*
Supervisor(s) Name: *Gamal M. Mahrous, Adel F. ALGhaith*

Abstract:
Background: Cancer ranks as a leading cause of mortality in the world. Gefitinib (GEF) is approved for patients with metastatic non-small cell lung cancer (NSCLC). EGFR is often shown to be overexpressed in certain human carcinoma cells, such as lung cancer cells. GEF is a class 2 molecule. There are numerous reported methods to enhance aqueous solubility of poorly soluble drugs. Among them, solid dispersion and complexation are one of the effective and accepted techniques in the pharmaceutical industry.
Methods: In this study, we prepared complexes using a kneading method with Methyl-B-cyclodextrin (MCD) and solid dispersion with Polyvinylpyrrolidone (PVP) by fusion method. Dissolution studies of the prepared SD and CD in different media (pH 1.2 HCL, pH 6.8). Evaluation of selected formulas of the prepared Solid dispersion and Complexes for MTT cytotoxicity assay on A549 lung cancer cells.
Results: Dissolution results showed two-fold enhancement in drug release for both PVP solid dispersion and MCD complex (60 % in one hour) compared to untreated GEF (30 % in one hour). In addition, the MTT assay using the A549 lung cancer cell line showed a decrease in IC50 from 10.7 mcg for untreated GEF to 3.78 and 3.7 mcg for GEF-PVP solid dispersion and GEF-MCD complex respectively.
Conclusion: The overall conclusion of this study is that the prepared GEF-SD by fusion method and GEF-Complexes by Kneading method showed marked enhancement in dissolution and in vitro cytotoxicity**.**

Abstract Code: POT1102

Quality of life Study of the use of antidepressants by caregivers of children having Leukemia in Riyadh.

Student(s) Name: *Reema Aldossari, Shehana Alotaibi*
Supervisor(s) Name: *Lamia Alnaim*

Abstract:
Background: Caregivers of children having leukemia often experience anxiety, depression, guilt and fear. This study aims to analyze the relationship of depression in the caregivers and their quality of life.
Methods: Cross sectional study was conducted on caregivers of children aged 0-17 years with Leukemia in the oncology ward, in KSUMC, from October 2022. This study attempted to identify the psychological status and problems in both caregivers and children with Leukemia, in the forms of depression, and quality of life. we used surveys (Becks's Tool + WHOQoL), interviews, and Statistical Package for Social Science (SPSS 19) was used for data entry and analysis and Chi square test. Our sample size was 100 caregivers of leukemic children, we used the surveys and interviews on female and male caregivers in KSUMMC in the inpatient oncology and the day care wards to study their QoL and the association of depression.
Results: So far, the data we have gathered from the interviews and the surveys were 23 sample, 78% of them were females, 22% males, averaged an age of 37-47 years old, 96% were married, 47% of them were unemployed, and after conducting the Beck's tool on them 60% of them showed no depression, 13% mild depression, 17% moderate depression, 4% severe depression, 4% very severe depression. And they were showing that their quality of life was significantly affected, but the final results are still pending.
Conclusions: Cases collected are too few to base any conclusion. Final conclusion is still pending, waiting for completion of data collection.

Abstract Code: POT1103

Genetic and Epigenetic Factors Regulating Immune Checkpoints Associated with Relapse in Colorectal Cancer Patients.

Student(s) Name: *Zaid H. AlHusseini, Muhamed H. Rasheed*
Supervisor(s) Name: *Homood M. Subeai*

Abstract:
Background: The aim of our study was to screen for potential immune checkpoint genes that influence relapse in colorectal cancer (CRC) patients and identify genetic and epigenetic mechanisms by which these genes can be targeted.
Methods: Genomic and epigenetic data of 223 CRC patients [relapse-free (n=193) and relapsed (n=30)] extracted from The Cancer Genome Atlas (TCGA). 51 immune checkpoint genes were analyzed. Student's t-test or Chi-square was used to identify significant clinical, genetic, and epigenetic factors between relapse-free and relapsed patients. Free survival analyses were performed using log-rank test based on patient gene expression profiles. Correlation and linear Regression analyses were executed to identify the significant clinical characteristics associated with the candidate immune checkpoint genes.
Results: The vital status of the relapsed group was statistically significant relative to the relapse-free group ($p<0.0001$). Among the 51 genes examined, PVR was significantly upregulated within the relapsed patients group ($P = 0.043$). Patients with high PVR expression were 2.16 times more likely to experience recurrence relative to patients with low PVR expression ($P = 0.037$). Diagnosis age, aneuploidy score, and fraction genome alteration were significantly correlated with PVR expression.

Conclusions: The upregulation of PVR was significantly associated with relapse in CRC patients. Promisingly, PVR expression profile and associated clinical characteristics have the potential to be used as biomarkers for relapse risk and rationale for alternative therapeutic strategies.
Our study suggests that targeting PVR might be beneficial in enhancing the treatment efficiency and, thereby, reducing the recurrence risk.

Abstract Code: POT1104

Dissolution enhancement of poorly aqueous soluble natural product Apigenin by solid dispersion and complexation, in vitro testing and anticancer activity on selected cancer cells

Student(s) Name: *Mohammed S. Alhazzaa*
Supervisor(s) Name: *Adel F. Alghaith, Gamal M. Mahrous*

Abstract:
Background: Apigenin (APG) is a flavonoid compound found in nature that has antiproliferative effects on neuroblastoma, pancreatic, colorectal, skin, and breast cancer cell lines. According to the biopharmaceutical classification system, APG is a class 2 molecule. There are numerous reported methods to enhance the aqueous solubility of poorly soluble drugs. Among them, solid dispersion and complexation are two of the most effective and accepted techniques in the pharmaceutical industry.
Method: In this study, we prepared complexes using a kneading method with Methyl-B-cyclodextrin (MCD) and solid dispersion with Polyvinylpyrrolidone (PVP) by fusion method. Dissolution studies of the prepared SD and CD in different media (pH 1.2 HCL, pH 6.8). Evaluation of selected formulas of the prepared Solid dispersion and Complexes for MTT cytotoxicity assay on A549 lung cancer cells.
Results: Dissolution results showed a percentage dissolved of 32 % and 40 % APG-PVP solid dispersion and APG-MCD complex respectively, in comparison to 19 % for untreated APG in the same time interval (one hour). In addition, the MTT assay using A549 lung cancer cell line showed a decrease in IC50 from 34.2 mcg for untreated APG to 16.2 and 12.2 mcg for the APG-PVP solid dispersion and APG-MCD complex respectively.
Conclusion: The complex and solid dispersion of APG might provide an approach toward the control of cancer cell growth, and the improved efficacy of the complex and solid dispersion formulation compared with that of the free APG might be due to the improved solubility and dissolution of APG.

Abstract Code: POT1105

Formulation and Evaluation of Atorvastatin Nanostructured Lipid Carriers for Topical Application

Student(s) Name: *Lama I. Alsulaiman*
Supervisor(s) Name: *Sarah I. Bukhari – Njoud A. Altuwaijri*

Abstract:
Background: The skin is susceptible to many microorganisms and despite the effectiveness of antibiotics, their potency could be lost over time due to antimicrobial resistance. Atorvastatin, an antihyperlipidemic drug is being repurposed recently as an antibacterial due to its potential antimicrobial effect. It is a BCS class II drug with low solubility and so was formulated using nanostructured lipid carriers (NLCs) to enhance its solubility and promote absorption through the skin.
Methods: The atorvastatin NLCs were prepared using homogenization followed by ultra-sonication. The NLC formulations were characterized in terms of the particle size, zeta potential, PDI, and encapsulation efficiency. Finally, Antimicrobial tests were performed using agar diffusion method and broth dilution method against SA, MRSA and E. coli. where the bacterial growth was monitored, and the diameters of the inhibition zones measured around each well and recorded in mm. Further AT-NLC antimicrobial activity is under investigation.
Results: NLCs formulations resulted in an average particle size of 120 nm, zeta potential values of -32 ± 5 mV, PDI value of ≤ 0.5 and an encapsulation efficiency around 94%. The Antimicrobial activity for Atorvastatin against E. coli showed inhibitory zone of 12mm. While showed its bactericidal activity against both SA and MRSA in liquid culture
Conclusions: The repurposing of atorvastatin using NLCs could be a promising approach to overcome the limitations of the drug and the bacterial resistance concerns. Repurposing an FDA approved medication is an effective strategy to discover new indications of an existing drug and expedite its approval.

Abstract Code: POT1106

Examining Anxiety, and Insomnia in Saudi Internships Students and Their Association with Online Gaming Addiction

Student(s) Name: *Anan M. Alobaid, Noor W. Alharthi*
Supervisor(s) Name: *Tahani K. Alshammari, Awatif B. Albaker*

Abstract:
Background: Internships are a mandatory graduation requirement to aid transition to the work environment. Some individuals are prone to anxiety in an unfamiliar environment. Anxiety is a public concern among young adults. Online gaming is linked to poor mental health and addiction. Here, we investigated the mechanism connected to gaming addiction with anxiety and insomnia among internship students.
Methods: A convenient sample of 267 KSU internship students was collected in a cross-sectional study module between July 17 and December 27, 2022.

The survey contained Generalized Anxiety Disorder-7(GAD-7), Athens Insomnia Scale(AIS), and Internet Gaming Disorder Scale ShortForm(IGDS9-SF).
The association was estimated using Pearson's correlations. Relationships between insomnia, anxiety and gaming addiction symptoms were examined by network analysis.
Results: Our results indicate that about 60% of participants exhibited mild to severe anxiety and insomnia, while 2.28% showed symptoms of gaming addiction. We found a moderate association between anxiety and insomnia. Item-level analysis indicated that feeling anxious (GAD_1) and unable to sit still (GAD_5) are essential for gaming and that uncontrollable worrying (GAD_2) is crucial for insomnia. Indicating an interplay between these items, supported by our centrality analysis, where we found that GAD_1 and GAD_2 depicted high centrality.
Conclusions: We found high rates of anxiety and insomnia and an association between selected symptoms of anxiety and insomnia. The Saudi lifestyle may contribute to these findings. Low gaming addiction rates could be attributed to a lack of entertainment time and increased risk awareness. Given these findings, awareness of anxiety and insomnia risks should be emphasized.

Abstract Code: POT1107

Potential Antifungal Effect of Atorvastatin Nanoparticles in Pulmonary Disease

Student(s) Name: *Aljawhara O. Alomran*
Supervisor(s) Name: *Sarah I. Bukhari, Fai A. Alkathiri*

Abstract:
Background: It has been discovered that Atorvastatin (ATR), in addition to its antihyperlipidemic effect, is thought to have antifungal effects, which could be useful in the treatment of lung disease caused by a fungal infection. Therefore, the study aimed to investigate the use of ATR with different Gelucire (GR) 44/14 and 50/13 as carriers in different ratios (1:1, 1:3) as an inhaled antifungal therapy to treat lung infections using the spray drying technique.
Methods: The formulated (ATR-GR) particles were characterized for drug content, particle size, zeta potential, encapsulation efficiency and antifungal tests.
Results: The drug content was found to be higher in the samples with GR 44/14, about 86 ±4.1% for 1:1 and 98 ± 0.3 % for 1:3. While for the GR 50/13 the drug content was 60 ± 3.2 % and 87 ± 4.2% for 1:1 and 1:3, respectively. Higher GR ratios led to smaller particle sizes and increased stability. Increasing ATR-GR ratio improved drug entrapment efficiency. GR enhances the drug release process by forming hydrogen bonds with the active substance, forming stable solids of the amorphous drug in nanoparticles. Antifungal tests were performed using agar diffusion assay; the results were expressed by measuring the inhibition zone (clear zone) around each well in mm. The samples with GR 44/14 in ratio 1:3 represented the best antimicrobial activity.
Conclusions: This potential promise could be developed for clinical studies of the pulmonary delivery of ATR nanoparticles as an antifungal agent.

Abstract Code: POT1108

Effectiveness of docetaxel in treatment of brain cancer cells

Student(s) Name: *Abdullah I. Asiri, Abdulelah S. Alturki*
Supervisor(s) Name: *Saad Alobaid*

Abstract:
Background: Cancer is a disease that can start in any organ or tissue of the human body where cells grow uncontrollably and can invade nearby tissue. Glioblastoma is the most aggressive type of brain tumor accounting for 60% of all brain tumors, with a median survival of 15 months. Docetaxel, a microtubule-stabilizing chemotherapy drug, has shown efficacy in several cancer types including breast, ovarian, and non-small cell lung cancer. However, its efficacy in glioblastoma remains unclear. Therefore, our study designed to explore the impact of Docetaxel formulations on glioblastoma cells.
Methods: In the present study, we have used two different nanoparticle formulations of Docetaxel as well as market formulation. Several experiments such as MTT assays, flow cytometry assay and scratch assay were conducted to analyze the impact of Docetaxel formulations on cell viability, proliferation, and apoptosis of glioblastoma cells.
Results: Our results have shown that Docetaxel nanoparticle formulation significantly decreased the viability and proliferation of glioblastoma cells. Furthermore, our findings indicated that the nanoparticle formulations of docetaxel exhibited superior effectiveness in reducing glioblastoma cell viability and inducing apoptosis compared to the marketed formulation.
Conclusions: In conclusion, these findings offer a strong evidence of the effectiveness of the Docetaxel nanoparticle formulation, could be an efficient treatment option for glioblastoma in the future. Further studies are needed into understanding and identifying the activated molecular mechanisms by which microtubule formulations exert their effect on glioblastoma cells that lead to improved anticancer activity.

Abstract Code: POT1109

SLN Mediate Active Lymphatic Delivery of Gefitinib into A549 Cell Line: Optimization, Biosafety, and Cytotoxicity Studies

Student(s) Name: *Saleh B. Albeigani / Abdulrahman F. Alsubaihin*
Supervisor(s) Name: *Gamaleldin I. Harisa, Abdulrahman Y. Shreif*

Abstract:

Background: Gefitinib (GFT) is a member of tyrosine kinase inhibitors (TKIs) anticancer, however, it is shown multiple systemic toxicities due to nonspecific distribution.

Moreover, lung cancer is a global problem Therefore, the current study was designed to optimize solid lipid nanoparticles (SLN) for the selective uptake of GEF into A549 Cell Line as a surrogate model for lung cancer.

Methods: SLN were prepared using the ultrasonic melt-emulsification method. SLNs were loaded with GEF (GEF-SLN) and subjected to characterization. In-vitro dissolution of GEF-SLN formulations was studied using the dialysis method. Biosafety in the terms of hemocompatibility was investigated using fresh blood samples. Additionally, the cytotoxicity of GEF-SLN was examined against the lung cancer cell line (A549) and compared to the free drug.

Results: The obtained results showed that the prepared formulations fall in the nanosized range from 114 to 411 nm with a negative zeta-potential value from -17 to -27 mV. The particle size of PlainSLN formulations was increased when the GEF is incorporated during preparation. GEF entrapment efficiency into SLN was 88% with a sustained-release profile of about 75% in 24 h. Additionally, the present results revealed that using surfactants with high drug solubility negatively impacts the stability of SLN formulation. SLN formulations showed insignificant erythrocyte hemolysis. The cytotoxicity studies revealed that SLN enhanced the cytotoxicity compared to free GEF.

Conclusions: This study concluded that SLN is a hopeful approach to enhancing the selective deposition of GEF into cancer cells through the lymphatic system to combat lung cancer metastasis.

Executive Master in Drug Regulatory Affairs

Program's Vision

Increase the quality of the health care sector by building human capacities familiar with drug regulatory affairs.

Program's Mission

Providing distinguished education in the aspect of drug systems and contributing to building a knowledge-based economy for the health care community through education and critical thinking and making the most of national and international expertise.

Program's Objectives

The main objective of this program is to meet the national needs for qualified professionals in drug regulation and to deepen the understanding of the current national and international regulations for development, manufacturing, registration and marketing of pharmaceutical and medicinal products.

6- Demonstrate an understanding of the Regulatory authorities' rules and responsibilities in ensuring the safety, quality and efficacy of pharmaceutical products.
7- Comparing and contrasting the basic principles and practices of Quality Management (QM), Quality Assurance (QA), and Quality Control (QC) in the pharmaceutical industry and explaining the parameters for regulatory compliance with the local and international codes of ethics.
8- Develop Assessing the health policy and linking between the regulatory system and health policy, plus illustrating the basic principle and concepts of Pharmacoeconomics.

Requirements for Admission

In addition to the requirements stated in the Unified Law of Graduate Studies at Saudi Universities, the student should hold a BSc in Pharmaceutical Sciences with a minimum of a " Good" GPA.

