

Book Abstract

**International Congress on Health
Sciences and Medical Technologies
2023**



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**Abstract book of ICHMST'23: International Congress
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PREFACE

International Congress on Health Sciences and Medical Technologies 2023 ICHSMT'23 held online at Tlemcen, Algeria, between 26 and 28 December 2023. It is a synergetic event attracting researchers from several nations and domains focusing on the strength of Health Sciences and Medical Technologies. It is the 7th edition following six successful editions held online 2021 and in-person: Tlemcen, Algeria (2016, 2017, 2019 and 2022) and Algiers Algeria (2018).

The congress attracted researchers from several nations and specialties as: Algeria, Germany, Iran, Switzerland, Netherland, Denmark, Malaysia, Pakistan, France, Tunisia, Morocco, Brazil, Egypt, India, Iraq, and Benin. The congress author's affiliations were from several departments such as medicine, biology, physics and chemical sciences, computer sciences, veterinary, agronomy, environment, pharmacy, dental Medicine, electronic and mechanical engineering.

The content was selected via strong criteria applied by the members of program committee. We received 47 submissions, which were reviewed by 1-3 reviewers and scanned by iThenticate software. We have accepted 30 abstracts presented in this book, the rate of acceptance was 63.83%. The submissions were categorized in three conferences:

- **ICCPH'23: International Conference on Cancer and Public Health 2023**
- **ICMT'23: International Conference on Medical Technologies 2023**
- **ICPCBS'23: International Conference on Preclinical and Basic Sciences 2023**

We are so proud to acknowledge all contributors to the establishment of this congress.

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Tlemcen, Algeria, December 2023

KEYNOTES

Mitigating Cardiac disease prevalence in sub-Saharan Africa

Could Gamification for improving health literacy and Pervasive computing based-remote health care assist?

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Abstract

Background: According to the World Health Organization (WHO), non-communicable diseases are responsible for a large proportion of deaths worldwide. African countries are bearing a large proportion of these deaths every year. Cardiac diseases are the leading causes of death alongside diabetes, cancer, and others in African countries. A previous study conducted in Benin on the distribution of the prevalence of cardiovascular diseases in Benin indicated a strong disparity in prevalence between rural and urban areas. Rural regions are most affected by the diseases. The reasons for this disparity are manifold. We found that the regional prevalence of cardiologic diseases is correlated with three main factors: (1) the effectiveness and efficiency of prevention and screening programs offered to the population, (2) the availability of medical equipment in care facilities close to home, (3) the hierarchy of the care unit in the country's health care structure. It is worth noting that people in rural areas live in remote locations and this makes their access to healthcare more difficult. Though, the study main question is: "How to mitigate the prevalence of cardiovascular diseases considering the challenges and problems of poor access to healthcare in certain areas?"

Objectives: Implementing traditional remote care (telemedicine) is challenging due to several factors related to infrastructure, technology, education, tradition, and culture.

Previous studies have shown that uptake of remote care in several African countries is low due to cultural means and low literacy rates. This study therefore aims to use the power of gamification in disease knowledge and remote care to increase people's adherence to prevention and early detection programs to reduce or mitigate the high prevalence of cardiovascular disease in the country. This aims also at mitigating the shortage of nurses in rural care units too.

Method: Our research method focuses on action research methods to plan, theorize, learn, and develop processes, frameworks, and tools to overcome issues of poor access to healthcare and drive the population to adhere to cardiovascular disease prevention and early detection programs (health behavior change) and increase their health literacy.

A mixed method was used to collect and analyze data on the gamification adoption and adherence to the different prevention and sensing programs as well as using people perception to improve the entire system for better adoption and adherence to the programs.

Study participants are sampled in rural and urban areas using the snowball method. The sample includes educated, illiterates, young, adults, and elderly people. People in rural areas with strong traditional backgrounds were enrolled.

Results: Gamification increases people's adherence to prevention and early detection programs as well as to health literacy, thus supporting lifestyle change.

The adherence to prevention and early detection programs is correlated to the adoption of gamification. Improving access to healthcare and prevention as well as sensing programs through appropriate telemedicine system and infrastructure (e.g., wearable) contribute to mitigating the disease prevalence across the country.

Keywords: Gamification in health literacy, remote care, pervasive computing, telemedicine, cardiovascular diseases, disease prevalence, early detection, prevention

IMMEDIATE IMPLEMENTATION AND DELAYED IMPLEMENTATION INTERESTS AND LIMITS

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Abstract

Background

Delayed implantation is a standard implant placement technique; it requires bone and mucosal healing before placing the implant.

This technique requires an excessive lengthening of the treatment duration. On the other hand, the immediate placement of an implant after tooth extraction theoretically makes it possible to limit bone loss and preserve aesthetics by preserving the vestibular bone table.

Our study was to compare two implant surgical techniques: immediate implantation (II) and delayed implantation (IR), in relation to the modifications and behaviors of the soft and hard tissues, in the vicinity of the implant.

It was carried out on 102 implantation sites, from December 2016 to March 2021, divided into two groups, 54 cases of delayed implantation and 48 cases of immediate implantation

Methods

In the two jaws, and including all sextants, the patients were followed for 6 months, during which tissue changes were assessed using a NABERS periodontal probe.

The clinical judgment on osseointegration is based on the “crystalline” sound heard during percussion with a metallic instrument, Radiological judgment was evaluated using radiovisiography (RVG).

Results

We did not obtain any rejection for implant in the 2 techniques. For both: osseointegration (OI) was obtained at least in the second month for all implants.

For immediate implantation (II): The loss of keratinized fibrous mucosa (KFM) was localized at the level of the mandible, it concerned sextant 4 (without significant difference $P=0.663$), much more for type 1 bones (without significant difference, $P=0.291$), however the gain was observed at the level of sextant 6, especially for type 2 bone. Mesial bone crest (MBC) and distal bone crest (DBC) gain was higher in males in (II) than in females. Mesial fibro mucosa (MFM) was greater than distal fibro mucosa (DFM) at 1 month and 6 months.

For delayed implantation: The average loss of FMK was greater compared to the average loss in the immediate implantation technique (with a significant difference, $P=0.04$).

Conclusion

It is difficult to find a consensus within the current literature as to the superior interest of the technique compared to the other but at the end of this work, we can conclude after the analysis of our results that the II is preferable to IR because it possible to reduce manipulations on the soft tissues, limit the resorption of hard tissues and the filling of the papillae more quickly after loading of the implant more than in the delayed technique, this of course if the preservation of the papillae was performed during the dental extraction, hence an atraumatic or so-called periodontal extraction.

Keywords: Immediate or delayed implantation; Keratinized fibromucosa; Crestbone; Osseointegration

ICMT'23

International Conference on Medical Technologies 2023

Towards an online classification of a breast cancer database using a linguistic summary

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Abstract:

Background: With the online computerization of medical digital data, the user finds problems to manage the medical information distributed in several departments, where taking a decision and making an online classification become difficult. In general, the online decision about the patient's state is based on the performance and speed of the online learning process. The present work aims to create an online medical classification system that allows the user to make a simple and transparent classification. This paper concerns a new method to develop an online medical classification system, using the information provided in the creation of a linguistic summary of a digital database.

Methods: Online classification involves two phases. The first one deals with online learning and the second one with online classification. The different research studies, which have been carried out in the field of online classification, were directed towards improving the learning process; they did not address the issue of volume of data which are scattered and heterogeneous.

By dint of the possibility to calculate the similarity between different linguistic summaries, it was possible to build an online medical classification system of Wisconsin Breast Cancer Database (WBCD) where the data are collected from distributed data sources. The patient's state is classified using the information obtained from our linguistic summaries of the medical Database.

