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CONCLUSION: The Laser Direct Infrared Imaging (LDIR) technique effectively detected microplastics in fish samples. These preliminary observations demonstrate LDIR's capability to accurately identify and characterize microplastics with spatial resolution. Nonetheless, further research with larger sample sizes and rigorous statistical analysis is necessary to validate these findings and draw definitive conclusions.

KEYWORDS: Edible Fish Tissues, Laser Direct Infrared Imaging, Microplastic

EP_132

LINKING STRESS TO SLEEP QUALITY AMONG UNDERGRADUATES: A CROSS-SECTIONAL STUDY

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INTRODUCTION: The growing prevalence of stress among medical students has become a major concern, as it not only elevates the risk of depression but also contributes to sleep disturbances that impair sleep quality.

OBJECTIVE: This research explored the relationship between stress levels and sleep quality among medical students in University of Cyberjaya.

MATERIALS & METHODS: Data were collected using validated questionnaires: Depression, Anxiety and Stress Scale-21 (DASS-21), Pittsburgh Sleep Quality Index (PSQI), and a self-reported sociodemographic inventory. A total of 400 medical students from the University of Cyberjaya participated in the study, selected through systematic random sampling and stratified sampling methods. Data analysis was conducted using descriptive statistics, logistic regression, chi-square tests, and one-way ANOVA, with statistical significance set at $p < 0.05$.

RESULTS: Results indicated that the prevalence of stress and poor sleep quality among medical students at the University of Cyberjaya was 34.8% and 66.4% respectively. A significant association was found between stress and sleep quality (χ^2 test, OR = 1.14, 95% CI: 0.85–1.83; $p < 0.001$). Within sociodemographic variables, age and ethnicity were the only factors significantly associated with stress ($p = 0.03$).

CONCLUSION: This study demonstrates a strong association between stress and poor sleep quality among medical students, highlighting the urgent need for institutional support and preventive measures. Further research and targeted interventions to reduce stress are necessary to support the mental well-being and academic success of medical students.

KEYWORDS: Stress, Sleep Quality, Sleep Disturbances,

Medical Students, Depression.

EP_133

PRELIMINARY STUDY OF AMBIENT RADIOACTIVE PARTICLES IN GEBENG INDUSTRIAL ESTATE VICINITY

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INTRODUCTION: The growing demand for rare earth elements (REEs) has led to an increase in the production of materials that generate radioactive waste as a byproduct, raising the risk of radiation exposure to nearby residents through environmental release. In Malaysia, residents near Gebeng Industrial Estate (GIE) may face such concerns due to the presence of REE processing facilities in the area.

OBJECTIVE(S): This study aimed to assess radioactive particle levels near the GIE and in comparative areas, as well as to analyse cellular turnover in residents of the GIE's vicinity.

MATERIALS & METHODS: This cross-sectional study involved environmental sampling at two different areas: exposed areas within 5 km of the GIE (16 sites) and comparative areas approximately 20 km away (16 sites). Ambient radioactive particle levels were measured at each site using a Tracerco Personal Electronic Dosimeter over 30 minutes, between 0900 and 1500, and analysed using Dose Vision software. Demographic data was obtained through a self-administered questionnaire. Buccal cells collected from participants in the exposed areas underwent a micronucleus (MN) assay and were stained with hematoxylin and eosin. Micronuclei were identified through microscopic examination. Data were analysed using SPSS.

RESULTS: Ambient radioactive particle levels in the exposed areas ranged from $2.7 \times 10^{-4} \mu\text{Sv}$ to $8.9 \times 10^{-4} \mu\text{Sv}$, while higher levels were recorded in the comparative areas, ranging from $1.1 \times 10^{-3} \mu\text{Sv}$ to $2.3 \times 10^{-3} \mu\text{Sv}$. All the recorded levels were well below the permissible radiation exposure limit. The ambient temperature in both areas ranged from 22.2 to 22.3°C, with humidity levels between 63.4% and 63.5%. Micronuclei counts in buccal cells ranged from 2 to 45, which may indicate cellular damage in the analysed samples. A non-significant positive correlation was observed between ambient radioactive particle levels in the exposed areas and the total micronuclei frequency (p -value = 0.779; $R^2 = 0.01$; Pearson Correlation test).

CONCLUSION: This preliminary study provides baseline data on ambient radioactive particle levels in the vicinity of the industrial estate. Elevated levels in comparative areas may be influenced by factors such as demographics, construction, and transportation. The presence of micronuclei in biological

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samples suggests a possible link between radiation exposure and adverse health outcomes.