The Program and Admission Requirements can be found in the following link:

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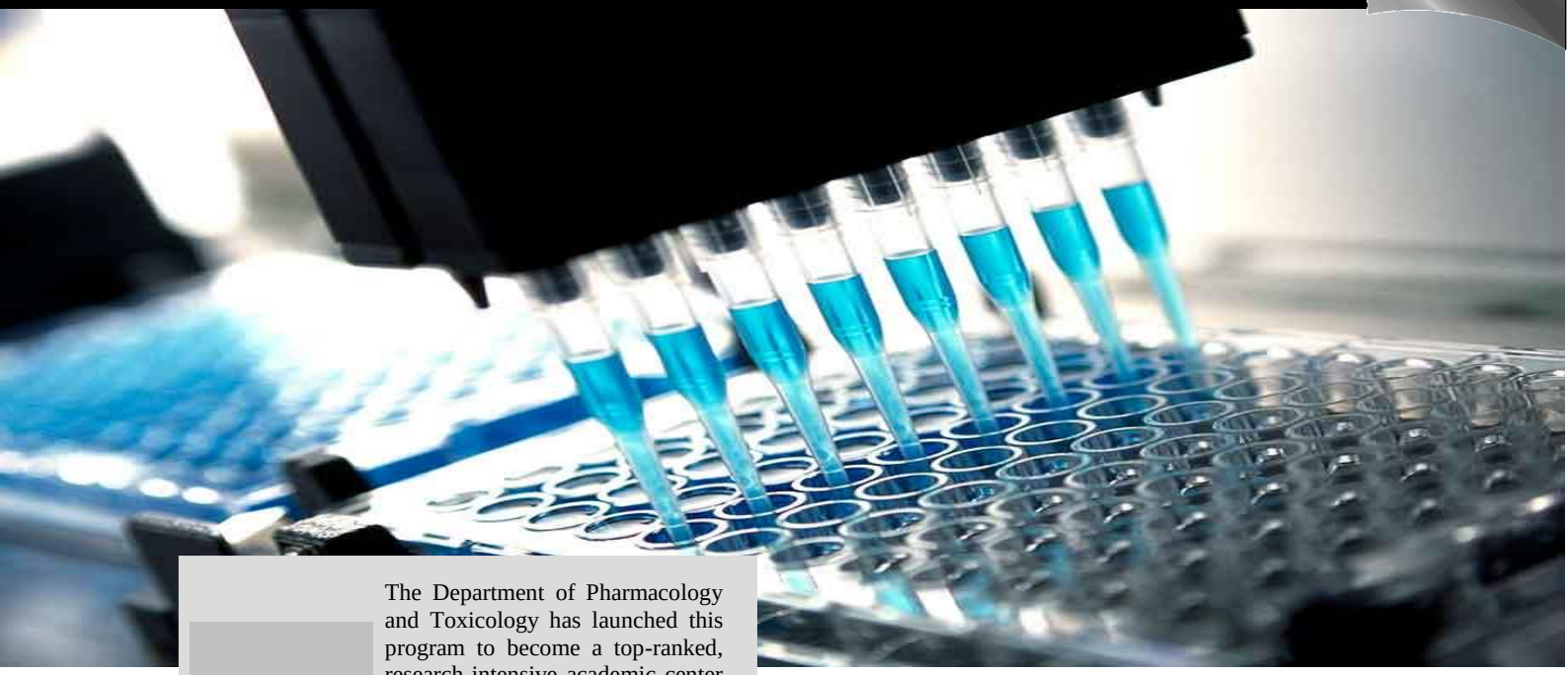
Tel: +966114694257 (WhatsApp)
E-mail: EMDRA@ksu.edu.sa

Master of Science in Pharmacology



Program's Vision

The Department of Pharmacology and Toxicology has launched this program to become a top-ranked, research-intensive academic center in the disciplines of pharmacology in the Arabian Gulf and the Middle East and recognized globally.
center in the disciplines of pharmacology in the Arabian Gulf and the Middle East and recognized globally.

Program's Mission

To prepare postgraduate student with the knowledge and abilities required for positions in pharmacological research. Graduates will be able to participate in preclinical and clinical studies.

Program's Objectives

5. Acquire new knowledge in pharmacology by conducting and promoting innovative research under the supervision of highly qualified faculty.
6. Prepare students for future success in their careers and lives through hosting up-to-date courses in pharmacology that help them develop a rigorous scientific attitude and, thus, serve pharmacy and other health-related professions.
7. Impart relevant information to students in a manner that encourages them to develop their analytical and intellectual capabilities and, thus, acquire knowledge, with an emphasis on self-reliance.
8. Expand the scope of modern pharmacological research to include cell physiology, biochemistry, genetics, and cellular and molecular biology for a better understanding of drug action

Requirements for Admission

In addition to the requirements stated in the Unified Law of Graduate Studies at Saudi Universities, the student should hold a BSc in Pharmaceutical Sciences with a minimum of a "High Good" GPA.

The Program and Admission Requirements can be found in the following link:
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Fields Available to Graduates

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Professional Poster Presentation Abstracts

Post Graduate

Pharmacy Practice and Pharmacotherapy

Abstract Code: PGPP 1200

Antimicrobial Susceptibility of Blood Stream and Respiratory Multi-Drug Resistant Gram-Negative Infections in Pediatric Patient

Author(s) Name: *Abdulrahman Mohammed Alotaibi, Mashal Almutairi*

ABSTRACT:
Background: Our objective is to determine the MICs of commonly used antimicrobial agents for Gram negative bacteria isolated from pediatrics with blood stream or respiratory infections. And to identify these bacteria and understand the resistance pattern among these bacteria.
Methods: Staring from July 2021 to January 2022, all pediatric patients with a positive culture for Pseudomonas aeruginosa, Klebsiella pneumoniae, Acinetobacter baumanni isolated from the blood or the respiratory tract was included in our study. The clinical isolates were sent our microbiology lab to determine the MICs against different antimicrobial agents. 19 isolates were identified during that period.
Results Klebsiella pneumoniae was the most common isolated MDR-GN pathogen (n= 9, 47%) followed by Pseudomonas aeruginosa (n=8, 42%) and Acinetobacter baumanni (n=2, 10 %). Overall, 16 % were resistant to carbapenems, 47 % were resistant to ceftazidime, 21% resistant to gentamicin, 16 % resistant to amikacin and 21% resistant to tobramycin. The median (range) MIC against imipenem was 2 ug/mL (0.25-256), meropenem was 0.625 ug/mL (0.25-256), ceftazidime was 12 ug/mL (0.25-128), amikacin was 4 ug/mL (1- 256), gentamicin was 2 ug/mL (0.5-256) and tobramycin was 1 ug/mL (0.25- 256).
Conclusions: Mortality rate in our population was 18%. Once we enroll more patients

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Abstract Code: PGPP 1201

Patterns and appropriateness of prescribing for people with dementia in ambulatory care in Saudi Arabia: A cross-sectional study

Author(s) Name: *Nahla A. Alageel, Carmel M. Hughes, Monira M. Alwhaibi, Walid Alkeridy, Heather E. Barry*

Abstract:
Background: Potentially inappropriate medication (PIP) and polypharmacy are risk factors for several negative health outcomes. The use of polypharmacy and PIP in people with dementia (PwD) is not well-described in Saudi Arabia. Therefore, we aim to estimate the prevalence of PIP and investigate associations between PIP and other patient characteristics in an outpatient setting.
Methods: A cross-sectional, retrospective analysis was conducted at a tertiary hospital in Saudi Arabia. Patients who were ≥65 years old, had dementia, and visited outpatient clinics between 01/01/2019 and 31/12/2021 were included. Prescribing appropriateness was evaluated by applying the Screening Tool of Older Persons Potentially Inappropriate Prescriptions (STOPP) criteria. Descriptive analyses were used to describe the study population. Prevalence of PIP and prevalence per each STOPP criterion were calculated. Associations between PIP, polypharmacy, age and sex was investigated by logistic regression.
Results: A total of 287 PwD were identified; 56.0% (n=161) were female. The prevalence of PIP was 61.0% (n=175). Common instances of PIP were drugs prescribed beyond the recommended duration (n=90, 31.4%), drugs prescribed without an evidence-based indication (n=78, 27.2%), proton pump inhibitors for >8 weeks (n=75, 26.0%), and acetylcholinesterase inhibitors with concurrent drugs that reduce heart rate (n=60, 21.0%). Polypharmacy was observed in 82.6% (n=237) of patients and was strongly associated with PIP (OR 21.9, 95% CI 8.3 – 57.5).
Conclusions: Findings have revealed a high prevalence of PIP among PwD in Saudi Arabia that is strongly associated with polypharmacy. Future research should aim to explore the key stakeholders in medicines management to optimise medication use for this vulnerable population.

Abstract Code: PGPP 1202

Direct Oral Anticoagulants Related Problems in Atrial Fibrillation Hospitalized Patients in a Single Center, Cross-Sectional Study.

Author(s) Name: *Huda Abdullaziz Alewairdhi, Ghadah Assad Assiri, Reem Saeed Matran*

Abstract:
Background: Direct oral anticoagulants (DOACs) such as dabigatran, rivaroxaban and apixaban are now recommended as the first line therapy for prevention of stroke in non-valvular atrial fibrillation (NVAF).
Limited literature is published regarding drug related problems (DRPs) of DOACs. DRPs are more common in hospitalized patients which increase morbidity, mortality and costs. Moreover, atrial fibrillation patients are often elderly with multi-morbidity and polypharmacy, which could make them more prone to medication errors and adverse events.

Methods: A retrospective observational study was conducted including data from January,2020 - December, 2022 to examine DOACs related problems in AF patients. Data were collected from electronic medical records (EMRs) of King Saud University Medical City (KSUMC).
Results: Overall, 138 patients were captured. The prevalence of DRPs was 74.63% in 103 patients with AF. The most common DRPs were classified within the treatment safety domain (55; 53.4%) followed by unclear problem or complaint due to the lack of documentation (49; 47.57%). In addition, drug selection was the primary cause of DRPs that was accounted for 22 patients (21.35%), followed by DRPs-related patient use which was recorded in 20 patients [19.4%].
Conclusions: DRPs associated with DOACs were significant. The primary common problem was safety and the primary cause was drug selection. The planned total number of patient records to be reviewed is 480. Although initial findings have shown a high percentage of DRPs, further case reviews may alter the current findings.

Social Pharmacy and Pharmaceutical Outcomes

Abstract Code: PGSP 1300

Cost-effectiveness analysis of oral semaglutide for the treatment of type 2 diabetes mellitus in Saudi Arabia

Author(s) Name *Asma Abdulaziz Almuhsin, Ahmad Alghamdi*

Abstract:
Background: Semaglutide is the first glucagon-like peptide-1 receptor agonist (GLP-1RA) that has been approved for oral administration and has shown a significant reduction in HbA1c. The aim of this study is to assess the cost-effectiveness of oral semaglutide versus sitagliptin and empagliflozin in patients with type 2 diabetes mellitus (T2DM) in Saudi Arabia. **Methods:** Analyses were performed from a healthcare payer perspective using a decision tree model comparing oral semaglutide with empagliflozin and sitagliptin in addition to metformin over a 52-week time horizon. Baseline cohort characteristics, treatment effects, adverse drug events, and transition probabilities were collected from published literature. Direct medical costs were derived from MOH and KSUMC costing data. A deterministic sensitivity analysis was performed.
Results: The base-case analysis revealed that the 52-week medical costs with oral semaglutide, empagliflozin, and sitagliptin in combination with metformin were SAR 6,086, SAR 4,392, and SAR 3,375 respectively. The ICER of oral semaglutide vs. sitagliptin was SAR 5,424, while the ICER for oral semaglutide vs. empagliflizine was SAR 4,237. By comparing all three options using sitagliptin as reference, oral semaglutide dominated empagliflozin (ICER SAR 5,424, SAR 10,171) respectively. Sensitivity analysis was robust against changes in oral semaglutide effectiveness and its cost.
Conclusions: The result of this analysis indicates that the addition of oral semaglutide to metformin is considered cost effective treatment option for T2DM patients. Future studies must evaluate the affordability of oral semaglutide to be considered for reimbursement by healthcare payers in Saudi Arabia.

Abstract Code: PGSP 1302

Healthcare Expenditures Associated with Uveitis in Saudi Arabia: A Single Center Cost of Illness Study

Author(s) Name: *Wejdan Ali Almutairi, Ahmed Alghamdi*

Abstract:
Background: Uveitis is a condition characterized by inflammation of the eyes that is associated with a substantial global economic burden. The aim of this study was to estimate the economic burden and understand the major cost drivers in Saudi Arabia.
Methods: This was a retrospective, prevalence-based single-center cost of illness study. Patients' medical records were reviewed and data were collected from a governmental eye specialist hospital in Riyadh between 2021-2022.A bottom-up micro-costing approach was conducted to estimate the direct medical costs associated with Uveitis including (medications, laboratory and diagnostics tests, outpatient visits, and hospitalization). Descriptive and inferential statistics were performed.
Results: A total of 187 Uveitis patients were included in the study (mean age 39, 51% male, and an average disease duration of 4 years). The total cost during study period was SAR 3,882,86 and the estimated average annual cost SAR 20,764 per patient. The annual cost varied significantly by type of Uveitis ranging from SAR 13,366 for posterior Uveitis to SAR 26,329 for intermediate Uveitis (p=0.04). The presence of cataracts and glaucoma in addition to Uveitis resulted in average annual cost of SAR 33,171 and SAR 27,722 respectively. Medications were considered the major cost driver (41%), followed by diagnostic tests (27%), lab tests (17%), and hospital visits and admissions (15%).
Conclusions: Uveitis imposes substantial economic burden on Saudi Arabia. Decision makers need to focus on allocating resources towards strategies that lower the cost by considering cost-effective treatment options and early detection programs in order to lower the growing economic burden of Uveitis.

Experimental Therapeutics and Toxicology

Abstract Code: PGET1500

The Effect of 6-Hydroxydopamine (6-OHDA) in LPS-Induced Neuro-Inflammation on Autistic Animal Model, Through Inhibition of Hindbrain Noradrenergic Neurons A2.

Author(s) Name: *Adullah M. Albogami, Hussain N. Alhammami, Mohammed M. Alghatani*

Abstract:
Background: Autism spectrum disorder (ASD) is a complicated neurodevelopment disorder during the first years of childhood. The prevalence rate of ASD has increased in the last years. ASD can characterize by social communication impairments, restricted and repetitive patterns of behavior and interests
The pathophysiology of ASD is still unknown. One of the proposed theories contributing to ASD pathogenesis is neuroinflammation. NA neurons participate in the physiological and behavioral processes related to motivation, learning, attention, and hemostasis.
Methods: We assessed using of intracerebroventricular (i.c.v) 6-hydroxydopamine (6-OHDA) on neuro-inflammation induced by lipopolysaccharides (LPS) through repetitive behavioral test and RT- PCR for IL-6, TNF-a and NfKB genes expression. Also, we measured COX-2, iNOS, and GPX-1 protein expression using western blot.
Results: In the self-grooming test, we find an increased repetitive behavioral between 6-OHDA (75 µg/µl/day) + LPS (500 µg/kg - i.p.) group compared to autism-controlled group ($P<0.05$). The results showed a significant induction of IL-6 gene expression in pre-frontal cortex (PFC) with 6-OHDA group compared to either controlled group or combination group ($P<0.05$). We observed an increase of TNF-a gene expression with 6-OHDA+LPS group compared to either controlled group or LPS group ($P<0.05$). We observed a significant reduction in COX-2 protein expression between LPS group and 6-OHDA+LPS group ($P<0.05$). Also. There is a significant reduced in anti-Oxidant (GPx-1) protein expression with 6-OHDA+LPS group compared to controlled group ($P<0.05$).
Conclusions: The using of 6-OHDA alone or with LPS can affecting the neuroinflammatory pathways in PFC of valproic acid (VPA) induced autism model.

Abstract Code: PGET 1501

Investigating Nicotine dependence's Mechanism and Potential Pharmacological and Environmental Interventions in Socially Isolated Rats

Author(s) Name: *Alhanouf Mohammed Almalaihi., Tahani K. Alshammari, Musaad A. Alshammari*

Abstract:
Background: Studies revealed that the average annual direct healthcare costs of depressed older adults exceed the costs for non-depressed individuals by almost one-third, indicating the substantial burden of depression. Nicotine smoking has been linked to developing late-life depression and the severity of depression in middle-aged and elderly. Our central hypothesis is that pathological features of chronic nicotine oral self-administration observed in socially isolated aged rats can be modulated via pharmacological treatment with topiramate (TPM) or housing in an enriched environment (EE).
Methods: By proposing a couple of rescue strategies, the pharmacological (TPM) and the environmental approach (EE), we built our study on four main groups. Group1, the socially isolated (SI) aged rats; group 2, SI-aged rats with chronic nicotine oral self-administration; group 3, SI-aged rats with chronic nicotine oral self-administration treated with TPM; and group 4, aged rats with chronic nicotine oral self-administration housed in EE. We used behavioral tests to investigate depression, anxiety, withdrawal, and preference.
Results: Data analysis and interpretation are ongoing since this project is in progress.
Conclusions: This work is public health relevant and would fill our knowledge gaps in nicotine addiction, aging, and depression pathology.

Abstract Code: PGET 1502

Study the Effect of Indole-3-Acetic Acid and Chenodeoxycholic Acid Against ValproateInduced Liver Injury in Rats: Role of FXR and TLR4

Author(s) Name: *Amjad Solaiman Aljrboa, Ahlam M. Alhusaini and Dr. Wedad S. Sarawi*

Abstract
Background: Valproic acid (VPA) belongs to the first-generation antiepileptic drugs, and it has the risk of life-threatening liver damage. The importance of our study is to investigate the protective effect of indole-3-acetic acid (IAA), chenodeoxycholic acid (CDCA) and their combination on VPA-induced liver injury focusing on toll-like receptor 4 (TLR4) and farnesoid X receptor (FXR).
Methods: Liver injury was induced in rats by daily intraperitoneal dose of VPA (500 mg/kg). The rats were treated with either IAA (40 mg /kg, orally), CDCA (90 mg/kg, orally), or combined therapy of CDCA and IAA one-hour post VPA dose for three weeks.