The summaries of Wisconsin breast cancer databases (WBCD) (Bache & Lichman, 2013) were constructed. The breast cancer database contains medical information of 699 clinical cases related to breast cancer and classified as malignant or benignant; 458 patients (65.5%) were mild cases and 241 patients (34.5%) were malignant. Our application is divided into two phases:

The first phase is built by a linguistic summary method; it is based on the calculation of fuzzy cardinality; it processes local medical database and also medical data flows that arrive sequentially. Then, the creation of an online classification model is based on the information obtained from the linguistic summary.

Results: Therefore, one can say that our classification system is effective, easy and fast as it is based on the theory of fuzzy logic. We developed the online classification of the linguistic summaries already made, instead of classifying the numerical databases. Our online classification is fast and efficient. A classification rate of 96% was found with our system on linguistic summaries. One can notice that the classification rate of 96% obtained in this work is the same as that found in other research studies. This classification system should be operated on a larger digital database.

There is no need for the optimization phase fuzzy rule seen in other classification works with fuzzy inference system. Our system is precise and interpretable in natural language; it uses fuzzy logic.

Conclusion: Our online medical classification system is performed on a given linguistic summary which was that has been based on the calculation of fuzzy cardinality and has been improved by our first algorithm. The deduction method does not require the learning phase; it updates this linguistic summary quickly and easily.

Keywords: Online classification, Linguistic summary, Medical data

Advancements in Early Detection of Alzheimer's Disease: Deep Learning Approach

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Abstract:

Background: Alzheimer's disease (AD) affects more than 40 million people worldwide. This neurological illness causes major challenges for affected persons and their families, and its prevalence rises sharply after age 65. The two primary damage types that we found in the brains of AD patients are amyloid plaques, which are produced by an overabundance of beta-amyloid protein buildup, and neurofibrillary degeneration, which is brought on by Tau protein deformation leading to numerous cell deaths in late-stage AD.

Methods: Several imaging modalities, such as CT, MRI, and OCT-A pictures, were investigated for AD detection in our thorough literature review. AD can start up to 20 years before symptoms appear which highlights the significance of early detection. Our objective is to use MRI and other medical imaging to develop a robust decision support system for early AD detection. We used a deep learning technique with a Kaggle dataset of four classes: Very Mild Dementia, Moderate Dementia, Non-Dementia, and Mild Dementia. Using three models (DenseNet121, ResNet50, and Xception), significant progress was made through transfer learning.

Results: A detailed analysis (see Table 1) reveals that DenseNet121 performs well in every class, while ResNet50 and Xception face recognition challenges due to uneven class distribution. Overfitting, hyper-parameter adjustment, and class disparities need to be addressed for improved performance.

Table1: Model Comparison and Observations

Model	Test Accuracy	Training Accuracy	Validation Accuracy
DenseNet121	73.73%	99.37%	96.20%
ResNet50	68.65%	99.66%	91.51%
Xception	72.56%	99.71%	93.07%

Conclusion: In summary, our research highlights the importance of early AD detection, emphasizing the use of MRI and deep learning methods. To improve overall performance, ongoing efforts are being made to resolve model-related variations and problems.

Keywords: Alzheimer Disease, Deep Learning, Diagnostic Imaging, Theoretical Models, Early Detection, Transfer Learning.

Sleep Stage Classification Using Hjorth Parameters and Signal Energy: A Study on PhysioNet's CAP Database

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Abstract

Background: Sleep disorders are a common but often under-researched area in medical science. This study focuses on classifying sleep stages, a crucial aspect of understanding and diagnosing sleep disorders. Prior studies have utilized various methods for sleep stage classification, but there is a continuous need for more accurate and efficient techniques.

Methods: This study employs the K-nearest neighbors (KNN) algorithm for classifying sleep stages. Data involving six individuals were sourced from the CAP Physio Net database. Electroencephalography (EEG) data were extracted and segmented into 30-second epochs using the K&R method. Bandpass filtering was applied to refine the data. Feature extraction was conducted using wavelet transforms, focusing on Hjorth parameters and energy.

Results: The method demonstrated high accuracy, with an overall classification accuracy of 96.3%. This indicates a substantial potential for the KNN algorithm in sleep stage classification, particularly when combined with wavelet-based feature extraction.

Conclusion: The study presents a novel approach to sleep stage classification using KNN and wavelet transforms. The high accuracy rate suggests this method could be a valuable tool for diagnosing and understanding sleep disorders.

Keywords: Sleep Disorders, Sleep Stage Classification, K-Nearest Neighbors, EEG, Wavelet Transform, Hjorth Parameters.

Simulation of the Aortic Valve's Functionality

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Abstract:

Background: The heart's fluid control system heavily relies on the aortic valve, ensuring one-way blood flow during the cardiac cycle. As heart failure and stenosis, major global causes of mortality, prompt investigations into substitute heart valves, current research emphasizes valve geometry, material properties, quantitative blood flow parameter assessment, and numerical hemodynamics modeling. This study aims to address challenges in these aspects and contribute to advancements in replacement heart valve technology.

Methods: The investigation utilized the Ansys solver to simulate the functionality of the aortic valve. A transient simulation, spanning the systolic phase at 0.28 seconds, was executed. Boundary conditions included static pressure and mass flow rate at the entry point, with static pressure also applied at the outlet. The simulation employed a Newtonian fluid with specified density and viscosity properties, incorporating an adapted mathematical model to analyze turbulence resulting from blood flow through the valve.

Results: The simulation's results demonstrated that the blood flow that resulted was evenly distributed, successfully preventing the development of regions with high velocity displacement and stagnant areas with low velocity. Unexpectedly, the valve leaflets were the location with the maximum flow velocity, which was found to be quite similar to the flow parameters of an actual human valve. A vortex was created during the first stage of acceleration, flowed forward, and developed larger as it moved away from the valve leaflets. The material selected for entry determines all of this variety.

Conclusion: To sum up, numerical simulation is a crucial tool for simulating hemodynamic parameters and has a major impact on the research of blood flow via valves. For the purpose of improving our knowledge and treatment of blood-related diseases, especially stenosis, this research is essential. The study thoroughly addresses a number of topics, including background data, methodology, the findings, and insightful conclusions.

Keywords: Aortic valve, Blood flow, Hemodynamics, Velocity

Heart Disease Evaluation using Deep Learning Techniques

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Abstract:

Background: Heart disease is a health problem that affects the structure and function of the heart, and has a variety of causes. Heart disease remains the leading cause of death in the world.

Methods: In this work, we have used the Cleveland dataset. This dataset is multivariate, which refers to multivariate numerical data analysis that provides or incorporates a number of distinct mathematical or statistical variables. There are 76 attributes in this dataset, however only a subset of 14 of them is used in all published studies. These 14 attributes are: age, sex, type of chest pain, resting blood pressure, serum cholesterol, fasting blood sugar, resting electrocardiographic results, maximum heart rate reached, exercise-induced angina, oldpea–ST depression brought on by exercise compared to rest, slope of the peak exercise ST segment, number of major vessels and Thalassemia. One of the main tasks on this dataset is to predict, based on the patient's given attributes, whether or not that patient has heart disease. To predict whether or not that patient has heart disease, we have defined a Multilayer Perceptron neural network, or MLP, that learns the problem reasonably well. This is a feed-forward neural network that consists only of fully connected layers. The problem is a binary classification, and we will model it using a sigmoid activation function on the output layer. We have used the adam optimizer with learning rate equal to 0.001. The model was trained to minimize binary-entropy loss function. Each observation has thirteen input variables with the same scale and a class output value of either 0 or 1. One hidden layer of 8 units with ReLU activation function is used. To reduce over-fitting, L2 regularization method is employed with regularization parameter lambda equal to 0.001. We train the model for 100 epochs and set a batch_size equal to 10 and a validation_split equal to 0.25. The choice of model and its associated parameters can have a significant impact on the performance of the model.

