BUMLS RESEARCH BULLETIN

Vol. 1 Issue 1

BABCOCK UNIVERSITY MEDICAL LABORATORY SCIENCE (BUMLS) RESEARCH BULLETIN

RESEARCH AREAS

- HAEMATOLOGY & BLOOD TRANSFUSION SCIENCE
- HISTOPATHOLOGY & CYTOLOGY
- CHEMICAL PATHOLOGY
- MEDICAL MICROBIOLOGY & PARASITOLOGY

Department of Medical Laboratory Science

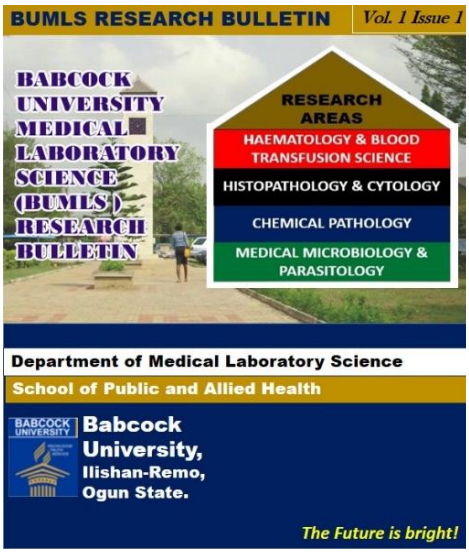
School of Public and Allied Health

Babcock University,
Ilishan-Remo,
Ogun State.

The Future is bright!

BABCOCK UNIVERITY MEDICAL LABORATORY SCIENCE (BUMLS) RESEARCH BULLETIN

ABOUT THE BULLETIN



Purpose

The quarterly **Babcock University Medical Laboratory Science (BU MLS) Research Bulletin** is dedicated to the dissemination of cutting-edge research, innovations, and reviews across various disciplines within medical laboratory science. This publication serves as a platform for sharing original research findings, review articles, and updates on advancements in diagnostic and analytical techniques, aiming to foster academic and professional growth among faculty, students, and the medical community.

Vision

To be a leading source of knowledge and innovation in Medical Laboratory Science, advancing scientific discovery and enhancing healthcare practices through rigorous research and scholarly excellence.

Mission

The quarterly Research Bulletin is committed to promoting high-quality research and insightful reviews in Medical Laboratory Science, contributing to evidence-based practices and the continuous improvement of healthcare. Our mission is to inspire learning, support professional development, and encourage collaboration across the fields of hematology, chemical pathology, histopathology, medical microbiology, and parasitology.

Objectives

1. Promote High-Quality Research

Encourage and showcase rigorous, peer-reviewed research by students and professionals, focusing on advancements in medical laboratory science to elevate the standards of scientific inquirywithin the department.

2. Facilitate knowledge Sharing and Innovation

Provide a platform for sharing innovative research findings and methodologies in areas such as hematology, chemical pathology, histopathology, microbiology, and parasitology to enhance learning and professional development.

3. Support collaboration across disciplines

Foster interdisciplinary collaboration by publishing research that connects medical laboratory science with related fields, thereby broadening the scope and impact of departmental research initiatives.

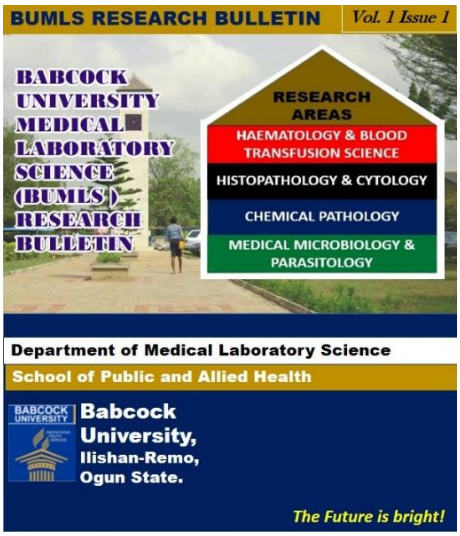
4. Enhance research skills among students and staff

Build research competencies by publishing articles on research methodology, study design, data analysis, and ethics, helping students and professionals to refine their skills and engage in high-quality research practices.