KEYWORDS: Radiation; Radioactive Particles; Rare-earth Element; Cellular Damage

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PREDICTING ANAEMIA RISK IN MALAYSIAN WOMEN: A COMPARISON OF LOGISTIC REGRESSION AND TREE-BASED MACHINE LEARNING MODELS USING NATIONAL HEALTH AND MORBIDITY SURVEY (NHMS) 2019

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INTRODUCTION: Anaemia is a common health issue affecting many women, particularly those of reproductive age. Early identification of individuals at risk through predictive modelling can enhance prevention strategies.

OBJECTIVE(S): This study aimed to assess the prevalence of anaemia and compare the performance of logistic regression and two machine learning models (Random Forest and XGBoost) in predicting anaemia risk. It also aimed to develop a predictive model using decision tree-based machine learning techniques with data from NHMS 2019.

MATERIALS & METHODS: A cross-sectional analysis was conducted using data from 8,492 female respondents with complete information on anaemia status and relevant variables. Six variables were included in all models: age, body mass index (BMI), diabetes, cholesterol, pregnancy status and fruit intake. Analyses were conducted using the same set of variables across both machine learning models and the logistic regression model. Machine learning models were trained and tested using a 70/30 train-test split. Model performance was evaluated using accuracy, sensitivity, specificity and the Area Under the Receiver Operating Characteristic Curve (AUC).

RESULTS: Anaemia prevalence was 23% with key predictors including increasing age, low BMI, diabetes and high cholesterol. Random Forest achieved 78.9% accuracy and an AUC of 0.864, while XGBoost achieved 80.2% accuracy and an AUC of 0.846. Random Forest offered better sensitivity (93.5%) and overall model balance. Logistic regression showed similar predictors as statistically significant ($p < 0.05$), while pregnancy and fruit intake showed borderline significance. Consistency across models reinforces the robustness of these findings.

CONCLUSION: Machine learning models, particularly Random Forest, demonstrate strong potential for identifying anaemia risk and support the use of hybrid approaches to improve women's health interventions.

KEYWORDS: Anaemia, Machine Learning, NHMS 2019, Women's Health, Logistic Regression

EP_135

SOCIODEMOGRAPHIC AND CLINICAL DETERMINANTS OF AI PERFORMANCE IN PULMONARY TUBERCULOSIS DETECTION: A MULTIVARIATE ANALYSIS

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INTRODUCTION: Artificial Intelligence (AI) tools, such as Qure.AI and Putralytica, offer rapid and automated chest X-ray (CXR) interpretations, which are valuable in TB-endemic areas. However, limited data exist on how patient-level factors influence these tools' classification behaviour.

OBJECTIVE: To examine how sociodemographic and clinical characteristics influence the PTB classification by two AI-based tools, Qure.AI and Putralytica.

MATERIALS & METHODS: This retrospective study analysed 1308 CXRs classified as Pulmonary Tuberculosis (PTB), Normal, and Abnormal non-PTB. CXRs, patient demographics, and clinical history were retrieved from the Institute for Clinical Research. The dependent variable was each AI tool's classification of CXR as PTB versus non-PTB. Multiple logistic regression identified predictors of PTB classification, including age, gender, ethnicity, comorbidities, TB-related symptoms, and smoking status. Adjusted odds ratios (aORs) were computed to determine the associated factors, independent of ground-truth diagnosis.

RESULTS: Qure.AI's performance in PTB classification was significantly reduced among patients aged ≥ 60 years (aOR = 0.64; 95% CI: 0.48-0.86, $p = 0.002$), TB-related symptoms (aOR = 0.68; 95% CI: 0.51-0.93, $p = 0.014$), and comorbidity: patients with ≥ 1 comorbidity (aOR = 0.18; 95% CI: 0.12-0.26, $p < 0.001$). In contrast, smokers had higher PTB classification odds than non-smokers (aOR = 2.03; 95% CI: 1.39-2.96, $p < 0.001$). Similar predictors were significant for Putralytica, with reduced performance in older age ≥ 60 years (aOR = 0.45; 95% CI: 0.35-0.58, $p < 0.001$), and comorbidity (aOR = 0.64; 95% CI: 0.50-0.82, $p < 0.001$). Male patients had higher odds of PTB classification than females (aOR = 1.36; 95% CI: 1.06-1.76, $p = 0.017$). Smoking status was associated with increased odds (aOR = 1.39; 95% CI: 1.03-1.87, $p = 0.031$).

CONCLUSION: Provided the study cohort is representative and free from significant selection bias, these findings demonstrate that age, comorbidity, smoking, and gender influence the classification behaviour of selected AI tools. This analysis offers a crucial evaluation of model fairness, which is distinct from diagnostic accuracy. Findings underscore the need for algorithm auditing and subgroup performance monitoring to ensure equitable deployment of AI tools in TB screening.

KEYWORDS: Pulmonary Tuberculosis, Artificial Intelligence, Sociodemographic, Clinical Determinants

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