Results: The results of our MLP model in terms of accuracy, precision, F-score, sensitivity, and specificity are compared to the following Machine learning algorithms: Support Vector Machine, K-Nearest Neighbors, Random Forest, Naïve Bayes, and Logistic Regression. The proposed MLP has the highest accuracy at 90.16% and the highest specificity at 89.66%. The model generally performs well across multiple metrics, showcasing a good balance between precision and sensitivity.

Conclusion: Heart disease refers to the buildup of plaque in the arteries of the heart that can lead to heart attack, heart failure, or death. Heart disease is the second leading cause of death worldwide. This paper proposed a feed-forward neural network that consists only of one hidden layer to detect heart disease on Cleveland dataset. This is a binary classification problem where the building model uses a sigmoid activation function on the output layer. Several hyper-parameters were used to create an efficient model such as L2 regularization method to reduce over-fitting, adam optimizer, and so on. A benchmarking was made in terms of accuracy, precision, F1-score, sensitivity, and specificity.

Keywords: Heart disease, Cleveland Dataset, deep learning, binary classification, and evaluation metrics

ICCPH'23

International Conference on Cancer and Public Health 2023

Delta-tocopherol inhibits angiogenesis by docking to vascular endothelial growth factor receptor-2 (VEGFR-2)

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Abstract:

Background: Cancer is a complex disease characterized by the uncontrolled multiplication and spread of abnormal cells throughout the body. Among the main characteristics of this pathology is angiogenesis, a process that induces the expression of angiogenic receptors VEGFR-2 in the blood vessels of tumors [1]. Furthermore, recent studies in animal models have demonstrated the anticancer activity of vitamin E isoforms, notably delta-tocopherols (δ -tocopherols), as well as a natural mixture of tocopherols. In this study, we conducted a molecular docking approach to investigate the inhibitory effect of delta-tocopherol on the angiogenic protein VEGFR-2 [2].

Methods: Proteins and ligands were obtained from the Protein Data Bank and PubChem databases, respectively. We conducted modeling and energy minimization for delta-tocopherol using Chem3D. The accuracy of the docking protocol was assessed through self-docking, employing the root-mean-squared-deviation (RMSD). Molecular docking was executed with the ArgusLab program and the best conformation was visualized with Discovery Studio. The drug-likeness characteristic was evaluated using Lipinski's rule.

Results: Simulation results revealed that delta-tocopherol exhibits a high affinity for VEGFR-2, with very low binding energy. The ligand interacts with a various number of amino acids through interaction bonds. We observe the presence of hydrophobic interactions of the Alkyl hydrophobic, pi hydrophobic, and Mixed pi/Alkyl hydrophobic types, indicating a strong affinity between delta-tocopherol and the VEGFR-2 protein. δ -tocopherol notably exhibits a single deviation from Lipinski's Rule of 5.

Conclusion: Our results of molecular docking analyses suggest that delta-tocopherol holds significant potential as an inhibitor for the VEGFR-2 protein. This inhibition could lead to the suppression of the FAK/PI3K/Akt signaling pathway, which is responsible for cell migration, vascular permeability, and cell survival.

Keywords: VEGFR-2, δ -tocopherol, molecular docking, inhibitor, angiogenesis

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Plasma lipids, dietary intake and predictive factors in breast cancer patients - A case control study-

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Abstract

Background: Several lifestyles factors and dietary factors play an important role in individual predisposition to the risk of cancer. The advantage is that they can be modified for primary, secondary or tertiary prevention of breast cancer (BC).

Objective: The aim of this study was to describe the epidemiology of the BC and to investigate the relationship between food quality, lifestyle and BC risk in women in western Algeria.

Methods: A case-control study was directed with BC cases and healthy control subjects to determine the relationships between food frequency, micronutrients and serum fatty acids. The latter were analyzed by gas chromatography. Data were statistically treated by multivariate analysis.

Results: Our findings showed that the factors predicting BC in the cancer cases were food frequency, nutrients profile, late menopause, BMI >25, history of BC, low economic status, low level of education, sedentary lifestyle and physical activity. A significant increase in plasma concentrations of SFAs ($26,55 \pm 2,13$ vs $31,76 \pm 1,82$ %) was noted in women with BC compared to controls, in contrast to PUFAs, which were found to be significantly reduced ($55,01 \pm 2,01$ vs $47,90 \pm 2,77$ %). This reduction was marked by a significant drop in the precursor of docosahexaenoic acid (DHA) i.e., ALA ($2,65 \pm 0,27$ vs $1,46 \pm 0,25$ %), EPA ($2,11 \pm 0,17$ vs $0,95 \pm 0,22$ %) and docosapentaenoic acid i.e., DPA ($1,26 \pm 0,19$ vs $0,50 \pm 0,55$ %). The multivariate analysis showed the significant interaction between the markers of the micronutrients, the age of the menopause and the lifestyle of BC cases.

Conclusion: Many lifestyle factors could be modified to protect against the malignancy. This study suggested that BC is associated with nutrients intake profile linked to low physical activity, the age of the menopause, the lifestyle, and the genetic predisposition are predictive factors of BC. A healthy, balanced diet plays a vital role in correcting this imbalance and reducing the associated risk.

Keywords: Plasma Fatty acids –Micronutrition- DHA - EPA - Vitamins – Physical activity- Lifestyle- Breast cancer.

Abbreviations: **BMI:** Body mass index; **SFAs:** Saturated fatty acids; **MUFAs:** Monounsaturated fatty acids; **PUFAs:** Polyunsaturated fatty acids; **ALA:** Linoleic alpha acid; **EPA:** Eicosapentaenoic acid; **DPA:** Docosa pentaenoic acid.

ARTIFICIAL NUTRITION PLACE BY ENTERAL SONDING IN THE CARE OF NUTRIED SICK: CASE OF CAC BLIDA CANCER

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Abstract:

Background: Malnutrition is a major problem in health institutions, because of its frequency and consequences and the main reason for it is disease. Enteral nutrition by probe is an indispensable alternative in the hospital environment. It allows to maintain nutritional intakes when the oral tract is not or poorly usable and access to the digestive tract is restricted. The objective of this study was the evaluation of enteral nutrition in patients with cancer pathologies admitted to the medical oncology department of CAC Blida.

Methods: The criteria for inclusion of patients are based on an assessment of the general nutritional status, based on a questionnaire at the time of consultation, weight loss, lack of appetite, anorexia, BMI, but also on biological markers of malnutrition such as albuminemia and CRP considered as an associated co-morbidity factor. This evaluation was carried out by a group of dietary nutritionists and pharmacists. The route of administration of nutritional concentrates is based on four types of probes: nasogastric or nasojejunal probes, gastrostomic probes and jejunostomy probes. The choice of the type of probe was based primarily on medical prescription, but also on the risk factors and major contraindications associated with food stomies. The nutritional concentrate used is Nutrison® concentrated 2kcal/ml, administered according to the nutritional need and the recommendations issued by the SFNEP (French Society of Clinical and Metabolic Nutrition). For the cancer patient, the total protein-energy requirements are approximately 25 to 30 kcal.kg⁻¹ per day, in perioperative; and 30 to 35 kcal.kg per day, for medical oncology. Protein requirements are 1.2 to 1.5 g.kg⁻¹ of protein per day. Follow-up patients had a total state of moderate to severe malnutrition and therefore needed nutritional care.

Results: Recommendations were made for this purpose. Nutritional follow-up of patients revealed an improvement in the overall condition of patients treated early, i.e. in moderate undernourishment, translated by improved BMI and albuminemia. We also found that early enteric feeding patients have a better prognosis than fasting patients. Complications are observed, in particular, by contributing to the obstruction of the probes, nausea, vomiting and bloating related to the composition of the nutrient concentrate.