5. Drive evidence-based practice in laboratory medicine

Encourage the application of research findings to clinical practice, supporting evidence-based approaches that can improve diagnostic accuracy, treatment outcomes, and overall patient-care in medical laboratory settings.

SCOPE OF THE BULLETIN



The quarterly Research Bulletin covers a broad range of topics within Medical Laboratory Science, including but not limited to:

1. Hematology & Blood Transfusion Science

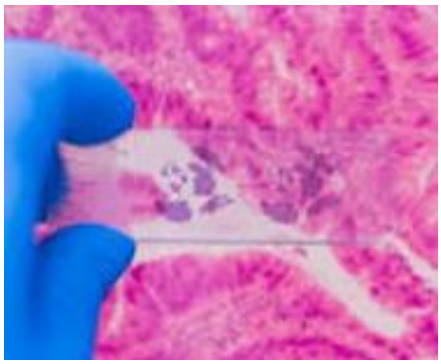
Research and reviews on hematological diseases, blood disorders, coagulation studies, advancements in hematological diagnostics, and emerging therapies.

2. Chemical Pathology

Studies on metabolic and endocrine disorders, biomarkers, toxicology, clinical biochemistry, and the development of diagnostic assays and techniques.

3. Histopathology & Cytology

Insights into tissue-based pathology, disease mechanisms at the microscopic level, innovations in staining techniques, and histological diagnostics.



4. Medical Microbiology

Research in bacterial, viral, fungal, and parasitic infections, antimicrobial resistance, and advancements in diagnostic microbiology.

5. Parasitology

Investigations on parasitic diseases, host-parasite interactions, epidemiology of parasitic infections, and novel diagnostic and therapeutic approaches.

6. Other Relevant Disciplines

The bulletin also welcomes contributions from related fields, including immunology, molecular diagnostics, cytopathology, and medical genetics, as well as interdisciplinary studies that contribute to advancing knowledge in clinical and diagnostic sciences.

This quarterly Research Bulletin strives to cultivate a culture of rigorous scientific inquiry, encourage interdisciplinary collaboration, and contribute meaningfully to the global body of knowledge in medical laboratory science. Each publication is peer-reviewed and designed to uphold the highest standards of academic integrity and scientific accuracy. We welcome contributions from faculty, students and researchers dedicated to advancing health outcomes through laboratory science.

EDITORIAL REMARK

Welcoming a New Era of Research Excellence in Medical Laboratory Science

Prof. E. N. Adejumo
Editor-in-Chief, BUMLS Research Bulletin

As Editor-in-Chief, it is my pleasure to introduce the inaugural issue of the BU Medical Laboratory Science (MLS) Research Bulletin. This publication represents a significant milestone for our department, emphasizing our dedication to advancing research, innovation, and knowledge sharing in Medical Laboratory Science (MLS). Our Bulletin aims to provide a platform where students, faculty, and colleagues can present valuable insights, research findings, and new methodologies that contribute to scientific excellence and better patient care.

Medical Laboratory Science has always been a vital part of healthcare, providing critical diagnostic information and supporting clinical decisions. Today, MLS is undergoing rapid transformation fueled by technological advancements, interdisciplinary collaboration, and evidence-based practice. Our Research Bulletin embraces these changes, promoting a culture of inquiry that positions our department as a valuable contributor to the MLS field globally.

The BU MLS Research Bulletin is anchored on five key objectives: promoting high-quality, peer-reviewed research across areas such as hematology and pathology; encouraging knowledge-sharing to introduce innovative approaches; fostering interdisciplinary collaboration to broaden the research impact; enhancing research skills among students and staff by sharing best practices in study design and data analysis; and promoting evidence-based practices that translate findings into clinical application. These objectives aim to elevate research quality, encourage learning, and make meaningful contributions to patient care.