Results: VPA group showed significant elevations in serum aminotransferases, triglyceride, and total cholesterol levels. Hepatic glutathione (GSH) level and superoxide dismutase (SOD) activity were significantly decreased, while malondialdehyde (MDA) level was markedly increased. Tumor necrosis factor-α (TNF- α), interleukin-1beta (IL-1β), lipopolysaccharides, and caspase-3 were significantly increased. TLR4 expression in hepatocytes was elevated, while FXR expression was downregulated. IAA significantly ameliorated all altered parameters. Whereas CDCA treatment reversed most of the deleterious effects caused by VPA, yet it has little or no effects on SOD and lipid profile. Combined treatment with IAA and CDCA showed mild improvement on some of the markers mentioned earlier, with additive effects only on the tissue expression of TLR4 and FXR receptors.
Conclusion: IAA could be a promising protective agent against VPA-induced liver injury. Key words: Valproic acid, indole-3-acetic acid, chenodeoxycholic acid, toll-like receptor 4, and farnesoid X receptor.

Abstract Code: PGET1503

Immunotoxicity and Immunomodulatory Responses Following Exposure to Bimetallic Engineered Nanomaterials in a Macrophage Model

Author(s) Name: *Anas Mohammed AlJarbou, Nasser Bader Alsaleh, Syed Farooq Adil*

Abstract:
Background: Engineered nanomaterials (ENM) are being employed in a wide range of applications including drug development, and hence, raising concerns on human health. Doping is a common method for improving the electrical, optical, and biological characteristics of ENM. However, the toxicity and underlying molecular mechanisms of ENM doping remain largely unknown. Prior research has identified the immune system as a notable target of ENM toxicity. Macrophages are a key cell type that eliminates pathogens and foreign substances including ENMs. In this work, we investigated the toxicity and immunomodulatory responses of zinc oxide doped-manganese oxide nanoparticles (ZnO@MnO2) in comparison to undoped MnO2 nanoparticles in the RAW 264.7 macrophages.
Methods: ENMs characterization was done by X-ray diffraction (XRD), Transmitted electron microscope (TEM) and Dynamic light scattering (DLS). Oxidative stress and inflammatory responses done through RT-PCR.
Results: The TEM data showed that both nanoparticles have an average diameter of ~30 nm. The cytotoxicity data demonstrated a dose-dependent decrease in cell viability following exposure to the nanoparticles with MnO2 nanoparticles being more toxic. Similarly, Exposure to MnO2 nanoparticles showed a trending more activation of inflammatory and oxidative stress responses. Cellular internalization of the MnO2 nanoparticles was significantly more compared to the doped nanoparticles. Finally, pre-treatment with several inhibitors, including autophagy, inflammasome and scavenger receptor inhibitors, showed little to no effect indicating that these pathways are not largely involved in driving the toxicity of the nanoparticles.
Conclusions: ZnO@MnO2 were less toxic compared to MnO2 indicating the doping ameliorate the toxic effect of the undoped MnO2.

Abstract Code: PGET1504

Use of Imeglimin in the Protection Against Nicotine-Induced Neurotoxicity

Author(s) Name: *Fahad Almutairi, Mohammed Almutairi, Mohammed Assiri, Nasser Alsaleh*

Abstract:
Background: Exposure to high concentration of nicotine from tobacco smoke, nicotine-replacement therapy, and other nicotine-containing products is associated with harmful effects on many organs, including the brain. There are several potential mechanisms underlying these effects such as mitochondrial dysfunction, oxidative stress, and inflammation. These events can lead to neurotoxicity and neurocognitive deficits. Targeting these mechanisms could help to rescue neurons from toxic effects of nicotine. Imeglimin, a new anti-diabetic drug belongs to tetrahydrotriazine-containing oral antidiabetic agents “glimins”, has shown improvement in mitochondria function via reducing reactive oxygen species.
Methods: Human neuroblastoma (SH-SY5Y) cell line was used to investigate the effect of imeglimin against nicotine toxicity. SH-SY5Y cells were pretreated with imeglimin (50 uM and 100 uM) 24 hr before nicotine exposure. Tetrazolium dye 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) and JC-1 assays were used to assess cell viability and mitochondrial membrane potential, respectively. All data will be expressed as mean ± SEM and analyzed by One-way ANOVA followed by Tukey’s test. P values < 0.05 were considered statistically significant.
Results: Our results revealed that imeglimin protects SH-SY5Y from nicotine toxicity. In addition, imeglimin rescues mitochondria from harmful effects of nicotine.
Conclusions: Taken together, our findings demonstrated that imeglimin protects against nicotine-induced neurotoxicity

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Abstract Code: PGET1505

National mRNA Platform for Development of Vaccine Candidate Against COVID19

Author(s) Name: *Mubarak Aldosary, Safia Aljedani, Alanoud T. Aljasham, Ahlam Alsaadi, Abdulrahman Alshammari1, Majed F Alghoribi, Mashal M. Almutairi*

Abstract:
Background: In the past vaccine development is known to take several years. During COVID19 pandemic the need to a new biotechnology specially to convoy the fast spread of the virus. Messenger RNA (mRNA) biotechnology provides rapid and cost-effective solution for vaccines development. During this project, we are aiming to establish a national mRNA platform for developing of a vaccine candidate against COVID19.
Methods: Our methodology is composed of three major steps. The first step includes analyzing and identifying of the SARS-CoV2 local strains sequences and utilize these sequences for vaccine development. Second, we cloned the spike gene DNA into a suitable vector and transformed into bacteria cells for amplification. The vector was linearized and subjected into transcription to produce the target mRNA. To increase the stability of the mRNA, it was polyadenylated, capped. Finally, we tested the produced mRNA immunogenicity responses with macrophage cells.
Results: We determined the DNA sequences of circulating strain of SARS-CoV-2 within Saudi Arabia. The spike gene was successfully cloned into the vector The mRNA was produced based of the spike gene DNA sequence with good quantity and quality. We were able to polyadenylate and cap the purified mRNA. The mRNA was formulated with lipofectamine and transfected into macrophage cells. Different immune responses were induced in comparison with the nontransfected macrophage cells indicting the ability of the mRNA-based vaccine candidate to induce immune response.
Conclusions: we were able to establish a platform for mRNA vaccine development for COVID-19 which can be extended to development of vaccine against other infectious diseases

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Abstract Code: PGET1506

Mechanisms Underlying Electronic and Tobacco Cigarette Smoking-Induced Hypertension: Role of Oxidative Stress

Author(s) Name: *Wael Alanazi & Yazeed Alqudayri*

Abstract:
Background: Tobacco cigarette smoking (TCS) is one of the main factors causing cardiovascular diseases (CVDs) worldwide. Studies confirmed that TCS smoking causes CVDs and hypertension (HTN) through various mechanisms. However, electronic-cigarette smoking (ECS) has been used as an alternative to tobacco smoking as it lacks most toxicants found in TCS. Still, the effect of ECS on cardiovascular system are not well studied. The current study aimed to compare the effect of ECS and TCS in causing HTN through induction of oxidative stress leading to angiotensin-II production and vasoconstriction.
Methods: Male mice were randomly divided equally into eight groups as follows: (Air control group), (Air control group treated with tempol as a potent free radical scavenger 50 mg/kg), (ECS without nicotine group), (ECS without nicotine group treated with tempol), (ECS with nicotine group), (ECS with nicotine group treated with tempol), (TCS group), (TCS group treated with tempol). Smoke conditions in which they were exposed 1h/daily, 7day/week for 4 weeks
Results: increase in blood pressure in TCS and ECS with nicotine except those who received tempol as compared to control group. Plasma levels of Angiotensin-II was elevated, and nitric oxide level was decreased. TCS and ECS with nicotine disrupted the balance between oxidants/antioxidants through measurement of oxidative stress markers including glutathione, glutathione peroxidase1, malondialdehyde and superoxide dismutase.
Conclusions: We found that oxidative stress is the main cause of endothelial dysfunction and hypertension in both ECS and TCS. An antioxidant (tempol) helped in prevention of oxidative stress, angiotensin-II production and hypertension induced by ECS and TCS

Pharmaceutical Engineering and Drug Regulation

Abstract Code: PGPD1600

Development of inhalable Osimertinib-loaded Liposomes for targeting Non-Small Cell Lung Cancer: Part I

Author(s) Name: *Baraa Mohammed Hajjar, Alanood S. Almurshedi1, Sultan M Alshehri*

Abstract:
Background: Lung cancer is the second most diagnosed cancer globally and the first leading cause of death. This study aimed to develop drug delivery systems consisting of Osimertinib-loaded cationic and pH-sensitive liposomes to improve tumor-targetability and therapeutic efficacy against non-small cell lung cancer (NSCLC).
Methods: Non-targeting (NLs), cationic (CLs), and pH sensitive (PSLs) liposomes were formulated with different ratios of lipid to Osimertinib (OSI) using the film hydration technique. The obtained Osimertinib-loaded liposomes (OSI-Ls) were characterized by particle size, charge, morphology, and carrier drug interaction. Additionally, encapsulation efficiency %, stability and in vitro drug release have been examined. OSI amount has been analyzed using a newly developed and validated HPLC method.
Results: In this study, a sensitive and selective HPLC technique was developed to quantify OSI in formulations. OSI was successfully incorporated in different liposomes (NLs, CLs, and PSLs) with varying ratios of lipid to OSI. TEM and particle size results showed that OSI-Ls were spherical, uniform, with smooth surfaces, and had narrow particle size distribution (<100 nm) with acceptable zeta potential values (□ +30 mV).

The highest EE% obtained was 88% for NLs, 83% for PSLs, and 68% for CLs at a ratio of 1:1 OSI to lipid. The in vitro drug release demonstrated sustained release at pH 7.5 from PSLs, CLs, and NLs. However, PSLs displayed rapid drug release in acidic pH conditions, indicating pH-sensitive release behavior.
Conclusions: This research suggests that apoptosis assessment, cellular uptake, and cytotoxicity of OSI-loaded NLs, CLs, and PSLs should be explored further in NSCLC cell lines.

Abstract Code: PGPD1601

Development of Afatinib loaded Nano structured Lipid Carrier Targeting Non-Small Cell Lung Cancer

Author(s) Name: *Hafsa Abdalla Elwali, Alanood S. Almurshedi, Zuhair A. Osman*

Abstract:
Background: Afatinib (AFT) is a first-line treatment for metastatic non-small cell lung cancer (NSCLC) approved by the Food and Drug Administration (FDA) in 2013. However, its clinical application is highly limited by its poor solubility, and consequently low bioavailability. We hypothesized that loading of AFT into nanostructured lipid carrier (NLC) will improve therapeutic outcomes and decrease side effects and toxicity.
Methods: Lipid screening and surfactant selection were carried out, then AFT loaded NLC was produced by High Pressure Homogenization technique. The optimal formulation was characterized by particle size, charge, and morphology. Then evaluated by HPLC, in vitro drug release, and cytotoxicity study.
Results: The optimal formulation was composed of stearic acid and oleic acid in ratio (7:3) with Tween80 1%. The mean particle size was 48.69 nm and value of PDI was 0.096 indicated narrower size of distribution and no aggregation. The zeta potential was − 26.8 mV. TEM images had a spherical form without adhesion or aggregation. The E.E.% was almost 99%. AFT-NLC was able to release the AFT in controlled manner and almost half of the drug (>55 %) was released after 24 h, followed Zero order kinetics. AFT-NLC showed enhanced cytotoxic potential in NSCLC cell lines (H-1975), as the proportions of necrotic cells increased from 1 to 71%, depending on the concentrations at 0.25 and 2 µM (a dose-dependent manner).
Conclusions: These successful investigations represent alternative drug delivery system for increasing the AFT bioavailability at site of action (lung) with higher retention and controlled release kinetic

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Abstract Code: PGPD1602

Inhalable Nano-liposomal dry powder of voriconazole for effective management of pulmonary aspergillosis: formulation and in vitro characterization

Author(s) Name: *Sarah Nasser Almarshad, Alanood S. Almurshedi, Sarah I. Bukhari, Basmah N. Aldosari*

Abstract:
Background: Invasive pulmonary aspergillosis (IPA) is the most serious type of lung fungal infection with a high mortality rate. Voriconazole (VRZ) is considered first-line therapy for IPA. Pulmonary drug delivery (PDD) is an effective way of targeting pulmonary fungal infections. Using dry powder inhalation (DPI) for local targeted PDD is an attractive choice that can be optimized for inhalation to deliver a wide range of drugs. High biocompatibility and biodegradability of liposomes as drug carriers in inhaled formulations have been reported in many studies. This study is designed to develop VRZ- loaded liposomal system (VRZ-Ls) for dry powder inhalation using the spray drying technique.
Methods: VRZ -Ls were prepared using a standard thin-film hydration method and characterized by particle size, Zeta potential, PDI, TEM, DSC, FTIR, encapsulation efficiency %, in-vitro drug release and then evaluated for Antifungal Activity. Novel DPI formulations of VRZ -Ls were prepared by spray drying method using Leucine.
Results: The prepared nano-liposomes showed smaller particle sizes (<100 nm), relatively high EE% (95±1.8%) and optimum zeta potential (-26±0.153 mV). TEM exhibited a spherical morphology with a size in agreement with results from nano sizer. DSC and FTIR analysis data show a decrease in crystallinity and a stable structure of the formulation. The prepared DPI showed good flow properties and good drug release.
Conclusions: The obtained results indicated that the novel inhalable DPI nanoparticles of VRZ -Ls could provide a promising strategy for the treatment of IPA.

Others

Abstract Code: PGOT1701

Folate decorated mesoporous silica nanoparticles for targeted delivery of 5-fluorouracil for ovarian cancer cells

Author(s) Name: *Adel Alhowyan, Aliyah Almomen, Aws Alshamsan*

Abstract:
Background: Ovarian cancer cell is overexpressed for folate receptors. Folate decorated AMSN loaded with 5-FU (AMSN-FU-FA) for targeted delivery of 5-FU were developed and investigated.
Methods: Particle characterization was performed by the DLS technique (Zeta-Sizer), structural morphology was examined by SEM and TEM. The drug encapsulation and loading were determined by the indirect method using HPLC. Physicochemical characterizations were performed by NMR, FTIR, DSC.

In-vitro release was conducted using dialysis membrane in PBS (pH 7.4) and phosphate buffer (pH 5.5). Anticancer activity was evaluated by MTT assay on ovarian cancer.

Results: Particle size of AMSN-FU-FA (907.6 ± 10.21nm with a polydispersity of 0.405 ± 0.001) with EE% (13.05 ± 0.73) and LC% (5.89 ± 0.32). NMR spectra confirmed the coating of AMSN with folate layer. Also, FTIR and DSC confirmed the coating of AMSN with folate as well as drug loading inside the AMSN-FU-FA. The in vitro release study of 5-FU from AMSN in PBS pH 7.4 was slow and controlled. Furthermore, the release rate of 5-FU from AMSN-FU-FA at pH 5.5 was slower than pH 7.4. After 24 h around 4 % of 5-FU was released from the formulation and after 216 h about 26.46 % of 5-FU was released from the formulation.

Conclusions: Based upon the above results it can be concluded that the encapsulation of 5-FU and functionalization of AMSN with folic acid can serve as potential carriers for 5-FU. Controlled and pH responsive release behavior might be effective for the long-term effects of the drug.

Abstract Code: PGOT1702

Senolytic Effect of Navitoclax in Breast Cancer Cells Induced into Senescence by Radiation and PARP Inhibition.

Author(s) Name: *Abrar Softah, Moureq Rashed AlOtaibi, Ali Alhoshani, Homood Moqbel AsSobeai, Khalid Hazani*

Abstract:

Background: Breast cancer is considered the primary lethal female cancer in Saudi Arabia. Although clinical studies and treatment protocols have been implemented and modified concerning breast cancer treatment, a significant number of patients experience recurrence and relapse. Studies have previously shown that PARP inhibitors (PARPI) can significantly delay tumour development in BRCA1-deficient mice. This study evaluated the ability of co-treatment of radiation and PARPI aided by senolytics to selectively eradicate breast cancer cells following the induction of senescence eventually leading the cells to apoptosis.

Methods: MTT Cell viability assay was used to screen for an optimal dose of PARPI and senolytics combination in two breast cancer cell lines: MDA-MB231, and 4T1. Senescence was confirmed in the treatment groups using SA-β- galactosidase and C12-FDG staining. Cell death was evaluated utilizing flow cytometry-based Annexin V/7AAD apoptosis assay. Gene expression of senescence canonical genes is to be investigated using reverse transcription polymerase chain reaction and immunohistochemistry assay in in-vivo studies.

Results: Apoptosis was found to significantly increase in comparison to radiation alone and radiation+PARPI (Talazoparib more than Niraparib). Consistently, we observed a significant elevation of senescence in treatment groups radiation (6 GY+Talazoparib+Navitoclax) both in vitro and in vivo. Also, alterations were observed in senescence-specific genes in vitro and in vivo; P53, P21 and inflammatory indicator IL-6, and apoptosis marker Caspase-3.

