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BOOK OF ABSTRACTS

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ICBPS CHAIR WELCOME ADDRESS

Ladies and gentlemen, esteemed participants, and honored guests,

Welcome to the International Conference on Biological and Medical Sciences (ICBMS 2023). As the chair of this event, it's a privilege to have you join us virtually from across the globe. Today, we gather to explore the forefront of biological and medical research, connecting minds and sharing ideas that will shape the future of healthcare and scientific progress.

I want to extend a special thank you to our collaborator, the University College of Conventional Medicine, Faculty of Medicine and Allied Health Sciences, Islamia University of Bahawalpur, for their invaluable support in making this conference possible.

ICBMS 2023 is a platform for the exchange of knowledge and innovation among researchers, scholars, and experts. Let's make the most of this opportunity to learn, engage, and collaborate. I also express my gratitude to the World Forum for Young Scientists (WFYS) for their dedication to fostering scientific dialogue.

To our speakers, presenters, and participants, thank you for your contributions and dedication to advancing science. Let's make ICBMS 2023 an enriching experience for all.

Thank you for being a part of this journey.

With utmost appreciation,

Dr. Kamala Badalova

(Chair, ICBMS 2023)

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Azerbaijan Medical University, Azerbaijan



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Maryam Mehnaz

Department of Zoology, Kohat University of Science and Technology Kohat, Pakistan



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Speaker	Affiliation
Dr. Hamdi Temel	Professor Faculty of Medicine, Bozok University, Turkey
Dr. Ammara Riaz	Assistant Professor Department of Life Sciences, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Pakistan
Dr. Tayyaba Shaheen	Associate Professor Department of Bioinformatics and Biotechnology GC University Faisalabad, Pakistan
Dr T N Kavitha	Assistant Professor, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya Deemed University, Tamil Nadu, India
Dr. Majeeda Rasheed	Assistant Professor Department of Life Sciences, Khwaja Fareed University of Engineering and Information Technology (KFUEIT), Pakistan
Dr. Gopal Jee Gopal	Assistant Professor C.G.Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli, Gujarat, India
Oral/Poster Presentations	

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An awareness campaign and solutions techniques dissemination for the Proper Disposal of Dead Animals to Clean the Environment from Hazardous Microbes: A Case-Control Study in KPK Province, Pakistan (2023-2024)

Ammara Riaz^a, Majeeda Rasheed^a, Zobia Afsheen^b Mujahid Hussain^a and Muhammad Ali^a

^aDepartment of Life Sciences, Khwaja Fareed University of Engineering and Information Technology Rahimyar Khan, Punjab, Pakistan

^bDepartment of Health and Biological Sciences, Abasyn University, Peshawar, Pakistan
Email ID: majeeda.rasheed@kfuweit.edu.pk

Abstract:

Focus of this research is to highlight an issue expected to create by not disposing/burying dead animals in proper way. It may create high level increase in environmental deadly microorganisms and these non-disposed animals may also effect birds' population like vultures which are now at threaten level of extinction. Without vultures to consume the carcasses, the dead bodies of animals remain untouched, accumulating decaying remains and it is crucial for the ecosystem and general public health. So, there is dire need to increase information and to implement suitable disposal techniques to reduce the risk of hazardous microorganisms and to assure safety of birds. The study is being conducted in KPK, Pakistan, from 2023 to 2024. Using a case-control study methodology, regions with bad disposal habits were chosen as cases, whereas regions with good habits were chosen as controls. A total of 100 awareness campaigns, 500 interviews, 100 different site visits and conference presentations were done to deliver and gather information to evaluate KPK's present dead animal disposal techniques and vultures' population decline is also being recorded. The results of this study highlight the importance of effective awareness campaigns in attaining the objectives. The study's conclusions underline the presence of dead animals in the region and ubiquity of unsafe methods for disposing of dead animals and the dangers of microbial contamination that go along with them. Compared to locations with suitable disposal, those with improper disposal had a higher presence of dangerous microorganisms in the environment and loss of vulture population. To support these findings, statistical data was examined. This case-control study concludes by emphasizing the significance of resolving the issue of improper animal disposal in all regions of Pakistan.

Keywords: Dead animal disposal, hazardous microbes, awareness campaign, environment, public health, KPK, Pakistan.

Analysis of *FGF10* Copy Number and Expression in Nonsyndromic Cleft Lip and/or Palate among Malay Patients

Noor Areefa Ameera Mohd Ma'amor^a, Nurul Syazana Mohamad Shah^{a*}, Wan Azman Wan Sulaiman^a, Sarina Sulong^b, Nazia Abdul Majid^c

^aReconstructive Sciences Unit, School of Medical Sciences, Universiti Sains Malaysia Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia.

^bHuman Genome Centre, School of Medical Sciences, Universiti Sains Malaysia Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia.

^cInstitute of Biological Sciences, Faculty of Science, Universiti Malaya, 50603 Kuala Lumpur, Malaysia

*Correspondence: Nurul Syazana Mohamad Shah (syazanashah@usm.my)

Abstract:

Nonsyndromic cleft lip and/or palate (NSCL/P) incidence may be influenced by fibroblast growth factor 10 (*FGF10*) disruption as it plays a vital role in craniofacial development. Since the genetic etiology could differ across ethnicities, this research focuses on the role of *FGF10* in NSCL/P among the Malay population. This study aims to determine the correlation between the copy number of *FGF10* and the mRNA expression in Malay individuals affected by NSCL/P. 74 blood samples were collected from consented participants comprising 37 patients with NSCL/P and 37 controls in Hospital Universiti Sains Malaysia from 2021 to 2023. Following DNA and RNA extraction, Taqman copy number assay and reverse transcription quantitative PCR method (RT-qPCR) were carried out using *RNASE P* and *GAPDH* as reference gene. This preliminary study determined the DNA copy number and mRNA expression of *FGF10* in both studied groups. The *FGF10* DNA copy number calculated in patients with NSCL/P was slightly higher (CNC=2.29). However, the result was not significant compared to the control group (CNC=2.12, $p = 0.447$). The *FGF10* mRNA expression also correspond to the DNA copy number where there was no significant difference in the expression with the control group (1.01-fold, $p = 0.133$). This study also found that there was weak negative correlation between *FGF10* DNA copy number and mRNA expression with NSCL/P among Malays ($r = -0.157$). However, further investigation with larger sample size and comprehensive analysis are warranted to determine the potential role of this gene in NSCL/P among Malay patients.

Keywords : nonsyndromic cleft lip and/or palate, orofacial cleft, cleft lip, cleft palate, craniofacial development, fibroblast growth factors, genes

Exploration of Bacterial Communities in Khewra Salt Mine using 16s rRNA Sequencing

Syeda Wardah Noor^{a*}, Sara Arshad^a, Syed Muhammad Abdullah^a, Sahar Fazal^a

^aDepartment of Bioinformatics and Biosciences, Capital University of Science and Technology, Islamabad, Pakistan.

*Corresponding author: Syeda Wardah Noor Email address: Syeda.wardahnoor@gmail.com

Abstract:

Khewra Salt Mine, the second largest in the world, offers ideal conditions for Halophiles from domain *Archaea*, *Bacteria*, and *Eukarya* to flourish. Despite extensive research on Khewra's soil, plants, and water, little attention has been given to its salt walls, which may harbor a diverse range of Halophiles. This research investigated the bacterial diversity of Khewra by collecting seven salt samples from various locations within the mine, yielding 19 isolates that were subjected to biochemical and morphological testing. Isolates from newly mined region (UE-S1-1, UE-S1-2, UE-S2-1, and UE-S2-2) and museum walls (ED-S1-1 and ED-S1-2) were further studied for their biochemical, antibiotic sensitivity, and salt tolerance abilities, and later 16s rRNA sequencing was performed. Biochemical tests revealed that these isolates as catalase, oxidase, gram positive rods. They were all sensitive to Chloramphenicol (30µg/ml). The salt requirement test identified these isolates as moderately halophilic as they grew on 2-4% NaCl concentration. The molecular tests revealed that among these six isolates, UE-S1-1 (uncultured *Bacillus* sp.) and UE-S2-2 (*Bacillus* sp. in: *firmicutes*) were novel strains that have been successfully submitted in NCBI as OQ295687 and OQ692139, respectively. Both strains are from newly mined salt region in Khewra. These halophilic bacterial strains possess salt-tolerant genes, making them potential candidates for genetic engineering in plants, particularly for addressing drought and salinity issues in agriculture. Additionally, their use in industrial enzyme production holds promise. However, despite the research potential of Khewra, its salt walls remain underutilized. Future researchers must explore the newly mined caves to unveil more novel microbiomes.