This Bulletin is a collective effort, and I extend my gratitude to the authors, reviewers, and editorial team members whose expertise, energy, and time have brought this first issue to life. I also thank our department leadership for their support in elevating MLS research and education. As an open invitation, I encourage our community—students, educators, and professionals—to contribute to future issues. Together, we are creating a dynamic resource and hub for MLS innovation, where new research, technological trends, and ethical considerations in our field will be explored.

Thank you for joining us on this journey to advance MLS.

Prof. E. N. Adejumo
Editor-in-Chief, BUMLS Research Bulletin

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BUMLSRB202511001

RESEARCH

Detection of *Clostridium difficile* Toxins A and B among undergraduate Students of a Private Tertiary Institution in Ogun State, Nigeria

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ABSTRACT

Background:

Clostridium difficile infection (CDI) poses a significant global health threat due to its high morbidity, mortality, and economic impact.

Aim:

The purpose of this study is to investigate the prevalence and risk factors of *Clostridium difficile* toxins A and B among undergraduate students at Babcock University, Ilishan-Remo, Ogun State.

Methodology:

Stool samples from 50 participants (25 males, 25 females) were screened using the JusCheck *Clostridium difficile* toxins A and B Combo Rapid Test. Demographic and clinical data were collected through structured questionnaires, and statistical analysis was performed using SPSS (version 18.0), with significance set at P<0.05.

Results:

Our findings showed that 4% of participants tested positive for toxin A, while 8% tested positive for toxin B. Self-medication, practiced by 34% of students, was significantly associated with CDI occurrence (P<0.05). Additionally, tribe was a significant factor (P<0.05). Among participants, 72% had no knowledge of *C. difficile*, while 36% reported experiencing diarrhea, watery stool, and abdominal discomfort in recent weeks, with 2% experiencing symptoms frequently.

Conclusion:

The findings highlight the presence of CDI among Babcock University students. Campaigns against self-medication and other risky behaviors that promote CDI should be intensified. Public health education on CDI awareness and prevention is crucial to reducing its spread

Key Words: *Clostridium difficile*, Toxin A, Toxin B, Prevalence, Risk factors

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RESEARCH

BUMLSRB202511002

Assessment of Total Antioxidant Capacity and Catalase in Apparently Healthy Students in Selected University in Ogun State

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ABSTRACT

Background:

Oxidative stress is caused by an imbalance between production and accumulation of Reactive Oxygen Species (ROS) in cells and tissues and the ability of a biological system to detoxify these reactive products.

Aim:

This study aimed to assess oxidative stress in apparently healthy students by measuring the Total Antioxidant Capacity (TAC) and Catalase activity.

Methodology:

A total number of 100 participants selected randomly involving 60 students (cases) with twenty (20) each from the three selected university and 40 non-students (controls). Peripheral blood sample was collected into anticoagulant bottle. The sample was assayed using spectrophotometric method and results were generated and subjected to statistical analysis. Comparison of result between case and control were made.

Results:

The results showed TAC activity not significant ($p>0.05$) 13.3±3.3 and 7.14±3.2 between test and control respectively. Similarly, no significant difference ($p > 0.05$) was observed in Catalase activity between the two groups 0.2 ± 0.1; 0.4 ± 0.1. The Pearson's correlation test showed that TAC and CAT activity had a negative relationship, indicating that as TAC activity increases, the CAT activity decreases. The inverse correlation observed between TAC and CAT activity provides additional insights, indicating that changes in one aspect could impact the other.

Conclusion:

This negative association suggests a compensatory response, where a rise in overall antioxidant capacity results in a reduction in catalase activity, possibly to maintain a homeostatic equilibrium. The findings provide a basis for further research on oxidative stress in young adults.

Key Words: Oxidative stress, total antioxidant capacity, catalase and peripheral blood.

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RESEARCH BUMLSRB202511003

Prevalence of *Trichomonas vaginalis* among Undergraduate Students of a Private University in Ogun State, Nigeria

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ABSTRACT

Background:

Trichomoniasis, caused by the protozoan Trichomonas vaginalis, is the most common non-viral sexually transmitted infection globally. Often asymptomatic, this parasitic infection can persist for years undetected, with infected individuals potentially experiencing complications such as vaginitis, cervicitis, urethritis, and negative pregnancy outcomes.