Conclusions: Radiation and Talazoparib aided by Navitoclax synergistically has proven to provide a low dose therapy protocol for the optimum treatment compared to the conventional breast cancer treatment used currently.


SCIENCE

Doctor of Philosophy in Pharmaceutical Chemistry

Program Highlights

Program's Beneficiaries

Student's holding a bachelor's and master degree in pharmacy from the Saudis, residents and from outside Saudi Arabia, demonstrators from various universities and government and private educational institutions in the pharmacy, staff of hospitals, pharmaceutical factories, research centers and other pharmacists who are interested in the research of pharmaceutical chemistry field.

Employment Opportunities Available

1-1. Academic and research jobs in Saudi public and private universities and colleges.
2- A research fellowship position at governmental and private universities and colleges in Saudi Arabia.
3-Leadership positions at public health and pharmacy care institutions such as the ministry of health, private hospitals, pharmaceutical factories, drug analysis centers, pharmaceutical companies

Application Requirements

1. The applicant must have a Bachelor's degree in Pharmaceutical Sciences or a Doctor of Pharmacy (pharm D) from King Saud University or any other university recommended by the Ministry of Education with a grade of no less than good with a cumulative average of (2.75 out of 5) or what Equivalent to it, provided that his grade in the specialization courses at the bachelor's level is not less than very good with a cumulative GPA of (3.75 out of 5) or its equivalent.
2.The applicant must have obtained a score of (550) in the TOEFL test or its equivalent.

About the Program

Program Objectives:
The objectives of the program can be summarized as follows:
1. To meet the needs of educational and professional institutions, pharmaceutical factories, research centers and other holders of national higher qualifications.

2 .Meeting the desires of the increasing number of master's degree holders to obtain higher qualifications.

3 .Enriching the scientific research in the two tracks (medicinal and analytical) of the department and revitalizing its general performance.

4. Providing the applicant for this degree with a broad base of knowledge in the fields of pharmacological chemistry and pharmaceutical analytical chemistry, enabling him to delve into one of their various branches, preparing him for self-reliance in independent research in the delicate field, and qualifying him to enter and confront practical life

Contact Us

Tel- 0114677730
Fax- 0114676383

Building Number: 23- College of Pharmacy

Master of Science in Pharmaceutical Chemistry

Program Highlights

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2.The applicant must have obtained a score of (550) in the TOEFL test or its equivalent.

About the Program

Program's Vision
Achieving local and international leadership and excellence in areas of pharmaceutical chemistry education and research.

Program's mission
Training of a generation of pharmaceutical chemists well equipped with top research techniques and education to contribute to the overall advancement in health and pharmaceutical care through fulfilling job market needs and providing solutions to problems faced by the pharmaceutical community.

Program's objectives
1-Training and graduating pharmaceutical chemists with the necessary professional knowledge to join the work force in pharmaceutical and health care sectors.
2-Providing the job market with highly qualified scientists with the ability to identify problems and provide solutions to the profession.
3-Meet governmental and private health sectors, pharmaceutical factories and research centers' needs with highly qualified pharmaceutical chemists.
4-Motivate students to conduct academic and applied scientific research and publish results of their research in international journals with high impact factors.

Contact Us

Tel- 0114677730
Fax- 0114676383

Building Number: 23- College of Pharmacy

Abstract Code: YPPP1800

Knowledge, Perceptions, and Readiness of Telepharmacy among Hospital pharmacists in Saudi Arabia

Author(s) Name: *Nehad J. Ahmed, Ziyad S. Almalki, Asmaa H. Alsawadi, Abdulmohsen A. Alturki, Abdulaziz H. Bakarman, Alwaleed M. Almuaddi, Saeed M. Alshahrani, Meshari B. Alanazi, Ahmed M. Alshehri, Ahmed A. Albassam, Abdullah K. Alahmari, Ghada M. Alem, Saad A. Aldosari and Ahmad A. Alamer*

Abstract:

Background: Telepharmacy is a technology-based service that provides promoted services like counseling, medication administration and compounding, drug therapy monitoring, and prescription review.

Methods: Between March and May 2020, a cross-sectional study was done among Saudi Arabian hospital pharmacists.

A survey was created using Google Forms as an online form. The survey was sent to the pharmacist's emails and WhatsApp. We increased the sample by using the snowball sampling method. The SPSS was used for data analysis. Differences in pharmacists' knowledge, perception, and readiness scores in relation to their years of experience were assessed using an independent samples t-test. The level of significance was set at P less than 0.05.

Results: A total of 411 people responded to the survey. Only 43.06% of the respondents agreed that telepharmacy is available in Saudi Arabia, and 36.74% of the respondents agreed that patients in rural areas can have more medication access and information via telepharmacy. Only 29.44% of pharmacists agreed that telepharmacy improves patient medication adherence, and about 33.82% of pharmacists agreed that telepharmacy saves patients money and time by eliminating the need for them to travel to healthcare facilities.

Conclusion: This research found that hospital pharmacists were unsure of their level of knowledge, their attitude toward telepharmacy, and their willingness to incorporate it into their future pharmacy practices.

Abstract Code: YPPP1801

HOSPITAL PHARMACISTS' INTERVENTIONS AMONG CRITICALLY ILL COVID-19 PATIENTS IN A TERTIARY HOSPITAL IN SAUDI ARABIA

Author(s) Name: *Samah Mohammed Hussein, Haifa Ibrahim Albazei, Meaad Rabah Alharbi, Shaden Abdulmajeed Al-amer, Yara Ali Alromaih*

Abstract:

Background: During the COVID-19 pandemic, the role of pharmacists widely expanded due to the dramatically increased demand of critical care units at hospitals which necessitate the interventions of pharmacists to ensure high quality medication and patient safety at intensive care units. Literature lacks similar studies in Qassim area. Hence, we conducted this study with an aim of investigating the pharmacists' nature and frequency of interventions provided to the critically ill COVID-19 patients.

Method: A retrospective study, was conducted at King Saud Tertiary Hospital in Unaizah, Saudi Arabia on COVID-19 patients admitted to the ICU between July 2020 to March 2022. All medication related interventions performed by pharmacists have been documented electronically, collected and subsequently categorized and analysed. Descriptive statistics were performed using SPSS version 25.

Results: The majority were male patients with a mean age of patients was ≥ 60 years in approximately 80.7%. One hundred fifty interventions (150) were made by pharmacists of which 57.4%, 40%, 6.6%, 2.7%, 0.7% were due to error in Dose changed, change frequency, Medication stopped, Wrong route of administration and Switch alternative. Based on the analysis of drugs involved in interventions, medication groups that were mainly associated with interventions included antibiotics (76%), Antivirals (7.3%) and Anti-fungals (5.3%).

Conclusions: Pharmacist involvement in the ICU ward during health emergencies like the COVID-19 pandemic enhances the therapeutic quality and outcomes. In light of the COVID-19 pandemic, additional research should be done to follow up on these findings.

Abstract Code: YPPP1802

Insight of Saudi Users of Cosmetic Regarding to Cosmetovigilance

Author(s) Name: *Fatimah Ahmed Alosayli, Lana Ahmed Aljebrin, Noura Ibrahim Alnowaiser Yara Nasser Alodhilah, Nada Abdelrahman Ibrahim, Mohammed Saif Anaam*

Abstract:

Background: The term "Cosmetovigilance" was introduced as a new term for addressing the safety of cosmetic products. There is significant variability across the community regarding knowledge as well as legislation of cosmeceuticals.

Methods: A cross-sectional study was conducted using a structured questionnaire divided according to demographic profile, knowledge, practices, attitude, and perception toward cosmetics.
The questionnaire was administered using the Microsoft form, subject to a convenience sample of 601 users of cosmetics in KSA. The data collected were analyzed using the Statistical Package for Social Sciences (SPSS)
Results: With respect to the level of awareness toward Cosmetovigilance about 74% of the participants demonstrated a clear understanding of the term. In terms of counseling and the impact of cosmetic induced adverse effect, the average awareness of participants were 62% and 55%, respectively. However, only 42% of participants responded correctly to the instructions for application of their cosmetics. Cross-tabulation between the level of education and the need to acquire knowledge about cosmetics has shown that the majority of participants has indicated that they need more knowledge about the term Cosmetovigilance.
Conclusions: Around 53% of public are well aware about the cosmetovigilance, while 62% have actual knowledge about it. Hence, more cosmetoviglance awareness program plus courses and workshops are recommended to raise the level of awareness.

Abstract Code: YPPP1803

Disposal of Unused and Expired Medications: A Cross Sectional Investigation Among Population of Saudi Arabia

Author(s) Name: *Maryam Khalique Farooqui, Aseel Ali Alrashed, Duaa abdualaziz Alfneekh, Reem Ibrahim Aldubayan, Refal Abdullah Alassaf*

Abstract:
Objectives: Improper medication disposal is a global issue which should be addressed urgently. This study aimed to investigate the Knowledge, Awareness, and Practice (KAP) towards disposal of unused, leftover, and expired medications among the residents of Qassim, Saudi Arabia.
Methods: A prospective cross-sectional survey was conducted among 877 out patients at King Saud Hospital (KSH), Unaizah, Qassim, Saudi Arabia over a three-month period. A pre-validated, structured questionnaire was used for data collection. Data were analysed using R software. For all analyses, $p<0.05$ was considered significant.
Results: Most of the 612 (70%) respondents had unused medications, 379 (62%) reported to store their unused medications in the refrigerator followed by bedroom cabinet 222 (36%). The majority 537 (88%) dispose unused medicines by throwing away in the household dustbins. The vast majority throw away near to expired 644 (73%), and expired medicines 809 (92%), in the household dustbins. Majority 757 (86%) of the participants denied of receiving formal education regarding safe medications disposal where 527 (60%) denied that the responsible sector for educating the public about safe medications disposal should be pharmacies. A significant but weak association ($p<0.05$; $\varphi c = 0.1$), between the storage of unused medicines at home and demographic factors such as age, marital status, education, and income was found.
Conclusion: It highlighted concerns that study respondents frequently store and discard unused and expired drugs improperly. Study results call upon concerned authorities to raise awareness regarding safe medication storage and disposal.

Abstract Code: YPPP1804

Knowledge and Quality of Life of Saudi Caregivers of Parkinson's Disease Patients: A study from a tertiary hospital in Riyadh, Saudi Arabia

Author(s) Name: *Abdulhadi A. Al Ofair, Muhannad S. Alamri, Sultan H. Alshehri, Ziyad A. Alzahrani, Alwaleed K. Alrumaih, Wajid Syed, Mohamed Alarifi, Abdulrahman Alwhaibi and Taim Muayqil*

Abstract:
Background: Parkinson's disease (PD) is a neurodegenerative disease manifested by a decline in cognitive and physical abilities that requires knowledge and attitude among caregivers to provide assistance and good life. Understanding the impact of disease is essential.
Method: This questionnaire-based study was conducted to assess level of knowledge of caregivers of PD patients, determine the factors affecting their knowledge level and evaluate variables resulting from caregiving and impacting their quality of life (QOL). SPSS software, version 26, was used for data analysis and results with p-value of <0.05 were considered statistically significant.
Results: 69 patients and their corresponding family caregivers were included. Overall, caregivers had low knowledge level reflected by a mean score of 3.45 of 8. However, 62.3% knew all medications used for their patients. A significant association was observed between knowledge level and gender of caregivers ($p = 0.038$), where 59% of males while 57.1% of females' caregivers had low and medium level of knowledge, respectively. A significant association was noted between level of knowledge and hours of caregiving ($p = 0.024$) as 55.5% of caregivers providing the least time of caregiving had low-level of knowledge, while 52.4% of those providing the longest time of caregiving had medium and high-level knowledge. Regarding the impact of caregiving on the quality of life, 78.2% confirmed experiencing ≥ 5 factors that negatively impact their QOL.

Conclusion: Caregivers of PD patients had low level of knowledge. Increase awareness and knowledge of PD caregivers to improve treatment outcomes, quality of care, and QOL

Abstract Code: YPPP1805

Characterization of infectious spondylodiscitis at tertiary hospitals in Saudi Arabia: A retrospective cohort study

Author(s) Name: *Hajar Alqahtani, Fatimah, Alzahrani, Hessah Bin Hithlayn, Ghaida Abaalkhail*

Abstract:

Background: Infectious spondylodiscitis (IS) is a rare but serious disease. It is defined as an infection of the intervertebral disc caused by a microorganism. It could also affect the paraspinal tissue causing further damage and abscess formation. IS has non-specific signs and symptoms including pain, fever, and some neurological manifestations.

Methods: This was a multi-center retrospective cohort study included adult patients 18 years of age or older admitted to King Abdul-Aziz Medical City (KAMC) in Riyadh and Jeddah who had admission diagnosis of infectious spondylodiscitis, positive spine MRI findings consistent with spondylodiscitis, positive microbiological findings, and received antimicrobial therapy. Patients were followed for 365 days from January 2017 until November 2021.

Results: A total of 76 patients out of 156, majorly males (67.1%) with a median age of 61 years had infectious spondylodiscitis were included. Patients were divided into three groups based on causative pathogen: brucella spondylodiscitis (BS group, N= 52), tuberculous spondylodiscitis (TS group, N= 13), and pyogenic spondylodiscitis (PS group, N=11). Most patients with BS and TS received triple or quad therapy with an average duration of 4 and 9 months respectively. The overall clinical cure rate was 66.7% with a relapse rate of 5.3% after 3 months of completing therapy.

Conclusions: The treatment for spondylodiscitis is not standardized. In our experience, conservative treatment can be considered an option for some patients with a cure rate of 66.7%. However, surgical intervention is not indicated in all cases, it could serve as prompt source control and therefore facilitate and may shorten the course of therapy.

Abstract Code: YPPP1806

Assessing the prevalence and characteristics of self-reported penicillin allergy in Saudi Arabian population: A nationwide cross-sectional study

Author(s) Name: *Maram Albasseet, Shuroug A. Alowais, Sumaya N. Almohareb, Khalid Bin Saleh, Ibrahim M. Asiri, Hisham A. Badreldin, Lena Alqazlan, Lolwa Fetyani, Lina Ali Alshehri, Areej M. Almutairi*

Abstract:

Background: Being allergic to penicillin can lead to the overuse of broad-spectrum antibiotics, contributing to the growing problem of multidrug resistance. Knowing the exact allergy history is essential as some circumstances may allow reinitiating penicillin. This study focused on assessing the prevalence and characteristics of self-reported penicillin allergy in the Saudi Arabian population.

Methods: We conducted a nationwide cross-sectional study via an electronic self-administered questionnaire directed toward the Saudi Arabian general adult population. Variables about respondent demographics as well as type and characteristics of the allergy were collected.

Results: One hundred ninety-three out of 2022 participants who completed the survey (9.5%) reported allergy to penicillin, with the most reported reaction being anaphylaxis in 89 participants (46.1%), non-anaphylaxis reported by 69 participants (35.8%). Twenty-two participants (11.4%) were identified as not having a true allergy due to reporting a tolerability issue or a non-penicillin-type agent. About 38% reported that the allergy occurred more than ten years ago.

Conclusion: This is the first study to report the prevalence and characteristics of self-reported penicillin allergy in Saudi Arabia. The data from this study provides valuable information to consider starting in-hospital penicillin de-labeling programs and providing evidence for healthcare providers to consider re-challenging certain qualified patients.

Abstract Code: YPPP1807

The Role of Pharmacist in Allergy Incidents among Hospitalized Patients

Author(s) Name: *Rahf Mohammed AlKanhal, Lamya Ibrahim Alsuhaibani, Rand Bader Aldaajani, Dr. Mohammed Saud Shawaqfeh*

Abstract:

Background: Allergic incidents among hospitalized patients have always been an issue in the medical field. With more medications arising, the risk of allergy has increased over the last decade. Numerous studies have estimated the prevalence of allergy among inpatients, determined the timing, and identified some of the risk factors associated with allergy episodes. This paper aims to evaluate and investigate the pharmacist's role in preventing and managing allergic reactions among hospitalized patients.

Methods: An observational retrospective review study. The data registry was from the Ministry of National Health Affairs (MNGHA). The number of participants was 455; 369 participants were excluded.

Results: In this paper, out of 455 participants, only 86 had gone through an allergy incident that met the inclusion criteria, which could have been prevented if there was a pharmacist intervention. 369 participants were excluded. The most common cause is antimicrobial agents 41 (47.7%), followed by anticonvulsants 11 (12.8%), the contrast media in 8 cases (9.3%), and NSAIDs in 4 (4.7%). Moreover, the allergy treatment outcomes were improved or resolved in 73 encounters (84.9%).

There were 7 anaphylactic shock (8.1%), and 6 deaths reported (6.98%) Unfortunately, there were 13 hospital readmissions (15.1%), and 11 ICU admissions (12.8%). However, the documented pharmacist interventions were only five (5.8%).
Conclusion: Pharmacists have a major role in ensuring the safety of medications. We recommend having more registered pharmacist interventions and increase monitoring of items with high risk of causing allergy.