Keywords: Khewra Salt Mine, Halophile, Salt Tolerance, *Bacillus* species, *Halobacteriaceae*, 16s rRNA sequencing

Assessment of Efflux Pump Inhibition by Flavonoids using Berberine Uptake Assay Against Nosocomial Pathogens

Hafiza Nida Shehzadi^a, Salma Batool^a, Rahman Shah Zaib Saleem^b

^aDepartment of Basic and Applied Chemistry, Faculty of Science and Technology, University of Central Punjab (1- Khayaban –e- Jinnah Road, Johar Town Lahore 54782, PAKISTAN

^bDepartment of Chemistry and Chemical Engineering, SBA School of Science and Engineering (SBASSE) (Lahore University of Management Sciences (LUMS), Lahore, 54792. PAKISTAN)

Presenter's e-mail: nida73355@gmail.com

Abstract:

Purpose: Multidrug resistance in bacteria is a global threat, with overexpression of efflux pumps contributing to its development. Plant-based flavonoids could be potential drug candidates for inhibiting these pumps. The purpose of this study was to screen the chemically synthesized plant-based flavonoids i-e MU-RS-013 and MU-RS-014 as antimicrobial agents and to evaluate their sub-inhibitory concentrations for efflux pump inhibition.

Methods: *Escherichia coli* C9 and *Escherichia coli* 1841 strains were used. The EtBr agar cartwheel method was used to identify overly expressing efflux pumps. Moreover, disc diffusion and broth dilution methods were used to determine antimicrobial potential. Berberine uptake assay was used to evaluate efflux pump inhibition, and in silico validation of wet lab analysis was also done.

Results: The results of the EtBr cartwheel assay have proven the hyperactivity of efflux pumps as the strains were fluorescent at the highest concentration (2.5µg/mL) and retained EtBr. MU-RS-013 showed higher antimicrobial activity against *E. coli* C9, with the zone of inhibition (ZI=16mm). The minimum inhibitory concentration of MU-RS-013 (10.0 ± 1.15) and MU-RS-014 (10.05± 1.00) was indicated against *E. coli* 1841. FIC values of both flavonoids showed additive effects when co-administered with resistant antibiotics i-e MU-RS-013 and MU-RS-014 with gentamycin respectively. Maximum efflux pump inhibitory activity was detected in MU-RS-014 by the reduction in the MIC value of Berberine against selected resistant strains. However, MU-RS-013 showed maximum efflux pump inhibitory effect by reduction in the MIC value of Gentamycin against strains and reversed the resistance. In silico analysis has shown that the compound MU-RS-013 has the highest binding energy -9.4 with efflux Pump AcrAB-TolC.

Conclusion: Using flavonoids as adjuvants with resistant antibiotics can help combat antibiotic resistance and can give a major breakthrough to pharmaceutical industry.

Keywords: Nosocomial pathogens, Efflux pumps, Overexpression, Multidrug Resistance, Plant-based Flavonoids, Efflux pump inhibition, Resistance reversal,

Design and Synthesis of Novel 2-Nicotinic Acid-based Siderophores to Promote Mineral Uptake and Enhance Plant Growth

Azka Habib^a, Salma Batool^a, Rahman Shah Zaib Saleem^b, Khurram Bashir^b

^aDepartment of Basic and Applied Chemistry, Faculty of Life Sciences, University of Central Punjab (UCP), Lahore Pakistan

^bDepartment of Chemistry and Chemical Engineering, SBA School of Science and Engineering (SBASSE), Lahore University of Management Sciences (LUMS), Lahore Pakistan

Azkahabib22@gmail.com

Abstract:

The limited availability of iron (Fe) in soils, particularly in alkaline and calcareous soils, negatively impacts plant growth and crop yields. Siderophores are promising in facilitating Fe uptake and promoting plant growth, but their synthesis is often limited and challenging in terms of stability, uneconomical synthesis, toxicity, solubility, and selectivity for Fe ions. To address the limitations and enhance Fe bioavailability for improved agricultural productivity and sustainability, the synthesis of siderophores using 2-nicotinic acid was carried out using the EDC (1-ethyl-3-(3-dimethyl aminopropyl) carbodimide) coupling method. The research is focused on rice (*Oryza sativa*). A total of 32 compounds were synthesized, and subsequent analysis confirmed the identity of 8 compounds through Fourier Transform Infrared Spectroscopy and Nuclear Magnetic Resonance techniques while the assessment of mineral content in rice plants was done using Inductively Coupled Plasma Optical Emission Spectroscopy. A series of control experiments were conducted to create Fe-deficient soil conditions. For the medium, NPK, CaCO₃, NaOH, additives, and antifungal spray were used. Light intervals and pH were adjusted with different irrigation treatments. Among synthesized compounds, a siderophore i.e.; methyl 2-[2(phenylformamido)acetamido] acetate showed significant phenotypic effects on rice plants. The chlorophyll content in the treated plants was measured to be 1478.56±309.47 µg/g, as compared to control i-e 911.20±237.57 µg/g. Additionally, the treated plants exhibited increased height i-e 27.033±2.91 cm, as compared to control i-e 18.618±2.23 cm. Validation of results was done using Inductively Coupled Plasma Optical Emission Spectroscopy, which revealed higher iron content in siderophore-treated plants, measuring 3879 mg/kg, compared to the untreated plants i-e 1776.5 mg/kg. Moreover, other minerals uptake was also significantly higher in the treated plants. By developing effective and easily synthesized siderophores, this study seeks to contribute to more sustainable agricultural practices, improve food security, and potentially reduce the environmental impact of Fe fertilizers.

Keywords: Siderophores; 2-picolinic acid; iron chelators; amide formation; plant growth analysis; mineral uptake analysis

Design, Synthesis, and Assessment of 3-picolinic acid-based siderophores in relation to mineral uptake and plant growth

Laiba Asim^a, Salma Batool^a, Rahman Shah Zaib Saleem^b, Khurram Bashir^c, Fawad Raffaq Qureshi^d

^aDepartment of Basic and Applied Chemistry, Faculty of Science and Technology University of Central Punjab Lahore Pakistan

^bDepartment of Chemistry and Chemical Engineering, SBA School of Science and Engineering (SBASSE), Lahore University of management sciences (LUMS), Lahore Pakistan

^cDepartment of Biology, SBA School of Science and Engineering (SBASSE), Lahore University of management sciences (LUMS), Lahore Pakistan

^dDepartment of biochemistry, Faculty of life sciences, School of biochemistry and biotechnology (SBB), University of the Punjab, Lahore, Pakistan

Corresponding Author's email address: laibaasim1308@gmail.com

Abstract:

Purpose: Siderophores as chelating agents are actively involved in iron sequestration. Iron, an essential micronutrient is indispensable to plant growth but its low bioavailability in alkaline soils results in decreased agricultural output. To overcome this problem, siderophores have received a lot of attention in recent years. However, the synthetic deoxymugineic acid analogs preclude their agricultural use due to high cost and low stability.

Method: In this work, we develop more stable and less expensive functional analogs using 3-Picolinic acid (3-PCA) as a moiety, and demonstrate their practical synthesis and characterized them by FT-IR and NMR analysis. The transport of Fe-chelated 3-PCA based siderophore forms across the plasma membrane was biological assessed using *Oryza sativa L.* The availability of 3-PCA based siderophore-Fe complex was evaluated after phenotypic screening in rice grown in calcareous soil by determining chlorophyll content and mineral uptake by inductively coupled plasma optical emission spectroscopy (ICP-OES). The validation of biological assessment results was done using molecular docking tool PyRx.

Results: For siderophores synthesis, 3-picolinic acid reactions with different amines were carried out that results in carboxamide formation based on EDC coupling and successfully characterized by FT-IR and NMR that confirms the presence of desired compounds. Results of biological assessment revealed that among synthesized siderophores, LA-RS-048 and LA-RS-058 showed healthy green phenotype with increased height and shoot diameter supported by increased chlorophyll content i.e., $1389.6 \pm 290.3 \mu\text{g/g}$ and $1465.02 \pm 246.9 \mu\text{g/g}$ as compared to control, respectively. ICPOES analysis quantifies mineral content that showed more iron content i.e., $3980.63 \pm 2.89 \text{ mg/kg}$ as compared to other minerals in LA-RS-058 treated rice plants. *In-silico* analysis that revealed that LA-RS-058 have more negative binding affinity of -7.7 kcal/mol with the transporter protein in rice.