Conclusion: Nutritional care plays a key role in all stages of oncological treatment. The choice of nutrient mixtures and the modalities of administration should be subject to validated protocols in hospital practice and be an integral part of a comprehensive approach to improving cancer therapy.

Keywords: Metabolic nutrition, medical oncology, oral tract, probes.

Identification of facultative aero-anaerobic microorganisms in the oral-dental environment of children undergoing chemotherapy.

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Abstract

Background: Children undergoing chemotherapy are at an increased risk of buccodental infections due to factors such as immunosuppression and imbalance in oral flora. The oral cavity microbiota plays a significant role in oral health and disease, and its composition can be altered in the presence of certain bacteria potentially leading to infections including facultative aero-anaerobic microorganisms.

Objective: This study aims to investigate the composition of facultative aero-anaerobic microorganisms in the oral environment of children receiving chemotherapy, excluding *streptococcus* based on a specific decision to focus on other microorganisms. With the goal of understanding potential microbial imbalances associated with weakened immune systems that may contribute to oral infections.

Methods: Buccal swabs were collected from children undergoing chemotherapy, and the samples were analyzed in the laboratory through isolation in selective media followed by purification and identification using standard microbiological methods.

Results: Fifty-six buccal samples were collected during the study. The analysis revealed the isolation of 64 bacteria, with 50 being Gram-positive, predominantly *Staphylococcus aureus*, and 14 being Gram-negative, predominantly *Enterobacter cloacae*. The results suggest a high microbial diversity in the oral cavity of children undergoing chemotherapy. However, the dominance of *Staphylococcus aureus* and *Enterobacter cloacae* may indicate their potential role in oral infections.

Conclusion: This study underscores the intricate microbial environment within the oral cavity of children undergoing chemotherapy. Further research is necessary to validate these findings and to develop effective strategies for the prevention and treatment of buccodental infections in this vulnerable population.

Keywords: Microorganisms, aero-anaerobic, buccodental, infection, children, chemotherapy.

Non-seminomatous germ cell tumors. About 05 cases and literature review

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Abstract:

Background: Testicular cancer is a disease, of young adults, and which presents about 1% of male cancers. We report a series of 5 cases of non-seminomatous germ cell tumor.

Methods: Through a retrospective cohort study, spread over a period of 5 years from January 2016 to March 2022, we report 05 cases collected at the level of the oncology department of the center for the fight against cancer (CLCC) and pathological and cytopathological anatomy laboratory of the University Hospital of Sidi Bel Abbés.

Results: The analysis of these 05 patients revealed the following results:

The annual frequency was estimated at an average of 2.33 new cases. The average age is 27.8 years (21-43 years). The most frequent clinical symptom is testicular pain, which was the first revealing sign observed in all patients. The intrascrotal mass was observed in 1 patient, i.e. 20%. Histology was carried out on the orchidectomy specimen in the five patients, which at the same time constituted a therapeutic gesture. We reported embryonic testicular carcinoma associated with mature teratoma, testicular germ cell tumor of mixed form with vitelline tumor type associated with a choriocarcinomatous contingent estimated at less than 10%, mixed non-seminomatous germ cell tumor embryonic carcinoma, vitelline tumor and immature teratoma, non-seminomatous tumor of testis combined yolk tumor component and embryonal carcinoma, and embryonal carcinoma.

All the patients benefited from a scrotal ultrasound examination, of which all the patients had a testicle of heterogeneous echostructure. Concerning our study and according to the TNM 2009 classification, T: We only use the pathological classification, after the orchidectomy. Stage T1 was found in 2 cases, and stage T2 found in 2 cases. All our patients 05 cases benefited from an inguinal orchiectomy before starting chemotherapy, including 2 cases on the left side and 3 cases on the right side.

Conclusion: According to this study and the review of the literature, we can conclude that testicular cancer continues to benefit from therapeutic progress but early diagnosis remains the guarantee element for a good prognosis.

Keywords: Testis; cancer; histopathology; non-seminomatous germ cell tumors.

Prevalence & risk factors of toxoplasma infection in pregnant women and natural therapy for Toxoplasma

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Abstract

Background: Toxoplasmosis is a parasitic infection caused by the protozoan parasite *Toxoplasma gondii*. It is a significant public health concern, particularly for pregnant women, as it can be transmitted to the fetus during pregnancy, leading to congenital diseases. The prevalence of toxoplasmosis in Algeria is currently unknown, and the treatment options for this infection have limitations in terms of their effectiveness on health.

Methods: in this study we conducted analysis of 200 blood samples from pregnant women to detect the presence of anti-*Toxoplasma gondii* antibodies and questionnaires were provided to patients to gather information on various sociodemographic characteristics. In the other part, An intraperitoneal infection of mice with dose of 15 cysts/mouse in 0.1 ml of PBS, pH 7.4, was injected. Mice in groups III and V were administered *Artemisia herba-alba* oil at a concentration of 5 ml/kg body weight/day, while group IV received treatment with Pyrimethamine + Clindamycin at doses of 25 mg/kg and 12.5 mg/kg, respectively. Groups I and II received appropriate control treatment.

Results: Our results showed that 20% of the samples were igG positive. Furthermore, our multivariate analysis indicated that toxoplasma gondii seropositivity was associated with certain factors with a P values=0.05, having cat at home (sig=0.02< P values), having a contact with soil (sig=0.01<P values). These findings has a significant association with *T. gondii* seropositivity

In other part the oil showed a good activities at a concentration of 5 mg/kg compared to the treatment with Pyrimethamine and Clindamycin which should be used with a high concentrations of 25 mg/kg and 12.5 mg/kg respectively, in the context of experimental toxoplasmosis infection in mice, there was a decrease in the parasitic load, a modulation of pro inflammatory cytokines, enhanced activation of CD4+ and CD8+ T cells, and a reduction in granuloma formation. Similar to Pyrimethamine and Clindamycin.

Conclusion: One of the major risk associated to toxoplasma gondi is cats and contact with soil. Additionally *Artemisia* oil could represent promising therapeutic approaches for the management of toxoplasmosis.

Keywords: prevalence, risk factors, toxoplasmosis, pregnant women, *Artemisia*.

Comparison between sperm DNA condensation and sperm parameters

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Abstract:

Background: Infertility affects around 15% of couples seeking a pregnancy. The man is involved in almost 60% of cases of couple infertility.

The biological exploration of male infertility is based on the study of sperm; it allows us to appreciate all the events that occur from the start of spermatogenesis to ejaculation. The spermogram and the spermocytogram remain first-line examinations; other techniques evaluating the entirety of the spermatid DNA complete them.

Methods: Our study was carried out on sperm collections from 52 infertile men, who were subjected to spermatid examination. The objective of our research is to evaluate the state of the integrity and maturity of spermatid chromatin by aniline blue staining technique, and study the link between the rate of sperm chromatin condensation and sperm parameters; the data were analyzed using the SPSS 22.0 software. Statistical tests including chi2 test, Pearson correlation were used, statistical significance was taken into account for p values <0.05.

Results: The results obtained do not show any association between the two parameters.

Conclusion: therefore the relationship between sperm chromatin condensation and human sperm morphology remains questionable and more appropriate and in-depth investigations are necessary to adequately answer this question.

Keywords: Infertility, sperm chromatin, aniline blue.

Characterization of Redox Biomarkers and Nutritional Status in the Elderly People – A case control study-

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Abstract

Background: Ageing is the product of the accumulation of a wide range of molecular and cellular damage over time. This leads to a progressive deterioration in physical and mental capacities, an increased risk of disease and, finally, death. These changes are independent of the number of years. Ageing is a major public health problem because of the pathological complications that follow.

Objective: The aim of this study is to characterise the redox balance and nutritional status of the elderly population.