Abstract Code: YPPP1808

Efficacy of Brentuximab Vedotin based Regimen Versus Standard Chemotherapy in Relapsed/Refractory Hodgkin Lymphoma: A Retrospective Observational Study

Author(s) Name: *Arwa Alhaj Issa, Amal Alotaibi, Areeg Abumostafa, Abdullah AlAteeq, Zahra Alhaj Issa, Abdullah AlRajhi, Abdullah AlRajhi*

Abstract:
Background: Hodgkin lymphoma (HL) is a lymphoma that affects the B-cells of the immune system. A novel agent such as anti-CD30 and PD-L1 inhibitors have been approved for relapsed or refractory HL (RRHL) based on single arm studies that showed meaningful overall response rate (ORR). This study aims to compare the effectiveness of brentuximab vedotin based regimen to other standard second-line chemotherapies used for RRHL.
Methods: All patient's data will be collected from the healthcare systems of King Fahad Medical City. The study will retrospectively evaluate data from male and female patients ≥14 years with classical HL who received a second-line treatment in one of Saudi Arabia tertiary hospitals from 2014 – 2021. The main evaluated endpoint is the ORR, which will be calculated based on Deauville score from the PET-CT.
Results: The study included 25 patients with RRHL, with a relatively equal distribution of males (52%) and females (48%). The mean age of diagnosis was 35 years, ranging between 16-69 years. Of the 25 patients, 16 (65%) had unfavorable disease.Treatment varied among the patients, with 9 patients (36%) receiving brentuximab vedotin-based chemotherapy. Approximately, half of those patients achieved complete-remission (CR) with a 55.55% ORR. The remaining 16 patients (64%) received other standard second-line chemotherapy, with 4 patients (25%) achieving CR and 31.25% ORR.
Conclusions: In conclusion, our preliminary results suggest that utilizing brentuximab vedotin may improve outcomes in patients suffering from RRHL. Further research into this area should continue so we can better understand our utilization of the product.

Abstract Code: YPPP1809

Descriptive analysis of the current clinical status for the use of metformin in the management of breast cancer

Author(s) Name: *Ghadeer Ahmed Alhawsawi - Shumukh Saleh Althubaiti - Khawlah Ibrahim Alshahrani - Raghad Abdullah Alghamdi - Sameer Ali Alshehri*

Abstract:
Background: Metformin, a biguanide antihyperglycemic, is the main medication for the management of type 2 diabetes. Earlier reports from preclinical and clinical trials have shown anticancer properties of the drug in several cancer types, including breast cancer.
Methods: This study aimed to analyze the current status of clinical trials registered in the ClinicalTrials.gov database related to the use of metformin for the management of breast cancer.
Results: A total of 37 clinical trials were found, with the majority of these trials (89%, n = 34) registered in 2010 or later. Nearly two-thirds of the trials (62%, n = 23) were registered under phase 2. The number of trials that were completed was 15 trials, with only three of those trials having their results posted. The primary purpose for the trials was mainly either treatment (76%, n = 28) or prevention (16%, n = 6). Metformin was included in the trials as a monotherapy (13.5%) or in combination with other medications (73%). The trials were conducted in 12 countries, with the US being the most abundant country (40%), followed by Egypt (11%).
Conclusions: This descriptive analysis shows the rapid global trend of clinical evaluation of metformin for the management of breast cancer.

Social Pharmacy and Pharmaceutical Outcomes

Abstract Code: YPSP1900

KAP (Knowledge, Attitudes and Perception) towards COVID-19 Vaccine among Pregnant Women in Saudi Arabia

Author(s) Name: *Anhar Mohammed Al-Mohsin, Ayham Mazen Rajeh, Asilah Waheep Al-Naimi, Aisha Omar Alaqueel, Eid Zaid Al-Khaldi, Dania Nazem Hamwiah, Khaled Mohammed Al-Subaie, Shaza Bashar Fakheraldeen, Abdulonem Ali Alsaleh, Nousheen Aslam*

Abstract:
Background: This study aimed to measures knowledge, attitudes and perception towards COVID-19 vaccine among pregnant women in Saudi Arabia.
Method: This is a cross-sectional, descriptive study conducted through a self-administered and structured online questionnaire. The questionnaire was administered using social media and via data collectors. The dependent and independent variables were identified and a statistical analysis was performed using R-JAMOVI.

Result: 1008 responses were recruited. 38% were in second trimester. 40% were didn't infected with COVID-19 during pregnancy while 14% infected with COVID-19 during their pregnancy. The average score of knowledge was 5.2 out of 9 (SD, 1.7; Mode, 6) showing a middle knowledge level. 39**%** of participants believed that COVID-19 vaccine reduces risk of the complication of COVID-19 infection on pregnant women such as stillbirth and premature birth. 58% believed that essential to take two doses and the second dose should be taken after 8 weeks of the first dose. 50% had delayed the vaccine till birth. 52% of participants believed two doses of the COVID-19 vaccine are effective against COVID-19 infection for mothers and their fetus. 37% of pregnant women believed the COVID-19 vaccine safe, effective and it didn't increasing risk of teratogenicity or congenital abnormality on fetus. 33% of pregnant women believed that the COVID-19 vaccine didn't causes miscarriage.
Conclusion: Although, half of the pregnant women have good knowledge, positive attitudes and good perception towards COVID-19 vaccine, they still preferred to delay vaccination against COVID-19 for the safety of themselves and their fetus.

Abstract Code: YPSP1901

Examining Bedtime procrastination and studyholism in undergraduate students and their association with Insomnia

Author(s) Name: *Tahani K. Alshammari, Aleksandra Maria Rogowska, Raghad F Basharahil, Sumayyah F Alomar, Sarah S Alseraye, Lobna A Al Juffali, Nouf M Alrasheed, Musaad A Alshammari*

Abstract:
Background: Behavioral addiction is an emerging clinical condition with high prevalence and chronicity. Here we examined the prevalence and the relationship between studyholism(SH), bedtime procrastination (BP), and sleep quality in undergraduate students. Method Utilizing the Studyholism (SI-10), The Athens Insomnia(AIS), and BP scales.
Methods: A convenience sample of 495 university students was recruited. Result Our findings indicated that the prevalence of insomnia was 75%, high SH was found in 15.31%, and increased study engagement(SE) was detected in 16.94%. Gender differences analysis showed that females presented higher SH and BP than males. Fifth-year students have higher SH than students from internship ($p < 0.001$), first-year ($p < 0.01$), and sixth-year ($p < 0.05$). Insomnia was positively related to SH and BP.
Results: Insomnia can be predicted positively by SH and BP. Participants with a medium level of SH are twofold more likely to experience insomnia than those with a low level. Studyholics (those with high SH scores) are six-time more susceptible to insomnia than students with low SH levels. Compared to individuals with low BP levels, those with medium and high BP were twofold more likely to report insomnia.
Conclusions: Our study highlights the interplay between insomnia, SH, and BP. Further, our findings indicate the need to increase awareness of insomnia.

Abstract Code: YPSP1902

Assessment the prevalence of electronic cigarettes and vapes use and the levels of awareness towards their health hazards among KSU students.

Author(s) Name: *Nawaf Abualreesh, Danah Albuaijan, Ibrahim Alsultan, Abdulrahman Alwahibi, Mohammed Assiri, Sahar AlJumaiyai, Abdulrahman Alwahibi, Mohammed Assiri*

Abstract:
Background: A paucity of research on the prevalence and awareness of e-cigarettes and vapes in Saudi Arabia (SA). This study aimed to determine the prevalence of smoking habits among a cohort of students at King Saud University (KSU), the factors contributing to their use, and the awareness level of students.
Methods: A cross-sectional, survey-based study was conducted on students enrolled at KSU. The questionnaire was developed through an extensive review of available literature. Data were collected using an online self-administered questionnaire in the period between September-December 2021. Descriptive analysis, Chi-square, and Mann-Whitney tests were applied using SPSS (version 26.0), and a p-value of <0.05 was considered statistically significant.
Results: A total of the 998 students, 58.6% were males and 41.4% were females. 212 (21%) were found to be current smokers and males had a higher proportion than females (30.1% vs 8.7%, p=0.001). majority of the students (65%) were considered heavy smokers as they smoked >10 cigarettes or smoked a hookah per day. Students from health colleges were significantly less likely to smoke than students in other colleges (p=0.001). 55% of smokers in a study believe that smoking alleviates the pressure of their work. 46.6% of the smokers used e-cigarettes and vapes over regular cigarettes and hookah, 45.3% preferred e-cigarettes over regular cigarettes since they don't contain any undesirable odors and 72% believe they cause less harm compared to regular cigarettes.
Conclusions: a clear increase in the use of new smoking devices with the assumption that their harm is less than traditional methods. Implementation of programs that educate students and increase their awareness is urgent to enhance overall health.

Abstract Code: YPSP1903

Quality of life, fatigue, and physical symptoms post-COVID-19 condition; a cross-sectional comparative study

Author(s) Name: *Maha M. AlRasheed, Sinaa Al-Aqeel, Ghada I Aboheimed, Noura M. AlRasheed, Norah Othman Abanmy, Ghadeer Abdulaziz Alhamid, Hadeel Mohammed Alnemari, Saad Alkhowaiter, Abdullah Rashed Alharbi, Fowad Khurshid, Khaled Trabelsi, Haitham A. Jahrami, Ahmed S. BaHammam*

Abstract:
Background: The magnitude of the post-covid-19 syndrome was not thoroughly investigated. this study evaluated the quality of life and persistence of fatigue and physical symptoms of individuals post-covid-19 compared with noninfected controls.
Methods: The study included 965 participants; 400 had previous covid-19 disease and 565 controls without covid-19. the questionnaire collected data on demographics, comorbidities, covid-19 vaccination status, general health questions, and physical symptoms, in addition to validated measures of quality-of-life (sf-36 scale), fatigue (fatigue severity scale, fss) and dyspnea grade (the modified medical research council dyspnea scale).
results: Covid-19 participants complained more frequently of weakness, muscle pain, respiratory symptoms, vocal problems, imbalance, taste and smell loss, and menstrual problems compared to the controls. joint symptoms, tingling, numbness, hypo/hypertension, sexual dysfunction, headache, bowel, urinary, cardiac, and visual symptoms did not differ between groups. dyspnea grade ii-iv did not differ significantly between groups (p= 0.116). covid-19 patients scored lower on the sf-36 domains of role physical (p= 0.045), vitality (p<0.001), reported health changes (p<0.001), and mental components summary (p= 0.014). fss scores were significantly higher in covid-19 participants (3 (1.8- 4.3) vs. 2.6 (1.4- 4); p<0.001).
Conclusions: Covid-19 effects persist beyond the acute infection phase. these effects include changes in quality of life, fatigue, and persistence of physical symptoms.

Abstract Code: YPSP1904

Dapagliflozin mitigates hypothermia and renal injury in lipopolysaccharide-induced acute inflammation independent of glycemia level.

Author(s) Name: *Wael A. Alanazi & Abdullah M. Aljuraybah*

Abstract:
Background: Lipopolysaccharide (LPS) is a fundamental structural component of the outer membrane of Gram-negative bacteria-induced sepsis resulting from severe inflammatory conditions linked to hypothermia and renal-cardiovascular complications. Dapagliflozin (DAPA) is a novel antidiabetic drug, the current study was conducted to evaluate the protective roles of dapagliflozin against blood sepsis complications through inhibition of inflammation induction.
Methods: Male rats (n= 48) were divided into six groups as following: control, LPS, LPS+DAPA, diabetic, diabetic+LPS and diabetic+DAPA+LPS. After two weeks of DAPA (1 mg/kg/day) treatment, each rat received a single dose of LPS (10 mg/kg) in LPS-treated groups. Tail skin and deep body temperature were recorded every two hours in all treated groups. After six hours of LPS treatment, all rats were anesthetized for harvesting blood samples and kidneys for analysis.
Results: The finding results showed that DAPA attenuates hypothermia induced by LPS in both normal and diabetic septic rats. Inflammatory markers were significantly decreased in DAPA-treated groups as compared with non-treated septic groups. In the pathohistological studies, septic rats showed a massive kidney injury. In contrast, DAPA decreased inflammation and showed great improvement in the kidney. Also, kidney injury markers including blood urea nitrogen and creatinine levels were returned to normal levels in DAPA-treated groups. Taken together, DAPA attenuated LPS complications related to body temperature and kidneys through the prevention of induced inflammation in both normal and diabetic septic rats.
Conclusions: However, these protective roles of DAPA against LPS-induced blood sepsis were independent of blood glucose levels, which may provide novel approaches in the management of blood sepsis complications.

Abstract Code: YPSP1905

Antibacterial activity of coated Toothbrushes and Toothpaste

Author(s) Name: *Reham Shalan, Maram Sharaby, Reham Abuzaid*

Abstract:
Background: The oral cavity is composed of teeth, gingival sulcus, tongue, tonsils, and soft and hard palates. It also provides a suitable growth environment for large numbers of microorganisms. Since the nineteenth century, toothbrushes have been widely used to suppress the growth of harmful bacteria, remove food residues, prevent oral malodor, protect enamel, and prevent gingival inflammation. However, the residual moisture and food debris residing in toothbrushes provide a suitable environment for pathogen growth, rendering them a potential risk for various oral diseases. On the other hand, toothpaste is a paste or gel to be used with a toothbrush to maintain and improve oral health and aesthetics.
Methods: Different concentrations of selected gram-positive and gram-negative bacteria will be prepared and used for evaluating the antimicrobial efficacy of different types of toothpaste available in the market by using the agar diffusion method. Different coated toothbrushes will be tested against different concentrations of the bacterial suspension. The brushes will be exposed to these suspensions left to air dry at room temperature.

Results: The result showed not all the products are effective against all the bacteria strains tested. However, in general, the coated toothbrushes (gold, silver, charcoal) showed more antibacterial effect than the non-coated, normal toothbrushes. For Toothpaste, that only toothpaste 10 is the one that showed effect against the different strains of bacteria tested.
Conclusions: The results showed that each product gave a different antibacterial response to each different strain of bacteria.

Abstract Code: YPSP1906

Comparative Evaluation of Amlodipine Besylate Generic Tablet and Capsule Brands in Riyadh, Saudi Arabia.

Author(s) Name: *Doaa R. Adam, Nuran Al Rayes, Raghad Fatoum, Ghosoun Arafeh, Tasneem Rashed Adam, and Adeola Kola-Mustapha*

Abstract:
Background: Amlodipine besylate was approved by the FDA in 1987, sold under the brand name Norvasc, manufactured by Pfizer. Generic medicines are claimed to be chemically and biopharmaceutically equivalent to the innovator product. Generic drugs are useful to decrease the cost by 85% of the innovator brand, which improves patients' health outcomes. The objective of this study was to evaluate the physicochemical quality control parameters and pharmaceutical equivalence of amlodipine besylate generic tablets and capsules with the innovator brands in Riyadh, Saudi Arabia.
Method: Five brands of Amlodipine besylate tablets and capsules (5 mg) were compared via quality control tests according to the United States Pharmacopoeia (i.e., hardness, thickness, diameter, weight variation, uniformity of dosage content, friability, disintegration, dissolution by ultraviolet spectrophotometry, and Fourier-transform infrared spectroscopy (FTIR)). All selected brands were found to comply with USP-NF specifications concerning weight variation, hardness, friability, disintegration time, FTIR, and drug content analysis.
Results: The dissolution profiles for all products satisfied the USP-NF specifications. Regarding, model-dependent data, all the tested brands followed the Higuchi model of release. Using the model-independent approach (similarity factor analysis), all products were considered similar except for one generic product (ABC-3). All brands had no significant difference in mean dissolution efficiency compared to the innovator, except ABC-3.
Conclusion: The results have shown that all selected brands complied with USP specifications for weight variation, hardness, friability, disintegration time, FT-IR, and drug content analysis. The dissolution profiles were similar to the innovator products. Thus, all the studied brands can be used interchangeably.

Medicinal Chemistry and Natural product

Abstract Code: YPMN2000

Green Synthesis of Silver Nanoparticles using Olive Waste Extract for Wound Healing Applications

Author(s) Name: *Alhassan R. Alqarih, Hassan A. Albarqi, Mohammad Zaki Ahmad*

Abstract:
Background:
Silver nanoparticles (AgNPs) have shown immense potential in wound healing due to their antibacterial, anti-inflammatory, and regenerative properties. However, the conventional chemical methods of synthesizing AgNPs have limitations such as toxic reagents, hazardous waste, and environmental pollution. Green synthesis of AgNPs using plant extracts is a promising alternative that offers an eco-friendly, cost-effective, and biocompatible synthesis of nanoparticles.
Methods: In this study, we report a green synthesis approach to synthesize AgNPs using olive waste extract as a reducing and stabilizing agent. The synthesized AgNPs were characterized using various analytical techniques, including UV-Vis spectroscopy, scanning electron microscopy (SEM), and energy dispersive X-ray spectroscopy (EDX). The potential of the synthesized AgNPs for wound healing was evaluated in vitro using Staphylococcus aureus and E-coli.
Results: The results showed that the synthesized AgNPs were spherical in shape, with an average size range of 70-90 nm. The olive waste extract acted as an excellent reducing and stabilizing agent, forming stable and biocompatible AgNPs. The in vitro evaluation showed that the synthesized AgNPs have antibacterial activity against Staphylococcus aureus and E-coli, indicating their potential for wound healing applications.
Conclusion: The green synthesis approach using olive waste extract is an eco-friendly and biocompatible method for synthesizing AgNPs. The synthesized AgNPs demonstrated excellent biocompatibility and wound-healing properties, making them a promising candidate for wound-healing applications.