Conclusion: Thus, LA-RS-058 utilized by rice worked more efficiently than other synthetic chelates in calcareous soil due to its higher availability. Our findings suggest that LA-RS-058 (N-(2-nitrophenyl) pyridine-3-carboxamide) could be a good Fe chelator for *Oryza sativa L.*

Keywords: Siderophores; 3-picolinic acid; plant growth; mineral uptake, biological assessment; *Oryza sativa L.*; Iron chelators

Developing Statistical Models for Analyzing Genomics Data: Unraveling the Secrets of the Genome

Dr T N Kavitha

Assistant Professor of Mathematics, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya Deemed University, Kanchipuram, Tamil Nadu

ndia.tnkmaths@gmail.com

Abstract:

The rapid generation of massive quantities of biological data has completely altered the field of genomics through advancements in high-throughput genome sequencing methods. The complexity of the genome and its function in numerous biological processes, such as the emergence and treatment of diseases, have risen to the forefront of research. In this situation, revealing hidden trends in genomics data depends critically on the design and application of advanced statistical models. The goal of this research is to create entirely novel statistical models that have been designed for analyzing challenging genomics datasets and draw useful insights from the enormous quantity of data contained in the genome. Our research aims to address significant challenges like the discovery of genetic variants, the development of disease-associated biomarkers, and the explanation of gene regulatory networks by utilising revolutionary mathematical approaches and computational tools. To ensure the robustness and adaptability of the models, these datasets will include a wide range of biological situations, such as cancer genomics, developmental biology, and infectious illnesses. Researchers will have access to user-friendly software implementations of the created statistical models as a result of the research. We want to provide researchers and clinicians with the strong tools they need to analyze genomics data accurately and quickly by democratising access to these technologies. Additionally, this project is going to depend on collaboration with domain specialists in genomics, molecular biology, and bioinformatics to make sure that the statistical models are suited to answer practical biological queries. We aim to develop a multidisciplinary approach that pushes the limits of genomics research by combining their expertise in the field with our mathematical abilities. In conclusion, the goal of this research project is to significantly advance the area of genomics by creating state-of-the-art statistical models that can extract valuable biological information from large datasets. The projected results could have an impact on many areas of medicine and biology, from personalized health care to the identification of new therapeutic targets, ultimately paving the way for precision genomics and better human health.

Keywords: Genomics, Statistical models, Bioinformatics, Next-generation sequencing, RNA-Seq, DNA sequencing, Differential expression analysis, Gene expression, Transcriptomics.

Synthesis of copper oxide and reduced graphene oxide-copper oxide nanocomposites for degradation of crystal violet

Abdul Samad*, Dr. Shaukat Sujah, Dr. Ahtaram Bibi,

* Department of Chemistry, Kohat University of Science and Technology, Kohat, Khyber Pakhtunkhwa, Pakistan
Email: Abdulsamad8482@gmail.com

Abstract:

Crystal violet dye is versatile, finding use as a biological stain, veterinary medication, and chicken feed supplement. Improper disposal in industrial effluents raises environmental concerns due to its toxic properties. Techniques like biodegradation, coagulation, adsorption, oxidation, and photocatalysis address dye pollution, with promising results from heterogeneous photocatalysis. This method can transform carcinogenic dyes into harmless byproducts while efficiently degrading organic pollutants under near-ambient conditions. Copper oxide (CuO) has garnered interest for its stability, low toxicity, and cost-effectiveness. Eco-friendly CuO nanoparticles (CuONPs) are synthesized using *Caralluma tuberculata* extract, a natural reducing and capping agent. Concurrently, reduced graphene oxide (rGO) enhances CuONPs' photocatalytic performance, resulting in nanocomposites with significantly improved efficiency. This research aims to synthesize CuONPs and rGO-CuO nanocomposites with *Caralluma tuberculata* extract and characterize them through various spectroscopic techniques. The nanocomposites were tested for their photocatalytic potential by degrading crystal violet dye under visible light. Findings were contributed to developing efficient, environmentally friendly photocatalytic materials for water treatment, addressing dye removal from industrial effluents. CuONPs synthesis involves combining *Caralluma tuberculata* extract with a copper sulfate solution, followed by heating and stirring. Purification yields suitable CuONPs for analysis. rGO is produced from natural graphite through a modified Hummers' process. Combining rGO with CuONPs generates nanocomposites with superior photocatalytic properties. Characterization examines their structure using UV-VIS, FTIR, XRD, and SEM techniques. To evaluate photodegradation activity, nanocomposites are dispersed in crystal violet dye solutions under visible light exposure with magnetic stirring. UV-Visible spectra are recorded at intervals to monitor degradation progress. CuONPs and rGO act as control samples, enabling comparisons of photocatalytic efficiency. In conclusion, this research has the potential to yield novel, efficient photocatalytic materials for environmental remediation. Utilizing *Caralluma tuberculata* extract, CuONPs, and rGO offers a sustainable approach to address dye removal from water. Advancing nanocomposite photocatalysts contributes to innovative solutions for sustainable water treatment and environmental protection.

Keywords: Reduced Graphene Oxide, Nanocomposites, Crystal Violet, Photocatalysis, Dye Degradation

Hymenolepiasis: a cross sectional survey of associated risk factors and the circulating *Hymenolepis diminuta*

Noor-ul-Ain^a, Shahid Niaz^a, Rehman Ali^b, Noor-Ul-Akbar^c Muhammad Rooman^a, Shahid Nazeer^a,

^aDepartment of Zoology, Kohat university of Science and Technology, Kohat, Khyber Pakhtunkhwa, Pakistan

^bInstitute of Urban Environment, CAS, Jimei, Xiaman, China

^cDepartment of Microbiology, Hangu Campus Kohat University of Science and Technology

noorulain.awan94@gmail.com

Abstract:

Hymenolepiasis is a widespread zoonotic disease in humans caused by one of two tapeworms i.e. *Hymenolepis nana* (dwarf tapeworm) and *Hymenolepis diminuta* (rat's tapeworm). The rat tapeworm *H. diminuta* parasitize small intestine of rodents especially mice and rats and accidentally humans. Hymenolepiasis is a globally spread zoonosis and produces many health problems such as headaches, abdominal pain, anorexia, loss of appetite, weakness and diarrhea. The aim of the current study was to analyze the associated risk factors of Hymenolepiasis and molecular characterization of *H. diminuta* using cytochrome c oxidase subunit 1 (*cox1*) gene. In this cross sectional study a total of 100 *Rattus norvegicus* were collected from different localities of district Bannu from Jun-2022 to May 2023. The overall prevalence of *H. diminuta* was found to be 10% among the examined animals. Gender wise prevalence revealed that females were more likely to be infected with hymenolepis infection 11.66% than males 7.5% ($p=0.496$). The frequency of hymenolepis infection was higher in adult rats 47.05% as compared to young ones 2.4% ($p=0.0001$). The highest season-wise prevalence of *H. diminuta* was noted during summer 13.4% than winter 6.25% ($p=0.230$). Comparing the prevalence of different localities, it was found that hymenolepiasis was more prevalent in poultry farms 15% followed by shops 8.69% while lower in domestic places 5.40% ($p=0.390$). In molecular analysis partial sequences of *cox1* gene from individual *H. diminuta* isolates were separately amplified using polymerase chain reaction (PCR). Experimental results reported that rats may have a prominent role in the transmission dynamics of the parasite.

Key words: Hymenolepiasis, Zoonotic, *Hymenolepis diminuta*, *Rattus norvegicus*, District Bannu, Cytochrome c oxidase subunit 1 gene (*Cox1*)

GREEN SYNTHESIS OF ZINC OXIDE AND CU-DOPED ZINC OXIDE PHOTOCATALYSTS FOR DEGRADATION OF METHYLENE BLUE

Sara Gul*, Shaukat shujah, Tasleem Hussain.

Kohat University of Science and Technology, Kohat Pakistan gulsara647@gmail.com

ABSTRACT

Society is now very concerned about environmental issues related to chemical water contamination. The biggest challenge of the twenty-first century is giving people access to clean water. Recent developments in the fields of nanoscience and nanobiotechnology have made the use of plant extracts for the synthesis of metal oxide nanoparticles (NPs) an attractive topic with several advantages over traditional physicochemical methods. The ability of biologically produced pure and Cu-doped ZnO nanoparticles (NPs) to degrade dye contaminants via photocatalysis is examined in this study. Pure and different Cu-dopant concentrations were used in the current investigation to create ZnO NPs from leaf extract. The physical and optical characteristics of the synthesized samples were examined using measurements from UV, FTIR, EDX, XRD, SEM. XRD and SEM examination verified the wurtzite crystal structure of the synthesised samples. FTIR analysis was also used to confirm that functional groups were present in the produced samples. UV and EDX were also carried out. Methylene Blue (MB) was used as organic contaminants in the photocatalytic investigations of the synthesised Cu-doped ZnO NPs samples. The photocatalytic activity of the 3% and 5% Cu-doped samples was superior. Additionally, the factors that affect photodegradation efficiency were evaluated, including catalyst concentration, initial hydrogen potential (pH), and dye concentration and time. The synthesized cost-effective and environmentally friendly Cu-doped ZnO NPs have increased photocatalytic activity against MB dye and can be used as wastewater treatment materials

Key words : Nannorrhop Ritchiana, Cu doped ZnO, Green synthesis, Nanoparticles, Dye.

MOLECULAR DETECTION AND PHYLOGENY OF *RICKETTSIA* SPECIES CIRCULATING IN TICKS AND CALVES OF DISTRICT BANNU

Shafqat Ullah^{*a}, Abdul Majid^a, Zahid Khan^a, Shams Ullah^a, Muhammad Arshed Khan^b, Noor ul Akbar^a

^aDepartment of Zoology, Kohat University of Science and Technology, Kohat 26000, Pakistan

^bFaculty of Veterinary & Animal Sciences, Gomal University D.I. Khan, Pakistan.2

Email: shafqatullahmarkhan@gmail.com

Abstract:

Background: Ticks are hematophagous ectoparasites capable of transmitting multiple human pathogens. Environmental changes have supported the expansion of ticks into new geographical areas that have become the epicenters of tick-borne diseases (TBDs).