Methods: Thirty five healthy young subjects (15 females and 20 males; median age, 34,41± 9,07 years) and nineteen elderly (11 females and 08 males; median age, 75,49 ± 5,86 years) were enrolled. The MNA questionnaire on dietary habits, evaluating the intake frequencies of food groups was submitted to each participant. Levels of blood free radicals especially nitric oxide, malondialdehyde and superoxide anion (NO, MDA, O₂⁻) and antioxidant profiles notably superoxide dismutase (SOD), catalase (CAT) and vitamin C were measured by spectrophotometry. The comparison of means between the controls and the elderly population is carried out using Student's t-test.

Results: Food frequency reveals a deficiency in the consumption of fruit and vegetables as well as eggs and fish, reflecting a state of malnutrition. Plasma antioxidants revealed low concentrations of vitamin C in the ageing population of both sexes, notably 57,55±5,69 vs 26,09±3,26 µmol/L ; 22,4±8,74 vs 18,16± 2,97µmol/L, (p < 0,001). The activity of SOD was significantly higher in elderly people of both sexes, i.e. 408,95±74,26 vs 515,61±61,41 U/min/ml, 309,35±63,12 vs 527,47±88,94 U/min/mL, (p < 0,001). In the contrary, the activity of CAT was significantly lower in ageing subjects, i.e. 14,69±3,55 vs 6,37 ± 0,89 U/min/mL, 16,38±2,96 vs 11,37±0,62 U/min/mL, (p < 0,001). Reactive oxygen species (ROS) profile underlined lower levels of NO in the elderly compared to controls, i.e. 5,13 ±0,61 vs 3,89±0,46 µmol/L, 5,09 ± 2,17 vs 3,96±1,34 µmol/L with p < 0,001 in female; and p < 0,05 in male. Super oxide anion showed a higher concentration in the elderly people compared to controls, i.e. 11,41± 1,7 vs 34,04±4,29 µmol/L, 4,75± 1,2 vs 30,28±8,73 µmol/L, with p < 0,001 for both sexes. Among lipid peroxidation, MDA concentrations showed high significant level in elderly men with (p < 0,01), i.e. 1,13 ± 0,34 vs 1,16 ±0,56 µmol/L, 1,21 ± 0,31 vs 1,65 ± 0,2 µmol/L

Conclusion: The results of this study indicate an evident oxidative stress in the elderly people. The high level of the free radical O₂⁻ influence the bioavailability of nitric oxide, interacting with it to form the even more aggressive peroxynitrite. The decrease in NO bioavailability with aging is also apparent in sedentary individuals. A significant lipoperoxidation appear in male subjects compared to controls. Antioxidant defense can be clearly seen in high SOD with a decrease in CAT activity marked in the elderly population. The latter is at risk of malnutrition and with the redox imbalance, modifiable factors, they can play a decisive role in aggravating or reducing the risks associated with poorly managed ageing.

Key words: Oxidative Stress – Reactive Oxygen Species - Antioxidant defense - Nutrition- Ageing - Lifestyle.

Degenerative pathology of the temporomandibular joint (About 7 cases)

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Abstract:

Background: The temporomandibular joint (TMJ) can be the site of degenerative damage like any other joint leading to a variety of morphological and functional deformities.

Methods: We accidentally discovered the degenerative damage to the TMJ following the recruitment of patients with temporomandibular dysfunction. Clinical examination revealed limited mouth opening with deviation towards the ipsilateral side associated with joint crepitus. The diagnosis of TMJ osteoarthritis (RDC/TMD criteria, Axis I, Group III) was confirmed by axiographic traces and MRI of the TMJ. (14 temporomandibular joints, 7 patients)

Results: In our study we have a female predominance (mean age $\pm$ 24.5 years). The axiographic tracing was atypical and identical for the 5 clinical cases: flat, short, the condylar slope is at 0° and the path of the stylet is reversed during the joint dynamics on the side of the damage, at the same time magnetic resonance imaging reveals: 6 cases of bilateral involvement with a plicated meniscus, one unilateral case with a perforated meniscus and a reduced joint space with flattening of the articular surfaces with the presence of osteophytes.

Conclusion: Degenerative disease has been considered as a disease whose progression is inevitable when clinical symptoms begin. The sooner treatment is started, the more effective it will be.

Keywords: temporomandibular joint, Degenerative damage, osteoarthritis, MRI, Axiography

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Study of the biological activity of two medicinal plants *Vitex agnus castus* and *Warionia saharae* from the Bechar region in southwest Algeria.

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Abstract

Introduction: The present study aims to valorize two medicinal plants (*Warionia saharae*, *Vitex agnus castus*) growing spontaneously in Béchar region, by evaluating their antioxidant, and antidiabetic effects.

Method: The freshly harvested plants are left to dry in the shade in a ventilated place for 7 to 15 days, then ground in a mortar, the powders thus obtained are then stored in hermetically closed bottles until use.

The evaluation of the antioxidant activity using the reduction of iron (FRAP) of ethanolic extracts of *Vitex agnus castus* and *Warionia saharae* showed significant antioxidant potentials. The ethanolic extract of the two plants presents a cross-inhibitory effect depending on the concentration of the extract.

Results: The maximal of antidiabetic activity of the ethanolic extract of *Vitex agnus castus* and *Warionia saharae* was about 4mg/mL. Their inhibitory potentials against α amylase and α glucosidase were 72.05% and 58.82% respectively, and 86.06% and 88.19% at 2mg/mL.

Conclusion: Finally, this valorization work made it possible to better characterize two medicinal plants from South-West Algeria (*Warionia saharae*, *Vitex agnus castus*).

Keywords: Extract, *Warionia saharae*, *Vitex agnus castus*, antioxidant activity, antidiabetic activity.

Evaluation of biofilm formation ability in different oral pathogens

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Abstract

Background: The human oral cavity harbors about 700 species of microorganisms that are present either as planktonic cells or incorporated into biofilms. Oral Biofilms are dense micro-communities that grow on surfaces of the oral cavity and encapsulate themselves with secreted polymers. Recently, increasing evidence has shown that the oral biofilm is closely related to several oral and systemic diseases such as, dental caries, gingivitis, candidiasis, diabetes, obesity, HIV and cancer. In the future, oral microbiome will become a new target for improving the physical state of humans.

Objective: In this study, we evaluated the biofilm formation ability in different oral pathogens.

Methods: The microbial strains used included fifteen *Staphylococcus* strains and ten *Candida* strains. Those are isolated from the oral cavity of Algerian subjects. The ability of biofilm formation was studied in vitro, by the 96-well microtiter plate assay and quantification of the biofilms biomass was evaluated by crystal violet method.

Results: All strains formed biofilms to different degrees, while biofilms of *Staphylococci* were strong compared to *Candida* biofilms.

Conclusion: Our study demonstrated that biomass of biofilm varied from one species to another as well as between strains of the same species.

Keywords: Oral cavity, Biofilm, *Staphylococci*, *Candida*.

Exploration of Medicinal Plants as Potential Solutions for the Treatment of Covid-19

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Abstract

Background: The Covid-19 pandemic, which has affected the entire world, has presented an unprecedented challenge for researchers and health professionals. In this context of global health crisis, therapeutic approaches including the use of medicinal plants have attracted growing interest.

Methods: Our study focused on the collection and evaluation of medicinal plants in the wilaya of Relizane as potential solutions for the treatment of Covid-19. To accomplish this, we conducted both an ethnobotanical and a cross-sectional descriptive survey among 100 patients aged 21 to 80 years old, suffering from Covid-19, using an anonymous electronic questionnaire. The data collected was analyzed using SPSS version 23 software.

Results Our results highlighted that the age group most affected was that of 30-39 years old, with a female predominance (87%). According to the results of the scanners, moderate damage (10-25%) due to Covid-19 was observed in 29% of cases. A total of 93.3% of patients used medicinal plants for curative or preventive purposes. Cloves were most commonly used, accounting for 23.5% of cases, followed by cinnamon (17.6%). In contrast, the use of Nokha (*Ammi visnaga*) was noted in only 3.9% of patients.