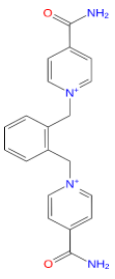
Abstract Code: YPMN2001

Exploring Novel Efflux Pump Inhibitors for Combatting Antibiotic Resistance: A Computational Study on the AcrAB-ToIC Efflux Pump in Escherichia Coli

Author(s) Name: *Raghad Omar Khojah, Alruba Faisal Albadri, Abdelsattar Mansour Omar, Khadijah Ahmad Mohammad*

Abstract:
Background: Antibiotic resistance is a major cause of death worldwide, with Multidrug resistant (MDR) bacteria presenting a serious threat to public healt
Overexpression of MDR efflux pumps is among the leading mechanisms of resistance. Therefore, a detailed understanding of the structure and function of the efflux pumps is crucial for addressing this issue. The clinically significant AcrAB-TolC efflux pump in E. coli was comprehensively investigated in this study. It is believed that inhibiting efflux pumps is a promising approach for restoring the activity of antibiotics against resistant bacteria. Several efflux pump inhibitors (EPIs) have been identified, but none have made it to market. In this context, our objective was to discover a new EPI for the AcrABTolC pumps using computational modeling.
Methods: We utilized the AcrB subunit co-crystallized with a known EPI (MBX3132) and screened 3.4 million lead-like compounds. We performed molecular docking to obtain the docking scores of each compound relative to the co-crystallized ligand and analyzed the behavior of high-scoring ligands with the protein in a simulated physiological environment using molecular dynamics.
Results: Our results showed three promising compounds (1, 5, and 6) with excellent protein stability and ligand-protein complex affinity compared to the co-crystallized structure.
Conclusions: These promising compounds displayed significant computational results. However, further investigations are necessary to evaluate their inhibitory activity in combination with antibiotics. Overall, this study presents a novel approach to identifying novel EPIs for the AcrAB-TolC pumps and provides a foundation for their development for potential clinical use.

Structure:



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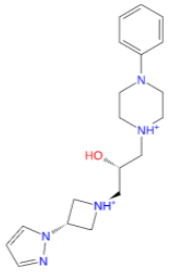

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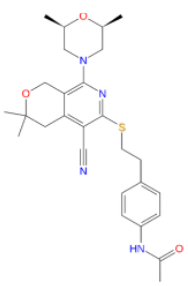
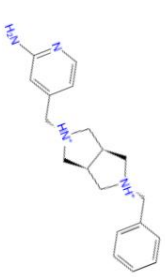




Comb 5

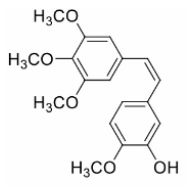
Abstract Code: YPMN2002

Study and biochemical evaluation of β-lactam analogs of Combretastatin A-4 as potent anticancer agents.

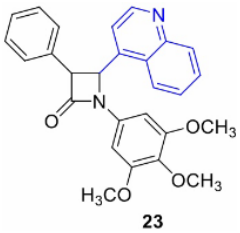
Author(s) Name: *Alshaymaa Ayoub Khoja, Lojain Omar Khoja, Aseel Ali Alghamdi, Ghadi Eyad Alnajjar, Thikryat Neamatallah, Azizah Malebari*

Abstract:
Background: Microtubule-targeted drugs have emerged as a hot spot in cancer treatment. Several compounds bearing the β-lactam ring as analogues of Combretastatin A-4 were designed as potential anti-tubulin drugs. Three of 3-phenyl-β-lactams (2-azetidinones) were examined in vitro for their antiproliferative effects in MCF-7 breast and HCT-116 colon cancer cells as effective tubulin polymerization inhibitors. These compounds are considered as rigid analogues of Combretastatin A-4 which contain the β-lactam ring system instead of the usual ethylene bridge present in natural combretastatin stilbene compounds. In these compounds, B ring para-methoxy of β-lactam 3 was replaced with naphthalene 22 and quinoline 23 substituents.
Methods
In-silico studies displayed that this novel 4-quinolin-4-yl β-lactam 23 favors the desired pharmacokinetic profile and drug likeness properties. A molecular docking study suggested possible binding conformations for the 4-quinolin-4-yl β-lactamin 23 the colchicine domain of tubulin.
Results: The 4-quinolin-4-yl β-lactam 23 (IC50= 0.110 and 0.061 μM) demonstrate improved activity over 4-naphthalen-1-yl β-lactam 22 (IC50= 2.5 and 3.6 μM) in MCF-7 and HCT-116 respectively. The 4-quinolin-4-yl β-lactam 23 (IC50= 0.110 μM) showed good activity in MCF-7 breast cancer cells which was comparable to the activity of its related B ring para-methoxy of β-lactam 3 (IC50 = 0.112 μM) as well as Combretastatin A-4 (IC50 = 0,80 μM).
Conclusions: It is believed that β-lactam 23 is a potential scaffold for the development of a tubulin polymerization inhibitor for breast and colon cancer treatment.

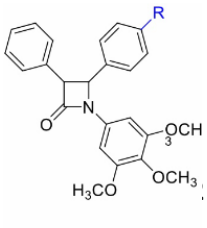
Structure:



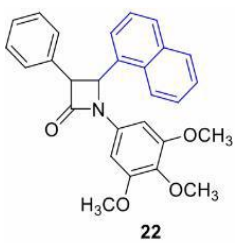
Combretastatin A-4



23



3 R=OCH_3



22

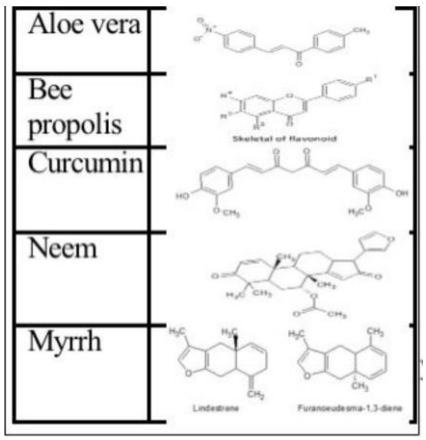
Abstract Code: YPMN2003

Review of Potential Use of Plant -Derived Medicine in Burn-Induced Wound Healing

Author(s) Name: *Shuruq Fahad Alanezi, Shahad yahya Alharbi, Rahaf jadid Alshrari, Hanan Bahjat Khojah*

Abstract:
Background: The fourth most severe type of trauma in the world is burn injuries. To accelerate the healing process, traditional medicine has been incorporated into wound care. Recent research results open new perspectives for the application of traditional and complementary medicine in wound care. The aim of the present study is to review studies on the current potential of herbal remedies for the healing of burn wounds.
Methods: Google, PubMed, and Science Direct were the data sources where the information was collected. Eight publications from 2015 to 2022 describing burn healing - including clinical trials, in vitro testing, and in vivo research - met the requirements.
Results: From the data, Aloe vera accelerates epithelialization in the final stages of wound healing through antioxidant stress. Propolis is used to treat chronic burns and wounds due to its antibacterial properties. The active components of neem, resnimbidin, nimbin and nimbidol, accelerate wound healing due to their anti-inflammatory and antibacterial effects. Turmeric contains curcumin, which reduces TNF-a and IL -1 and promotes wound healing. Myrrh resin has antibacterial and antifungal properties due to the presence of sesquiterpenes and furanosequiterpenes.
Conclusions: The review study shows that aloe vera is the herb of choice for the treatment of 1st and 2nd degree burns. Wound dressings containing myrrh significantly accelerated the healing of skin wounds. Propolis has been shown to be as effective as the prescription drug silver sulfadiazine in treating minor burns. Curcumin and neem have proven as herbal medicines for wound healing.

Structure:



Abstract Code: YPMN2004

Caffeine Level Determination by Ultra-Violet Spectrophotometric method in Soft and Hard Energy Drinks Available in Buraydah, Al-Qassim, Saudi Arabia

Author(s) Name: *Mohd Rashid, Ahamd Hassan Ahmad Alshehri*, Khalid Hassan Ali Alkarni, Talal Jahaz T Almutairi, Makhmur Ahmed*

Abstract:
Background: The present study was carried out to determine caffeine levels and pH in six brands of carbonated soft and energy drinks available in local market of Buraydah, KSA. In recent years, a number of drinks introduced to market and may be increase the health risk to consumers.
Methods: Quantitative analysis of caffeine was determined by UV Spectrophotometer method, using chloroform as extracting solvent and pH of drink by pH meter. Standard solution of caffeine was prepared by dissolving 25 mg of caffeine in 250 mL chloroform.
Results: The pH of drinks was found in acidic range from 5.10-2.83. The minimum caffeine level was observed in carbonated soft drink Sprite (14.7 ppm), while energy drink Red Bull showed highest caffeine content (67.4 ppm). The carbonated Coca-cola drink was found highest caffeine content (43.6 ppm) and whereas Pepsi in range of 41.1 ppm.
Conclusions: The recent studies suggest that we can drink only 3-4 cans per day.

Abstract Code: YPMN2005

Discovery of Novel Main Protease Inhibitors as Therapeutic Candidates for COVID-19

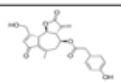
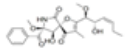
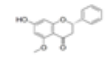
Author(s) Name: *Mohammad Abdalmoety Khanfar, Nada Naser Salaas, Reem Majdi Abumostafa*

Abstract:
Background: COVID-19 is an infectious disease caused by SARS-CoV-2 that develops fatal dyspnea and acute respiratory distress syndrome. Few treatments are currently available that can act specifically against SARS-CoV-2; therefore, there is an urgent need to develop novel and specific SARS-CoV-2 antiviral agents. The main protease (Mpro) is an essential enzyme for the life cycle of SARS-CoV-2. Inhibiting Mpro will halt the virus's life cycle; thus, this enzyme represents an important antiviral target.
This research aims to employ manually generated pharmacophore models and quantitative structure−activity relationship (QSAR) analysis to explore novel chemical scaffolds of Mpro inhibitors from the natural products repository.
Methods: Genetic function algorithm (GFA) and multiple linear regression (MLR) analysis were employed to generate self-consistent and predictive QSAR models based on optimal combinations of pharmacophores and physiochemical descriptors.

AnalytiCon Discovery database of purified natural products was screened using the pharmacophore model that emerged in the highest-ranked QSAR model for structurally novel Mpro inhibitors. The twelve compounds with the highest predicted activity were bioassayed for their Mpro inhibitory activity.
Results: Three compounds showed high bioactivity with IC50 values in low micromolar (µM) ranges. This algorithm discovered Lactucopicrin, Pseurotin A, and Alpinetin as active Mpro inhibitors with IC50 values of 0.99 µM, 1.06 µM, and 8.8 µM, respectively.
Conclusions: This work demonstrates a powerful strategy that combines computational modelling with experimental validation to identify structurally diverse and effective molecules that can serve as a basis for developing novel and potent drugs for pandemic pathogens, in this case, Mpro inhibitors

Structure:

The captured compounds with their corresponding QSAR-predicted IC_{50}, % M^{pro} inhibition at 10 µM, and experimental IC_{50}.

Captured compounds	2D structure	Predicted IC_{50} (µM)[a]	% M^{pro} Inhibition at 10 µM	Experimental IC_{50} (µM) ± SEM
Lactucopicrin		28.2	80	0.99 ± 0.08
Pseurotin A		0.28	75	1.06 ± 0.11
Alpinetin		0.80	54	8.8 ± 1.91

[a]Predicted IC_{50} values as calculated from QSAR equation.

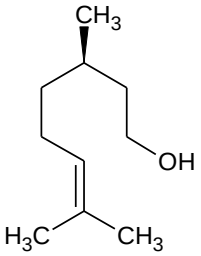
Abstract Code: YPMN2006

Review of Topical Plant-Based and Patent Repellents Against Mosquito Bites

Author(s) Name: *Remas majed alsuhayyan, Raghad farzal alshammari, Hanan Bahjat Khojah, Hanan Bahjat Khojah*

Abstract:
Background Mosquito bites are the leading cause of 80% of deaths worldwide, according to the US (CDC). In the U.S., at least 50 fatal reactions to mosquito bites occur each year. Research in this area focuses more on natural mosquito repellents than synthetic chemicals. This review presents the most promising herbal mosquito repellents and their mechanisms of action, as well as the scientific investigation of patented integrative mosquito repellents for the treatment of mosquito bites.
Methods: This article reviews the insect repellents in use today, most of which are natural products. A comprehensive search of the electronic databases PubMed, Web of Science, Google Scholar, and Science Direct yielded articles on mechanisms of action, commercial products, repellent dosage forms, and patented repellents.
Results: Citronella eucalyptus essential oil has been shown to be effective in repelling mosquitoes, contains approximately 85% citronellol, and is effective for up to 6 hours. 2-Undecanon is extracted from the wild tomato Lycopersicon hirsutum and was proven to be as effective as 15% Deet. 40% of patents mentioning essential oils refer to an isolated natural repellent component. These include the cyclic and non-cyclic monoterpenes limonene, pinene and linalool.
Conclusions: The review study shows that citronella eucalyptus essential oil is the most popular mosquito repellent. 2-undecanone (BioUD®) is the latest active ingredient against mosquito bites. Patented essential oil-based mosquito repellents have a wider global reach in the 21st century. Essential oils are abundant in nature, and their use as mosquito repellents can be considered a sustainable and biocompatible alternative.

Structure:



Abstract Code: YPMN2007

Study of synergistic effect of natural and synthetic preservatives using the challenge test

Author(s) Name: *Amal El Hamwi, Areeg Abu Mustafa, Hanaa Abdulla, Sara Zaraa*

Abstract:
Background: Many pharmaceutical, food, and cosmetic products must contain at least one preservative agent. A preservative is added to the products to provide an antimicrobial effect and inhibit any contamination, thus prolonging the product's shelf-life. The study aims to test the effectiveness of the initial preservative present in the base cream and evaluate the synergistic effect after adding a natural preservative to the formulation.
Methods: The microbial challenge test was performed based on the standards proposed in the United States Pharmacopeia protocol 51 (USP). The test was performed at different time points over one month.
Results: With the use of rosemary at a 100 mg/ml concentration as a preservative the fungal concentration did not increase during the testing period, and the bacterial concentration has been reduced by at least 2.0 log from the initial count by day 14 and did not increase until the completion of the test by day 28. In addition, each test performed led to less than 250 CFU for Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, and Candida albicans and less than 80 CFU for Aspergillus brasiliensis. Therefore, the USP 51 criteria was met

Conclusions: The use of rosemary in combination with phenoxyethanol improved the preservation efficacy and established a synergistic effect. A new formulation containing more natural preservatives and less synthetic ones can be produced, thus increasing safety, consumer compliance, and reducing manufacturing costs.

Experimental Therapeutics and Toxicology

Abstract Code: YPET2100

Development and Characterization of Emulsion Formulation of herbal extract of Cichorium intybus for Topical application & Evaluation of its Antimicrobial Activity

Author(s) Name: *Ghala Khaled Alturaif, Taif Mohammed Alkhalf, Linah Khaled Almutairi, Wesam Mathkar Almutairi., Sana Hashmi*

Abstract:
Background: An immiscible liquid mixture (emulsion) consists of two phases. One is a continuous phase, while the other is a dispersed phase. The Cichorium intybus, is a small plant that has been studied in terms of pharmacology and phytochemistry. The organic acid-rich extract of red chicory, exhibits anti-bacterial activity against various periodontopathic bacteria.
Methods: The methodology of the research consists of three sequential sections. Firstly, the development of Emulsion which included collection of plant material and preparation of the extract then formulation of emulsion. Secondly characterization of formulated emulsion using multiple tests. Lastly Evaluation or study of antimicrobial activity of formulated emulsion.
Results: Four tests have been done on two samples of emulsion to determine the best formula. For emulsion A petroleum ether was used and B with ethanol. In pH test emulsion A showed neutrality, while emulsion B showed Acidity. While on organoleptic test, the results of both emulsions were observed to be the same by having smooth texture and strong odor except for color emulsion A was light brown and emulsion B showed a brown mustard color. For water solubility miscible test, both emulsions were dyed with amaranth and both showed immiscibility which indicates that O\W emulsion was successfully obtained. The dilution test showed no breakage in water medium for both emulsions, on the other hand both broke when an oil medium was added.
Conclusion: O/W was successfully obtained in both emulsions. The research is still going and further testing will be conducted on emulsions to evaluate their antimicrobial activity against microorganisms.