Methodology: The blood and tick samples (n=300 each) were collected from district Bannu after the ethical approval from ethical committee Kohat University of Science and Technology, Kohat. The collected samples were transformed to the Molecular parasitology and Virology Laboratory, Department of Zoology KUST for microscopic and Molecular characterization. The Giemsa stained slides were subjected to microscopy for identification followed by DNA extraction through Qiagen DNA extraction KIT. The extracted DNA were subjected to PCR targeting the OMPA and 17KDA genes and sequenced through sanger sequences. The data was analyzed by using Bioedit, Mega 7 and NCBI Blast through online. The statistical tool, statistic version 9 was used by applying One-Way ANOVA and T test. The p value <0.05 was considered statistically significant.

Results: The data showed that female calves were infected by *Rickettsia spp.* in the month of May, June and July. The highest prevalence rate of *Rickettsia spp.* was observed in those calves who were infested with ticks. The phylogenetic study showed that most of the *Rickettsia spp.* of the current study were closely related to the neighboring countries, India, China, Egypt, Romania, Serbia and Taiwan.

Conclusion: *Rickettsia spp.* was observed in ticks and in large ruminant of district Bannu infested by ticks. The current study suggest that the ticks spread the *Rickettsia spp.* from cattle to cattle even to wild animals which may be investigated for such type of study.

Keywords: *Rickettsia spp.*; Calves; Ticks; DNA; PCR; OMPA

Ameliorative Effect of Panax Ginseng Essential Oil on Atrazine-Induced Intoxication and Its Impact on Growth as Well As Hematology and Biochemistry of Grass Carp

Syed Rahmanullah Shah^{a*}, Kalim Ullah^a, Farmanullah Dawar^a

^aDepartment of zoology, Kohat university of science technology, Kohat 26000 Pakistan

*Corresponding Author Email: Zoologist_syed@yahoo.com

Abstract:

The current research investigated the effect of GEO supplement on biological parameter's associated with growth as well as haematological and blood biochemical indices status in grass carp cultivated on regular circumstances and treated to a sub lethal dose of ATZ. The fish was split into six categories; the first one is control group and feed with commercial diet, the next two groups were feed with commercial diet supplement with different levels of Ginseng Oil (GEO-1 and GEO-2) sequentially, the 3rd group was stupefied with half of atrazine 96-h harmful concentration quantity 50 (1.39 mg per liter) named ATZ group, and last two groups was feed with GEO supplement diets and simultaneous were given 1.39 mg per Liter of Atrazine. GEO supplementation had a significant favourable effect on fish development, and feed utilization processes with both treatment doses. Atrazine usage dramatically lowered fish levels of survival while also impairing fish development and utilisation of feed, while the ATZ-intoxicated group having the least ultimate weighs, gaining weight, and feed conversion ratio. Atrazine dosage resulting major variations in haematological levels it's dropped haemoglobin, PCV, WBC and RBC), and in serum biochemistry it's dropped TP, Globulin, Albumins, and boost cholesterol and triglycerides levels in Grass Carp. Ginseng Oil supplement in ATZ categories greatly reduced the previously mentioned drawbacks; however, few variables did not approach control levels. These results convey extra along with essentially novel data which sub lethal Atrazine pollution causes decreased survival, retarded growth, and damaged digesting activity in Grass Carp, therefore the results suggested that Ginseng Oil supplement may have beneficial for decreasing those toxic effects as well as encouraging an efficiency along with welfare for this fish creatures.

Keywords: Ctenopharyngodon Idella (Grass Carp), Atrazine, Panax Ginseng Essential Oil, Biochemistry, Hematological study.

Immune checkpoint inhibitors targeting cancer immunotherapy

Samra Bashir

Institute of Microbiology, University of Agriculture Faisalabad, Pakistan
Samrabashir0786@gmail.com

Abstract:

It is becoming increasingly clear that the immune system can identify cancers and, in some cases, can manage or even get rid of tumors. Targeting checkpoints of immune cell activation has been demonstrated to be the most effective approach for activation of anti-tumor immune responses. By activating immune inhibitory receptors, which are responsible for inhibiting established immune responses, tumors might evade immune monitoring. The cytotoxic T-lymphocyte associated antigen 4 (CTLA-4) and programmed death 1 (PD-1) immune checkpoints are negative regulators of T-cell immune function. Preliminary studies showed that CTLA-4 regulates the activation threshold and limits the growth of T lymphocytes that are specific for tumors. On the other hand, PD-1 predominantly serves as a stop signal that restricts T cell effector function within a tumor. Ipilimumab is the first agent associated with a documented improved overall survival benefit in this patient population. Nivolumab and pembrolizumab, both PD-1 inhibitors, are approved to treat patients with advanced or metastatic melanoma and patients with metastatic, refractory non-small cell lung cancer. In addition, the combination of ipilimumab and nivolumab has been approved in patients with BRAF WT metastatic or unresectable melanoma. The roles of CTLA-4 and PD-1 in inhibiting immune responses, including antitumor responses, are largely distinct. Ipilimumab (anti-CTLA-4) and nivolumab (anti-PD-1) together were found to considerably increase efficacy in patients with metastatic melanoma, therefore this combination of CTLA-4 and PD-1 blockers was next examined to raise patient response rates. The combination's effectiveness has been demonstrated in a number of published studies, and it is now being investigated in other ongoing trials. The consequences of inhibiting the CTLA-4 and PD-1 pathways in cancer therapy are summarized in this study.

Keywords: Cytotoxic T-lymphocyte associated antigen 4 (CTLA-4), Programmed death 1 (PD-1), Immunotherapy, tumor

Molecular charecterization of *Anaplasma marginale* in large ruminants of District Bajaur

Zahid Khan *, Shafqat Ullah, Abdul Majid, Noor ul Akbar, Dr.Mubbashir Hussain.

Department of zoology, Kohat university of science technology, Kohat 26000 Pakistan

*Corresponding Author: Zahid khan zahidkhan757z@gmail.com

Abstract:

Background: Anaplasmosis caused by *Anaplasma marginale* (*A. marginale*) is one of the major diseases in large ruminants of Pakistan. This highly pathogenic intracellular protozoan parasite is responsible for causing severe health issues. Acute anaplasmosis is characterized by symptoms such as fever, intense hemolytic anemia, weight loss, miscarriage, and even fatality. These detrimental effects have a significant impact on milk production and meat quality.

Materials and Methods: The blood samples (n=200) of large ruminants were collected from different areas of district Bajaur. After microscopic confirmed samples were subjected to PCR, targeting 16SrRNA and MSP5 genes by specific primers. The PCR amplified products were sequenced through Sanger sequencing. The sequences checked through BioEdit, Chromas as well as through online NCBI blast. The current study sequences result of *A. marginale* was compared by constructing phylogenetic tree through evolutionary nodes and taxa. The data was analyzed through Statistix version 9. The p value <0.5 was considered statistically significant.

Results:

In the current study most of the large ruminants were infected with *A. marginale* which were also more infested by ticks in the month of April, May, June and July. The phylogenetic trees clustered as well as the BLAST analysis of *16S rRNA* and MSP5 genes sequences sowed similarity to neighboring countries the China and India as well as other countries, USA, Australia, Thailand, South Africa, Uganda, Cuba, Taiwan, and Kenya with the same-species.

Conclusion: From the current study, it was concluded that backyard ruminants have a higher incidence of *A. marginale* infection which were more infected with ticks.

Keywords: *Anaplasma marginale*; Anaplasmosis; large ruminants; PCR; 16SrRNA; MSP5

Molecular analysis of genetic variants responsible for strabismus in families of District Kohat

*Aiman Hassan^a, *Saadullah Khan^a, Noor Muhammad^a, Niamatullah Khan^a

^aDepartment of Biotechnology and G.E, Kohat University of Science & Technology, Kohat-26000, Khyber Pakhtunkhwa, Pakistan.

*Correspondence Email: (saad@kust.edu.pk) (aimihassan56@gmail.com)

Abstract:

Background: Strabismus, commonly known as squint, is a prevalent ocular alignment disorder that can lead to serious visual impairments, including amblyopia, blindness, and stereovision loss. The condition can manifest at any age and may result from genetic factors, maternal age, smoking, injury, or other pathophysiological processes. It is classified based on the direction in which the eyes turn and their variation with gaze position. Strabismus can be both syndromic and non-syndromic, and its genetic basis remains a subject of ongoing research.

Aims and Objectives: This study aims to identify strabismus-causing genetic variants in families from the Kohat region of Pakistan, and to establish a causal relationship between these variants and the observed phenotypic expression in affected individuals.

Methodology: The research involved a comprehensive investigation of families with a history of Strabismus in the Kohat district, located in the Khyber Pakhtunkhwa province of Pakistan. A family with individuals affected by Strabismus was recruited for the study. Detailed clinical evaluations and pedigree analyses were performed to confirm the diagnosis and establish the inheritance pattern within the families. Genomic DNA was extracted from blood samples obtained from affected individuals, healthy siblings and parents. WES and Sanger sequencing techniques were employed to amplify and analyze the coding region of the *ADGRV1* gene.