Among participants who used clove, 67% reported notable effectiveness, with a significant improvement in their general condition after 48 hours of treatment, as well as a disappearance of many symptoms, including fever, body aches and breathing problems. Our study also revealed a statistically significant relationship between clove use and disease progression, with a $p < 0.05$. Indeed, cloves contain 70 to 90% eugenol, an immunostimulating, antibacterial, antiseptic and antifungal compound, which is also present in many medications.

Conclusion: In light of these promising results, additional pharmacological studies on these medicinal plants are strongly recommended in order to enhance the conclusions of this investigation.

Keywords: Covid-19, Effectiveness, Ethnobotanical survey, Clove.

Influence of Agar Agar on the Final Stability of Simple Aqueous Emulsions with Vitamin C

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Abstract:

An emulsion is a biphasic system prepared by combining two immiscible liquids, with one dispersed in small droplets in the other. The thermodynamic instability of these systems makes it unstable. Until now, stability has remained a challenge when formulating emulsions. However, it is crucial to choose a Formulation technique, such as the critical HLB (hydrophilic-lipophilic balance) method, and compounds like Agar Agar, a gelling agent, to give more stability physic. The study aimed to prepare a stable aqueous emulsion using the critical HLB method and investigate the influence of adding Agar Agar.

Materials and Methods: Various formulas were developed by varying the quantity of surfactants SPAN 60® and TWEEN 80® and Agar Agar with different HLB values, using vaseline oil as lipophilic phase, and vitamin C as the active agent. Emulsions were prepared using the phase inversion technique. Preparations were checked immediately after production and after storage at room temperature. Emulsions were evaluated by macroscopic and microscopic methods, centrifugation test, emulsion type (hydrophilic or lipophilic), pH, and conductivity measurements.

Results: Our results showed that with adding Agar Agar, emulsions with HLB values of 6-6.5-7.5-8-10-10.5-11-11.5 became stable. The conductivity was constant without significant difference over a 2-month study period $p = 0,44 > 0,05$. Values conductivity is correlated to the proportion of Agar Agar ($R^2 > 0,65$) and to HLB value ($R^2 = 0,91$), the pH emulsion's was poorly correlated to proportion agar agar and HLB values ($R^2 < 0,45$). However, addition of agar agar has increase the pH values with signification $p = 0 < 0,05$.

Conclusion: Agar Agar has increased the emulsions stability physics, influenced conductivity and pH.

Keywords: Vitamin C, agar agar, critical HLB, SPAN 60®, TWEEN 80®

Variations in Polyphenol and Flavonoids Content Depending Date Fruits Cultivars and Extraction Methods

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Abstract:

Background: Date fruits are known for their rich nutritional profile, including a wide range of bioactive compounds, such as polyphenols and flavonoids, which contribute to their potential health benefits. The aim of this study was to investigate and compare the total polyphenol and flavonoid content of three date cultivars (Deglet Nour, Ghars and Mech Degla) using two different extraction methods; cold infusion to approximate the real direct consumption of dates and decoction for date derivatives, and to assess the impact of these factors on the nutritional quality of date fruits.

Methods: For this study, fresh date fruits from three cultivars (Deglet Nour, Ghars and Mech Degla) were collected from Tolga, Biskra and prepared. In terms of extraction, the ratio of 1/10 was used. For cold infusion, dates were mixed and soaked in distilled water for 24 h at 4 °C. For decoction, dates were mixed with distilled water and boiled for 20 min. Total polyphenol content was determined using the Folin-Ciocalteu assay, and total flavonoid content was assessed using the aluminum chloride colorimetric method.

Results: The results of this study revealed no significant variation for the yield of extraction in both cultivars (Deglet Nour $57,3 \pm 2,475$ %, Ghars $59,75 \pm 9,899$ % and Mech Degla $62,275 \pm 23,087$ %) and extraction method used (cold infusion $51,417 \pm 4,937$ % and decoction $68,133 \pm 9,848$ %) using Kruskal-Wallis test and T-test respectively $p = 1 > 0,05$ and $p = 0,340 > 0,05$.

For total polyphenol content, a significant variation between the used extraction method was detected using Mann-Whitney U test ($p = 0 < 0,05$), where decoction gave the greatest total polyphenol quantity $336,019 \pm 49,170$ µg GAE/mg extract compared to cold infusion $131,868 \pm 31,483$ µg GAE/mg extract. However, the total polyphenol content was not effected by dates cultivars (Deglet Nour $253,663 \pm 120,891$ µg GAE/mg extract, Ghars $202,563 \pm 122,351$ µg GAE/mg extract and Mech Degla $245,603 \pm 107,556$ µg GAE/mg extract) using Kruskal-Wallis test ($p = 0,519 > 0,05$). Also, total flavonoids content was not influenced by both the used extraction methods (cold infusion with $0,099 \pm 0,011$ µg QE/mg extract and decoction $0,155 \pm 0,134$ µg QE/mg extract) and the studied dates cultivars (Deglet Nour $0,087 \pm 0,0293$ µg QE/mg extract, Ghars $0,212 \pm 0,134$ µg QE/mg extract and Mech Degla $0,083 \pm 0,014$ µg QE/mg extract) using Mann-Whitney U test ($p = 0,258 > 0,05$) and Kruskal-Wallis test ($p = 0,241 > 0,05$) respectively.

Conclusion: the total polyphenol content of date fruits was influenced by the used extraction method, in which decoction gave the highest quantity. This result has implications for the consumption of dates as derivatives cooked until they boil that may offer more total phenolic quantity than direct consumption of dates for the consumer. Nevertheless, the consumption of Deglet Nour, Ghars or Mech Degla in direct way or as derivative may give the same total flavonoid quantity.

Keywords: date fruits, polyphenols, flavonoids, cold infusion, decoction

Astaxanthin's Protective Effects in Hepatocellular Carcinoma: Exploring Molecular Mechanisms Using In Silico Approaches

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Abstract:

Background: Astaxanthin, a potent natural carotenoid, exhibited potent anti-carcinogenic progression of certain types of cellular carcinoma, making it a promising candidate for adjunctive therapeutic strategies. The objective of this study was to clarify the molecular mechanisms behind the effects of Astaxanthin on hepatocellular carcinoma.

Methods: Using computational methods, the Comparative Toxicogenomics Database, GeneMania, Metascape, Mienturnet platforms, and Cytoscape software were applied at different stages to understand the protective effects investigated in this study.

Results: The data showed that the following genes may be modulated by Astaxanthin to produce anti-hepatocellular carcinoma effects: AKT1, CAT, CRP, CXCL8, CYP1A1, IDH1, IL6, NFE2L2, PGD, PRDX1, PTEN, PTGS2, SOD1, TGFB1, TLR4, TNF, and TP53. According to genomic network analysis, the majority of the found interactions were attributed to co-expression and physical interactions (45.42% and 29.67%, respectively). The mechanisms related to the studied protective effect of Astaxanthin included different pathways such as the "Selenium micronutrient network", "Cellular response to stress", "Response to oxidative stress", "Regulation of apoptotic signaling pathway", and "Response to tumor necrosis factor". Astaxanthin also showed significant binding affinity with important studied genes. Moreover, 94 microRNAs associated to hepatocellular carcinoma and targeted by Astaxanthin were identified; the most highly expressed and interacted were hsa-miR-155-5p, hsa-miR-146a-5p, and hsa-miR-106a-5p. The main transcription factors associated with targeted genes were NFKB1, PPARD, NFKB2, MTF1, and CSRNP1. Astaxanthin's physicochemical and pharmacokinetic properties showed minimal gastrointestinal absorption with the inability to cross the blood-brain barrier. It has also been found that capsaicin inhibits CYP2D6.