Abstract Code: YPET2101

Aspartames Alter Pharmacokinetics Parameters of Erlotinib and Gefitinib and Elevate Liver Enzymes in Wistar Rats

Author(s) Name: *Rana Yosef AlMotawa, Hajer Saad Alrasheed, Aliyah AlMomen*

Abstract:
Background: Erlotinib (ERL) and gefitinib (GEF) are extensively metabolized by CYP450 enzymes. Aspartame (ASP), an artificial sweetener, induces CYP2E1 and CYP3A2 enzymes in the brain and could increase liver enzymes.
Therefore, the influence of ASP on the pharmacokinetics (PK) of ERL and GEF in Wistar rats was evaluated.
Methods: The PKs of ERL and GEF were evaluated after receiving 175mg/kg or 1000mg/kg of ASP for four weeks using UPLC-MS/MS. Liver enzymes levels after four weeks of ASP consumption were also evaluated.
Results: ASP 175mg/kg was able to significantly alter levels of Cmax (36% increase for ERL, 38% decrease for GEF), AUC0-72 (205% increase for ERL, 41% increase for GEF), and AUC0-∞ (112% increase for ERL, 14% increase for GEF). Moreover, ASP 175mg/kg decreased the apparent oral clearance ERL and GEF by 58% and 13%, respectively. ASP 1000mg/kg increased Cmax of ERL by 159% and decreased GEF's Cmax by 73%. Both AUC0-72 and AUC0-∞ were increased by ASP 1000 for ERL and decreased for GEF. CL/F decreased by 64% for ERL and increased by 38.8% for GEF. Moreover, data indicated that ASP significantly increased levels of liver enzymes within two weeks of administration.
Conclusions: Although ASP 175 and 1000mg/kg alter ERL and GEF PKs parameters, ASP 1000mg/kg has the highest impact on most parameters. ASP 1000mg/kg also can significantly increase activities of liver enzymes indicating the possibility of inducing liver injury. Therefore, it might be of clinical importance to avoid the administration of aspartame-containing products while on ERL or GEF therapy.

Abstract Code: YPET2102

Preparation and characterization of gentamycin/thymoquinone co-encapsulated polymer-lipid hybrid nanoparticles

Author(s) Name: *e(s): Ghadah Alotaibi, Faisal Alsuwayyid1, Lama Alkhathran, Weam AL Salman, Sabiha Alrouisan, Majd Alyaqub, Ibrahim Farh, Majed Halawani, Alaa Eldeen*

Abstract:
Background: Despite its high bactericidal activity, (Gen) is oto- nephrotoxic, with a high propensity for acquired bacterial resistance and biofilm formation. The goal of this project is to enhance the therapeutic efficacy of Gen by co-encapsulating with (TQ) in optimized (PLN) systems.

Methods: To incorporate Gen-TQ into PLN, a direct emulsification-solvent-evaporation method was used. The particle sizes and size distribution were determined using a light-scattering technique, and particle morphology and composition were determined using TEM. A sensitive HPLC method was used to determine drug loading and entrapment efficiency. The dialysis bag technique was used to investigate the drug release profile. The antibacterial activity was tested against a variety of S. aureus resistant strains and biofilms.
Results: The PLN average size 129.91.8- 163.83.9 nm. The polydispersity index for the formulations was in the range of 0.12- 0.14, indicating very good particle size distribution. The values for zetapotential were extremely low. Entrapment efficiency >85% in most cases. Increasing the polymer ratio resulted in smaller particle size and greater size uniformity. The TEM of the particles revealed a uniform spherical shape and drug entrapment in the core of the particles. Gen and TQ demonstrated a consistent drug release profile, with Gen releasing at a faster rate than TQ.
Conclusions: The co-encapsulation of Gen-TQ into PLN was accomplished successfully using the emulsification-solvent-evaporation method. The PLN exhibited distinct properties; small particle sizes, high size uniformity and entrapment efficiency. The prepared system has the potential to improve antibacterial activity against resistant strains of bacterial isolates and biofilms

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Abstract Code: YPET2103

Association between impaired metabolic function and vascular dysfunction in metabolic syndrome

Author(s) Name: *Shaden H. Alkhatib, Omar Z. Ameer and Ibrahim M. Salman*

Abstract:
Background: Metabolic syndrome is associated with an increased risk of vasculopathy and cardiovascular disease progression. However, to what level those vascular abnormalities correlate with metabolic disturbances remains debatable. This study explored the association between vascular dysfunction and metabolic parameters in a rodent model of metabolic syndrome, the high fat diet (HFD)-streptozotocin (STZ)-induced diabetes mellitus rat (HFD-D).
Methods: Five-week-old male Wistar albino rats (n=24) were fed with either HFD (45 kcal% fat) or control diet (10 kcal% fat) for 10 weeks. On week 6, 40 mg/kg STZ and saline were injected intraperitoneally into the HFD and controls, respectively. At the end of the feeding period, metabolic data was collected. Subsequently, postmortem collection of blood and kidney samples was undertaken, and the abdominal aortic rings maximal vasoconstrictor and vasodilator responses challenged. Fasting blood glucose (FBG), plasma total cholesterol (TC), plasma triglyceride (TG), plasma high density lipoprotein (HDL), plasma creatinine (Cr), urinary protein: urinary creatinine (UPC) and kidney index (KI) were measured.
Results: HFD-D rats had higher FBG, TG, Cr, UPC, and KI compared with controls. HDL was lower in HFD-D while TC remained unchanged. Maximal responses to norepinephrine (NE Rmax) induced-vasoconstriction were greater whereas those to acetylcholine (ACh Rmax) induced-vasorelaxation were blunted in the HFD group compared with controls. A positive correlation between NE Rmax and FBG was found, while ACh Rmax was negatively correlated with FBG, KI, UPC and TG.
Conclusions: impaired glucose metabolism, lipid profile and renal function are potential key contributors to vascular dysfunction in this disease model.

Abstract Code: YPET2104

The Effect of Reduced Graphene Oxide (rGO) on the Delivery and the Cytotoxicity of Superparamagnetic Iron Oxide Nanoparticles (SPIONs)/Doxorubicin (DOX) on Breast Cancer Cells

Author(s) Name: *Aysha Masri, Batool Sharbek, Lama Abujubara, Edreese Alsharaeh*

Abstract:
Background: The synergistic impact of combined therapy between hyperthermia and chemotherapy showed remarkable success in treating advanced and recurrent cancers, including enhancement in the tumor site's drug accumulation, cellular uptake, inhibition of DNA repair, and higher drug cytotoxicity against cancer cells. Although traditional chemotherapy such as doxorubicin (DOX) has had some success, its significant limitations include harmful adverse effects and non-specific targeting leading to cardiotoxicity. Nanotechnology has emerged as an alternative technique to overcome these limitations.
Methods: In this study, Superparamagnetic Iron Oxide Nanoparticles (SPIONs) were coated with Polyethylene Glycol (PEG) and have superparamagnetic properties as well as reduced graphene oxide (rGO). The complex formed is used as an active target nano vehicle to deliver anticancer drug inside the tumor with higher accumulation using magnetic hyperthermia. SPIONs-PEG-rGO complex was synthesized in situ via coprecipitation of Iron Chloride, Ferrous Sulphate, and modified Hummers method.
Results: Different characterization techniques were used to confirm the successful synthesis of SPIONs-PEG-rGO complex, including X-Ray Diffraction (XRD), Infrared Spectroscopy (IR), and Dynamic Light Scattering (DLS).
Conclusion: The aim is to evaluate the effect of rGO combined with PEG-coated SPIONs on drug loading DOX, specific targeting, and in-vitro hyperthermia therapy.

Abstract Code: YPPD2200

"Manuka Honey@PVP Electrospun Nanofibrous Wound Dressing: Fabrication, Characterization, and Enhanced Wound Healing Properties"

Author(s) Name: *Kholod Khalid Alrobaian, Lamyaa Mohamed Kassem, Ahmad Gamal Eldeen, Ayman Hassan Zaki, Samaa Imam Eldek, Mohamed Salem Khalifa Alshammari*

Abstract:
Background: Electrospinning provides nanofibrous wound dressings (WD) for drug delivery and healing. The objective of our study was the fabrication an innovative wound dressing that promote wound healing. PVP biocompatible, biodegradable synthetic polymer that make it perfect to formulate WD. Methylglyoxal (MGO) and other nutrients in Manuka honey (Mh) create a wound-healing environment by inhibiting the spread of inflammatory cells.
Methods: Manuka honey-treated polyvinyl pyrrolidine (Mh@PVP) nanofibrous mats were manufactured by electrospinner, characterized by SEM, XRD, and FTIR, and tested for tensile strength in order to determine the optimal ratios of PVP and Mh. On male Swiss albino mice, wound healing potentials and histological studies were conducted.
Results: SEM images and mechanical tests confirmed that 15% Mh@PVP gave the best scaffolds. Increasing the concentration of PVP upto 15% enables the incorporation of higher Mh percentage in Mh@PVP composite which significantly improves the mechanical, tensile, and conductivity properties of PVP nanofibers and promote Mh ability to heal wounds faster. MGO showed burst-and-continuous releasing patterns that lasted for up to seven days. In animal study Mh helps high-quality wound healing (fast, scarless, with hair growth). The histopathological analysis demonstrated substantial increase in keratinocyte expression. Cell viability analysis revealed that more than 90% of viable cells were present in all scaffolds.
Conclusions: Mh@ PVP Nanofibrous scaffold shows a promising potential as a makeup model that can promote keratinocyte growth and be used for medication delivery. Chronic wounds, such as those caused by diabetes or prolonged bed rest, can benefit from this novel dressing.

Abstract Code: YPPD2201

Amino acid -based nanocapsules for taste masking of bitter drug: fabrication and palatability evaluation

Author(s) Name: *Saleh Mohammed Alyami, Ibrahim Saleh Alhareth, Hamad Saleh Alyami*

Abstract:
Background: Patient compliance is critical for effective clinical outcomes and taste masking is key as it is positively related to patient compliance. To enhance and even maintain patient compliance, particularly among pediatric patients, dosages need to be designed to deliver the required dose safely, reliably, and with acceptable taste. The interfacial polycondensation method, which is simple, offers the potential to encapsulate bitter APIs.
Methods: Taste masked PMZ nanocapsules (NCs) were prepared using an interfacial polycondensation technique. A one-step approach was used to expedite the synthesis of NCs made from a biocompatible and biodegradable polyamide based on L-arginine. Molecular Weight Measurement and Entrapment Encapsulation Efficiency were conducted using Nicomp N3000 (Billerica, MA, USA). FTIR, PSA, XRD, TEM, DSC, Release Study, Palatability Assessment were performed.
Results: The produced NCs had an average particle size of 193.63 ± 39.1 nm and a zeta potential of −31.7 ± 1.25 mV, indicating their stability. The NCs were characterized using differential scanning calorimetric analysis and X-ray diffraction. The in vitro release study of the PMZ-loaded NCs displayed a 0.91 ± 0.02% release of PMZ after 10 min using artificial saliva as the dissolution media, indicating excellent taste masked particles.
Conclusions: Taste masked PMZ nanocapsules, which were encapsulated with a polymer made of a polyamide based on L-arginine nanocapsules, were successfully prepared using the interfacial polycondensation method. The morphological, molecular profiling, in vitro, and in-vivo results of the nanocapsules support their suitability for taste masking. The employed method facilitated the production of a simple cost-effective process.

Abstract Code: YPPD2202

Irisin induce apoptosis in metastatic Prostate cancer cells and inhibit tumor growth in vivo

Author(s) Name: *Khalil Habib Alshanqiti, Sumayyah Fahad Alomar, Aliyah Abduljabar Almomen*

Abstract:
Background: Prostate cancer is the second most common cancer occurring in male worldwide, in 2022 a prediction of high incidence cases are expected.
The integrin receptor αVβ5 that binds to matrix macromolecules and proteinases which ultimately stimulates angiogenesis. αVβ5 is a coactivator receptor that works along with αVβ3 in the activation process of the growth factor receptor in advanced prostate cancer cells (PC-3).
Irisin is an isolated hormone secreted by skeletal muscles in response to exercise and cold weather to induce thermogenesis. Moreover, it might have some beneficial effects such as heating the body and burning calories. Since αVβ5 is the main receptor involved in the activation of Irisin in cells, this study aims to investigate the possible effect of Irisin on PC-3, therefore understanding the underlying mechanism.

Methods: The effect of Irisin on the viability of PC-3 was evaluated using MTT assay, while the ability of irisin to induce apoptosis was evaluated using flo-cytometry.
Results: Irisin was able to reduce the viability of PC-3 up to 70% approximately, as it maintains the viability of normal epithelial cells (the HEK cell line), it boosts Annexin-V and 7-AAD positive cell numbers and induces apoptotic activity, it reduces the expression of Bcl-2, Caspas3, AKT/PI3k and Bcl-xL in PC-3 cells, in addition to attenuating tumor progression in xenograft models of (PC-3).
Conclusion: Irisin shows an apoptotic effect on PC-3. Investigating the apoptotic mechanism of irisin on PC-3 as well as changes in the αVβ5 receptor using western blot is recommended for future work.

Abstract Code: YPPD2203

Preparation and characterization of Nanoemulsion for topical delivery of Itraconazole

Author(s) Name: *Kholood Khalid Alsabeelah, Shahad Radi Alruwaili, Hanan Bahjat Khojah, Mohammed Elmowafy, Mohammed Elmowafy*

Abstract:
Background: Itraconazole an antifungal agent of the triazole class, has a broad activity spectrum. Because it is well tolerated by patients, itraconazole is commonly used to treat fungal infections. Itraconazole is a drug of choice for immunocompromised and non-immune-compromised patients, and for patients who cannot tolerate treatment with amphotericin B. However, the use of itraconazole is limited by its hydrophobic properties and oral bioavailability, which varies widely from prevalence to prevalence. Therefore, nano-emulsions have improved transdermal permeation of many drugs compared to conventional topical formulations such as emulsions.
Methods: We prepared six formulations by adding nano-surfactants to itraconazole using water titration. These formulations contained oleic acid (oil phase), Tween20 (surfactant), propylene glycol (co-surfactant) and distilled water. We measured the particle size and charge that appeared on the sample surface using a Zeta-Sizer instrument after shaking these mixtures at different Smix rates (surfactant: co-surfactant rate).
Results: The particle size was found to decrease with increasing surfactant concentration. This could be due to the ability of surfactants to decrease interfacial tension. The release of itraconazole was increased with increasing surfactant concentration. Stability was found to increase with increasing surfactant concentration. On the TEM image of NE5, the Nano-emulsion appears light and the surrounding dark.
Conclusions: We found that the zeta potential was not affected by surfactant concentration. Stability was found to increase with increasing surfactant concentration. It was found that the in vitro release of itraconazole increased with increasing surfactant concentration.

Abstract Code: YPPD2204

Developments in the Treatment of Resistant Hypertension by Use of Electroceuticals to Stimulate Baroreceptors: A Narrative Review and Meta-Synthesis

Author(s) Name: *Ranim G. Abou Shameh (rshameh@alfaisal.edu), Ibrahim M. Salman*

Abstract:
Background: Baroreflex activation therapy (BAT) is a major advance in the field of electroceuticals that uses neuromodulation of carotid sinus baroreceptors to reflexively lower blood pressure (BP) in resistant hypertensive patients. The latest FDA-approved BAT device for resistant hypertension treatment – BAROSTIM NEO® – has shown clinically significant reductions in arterial BP in such patients. However, newer evidence suggests that aortic baroreflex may be a superior BP-lowering target than carotid baroreflex. Current research focuses on using a similar BAT device for aortic baroreceptor modulation via aortic depressor nerve.
Methods: A methodological search for articles was conducted over MEDLINE and EMBASE using key terms including 'carotid sinus baroreceptor', 'aortic baroreceptor', 'baroreflex activation therapy', and 'resistant hypertension'. 32 papers were selected for data extraction and analysis.
Results: Initial human trials of BAROSTIM NEO® show an average decrease of 26±31 mmHg in systolic BP and 11±17 mmHg in diastolic BP. Animal studies of aortic baroreceptor stimulation show a more significant effect, with an average decrease of 88±17 mmHg in systolic and 74±23 mmHg in diastolic. Furthermore, while optimal BAROSTIM NEO® operation parameters range from 0.8 – 25.0 mA at 10 – 100 Hz, those best for aortic baroreceptor stimulation are around 0.4 mA at 5 – 15 Hz according to preclinical studies.
Conclusions: Lower charge injection parameters required for aortic baroreceptor stimulation to produce the same, or possibly greater, effect means potentially lower risk of nerve strain and long-term complications. As such, the future of electroceutical implants for hypertensive treatment appears to march toward aortic baroreflex stimulation.

Others

Abstract Code: YPOT2300

Current and future prospective of pharmaceutical manufacturing in Saudi Arabia

Author(s) Name: *Sultan Alshehri, Rehab Alshammari, Mohammad Alyamani, Rufaidah Dabbagh, Bandar Almalki, Omamah Aldosari, Renad Alsowaigh, Amirah Alkudeer, Fatimah Aldosari, Jumana Sabr, Fayaz Shakeel*

Abstract:
Background: The pharmaceutical industry is a multi-billion-dollar global industry that have a significant economic impact and play a major role in human health and wellbeing. Previous studies showed that the number of registered pharmaceutical industries in KSA exceeds the 40 manufacturers covering only 20-25% of the Kingdom's need of dispensed medicines.
Methods: This observational descriptive study that was carried out with the objective of exploring the contribution of the local pharmaceutical industry to the Saudi drug security. Using a drug formulary provided from the Saudi Food and Drug Authority, containing all registered pharmaceutical products available in Saudi Arabia, we extracted information about drug class, drug type, country and place of manufacturing, shelf-life and price
Results: Results showed that the majority of drugs in the market are manufactured in Europe (43.86%), followed by Saudi Arabia (22.55%), China and India (20.47%), Americas (10.24%), and other nations (2.61%). Also, it was shown in this study that approximately all the drug route of administrations, dosage forms, packaging items are imported from abroad in very large quantities when compared to those manufactured by Saudi pharmaceutical companies.
Conclusions: The small contribution of Saudi pharmaceutical companies in local drug security makes a large additional burden on the Kingdom's annual budget as a result of the overdependence on medicine from abroad. This study is undertaken to support 2030 ambitious vision through encouraging the contribution of local pharmaceutical industries in Saudi drug security to fulfill the needs of our community.