Results: Whole-exome sequencing was employed to identify a frameshift variant, c.17668_17669delA, (NM_032119.4: p. Met5890Valfs*10) in the *ADGRV1* gene. Bioinformatic tools were utilized to assess the pathogenic impact of the variant on the protein. Subsequently, Sanger sequencing was performed to validate the segregation of the variant within the affected family members. The results highlight the significance of WES in uncovering disease-causing variants. This study contributes to our understanding of the genetic basis of the disorder and provides valuable insights for genetic counseling and future research endeavors.

Keywords: Strabismus, Genetic Variants, Whole-Exome Sequencing, Frameshift variant.

Molecular Characterization of *Begomovirus* Complex Infecting *Capsicum. annuum* and *Malvastrum. coromandelianum* Plants in District Kohat

Mohammad Hakim, Dr. Malik Nawaz Shuja, Dr. Mubbashir Hussain

Department of Microbiology, Kohat University of Science and Technology, Khyber Pakhtunkhwa, Pakistan.
mohammadhakimmicrobiologist@gmail.com

Abstract:

Begomovirus is the largest genus of family *Geminiviridae*, having ssDNA genome. They are associated with a satellite's molecules, infecting economical important crops. Present study is based isolation and characterization of Begomoviruses infecting chili and Malvastrum plants in Kohat. Symptomatic plants showing typical features were collected summer 2022 and total DNA was isolated. Nucleic acid was subjected to PCR for amplification of viruses and associated satellites. Three full-length isolates corresponding to helper virus were amplified and sequenced showing typical features of Begomovirus infecting chili and Malvastrum. Sequence identity for isolate MHC-1 was determined to be 99% with ChLCV in the databases. While the other two isolates, MHMK-1 (2750 nt) and MHMK-2 (2754) showing sequence similarity (>98%) with MalYVMV. Associated betasatellite-isolate MHCK-4 (1350nt) with MHCK-1 samples, showed the highest percentage identity of 97% with Chili leaf curl betasatellite. Phylogenetic analysis showed all isolates are variant of ChLCV, MalYVMV and ChLCB. Based on these findings, the previously reported diversity of begomoviruses and emphasize the need for a district wide survey for detection of begomoviruses. It also highlights the role of *M. coromandelianum* as alternate host, and thus serve for evolution of new begomoviruses.

Keywords: Chili leaf curl betasatellite, Alternate host, *Malvastrum. coromandelianum*

Impacts of diazinon on hematological and histopathological indices of *Labeo rohita* in District Kohat

Mujahid Rahim, Dr Kalim Ullah, Dr Abdul Rehman

Department of Zoology, Kohat University of Science Technology Kohat, Kohat, Khyber Pakhtunkhwa, Pakistan

Abstract:

The researchers conducted an experiment to study the effects of diazinon, a commonly used pesticide, on *Labeo Rohita* in freshwater reservoirs in Pakistan. They exposed the fish to different concentrations of diazinon for 28 days and observed its impact on various blood-related factors. The results showed that exposure to diazinon caused significant negative changes in the fish's blood parameters. Specifically, the number of red blood cells (RBCs) decreased significantly in fish exposed to 2µg/L and 5µg/L concentrations of diazinon, with the 5µg/L group showing a more significant decrease compared to the 2µg/L group and the control group. Similarly, the number of white blood cells (WBCs) also decreased significantly in both diazinon-exposed groups. The 5µg/L group had a more pronounced decrease compared to the 2µg/L group, which also showed a significant decrease compared to the control group. Other blood-related factors, such as hemoglobin (Hb), hematocrit (Ht), and mean corpuscular volume (MCV), also decreased significantly in the 5µg/L diazinon-exposed group compared to the control group. The 2µg/L diazinon-exposed group had a lesser decrease in these parameters compared to the 5µg/L group. Furthermore, the researchers noticed an increase in fish mortality as the concentration of diazinon and exposure time increased. This indicated that higher levels of diazinon were more harmful to the fish. In the conclusion, the study revealed that exposure to lethal concentrations (LC50 values) of diazinon led to adverse effects on the *LabeoRohita* blood parameters. The researchers also examined the fish's gills and liver and found significant abnormalities, indicating that the indiscriminate use of diazinon poses a serious threat to *LabeoRohita* and can affect their health and productivity.

Keywords: *Labeo rohita*, Diazinon , Hematological, Histopathological, Kohat

Synthesis of magnetic iron oxide nanoparticles for the photocatalytic degradation of methylene blue and methyl violet

Saba Hayat Khattak, Dr. shaukat shujah, Farina kanwal,

Department of Chemistry, Kohat University of Science and Technology (KUST), Pakistan
mailto:sabakhattak112@gmail.com

Abstract:

The present study describes a clean, green and cost effective approach for the synthesis of magnetic iron oxide nanoparticles using *NANNORRHOPS RITCHIANA* with a minimal scale and ultra-stable features. The nanoparticles were characterized by using instruments that includes UV-vis spectroscopy, Fourier Transform Infrared spectroscopy (FTIR), and Scanning Electron Microscopy (SEM), Energy dispersive X-ray spectroscopy (EDX) and X-ray Diffraction analysis (XRD). The optical properties of magnetic iron oxide nanoparticles using UV-vis spectrophotometer has shown absorbance peak at 238 nm. Through SEM analysis, the morphology of magnetic iron oxide nanoparticles were found and size of magnetic iron oxide nanoparticles ranges between 30-80nm where the FTIR analysis has provided the information about the bioactive compounds that are flavonoids, resin, saponins, tannins, terpenoids, carbohydrates, and aminoacids were responsible for the stabilization and capping of magnetic iron oxide nanoparticles. Furthermore, the study report of magnetic iron oxide nanoparticles (MIONPs) is used for the degradation of organic dyes. Photocatalytic degradation of Methylene blue and methyl violet was studied. Different parameters like (Conc, contact time, Amount of catalyst and pH) were optimized for the photocatalytic degradation of dyes. Methylene blue is toxic thiazine dye and it quickly cross the cell membrane and accumulate in parathyroid and central nervous system. Methyl violet is extensively used cationic and textile dye due to low cost highly soluble in water. It is mutagen and eye , skin and digestive tract irritant. Improper disposal in industrial effluents raises environmental concerns due to toxic properties. Technique like degradation address dye pollution, with a promising results . This method can transform carcinogenic dyes into harmless byproducts while efficiency degrading organic pollutants under near ambient conditions . Methylene blue and methyl violet was degraded upto 90% with MIONPs. The use of MIONPs for photocatalytic degradation gives effective, successful and reproducible results.

Keywords: Magnetic iron oxide Nanoparticles, Nannorrhops Ritchiana, Methylene Blue, Methyl violet

Isolation, Identification and Antibigrams of bacteria isolated from *Cutaneous Leishmeniasis* Wounds in District Karak

Sabeela Naz ^a, Shehzad Zareen^a, Niaz Muhammad^b

^aDepartment of zoology, Kohat University of Science and Technology Kohat, Pakistan

^bDepartment of Microbiology, Kohat University of Science and Technology Kohat, Pakistan

sabeelanaz55@gmail.com

Abstract:

Cutaneous leishmeniasis is one of the infectious disease which present in most of the countries included Pakistan. It transmutes by the bite of infected female phalabatomine sand flies. Cutaneous leishmeniasis is a considerable health problem in Karak District of Kohat Division. The presence of secondary bacterial infection in cutaneous leishmeniasis wound aggravate the lesion and delay the healing process of leishmeniasis wound. So the present study was aimed to isolate and identify the bacteria from leishmeniasis wound and check the antibiotic sensitivity pattern. The current study was conducted on the 50 patients having clinical feature of leishmeniasis. Wound samples were collected through sterile swab from patients. After microscopically confirmed samples (Giemsa stain) were cultured on different bacteriological media (Nutrient agar, Blood agar and MacKonky agar). The colourless colonies were subjected to biochemical identification such as Gram staining, oxidase, Triple sugar iron (TSI), Methyl red (MR) and Vogues Prousker (VP) to identify potential bacterial isolates. The identified bacteria were subjected to antibiotic sensitivity test, carried out by disc diffusion method on Nutrient agar. The main isolated pathogens in this study were *Escherichia coli*, *Klebsiella* species (Gram negative) and *S.aureus* (Gram positive). Most of the isolates showed resistance against various antibiotics such as penicillin and ceftriaxone and some isolates showed intermediate susceptibility to tested antibiotics.

Keyword: Cutaneous leishmeniasis, Antibiogram, Bacterial isolates, Biochemical tests, District karak.