Conclusion: According to these results, Astaxanthin appeared to be an appropriate candidate for preventing hepatocellular carcinoma, requiring experimental pharmacological research to confirm its properties.

Keywords : Astaxanthin, Hepatocellular Carcinoma, genes interactions, microRNAs

Molecular Docking Studies Of Glycyrrhizic Acid (Ga) And Glycyrrhetic Acid (Ge) From Glycyrrhiza Glabra As Potentiel Inhibitor Of Cyclooxygenase-2 (Cox-2), 5-Lipoxygenase(5-Lox) And Microsomal Prostaglandin E Synthase-1(Pges-1) For The Treatment Of Dysmenorrhea Disorders

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Abstract

Background: *Glycyrrhiza glabra* is a well-known medicinal plant with valuable secondary metabolites and pharmacological properties.

Glycyrrhiza glabra contains many bioactive components like Glycyrrhizic acid, a triterpenoid saponin extracted from the root of *Glycyrrhiza glabra* , along with its aglycone glycyrrhetic acid, are known in the literature for their wide range of pharmacological properties including anti-inflammatory, hepatocarcinogenesis, antiviral, and interferon-inducing activities.

Methods: The 3D structures of both compounds were docked into the active site of the different enzymes using autodock software. All the protein-ligand complexes were critically analysed based on energy and KI. The non-covalent interaction was evaluated and compared using Chimaera-X software.

Result Analysis:

Docking calculations of glycyrrhetic acid against various proteins showed a binding energy of -8.73 kcal/mol for COX-2 and -9.71 kcal/mol for 5-LOX and -8.07 kcal/mol for PGES-1.

On the other side, glycyrrhizic acid was also investigated and docked into different targets. The best orientation, shows binding energy of -6.28 kcal/mol for COX-2 and -4.96 kcal/mol for 5-LOX and -5.80 kcal/mol for PGES-1, different complexes enzyme-ligands was selected for further analysis. Finally, on the basis of binding energy and interaction of ligands with proteins, it is evident that glycyrrhetic acid (1) has more potent anti-inflammatory properties than glycyrrhizic acid (2) for the treatment of dysmenorrhea disorders.

Conclusions: we conclude that glycyrrhetic acid shows more potential against all the targets and expresses the best inhibition potential against protein 5-lipoxygenase.

Key Words: Glycyrrhizic acid, Glycyrrhetic acid, COX-2, 5-LOX, PGES-1, Molecular Docking

Assessing the Fitness Cost of Antibiotic-Resistant *Staphylococcus aureus* Isolates: A Comprehensive Review

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Abstract

Background: *Staphylococcus aureus* has demonstrated a concerning capacity for developing resistance to last-resort antibiotics. While many antibiotic resistance mechanisms entail a fitness cost, often manifested as a reduced bacterial growth rate, this systematic review focuses on the fitness costs associated with antibiotic resistance in *S. aureus* resulting from mutations.

Methods: A comprehensive search was conducted in PubMed and Scopus using specific keywords. Only peer-reviewed articles in English were included. Studies detailing the fitness costs associated with antibiotic resistance targeting protein synthesis in *S. aureus* were selected. Each article's findings on fitness testing, minimum inhibitory concentrations (MICs) of mutants, mutation positions, and the occurrence of compensatory mutations were systematically recorded.

Results: A total of 35 articles were included in the final analysis, examining the fitness costs associated with antibiotic resistance targeting protein synthesis in *S. aureus* arising from mutations. Data analysis revealed that in 26 studies, the emergence of antibiotic resistance was frequently accompanied by a discernible fitness cost.

Conclusion: This review highlights that the selection pressure exerted by antibiotic resistance often results in a substantial fitness cost in *S. aureus*. Further in vivo experiments indicated that these mutations not only impacted bacterial virulence but also influenced the ability to establish a successful infection.

Keywords: *Staphylococcus aureus*; antibiotics resistance; mutation; Fitness cost; compensatory mutations

Acknowledgment: We would thank «Direction Générale de la Recherche Scientifique et du développement technologique (DGRSDT)» of the Algerian Ministry of Higher Education and Scientific Research.

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Anti-hemolytic effect of the Ethyl acetate extract of *Peganum harmala* seeds

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Abstract:

Background: *Peganum harmala* seeds have been used traditionally in medicine. This plant has potent antioxidant properties, especially because of their alkaloids. These substances appear to be effective in protecting and delaying the deterioration of red blood cells.

Methods: Our study aims to evaluate the anti-hemolytic effect against AAPH-induced hemolysis of ethyl acetate extract of *Peganum harmala* seeds (aqueous extract fraction) on human red blood cells. β -Carotene Bleaching assay was then performed (1), and an AAPH-induced hemolysis test were used to evaluate the extract (2).

Results: The results showed that the extract was effective in β -Carotene Bleaching assay, with an IC50 value of 218 μ g/mL. Additionally, the extract demonstrated IC50 value of 40 μ g/mL against AAPH-induced hemolysis.

Conclusion: As a conclusion alkaloids could be related to the observed antioxidant activity and protecting red blood cells membrane from degradation by scavenging free radicals. Further studies are required for identification of the potent compound which could be natural source against oxidative stress.

Keywords: *Peganum harmala*, β -Carotene Bleaching, Antioxidant, Hemolysis.

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Discovery of novel approved drugs inhibitors of TMPRSS2 for COVID-19 treatment: an in silico approach

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Abstract:

Background: The rapid outbreak of SARS-Coronavirus 2 (SARS-CoV-2) caused a serious global public health threat. The transmembrane serine protease 2 (TMPRSS2) has been established as one of the host proteins that facilitate entry of SARS-CoV-2 into host cells [1], therefore, direct TMPRSS2 inhibition will inhibit virus activation and disease progression [2]. The present study aimed to investigate the binding of this protease with some guanidine derivatives approved drugs.

Methods: In this study, 18 approved drugs, containing the guanidine group were docked against TMPRSS2's ectodomain (7MEQ) using the SwissDock. The top scoring complexes were used as initial structures for the molecular dynamics simulation (100ns) to assess the stability and dynamics of the interactions between the best interacting drugs and the TMPRSS2 target.

Results: Among the studied drugs, Famotidine and Argatroban, strongly binds with TMPRSS2 S1 pocket with estimated full fitness energies of -1847.12 and -1630.87 kcal/mol, respectively. A significant number of non-covalent interactions such as hydrogen bonding, hydrophobic and electrostatic interactions were detected in protein-ligand complexes. Analyses of the trajectory dynamics collectively established further that Famotidine and Argatroban bound and interacted stably with the critical residues of TMPRSS2 active site.

Conclusion: The results obtained herein highlight the enhanced stability and good binding affinities of the Argatroban and Famotidine towards the protease TMPRSS2. These approved drugs might be used either as COVID-19 therapeutics or as starting points to develop novel anti-SARS-CoV-2 drugs.

Keywords: SARS-CoV-2, TMPRSS2, Approved drugs, Molecular docking, Molecular dynamics.

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Phytochemical and Antioxidant Activities of Olive Mill Wastewater in N-West-Algeria

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Abstract

Purposes: Natural polyphenol extracts have been usually associated with great bioactive properties. The exploitation of olive mill waste water (OMWW), an olive oil processing by product, is becoming an important aspect of sustainable development olive oil industry. In this study, we investigated in vitro antioxidant activities of the phenolic OMWW extracts.

Methods: OMWW was obtained from olive mill press in Tlemcen region (N-West-Algeria) and stored during the experimental period at 4°C until use within few days. The analysis was carried out by liquid-liquid extractions by organic solvents using three testing systems: the total antioxidant capacity, the trapping of the DPPH radical and iron reduction.