Abstract Code: YPOT2301

Impact of Parental Knowledge, Attitude, and Practice on the Prevalence of self-medication practice among children in Riyadh, Saudi Arabia.

Author(s) Name: *Najd Abdullah Alenazi, Mayar Seeid Alenhhas, Raghad Abdulaziz Alrasheed, Noor Saleh Alobud, Delail Saeed Ibn Hasan, Basheerahmed Abdulaziz Mannasaheb, Mohammed Jaber Alyamani*

Abstract:
Background: An Activity practiced individually or directed by someone to handle minor health illnesses is regarded as SM. irrational and irresponsible SM comes with countless adverse health consequences.
Methods: The present community based cross sectional study was conducted from February to May 2022 to explore the level of knowledge, attitude, and practice among parents, residing in Riyadh, Saudi Arabia. Participants were approached by visiting the healthcare centers. Overall, 560 parents participated. The data were analyzed using SPSS, by applying chi-square, Pearson correlation and multivariant logistic regression tests. A p-value of <0.05 was considered significant
Results: The major (62.5%) contributors were mother, Saudi national (54.1%), having children of both genders (boys and girls- 49.1%), high school and graduates (64.8%), working in non-medical sector (46.8%). The mean parental knowledge, attitude and practice scores were 5.1/7,17.4/24 and 6/7 respectively. About 40.2% of parents have SM their children during the last thirty days. The most medical conditions were cold and cough (32.5%). The most used paracetamol (32.9%), The reasons for SM were previous experience (30.4%). Pearson correlation analysis revealed the significant negative correlation between parental SM in their children during last 30 days with Knowledge (r= -.090, p=0.034), attitude (r= -.095, p=0.025) towards SM. The parents who are mothers, with positive attitude and having two children are significantly 1.7,1.5 times more likely to SM their children compared to their counter parts.
Conclusions: Rational SM is key not only for better health outcome, also limit adverse drug events, dosage, and treatment errors.

Abstract Code: YPOT2302

Mining local exome and HLA data to characterize actionable pharmacogenetic variants in Saudi Arabia

Author(s) Name: *Noura Sultan AlMuqati, Sateesh Maddirevula, Fowzan Sami Al*

Abstract:
Background: Implementing pharmacogenetic testing has been shown to improve personalized prescriptions by providing pharmacophenotype data to maximize the efficacy of drugs and minimize side effects. Knowledge of the frequency of PGX-relevant variants in the local population is a prerequisite to informed policymaking. Unfortunately, such knowledge is largely lacking from the Middle East. In this study, we describe the distribution of known PGX variants and haplotypes from Saudi Arabia, one of the largest countries in the Middle East, to ascertain allele frequencies of known PGX variants. Additionally, we describe novel potentially deleterious variants in pharmacogenes.
Methods: We analyzed exome data (n= 13,473) and HLA haplotypes (n= 64,737) from the Saudi population. In addition, we queried another exome database (n=816) of well-phenotyped research subjects from Saudi Arabia to discover novel PGX candidate variants.
Results: Our results show that only 26% (63/242) of class 1A/1B PharmGKB variants were identified, we estimate that 99.57% of the local population have at least one PGX variant (class 1A/1B PharmGKB). This translates to a minimum estimated impact of 9% of medications dispensed by our medical center annually. We also highlight the contribution of rare variants where 71% of the genes devoid of common PGX variants had at least one potentially deleterious rare variant.
Conclusions: We show that approaches that go beyond the use of commercial PGX kits that have been optimized for other populations should be implemented to ensure universal and equitable access of all members of the local population to personalized prescription practices.


Rf
[261]
Db
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Sg
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Bh
Hs
Mt
Ds
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lanthanum
57
La
138.91
cerium
58
Ce
140.12
praseodymium
59
Pr
140.91
neodymium
60
Nd
144.24
Pm
61
Sm
62
Eu
63
Gd
64
protactinium
91
uranium
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neptunium
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Ph.D. in Pharmacology & Toxicology

Program's Vision

To become a top-ranked, research-intensive academic center in the disciplines of pharmacology in the Arabian Gulf and the Middle East and recognized globally.

Program's Mission

To prepare postgraduate student with the knowledge and abilities required for positions in pharmacological research. Graduates will be able to participate in preclinical, clinical studies, pharmacological reviews, and in the assessment of pharmaceutical and biotechnological industries.

Program's Objectives

9- Prepare students for future success in their careers and lives through hosting up-to-date courses in pharmacology that help them develop a rigorous scientific attitude and, thus, serve pharmacy and other health-related professions.

10- Acquire new knowledge in pharmacology by conducting and promoting innovative research under the supervision of highly qualified faculty.

11- Impart relevant information to students in a manner that encourages them to develop their analytical and intellectual capabilities and, thus, acquire knowledge, with an emphasis on self-reliance.

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The Program and Admission Requirements can be found in the following link:
https://graduatestudies.ksu.edu.sa/ar/node/2064

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Graduates of the Ph.D. Program in Pharmacology will be able work in different fields for example: Academia, Pharmacology Researcher, Pharmacologist, Researcher/Manager in R&D department of Pharmaceutical Companies, Supply Manager, and Drug Regulatory Officer, … etc

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Tel: 0114677184 (male section)
Tel: 0118058211 (female section)
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College of Pharmacy - King Saud University
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Tangible Benefits

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14- Full American ASHP Accreditation for the Pharmacy Practice Residency (PGY1) program
15- Teaching Certification program

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- Roundtable Discussions
- Committees Involvement
- Simulations
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- Access to KSUMC facilities
- Experiential-based Learning

Application Requirements

9. Doctor of Pharmacy or Equivalent
10. Accredited PGY1 Residency (***for applying to PGY2 programs)***
11. Three Letters of Recommendation
12. Updated CV
13. Letter of Intent

Programs & Specialties

General Pharmacy Practice

Ambulatory Care

Infectious Disease

Critical Care

Hematology Oncology

Cardiology

Internal Medicine

Parenteral Nutrition

Programs Brochure

Contact Us

Postgraduate Pharmacy Education Center
PGPE@ksu.edu.sa


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NH2
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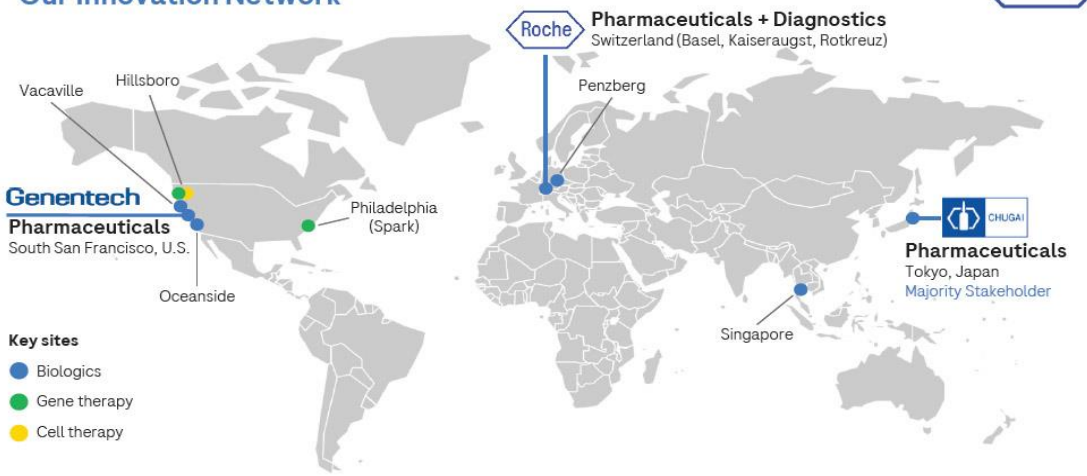
Roche Fact Sheet – 2022

Our Innovation Network



1896 F. Hoffmann-La Roche founded and headquartered in Basel, Switzerland

1976 Genentech founded and headquartered in South San Francisco, U.S.

2001 Roche and Chugai combined pharmaceutical operations in Japan

2009 Roche acquired Genentech and combined pharmaceutical operations in U.S.

2018/19 Roche integrated Flatiron Health, FMI and Spark into the Roche Group

About Roche

Founded in 1896 in Basel, Switzerland, as one of the first industrial manufacturers of branded medicines, Roche has grown into the world's largest biotechnology company and the global leader in in-vitro diagnostics. The company pursues scientific excellence to discover and develop medicines and diagnostics for improving and saving the lives of people around the world. We are a pioneer in personalised healthcare and want to further transform how healthcare is delivered to have an even greater impact. To provide the best care for each person we partner with many stakeholders and combine our strengths in Diagnostics and Pharma with data insights from the clinical practice.

In recognising our endeavour to pursue a long-term perspective in all we do, Roche has been named one of the most sustainable companies in the pharmaceuticals industry by the Dow Jones Sustainability Indices for the thirteenth consecutive year. This distinction also reflects our efforts to improve access to healthcare together with local partners in every country we work.

Genentech, in the United States, is a wholly owned member of the Roche Group. Roche is the majority shareholder in Chugai Pharmaceutical, Japan. For more information, please visit www.roche.com

A Leader in Personalised Healthcare

Pharmaceuticals

- **#1** R&D Investment as % of 2021 revenue vs top Pharma peers
- **16** Blockbuster drugs based on 2022 global sales
- **14** Million patients treated with Roche medicines
- **32** Roche medicines on the WHO list of essential medicines
- **267** Thousand patients participated in clinical trials

Diagnostics

- **#1** Core Lab company based on 2022 revenue
- **29** Billion test results produced with Roche systems in 2022
- **809** Million COVID tests conducted in 2022 with Roche products
- **3** FDA Breakthrough Device Designations Granted for Roche diagnostics in 2022

Industry Leadership

- **#1** In neurology and *in vitro* diagnostics market
- **14** Years running Roche ranked as one of the top 3 most sustainable healthcare companies in the Dow Jones Sustainability Indices
- **103,613** Employees
- **150+** Countries

Contact Information
Investor Relations
CH-4070 Basel
Switzerland
Email: investor.relations@roche.com
Website: www.roche.com/investors

Additional Information

This document contains certain forward-looking statements. These forward-looking statements may be identified by words such as 'believes', 'expects', 'anticipates', 'projects', 'intends', 'should', 'seeks', 'estimates', 'future' or similar expressions or by discussion of, among other things, strategy, goals, plans or intentions. Various factors may cause actual reflected in forward-looking statements contained in this document, among others: (1) pricing and product initiatives of competitors; (2) legislative and regulatory developments and economic conditions; (3) delay or inability in obtaining regulatory approvals or bringing products to market; (4) fluctuations in currency exchange rates and general financial market conditions; (5) uncertainties in the discovery, development or marketing of new products or new uses of existing products, including without limitation negative results of clinical trials or research projects, unexpected side government pricing pressures; (7) interruptions in production; (8) loss of or inability to obtain adequate protection for intellectual property rights; (9) litigation; (10) loss of key executives or other employees; and (11) adverse publicity and news coverage. The statement regarding earnings per share growth is not a profit forecast and should not be interpreted to mean that Roche's earnings or earnings per share for any current or future period will necessarily match or exceed the historical published earnings or earnings per share of Roche.

Information accessed herein may not under any circumstances be used for the purpose of, or in connection with, the quotation of any securities on an automated inter-dealer quotation system within the meaning of Rule 12g3-2(b) under the Securities Exchange Act of 1934.

1- the reference : https://assets.cwp.roche.com/f/126832/x/4a7cdc4435/roche-fact-sheet_ir_global.pdf accessed on 2nd May 2023
2- For more information, you can contact jeddah.medinfo@roche.com
3- If there are any concerns on the submitted materials, please contact the General Authority for Food and Drug Administration on the unified number: 19999.

In case of any adverse events – including any possible side effects not listed in the leaflet – or product complaints associated with the use of any Roche products, patients should talk to their HCPs and HCPs should report the details in accordance with the national requirements via the national spontaneous reporting systems to:

The National Pharmacovigilance Centre (NPC)
Land Line: 19999.
Fax: +966 11 205 7662
Email: npc.drug@sfda.gov.sa

Roche Products Saudi Arabia L.L.C.
Direct Tel. +966 12 211 4600
Mobile: +966 56 784 4692
Email: jeddah.drug_safety@roche.com

Roche Products Saudi Arabia L.L.C.
8042 Laysen Valley
West Umm Al Hamam dist. 2195
Riyadh - 12329
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DIAMOND SPONSOR

tabuk pharmaceuticals

Established in 1994 and headquartered in Riyadh, we are the largest privately-owned pharmaceutical company in Saudi Arabia, with a strong market presence throughout the Middle East and Africa (MEA) region. With advanced manufacturing sites in Tabuk, Dammam, Sudan, and Algeria, Tabuk Pharmaceuticals manufactures and distributes a wide range of pharmaceutical products, addressing various therapeutic fields, including central nervous, cardiovascular, respiratory, musculoskeletal, gastrointestinal systems, and anti-infectives.

With over 2,400 qualified employees, Tabuk Pharmaceuticals' commitment to quality and innovation has enabled the company to establish itself as a key player in the region's pharmaceutical industry. Our dedication to excellence has earned us a reputation as one of the fastest-growing companies in Saudi Arabia among all pharmaceutical companies. At Tabuk Pharmaceuticals, we are proud to deliver world-class products that meet the highest standards of quality and efficacy.

Join us

Tabuk Pharmaceuticals, located in Riyadh, Kingdom of Saudi Arabia was established in 1994, in 1997 our geographical presence was expanded to include the Algerian market, followed by including markets of United Arab Emirates, Kuwait, Oman, Bahrain, Qatar and Jordan in 1999. In 2004 we expanded our geographical presence to include the Egyptian market, in 2005 we Established a well-developed Corporate Research and Development center in Jordan, Acquisition of Tabuk Pharmaceuticals by Astra Industrial Group (AIG) as a 100% owned subsidiary was in 2006, followed in the year after by establishing a regional office for the Middle East and North Africa in Cairo, Egypt. In 2010 the acquisition of Sigma Tau Sudan by Tabuk Pharmaceuticals to strengthen Tabuk Pharmaceuticals presence in North Africa was completed, and five years later we luanched a state-of-art new production site in Dammam, Kingdom of Saudi Arabia to be the first ever site in the Kingdom to manufacture lyophilized injectables. By 2016 Launching a modern new production site in Blida, Algeria to strengthen Tabuk Pharmaceuticals presence in North Africa was accomplished.

SCAN ME

شركة مساهمة سعودية
رأس المال 1,200,000,000 ريال
Saudi Joint Stock Company
Capital S.R 1,200,000,000

SPIMACO is the leading vertically-integrated pharmaceutical manufacturer in Saudi Arabia, and the only pharma company listed on the Saudi Stock Exchange.

With five manufacturing complexes and a network of regional affiliates and multinational partnerships, SPIMACO has created an unrivalled footprint across the MENA Region.

The company delivers an extensive portfolio of pharmaceutical products, covering a wide range of therapeutic areas, and including oral and injectable medicines, and sterile products.

SPIMACO is committed to increasing access to healthcare, improving the quality of life of patients, and supporting the communities where it operates.

Market Leader in Saudi Arabia
Over 1200 Employees
5 Manufacturing Facilities
1 API Manufacturing Facility
SFDA Approved High-Potent Manufacturing Facility
Over 2bn units per annum
Transport & Distribution Operations in 16 countries
1000+ Stock Keeping Units (SKUs)

Arfaj Medical Services Company
شركة العرفج للخدمات الطبية
AND
Arfaj Medical Services Co and Haven SCIENTIFIC
---Future today! ---

Arfaj medical services company and its affiliate, second advance medical company one of the leading companies in the medical sector founded in 1980 and located in Riyadh are engaged in Medical supplies and Maintenance of medical systems and entered in partnership with Haven Scientific to develop patents in medical diagnostics. Arfaj Medical Services Company has entered in mutual & scientific relation s with Al-Faysal University and king Saudi University to develop more patents in Medical Devices Such as Covid- 19 transport media as the first company to produce it locally with approval of SFDA
The company still in hot search to attract the Saudi researchers & inventors and support them to develop their scientific activities into value–added products
Haven Scientific is a local manufacturer for genomic tests, with its own proprietary designs (infectious diseases, genetic testing, nucleic acid isolation etc)
Moreover, no such company /factory existing bin Saudi Arabia, Middle East and Africa for localized designing and manufacturing diagnostic tests tailored to the local genetic and microbial composition. Haven scientific is recently located in King Abdullah university for technology (KAUST)

يوم البحث العلمي بكلية الصيدلة
12 2023 College of Pharmacy Research Day

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