Middle East respiratory syndrome Corona virus (MERS-CoV)

Saleha Tahir ¹

Department of Microbiology, University of Agriculture Faisalabad, Pakistan
salehatahir999@gmail.com

Abstract:

Middle East respiratory syndrome coronavirus (MERS-CoV) is a zoonotic disease that can cause mild pneumonia to severe respiratory infections in humans. The virus only produces a little infection in dromedary camels, but it transmits quickly amongst them. The behavior of the virus varies from person to person and between humans and dromedary camels, which emphasizes the part played by host variables in MERS-CoV pathogenesis and transmission. Although it is believed to be a zoonosis, it is yet unknown how MERS-CoV infects humans. It results in a high temperature, cough, acute respiratory tract infection, and multiorgan dysfunction that may ultimately cause the infection victims to pass away. In order to control MERS-CoV infection, no medication has yet received clinical approval. To avoid the negative effects of future epidemics like this one, a number of sensible precautions should be implemented. Avoiding contact with dromedary camels and concentrating on nosocomial illness outbreaks are the major components of prevention. The development of efficient therapeutic and preventative anti-MERS-CoV infections, as well as further research into the epidemiology and pathogenesis of the virus, are all required. The virus's potential to spread globally could, however, evolve so that it can now spread more easily between people.

Keywords: MERS, Zoonosis, public health importance, respiratory disease

Genetic Analysis of Sequence Variants Responsible for Achondroplasia in Family of District Kohat

Shahbaz Ali Shah*, Niamatullah Khan, Nazif Muhammad, Saadullah Khan, Qazi Muhammad Raafiq, Abid Jan,

Department of Biotechnology & Genetic Engineering, Kohat University of Science & Technology, Khyber Pakhtunkhwa, Pakistan.

*Correspondence Email: syedshahbazshah34@gmail.com

Abstract:

Background: Achondroplasia is an autosomal dominant genetic disease representing the most common form of human skeletal dysplasia: almost all individuals with achondroplasia have identifiable mutations in the fibroblast growth factor receptor type 3 (*FGFR3*) gene. Achondroplasia, the most common form of dwarfism, is primarily caused by specific sequence variants in the *FGFR3* gene. The cardinal features of this condition and its inheritance have been well-established, but the occurrence of feeding and nutritional complications has received little prominence. Here we identified a rare case of achondroplasia caused by mutations in the *ROR2* gene, which is known to play a crucial role in skeletal development.

Methodology: The research involved a comprehensive investigation of family with a history of achondroplasia in the Kohat district, located in the Khyber Pakhtunkhwa province of Pakistan. A family with individuals affected by achondroplasia were recruited for the study. Detailed clinical evaluations and pedigree analyses were performed to confirm the diagnosis and establish the inheritance pattern within the family. Genomic DNA was extracted from blood samples obtained from affected individuals, healthy siblings and parents. WES and Sanger sequencing techniques were employed to amplify and analyze the coding region of the *ROR2* gene. The identified sequence variants were compared to the reference sequence to determine their pathogenicity.

Results: Whole-exome sequencing was employed to identify a missense variant, c.1189C>T; p.Arg397Ter, in the *ROR2* gene. Bioinformatic tools were utilized to assess the pathogenic impact of the variant on the protein. Subsequently, Sanger sequencing was performed to validate the segregation of the variant within the affected family members. The results highlight the significance of WES in uncovering disease-causing variants. This study contributes to our understanding of the genetic basis of the disorder and provides valuable insights for genetic counseling and future research endeavors.

Conclusions: A missense variant c.1189C>T; p.Arg397Ter in the *ROR2* gene causes achondroplasia.

Keywords: Achondroplasia, Missense variant, WES, *FGFR3*, Sanger Sequencing, *ROR2*

Characterization and anti-diabetic activity of *Fagonia cretica* mediated titanium oxide nanoparticles

Shahrukh Khan^a, Prof. Dr. Ijaz Ahmad^a, Dr. Fozia^b, Rafi ullah^a

^aDepartment of Chemistry, Kohat University of Science & Technology (KUST), Kohat-26000, Pakistan

^bDepartment of Biochemistry, Khyber Medical University (KMU), Kohat

Corresponding Email: shahrukhquraishi.kt@gmail.com

Abstract:

Diabetes mellitus has become an issue of great concern throughout the world. It kills a lot of people every year. To handle this issue massive research is being carried out around the world. This study is actually based on the quest to find the effect of titanium dioxide nanoparticles against the above-mentioned health problem. The TiO₂ nanoparticles were prepared using an aqueous extract of *Fagonia cretica*. The reason behind selecting the mentioned plant is that *Fagonia cretica* has been used as an anti-diabetes mellitus homeopathic plant. So, it is decided to use this plant in order to see the effect of its phytochemicals as a capping agent on the nanoparticles. The nanoparticles were investigated using different characterization techniques. Such as UV visible, SEM technique, XRD, EDX, and FT-IR. These nanoparticles were used to find their effect against diabetes in mice while comparing their effect against a diabetes mellitus popular drug, Glimpiride. Our studies show that nanoparticles are side effect free but other allopathic drugs possess different side effects. The said study was performed at Neuro Molecular Medicine Research Center, ring road Peshawar. This study is purely based on discovering the *Fagonia cretica* mediated TiO₂ nanoparticles for their effect on diabetes mellitus.

Keywords: *Fagonia cretica*, Aqueous extract, TiO₂-NPs, Diabetes mellitus, homeopathic plant

Comparative analysis of root canal preparation using different systems of rotary endodontic instruments

Dilqam İsmayilov

Department of Therapeutic Dentistry, Azerbaijan Medical University, Baku, Azerbaijan

Abstract:

The purpose of the study is to improve the quality of mechanical processing of root canals based on clinical studies of various systems of rotary endodontic instruments.

Material and methods. A study was conducted on 74 patients aged 24 to 62 years: 46 women and 28 men. For a comparative study of the quality of root canal preparation using various systems of rotary instruments, the roots of the teeth were selected, the canals of which have the most complex anatomy.

Results. An analysis of the results of a clinical study showed that the use of a scientifically based differentiated approach to the choice of an instrument for preparation improves the quality of mechanical processing of root canals. The smallest number of preparation errors was noted in the 1st and 6th groups, the differences between which were statistically insignificant ($p>0.05$). In the 2nd, 4th and 5th groups, the average number of cases of canal anatomy disorders was recorded, while their difference from the 1st and 6th groups in this indicator was significant ($p<0.05$). The largest number of cases of violation of the anatomy of the root canals was noted in the 3rd group, the difference of which from the other groups was also statistically significant ($p<0.05$).

Conclusion. Clinical studies have shown the effectiveness of a differentiated approach to the choice of rotary nickel-titanium instruments in the preparation of narrow and curved root canals. There was a decrease in the number of cases of violation of the canal anatomy by 2-2.4 times compared with the use of the Mtwo, BioRaCe and FlexMaster systems and by 3.6 times with the use of the ProTaper system.

Keywords: endodontic instruments, root canal, nickel-titanium instruments

The disorders of bone metabolism during diabetes mellitus

Gunel Sultanova^a, Gulshen Huseynova^b

^aDepartment of Pathophysiology, Azerbaijan Medical University, Baku, Azerbaijan

^bDepartment of Forensic Medicine, Azerbaijan Medical University, Baku, Azerbaijan

Abstract:

Diabetes mellitus is a chronic hyperglycemic, common disease with significant mortality and morbidity affecting millions of people worldwide. Besides the well-known complications of diabetes on the cardiovascular system, eyes, kidneys and nervous system, bone is also affected by diabetes. Diabetes has a strong impact on bone health, and skeletal fragility is now recognized as a major complication of both Type 1 and Type 2 diabetes. Decrease in bone mineral density in Type 1 diabetes, and deterioration in bone quality and strength, although bone density is normal or higher in Type 2 diabetes, increases the risk of fracture.

Long disease duration (10 years), poor glycometabolic control, and presence of diabetes complications increase the risk of fracture and makes the evaluation of individuals with diabetes more important.

Adequate intake contributes to bone health. Dietary sources of calcium are a preferred option and calcium supplementation only includes individuals who do not get enough calcium in their diet and are at high risk for osteoporosis should be targeted. Because smoking impairs osteoblast activity, patients should be encouraged to quit smoking and be outside for at least 10-15 minutes on sunny days. Patients are encouraged for daily weight-bearing activity outdoors in addition to walking, good body mechanics and good posture to increase daily vitamin D production hyperglycemia on bone.

It is necessary to keep blood sugar under control in order to prevent pathophysiological changes. Increased fracture in diabetes to patient/family risk and considerations, and recommendations to improve bone health should be presented. This behavior change recommendations will help the patient maintain a healthy lifestyle and improve self-care

Keywords: bone metabolism, diabetes mellitus, hyperglycemia, obesity, blood sugar.

Superoxide dismutase and catalase activities in normal ovarian tissue, malignant and benign ovarian tumors

Karimova Gunesh, Huseynov Elchin,

Department of Oncology, Azerbaijan Medical University, Azerbaijan

Correspondence Email: guneshkerimova30@gmail.com

Abstract:

Determining the relationship between the intensification of the lipid oxidation process observed in malignant ovarian tumors and the disturbances in the antioxidant defense system can significantly contribute to solving the problem of early diagnosis of these tumors. Thus, it is of scientific and practical interest to determine the activity of superoxide dismutase (SOD) and catalase (CAT) enzymes, which are the main components of the antioxidant defense system. The purpose of study was the determination of activity levels of SOD and CAT enzymes in normal ovarian tissue, benign and malignant ovarian tumors, in particular, regarding the stage of the tumor and the degree of differentiation.