Results: Quantitative analysis of the phenolic compounds showed that the extract OMWW had a high content of phenolics namely: polyphenols (226.93 ± 58.06 mg EAG/g DM), condensed tannins (635.32 ± 87.15 mg EC/g DM), hydrolysable tannins (630.23 ± 104.6 mg EAG/g DM), total tannins (0.57 ± 0.07 g/l) and flavonols (674.74 ± 79.09 mg EQ/g DM) respectively. The total antioxidant capacity of ethyl acetate recorded by the values 232.65 ± 157.82 mg EAG/ g DM was found to be higher compared to those of n-butanol (145.33 ± 107.39 mg EAG/ g DM) and methanol (98.29 ± 40.04 mg EAG/g DM). The antioxidant power of these extracts is lower than that of gallic acid (975 mg EAG/ g DM). The extracts of ethyl acetate, n-butanol and methanol highlighting an inhibition percentage of $91.47 \pm 75.56\%$, $90.12 \pm 83.49\%$ and $94.03 \pm 86.21\%$ respectively, reveal values close to those of ascorbic acid (94.06%). This indicates a high power of trapping the DPPH radical by the extract. Concerning the reducing power of extracts, the iron reduction efficiency is inversely proportional to the EC50 value, the lowest EC50 concentrations were noted for ascorbic acid and in the ethyl acetate and n-butanol fractions at 0.068 mg/ml, 1.32 ± 0.68 mg/ml and 1.43 ± 0.46 mg/ml respectively.

Conclusion: The high antioxidant, radical scavenging activities and phenolic content of the OMWW extract suggest potential applications in the food and pharmaceutical industries and may be used as alternatives in the search for natural replacement of synthetic antioxidant food additives.

Key words: OMWW - pollution - phenolic compounds - Antioxidant activities –DPPH - EC50

Search for new topoisomerase II inhibitor anticancer drugs by virtual screening of natural products based on docking, 3DQ SAR and pharmacophores

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Abstract

Background:

Through molecular modeling, particularly with virtual screening, the drug discovery process becomes economical in terms of time and money. The objective of this work is to search for competitive inhibitors of topoisomerase II, an enzyme overexpressed in cancer cells, by parallel virtual screening.

Methods: The chemical library screened is the Ambinter natural product database and some chemical libraries taken from the Zinc15 database. We associated docking in the “PDB 1ZXM” protein structure of the topoisomérase II ATPase site by Molegro Virtual Docker6.0 software with screening based on pharmacophores and 3D QSAR by Discovery Studio V.2.5.5. The physicochemical, pharmacokinetic and toxicological properties of the candidates selected by the pharmacophores and having presented a good predicted IC₅₀, a good score and good interactions, were predicted in silico.

Results: Hydrophobic groups, aromatic rings and hydrogen bond acceptors are the main chemical characteristics of the pharmacophores selected by the 3DQSAR equations constructed and statistically validated. The interpretation of the docking results was made with reference to the natural substrate and in relation to the leads described. We based on the score and the interactions with key amino acids and magnesium, essential for competitive inhibition. Hits accessible to synthesis, bioavailable orally, non-carcinogenic in mice and rats, not showing cardiac toxicity and presenting good in silico pharmacokinetic characteristics, were selected for subsequent experimental studies.

Conclusion: MD simulations should be applied following initial screening studies because they give a more precise description of the mechanisms and thus provide more reliable and comparable approximations with in vitro experimental results.

Keywords: topoisomerase II, cancer, docking, natural products, pharmacophores, 3DQSAR

Docking-based virtual screening for Glucokinase and Dihydroorotate dehydrogenase inhibitors in *Trypanosoma cruzi*

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Abstract

Background: Chagas disease, caused by *Trypanosoma cruzi*, currently represents one of the greatest therapeutic challenges in tropical medicine, due to the complexity of the parasite's life cycle. Several problems are associated with the use of natural product chemical libraries, so the objective of this work is first to obtain a fully prepared and optimized natural product chemical library. Then, search for new potential inhibitors of two biological targets involved in Chagas disease by virtual screening based on docking.

Methods: AnalytiCon Discovery is a base of 45536 natural products. The FAF Drugs4 server was used in its processing. The PdbViewer software was used for the preparation of protein structures downloaded from the PDB bank and finally the Molegro Virtual Docker (MVD) was the docking software used. "Data cleaning" and "Data filtering" based on ADME physicochemical criteria, elimination of covalent inhibitors (warheads), PAINS and undesirable substructures, were carried out. A virtual screening by molecular docking of the prepared and optimized base was launched after validating the MVD software with the selected protein structures Glucokinase (TcGlcK) and Dihydroorotate dehydrogenase (TcDHODH) from *Trypanosoma cruzi*.

Results: Out of 20285 compounds prepared from the AnalytiCon Discovery database, 9000 were used for docking screening, and after Hit picking by analysis of docking scores and interactions, 12 TcDHODH inhibitors "Hit" compounds and 16 hits for TcGlcK were selected for experimental studies.

Conclusion: The AnalytiCon, prepared and used, was exploited in virtual screening by molecular docking, for the search for new potential inhibitors of glucokinase and dihydroorotate dehydrogenase of *Trypanosoma cruzi* involved in the Chagas disease. We further recommend that after virtual screening, researchers should perform experimental assays to validate the identified compounds and their interactions with the target protein.

Keywords: natural products, AnalytiCon Discovery, virtual screening, docking, trypanosomiasis, hit

Assessing the Role of PCSK9 as a Diagnostic Biomarker for Inflammation in Type 2 Diabetes: Insights and Implications

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Abstract:

Background: Proprotein convertase subtilisin/kexin type 9 (PCSK9) plays a crucial role in regulating cholesterol metabolism by targeting the low-density lipoprotein receptor. Recent studies have unveiled a connection between circulating PCSK9 and key factors such as glucose homeostasis, insulin resistance, and inflammation. This study aims to evaluate the potential of PCSK9 as a diagnostic biomarker for inflammation in individuals with type 2 diabetes (T2D).

Method: A total of 595 volunteers, including 313 with T2D, participated in the study. Anthropometric data were gathered, and serum levels of various biochemical markers related to cardiovascular and inflammatory processes, including PCSK9, lipid profile, insulin, adiponectin, and TNF α , were measured. Results are presented as Mean $\pm$ Standard Error of the Mean (SEM). Student t-test was used for matched data and the Spearman correlation test to assess associations between variables. Significance was considered at $p < 0.05$.

Results: Findings revealed a high prevalence of abdominal obesity (34.39% vs. 64.15%, $p < 0.001$) and elevated blood pressure (24% vs. 56.65%, $p < 0.001$) among T2D patients. Circulating PCSK9 levels were significantly higher in non-diabetic participants (63.24 ± 44.86 ng/mL vs. 42.92 ± 0.27 ng/mL, $p < 0.001$). Conversely, T2D patients exhibited significantly elevated serum concentrations of total cholesterol (1.35 ± 0.48 g/L vs. 1.59 ± 2.31 g/L, $p < 0.001$), LDL cholesterol (0.79 ± 0.49 g/L vs. 0.86 ± 0.40 g/L, $p < 0.02$), triglycerides (0.88 ± 0.52 g/L vs. 1.03 ± 0.02 g/L, $p < 0.001$), and total proteins (62.79 ± 14.43 g/dL vs. 70.9 ± 0.02 g/dL, $p < 0.001$). In T2D patients, serum PCSK9 levels showed significant correlations with LDL cholesterol ($r = 0.238$, $p < 0.001$), TNF α ($r = -0.384$, $p < 0.05$), and insulin resistance ($r = 0.171$, $p < 0.01$).

Conclusion: Variation in serum PCSK9 levels and its associations with inflammatory cytokines in T2D suggest its potential as a biomarker for the diagnosis, treatment, and monitoring of inflammation in T2D.

Keywords: Keywords: PCSK9, Type 2 Diabetes, Inflammation, Biomarker, Metabolic Syndrome

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