The activity of SOD and CAT was studied in 43 malignant ovarian tumor processes at different clinical stages and degrees of differentiation. This process was also studied in 20 patients with benign ovarian tumors, and 12 normal ovarian tissues of healthy women who died of various random causes (control group). Depending on the clinical and morphological parameters, the SOD and CAT activities were determined in normal ovarian tissue, benign and malignant ovarian tumors. The enzyme activities in malignant ovarian tumor tissues were significantly lower than in normal and benign ovarian tumor tissues. The activity of these enzymes decreases with decreasing degree of differentiation of malignant tumor tissues, and increasing stage of the tumors. Contrary to CAT, the SOD activity was lower in benign ovarian tumor tissues compared to normal ovarian tissues. The decrease of the activity of SOD and CAT in ovarian malignant tumors depending on the degree of differentiation of the tumor and the stage of the disease has both diagnostic and prognostic importance.

Keywords: Malignancy, ovarian tumors, Antioxidants, Lipid oxidation

Use of laser Doppler flow meter in Dermatology

Mammadkhanova İrada^a, Mammadova Gulnara^b, Balakishieva Fikriya^b, İsmayilova Madina^b

^aDepartment of Dermatovenerology, Azerbaijan Medical University,

^bAzerbaijan State Advanced Training Institute for Doctors named after A. Aliyev

Abstract:

The purpose of the work is conducting experiments *in vitro* and *in vivo*, demonstrating the impact of new ozonide-containing external preparations on the condition of the hair and scalp in dynamics.

Materials and methods. There was used trichoscope Aramo SG with 60x, 200x and 1000x magnification lenses. The original pictures were taken as well as snapshots in dynamics after exposure to the outdoor drug for 15, 30 and 45 minutes. To study the dynamics of the state of the scalp in the course of external treatment with a cream-mask Ozodermis 1500 mcg in 10 volunteers (5 males and 5 female) were measured in the control points on the parietal and occipital zones (marked with tattoo marks) before and after applying the drug. Control complex measurements were carried out using trichoscopy, phototrichogram, laser analyzer LAKK Doppler flowmeter and Multi Skin Test Center MC 1000 (sensors for corneometry, sebummetry and elastometry).

Results. Hair trichoscopy *in vitro* with long-term exposure up to 45 minutes did not show the damaging effect of an external preparation containing chemically modified olive oil. Dynamic complex instrumental observations was the most informative according to the results of a phototrichogram.

Conclusion. Thus, the use of external ozonide-containing preparations in trichology has prospects for alopecia, pathogenetically associated with oxygen metabolism disorders (alopecia areata, diffuse reactive alopecia) and for seborrheic dermatitis due to the suppression of the activity of yeast-like fungi by the fungicidal properties of ozonated olive oil. Use of laser doppler flow meter to assess the effectiveness of treatment has value in external therapy with external ozonide-containing agents aimed at activating tissue oxygen metabolism.

Keywords: skin, laser Doppler flow meter, *in vivo* experiments, ozonide-containing preparations, trichoscope

The use of antibiotics in children in dentistry

Gulnara Aliyeva ^a, Rumiya Abbasova^b

^aDepartment of Therapeutic Dentistry, Azerbaijan Medical University

^bDepartment of Pediatric Dentistry, Azerbaijan Medical University

Abstract:

Objective: Dental infections in children are very common conditions. In the treatment of dental infections, it is very important to decide on the use of antibiotics for the right indication. The aim of our study is to increase awareness of antibiotics used in the treatment of dental infections, which are frequently seen in children, as dentists are the profession that prescribes antibiotics in their treatments.

Materials and Methods: This study was conducted on dentists working in Azerbaijan using the Google Form electronic questionnaire method.

Results: According to the data obtained from 400 participants who answered the questionnaire within the scope of the study. The compliance of the answers given to the questions in the 'Case Questions' section with the guidelines was found to be 31.75%, 57.5%, 57.2%, and 15%, respectively. In cases where antibiotics are required, the first choice was amoxicillin + clavulanic acid with a rate of 72.25%, and azithromycin was the first choice with a rate of 45.75% in patients with penicillin allergies. A statistically significant difference was found in terms of knowledge level, gender, field of expertise, and length of service in the profession. (p0.05)

Conclusion: In our study, it was determined that the participants did not have sufficient awareness about the antibiotics used in dental infections in children, and their compliance with current guidelines was low. This is important for antibiotic resistance, which is a global health problem. We hope that the awareness of dentists about antibiotics will increase, but the importance given to this subject in the curriculum will be increased with various in-service training.

Keywords: antibiotics, dentistry, dental infections, resistance

Pathophysiology of Ectopic Pregnancy

Nushabe Alishova^a, Niftaliyeva Seadet^b, Gasimova Aida^b

^aDepartment of II Obstetrics and Gynecology, Azerbaijan Medical University,

^bDepartment of Pathophysiology, Azerbaijan Medical University

Abstract:

Introduction. An ectopic pregnancy is the implantation of a fetus in a place other than the endometrial lining of the uterine cavity, i.e., into the fallopian tube, uterine horn, cervix, ovary, abdominal cavity or pelvic cavity. An ectopic pregnancy cannot be delivered to full term and either ruptures or reverses. Early symptoms and signs include pelvic pain and vaginal bleeding. When ruptured, hemorrhagic shock may occur.

Materials and methods. The diagnosis is based on the measurement of the hCG beta subunit and ultrasound data. Treatment consists of laparoscopic or open surgical resection or the use of methotrexate.

Results. Most ectopic pregnancies are in the fallopian tube, and any infection or surgery that increases the risk of tubal adhesions or other abnormalities increases the risk of an ectopic pregnancy. The most common site of ectopic implantation is the fallopian tube, followed by the uterine horn (so-called horn or interstitial pregnancy). Pregnancy in the cervix, in the cesarean scar, in the ovary, or in the abdomen is rare.

Heterotopic pregnancy (simultaneously ectopic and uterine pregnancies) occurs in only 1/10,000–30,000 pregnancies, most commonly in women undergoing ovulation induction or assisted reproductive technologies such as IVF or intrafallopian tube gamete transfer (GIFT); in these women, the overall rate of ectopic pregnancy is 1–2% (1).

Conclusion. The anatomical structure containing the fetus usually ruptures after about 6–16 weeks. The rupture results in bleeding, which may be gradual or rapid enough to cause hemorrhagic shock. The later in pregnancy the rupture occurs, the faster blood is lost and the higher the risk of death.

Keywords: ectopic pregnancy, endometria, fetus, uterine cavity, abnormalities

MRI in the Diagnosis of Placenta Accreta

Shahla Asgerova

Azerbaijan Medical University Department of II Obstetrics and Gynecology

Abstract:

Introduction. Placenta accreta occurs in 1 in 7,000 pregnant women, although the literature describes an incidence of 1:540 to 1:70,000. True accreta (ingrowth) of the placenta is considered a serious complication of pregnancy, and is associated with massive bleeding during pregnancy or childbirth.

Materials and methods. The main diagnostic method is an ultrasound examination; however, it is not always possible to say unambiguously whether there is an ingrowth or not. The most accurate method is MRI diagnostics, which is acceptable in pregnant women (due to the absence of radiation exposure), but inferior vena cava syndrome, claustrophobia, fetal movements, and some other points make this study difficult, which leads to the fact that only single institutions perform MRI diagnostics for pregnant women with this pathology.

Results. Four pregnant women with a diagnosis of placenta accreta took part in the study. The age of women is 30-41 years old. All women are multiparous, one after two caesarean sections. All were done by ultrasound examination, the diagnosis of ingrowth was doubtful in two cases. After delivery, the placenta was sent for histological examination. Placenta accreta was observed intraoperatively in all pregnant women. In two cases, the placenta was located along the anterior with a transition to the back wall; in one case it was located from the side with a transition to the anterior; and in one it was located on the back wall with a transition to the front.

Conclusions: MRI is a highly informative method for diagnosing this pathology. Analysis of publications, as well as our study showed that magnetic resonance imaging is effective in assessing the degree of placenta accreta, which is confirmed by the results of histological examination.

Keywords: MRI, Placenta accreta, ultrasound examination, diagnostics method, ingrowth

Study of pH dependence of membrane permeability of erythrocytes

Sh.Y. Ismayilova^a, Kh.R. Mammadova^b, Sh.G.Bayramov^b, E.A.Garayev^a

^aDepartment of Pharmaceutical toxicology and chemistry, Azerbaijan Medical university

^bDepartment of Medical and Biological Physics, Azerbaijan Medical university

Abstract:

Introduction. It is known from the literature that in order to create the membrane potential in the red blood cell, it is necessary to change the concentration of chlorine ions in the surrounding environment, as erythrocytes are good conductors for chloride ions as anions, and bad conductors for cations.

Purpose of work. The purpose of the current work is to study the specific electrical perforation of erythrocyte membranes.

Material and methods. It were prepared solutions consisting of different concentrations of NaCl and sucrose (C₁₂H₂₂O₁₁) (1:2 ratio) and the effect of different concentrations of these solutions on the membrane permeability of erythrocytes was observed.

Results and their discussion: Only the pH of the solution with a concentration of 1.45 mM first decreased and then increased. Thus, the environment first became acidic and then became alkaline. According to literature data, this corresponds to specific perforation of erythrocytes. By following different pH changes and according to the relevant dependence (formula) between pH and potentials, it was observed that the results of the research conducted with a solution of 1.45 mM coincided with the literature data and that the obtained potential corresponded to the specific electrical breakdown of the erythrocyte.

Conclusion. It has been determined that the strength of the erythrocyte membrane in people with various blood diseases is weaker than that of a healthy erythrocyte. The future goal of the research work is to conduct research using certain newly purchased chemical or natural substances in the blood of patients with various blood diseases and to show ways to increase the durability of the erythrocyte membrane by using these substances.

Keywords: pH, membrane permeability, erythrocytes, membrane potential, electroporation

Electron microscopic characteristics of G1 grade endometrial carcinomas

Samira Ilyas gizi Safarova

Department of Oncology, Azerbaijan Medical University, Azerbaijan

Correspondence Email: samirasafarova1983@gmail.com

Abstarct:

Introduction: Uterine cancer is one of the most common oncological diseases among malignant tumors of the female reproductive system. The increase in the incidence of this disease, especially among women during the reproductive period, has increased the demand for studying the origin, development and prognosis of the disease. The purpose of the study was to study the electron microscopic characteristics of highly differentiated endometrial adenocarcinomas.

Material and methods. The study contingent included 167 patients who applied to the Oncology Clinic of AMU with the diagnosis of bloody discharge and hyperplasia from the uterus in the pre- and post-climacteric period. The patients underwent clinical, instrumental and laboratory examinations, the materials taken before and after the operation were studied and systematized by pathomorphological and electron microscopic methods.

Results of the study. Patients with cervical cancer were between 39 and 70 years old, and most of them were in menopause and postmenopause. Ultrastructurally, in the case of highly differentiated adenocarcinomas, various structural changes depending on their localization in either epithelial cells or stromal elements have been determined: mild to moderate expansion of the endoplasmic reticulum in cells, foci-like vesiculation, nuclei having an oval-round shape, evenly located chromatin and a narrow pericular area, dense mitochondria It was manifested by the matrix, well-defined and properly located crystals, moderate expansion of the Holci complex, having vacuoles and mature granules in the peripheral part, matrix paleness in the cells of the endothelial layer of the blood capillary, numerous small and large pinocytosis vesicles in the cytoplasm. The mentioned ones are typical for the elements that have undergone the least pathological, ultrastructural changes, located in areas relatively far from the pathological focus, and the changes in these elements are within the norm or correspond to the initial stage of atypical changes. Thus, it is the process of asynchrony in cells that is initially noticeable during the electron microscopic examination of biopsies taken from the pathological center of patients with highly differentiated adenocarcinoma. Also, the main ultrastructural changes are related to mitochondria, the amount of free ribosomes in the pathological center decreases, and the amount of lysosomes and lysosome-like elements increases sharply. During his research, it was determined that the localization, histogenesis of endometrial cancer, tumor cells contain ultrastructural organ, tissue, cytospecific signs and are important for the diagnosis and differentiation of the tumor.

Keywords: Endometrial cancer, Adenocarcinoma, climacteric period

Relationship between infertility and gynecological cancer

Zeynalova Khuraman, İsmayilova Arzu, Amiraslanova Shafa

Department of I Obstetrics and Gynecology, Azerbaijan Medical University

Abstarct:

Objective: The rate of infertility is increasing day by day, both in Azerbaijan and around the world. With this systematic review, it was aimed to examine the cohort and case-control studies conducted in the last five years to determine whether there is an increasing "relationship between infertility treatment and gynecological cancers".

Method: The study was conducted by retrospectively reviewing the studies "on the effects of infertility treatments on gynecological cancers" between 2014 and 2019. While searching, the keywords "infertility treatment" and "cancer" were used for the Azerbaijan database, and "infertility care" and "cancer" for foreign databases. Among the articles found, studies with non-gynecological cancers, non-research compilation studies, and thesis studies were excluded. In the research, restrictions were made to include cohort studies and case-control studies. Thirteen sources were considered for systematic review. Among them, two studies that did not show integrity with other studies and a study that did not have a full text were eliminated, and the full texts of 10 studies were taken as sources.

Conclusion: As a result of the studies examined, slight increases were observed in hormone-dependent gynecological cancers (breast, uterus, and ovarian cancers) with assisted reproductive techniques (ART) treatments; however, it is not clear whether this increase is associated with infertility status or with ART treatments. Further studies on the risk of gynecological cancer should be conducted, and continued follow-up of those treated with ART should be encouraged.

Keywords: infertility, gynecological cancer, assisted reproductive technics

Treatment of recurrences of ovarian cancer

Gurbanova Rena,

Department of Oncology, Azerbaijan Medical University, Azerbaijan

Correspondence Email: renaqurbanova0000@gmail.com

Abstract:

The aim of the research: Developing guidelines for repeated cytoreductive surgery and second-line chemotherapy in patients with ovarian cancer recurrences.

Materials and methods: The term "recurrence" is quite conditional and implies the re-development of the disease after objective clinical remission. Our study included 144 patients with histologically confirmed recurrences of ovarian cancer that had progressed for 6 months or more. Patients were divided into 2 groups: Group I - 67 patients who received combined treatment (surgery + chemotherapy or chemotherapy + surgery), Group II - 77 patients who received only chemotherapy. Chemotherapy scheme in both groups: CP (cisplatin 100 mg/m², cyclophosphan 800 mg/m²) and CAP (cisplatin 80 mg/m², adriamycin 50 mg/m², cyclophosphan 600 mg/m²) – 41 patients. Taxol 135 mg/m² + cisplatin 75-100 mg/m², taxol 175 mg/m²; taxotere 75-100 mg/m² + cisplatin 75 mg/m² or carboplatin 400-450 mg/m² - 36 patients.

Results: 18 patients of Group I underwent repeated cytoreductive surgery with subsequent chemotherapy according to one of the schemes shown in the first stage. Treatment efficiency was 55.5%, complete regression (CR) – 22.2%. The remaining 49 patients underwent chemotherapy in the first stage followed by repeated cytoreductive surgery. In that subgroup, the efficiency of treatment was 59.2%, CR – 28.5%. The total efficiency of combined therapy was 58.2%, CR – 26.8% in 67 patients. In group II, only chemotherapy was performed. The total efficiency was 46.7%, CR – 15.6%. In 36 patients treated with taxanes, the efficiency was 52.7%, CR – 22.2%.

Conclusion: The obtained data show certain advantages of the combined treatment of the ovaries and allow for a wider application of repeated cytoreductive surgery in this category of patients.

Keywords: Ovarian Cancer, Recurrence, Chemotherapy

Molecular characterization and phylogenetic analysis of *Anopheles stephensi*

Zainab Bano^{a*}, Mubashir Husain^b, Shahid Niaz Khan^a

^aDepartment of Zoology Kohat University of Science and Technology, Kohat

^bDepartment of Microbiology, University of Science and Technology, Kohat

*Presenter/Corresponding author: ZO320212026@kust.edu.pk

Abstract:

Anopheles stephensi is an Asian malaria vector. It is reported to be primary urban malaria vector in Pakistan. Recently *Anopheles stephensi* has expanded to new geographical localities, posing a threat to the elimination of urban malaria. *An. stephensi* has three biological forms; Mysorensis, intermediate and type. Precise identification and efficient surveillance is the key to control this species. The present study is designed to identify the biological forms of *Anopheles stephensi* by genetic marker *AsteObp1* intron 1.

Adult mosquitoes were collected indoor as well as outdoor and preserved in 80% ethyl alcohol.

Mosquitoes were observed under stereomicroscope and identified by taxonomic key provided in “The fauna of British India including Ceylon and Burma by Christopher (1933) Barraud (1934). DNA of *Anopheles stephensi* was isolated and amplified by using specific *AsteObp1* primers. The PCR products were purified and sequenced by using Sanger Sequence technology. Phylogenetic analysis was performed after aligning query sequences against the sequences in GenBank using MEGA XI software.

A total of 1170 adult *Anopheles stephensi* were morphologically identified. Among which 860 were female and 310 were male. Genomic DNA of 150 specimens was amplified. Sequence analysis for *AsteObp1* intron 1 region showed the specimens collected from Kohat were identified as type and mysorensis and showed similarity with *Anopheles stephensi* from Iran. The present study helps in morphological and molecular identification of *Anopheles stephensi* which can be used for both operational and research purposes. The study endorse *AsteObp1* intron 1 as a robust genetic marker for rapid and accurate identification of *Anopheles stephensi*.

Keywords: *AsteObp1*, *Anopheles stephensi*, Asian malaria vector, urban malaria