Aim:

This study aimed to determine the prevalence of *T. vaginalis* among undergraduate students at Babcock University, Ogun State, Nigeria, and to assess associated socio-demographic factors to better understand potential transmission risks and infection control strategies.

Methodology:

A cross-sectional descriptive study was conducted over three months (May – July 2023) among consenting undergraduate students. A total of 110 high vaginal swab samples were collected from randomly selected female students who met the eligibility criteria. Laboratory identification of *T. vaginalis* was performed using a wet mount preparation, with characteristic morphology and motility assessed microscopically. Demographic and clinical data were gathered via questionnaires. Statistical analyses, including ANOVA and Chi-square tests, were applied to evaluate prevalence patterns and demographic correlations.

Results

Of the 110 samples analyzed, the prevalence of *T. vaginalis* was 1.8%, with positive cases recorded only in the 26-30 age group. Prevalence was equally low across marital status, study level, religious affiliation, and ethnic groups. The majority of the participants were within the 16-20 age range, predominantly single, Christian, and Yoruba.

Conclusion:

The study found a low prevalence of *T. vaginalis* among the participants, though it highlighted the presence of other infections, including yeast infections. Identified risk factors included previous trichomoniasis history. Preventive measures, such as maintaining a single sexual partner, condom use, and abstinence, are recommended. Awareness campaigns targeting infection control, prevention, and early diagnosis are crucial for reducing transmission and fostering health-seeking behaviors among students.

Key Words: Trichomoniasis, *Trichomonas vaginalis*, Prevalence, Undergraduates, Ogun State

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RESEARCH BUMLSRB202511004

Histological and Biochemical Changes in the Heart and Testes of Male Wistar Rats Exposed to Ciprofloxacin Oral Suspension

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ABSTRACT

Background:

Ciprofloxacin, a fluoroquinolone antibiotic, is widely used to treat various infections, including urinary, respiratory, and gastrointestinal infections. However, concerns have arisen regarding its potential effects on organ health, particularly in the heart and testes.

Aim:

This study investigated the histopathological and biochemical impacts of oral ciprofloxacin administration on the heart and testes of male Wistar rats.

Methodology:

Thirty male Wistar rats (100–150 g) were acclimated for two weeks before being divided into control (Group I) and test groups (Groups II-V). Test groups received ciprofloxacin at dosages of 0.5, 1.0, 2.0, and 2.5 mg/kg body weight twice daily for two weeks. Post-treatment, rats were sacrificed, and blood samples were collected for biochemical analysis. Heart and testes tissues preserved in 10% neutral-buffered formalin were processed for histopathological evaluation.

Results:

Serum analysis showed a significant decrease in testosterone ($p<0.05$) and an increase in luteinizing and follicle-stimulating hormones ($p<0.05$) in test groups compared to controls. Histopathological examination of the heart revealed no abnormalities in groups II-IV, while group V showed fatty accumulation. Testicular histology indicated mild spermatid degeneration in groups III and IV and necrosis in group V, with no significant changes observed in group II.

Conclusion:

Ciprofloxacin administration induces dose-dependent pathological alterations in the testes, with high doses also affecting cardiac tissues. This study suggests cautious use of ciprofloxacin due to potential adverse effects on reproductive and cardiac health.

Key Words: Ciprofloxacin, Histopathology, Biochemical analysis, Wistar rats, Body organ

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RESEARCH BUMLSRB202511005

Superoxide Dismutase and Malondialdehyde Levels in Apparently Healthy Students in Selected Universities in Ogun State, Nigeria

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ABSTRACT

Background:

Oxidative stress is a global concept in redox biology and medicine, characterized by an imbalance between oxidants and antioxidants, leading to disrupted redox signaling, control, and molecular damage. Superoxide dismutase (SOD) is a crucial antioxidant defense against oxidative stress. MDA, on the other hand, is a widely used oxidative stress biomarker that particularly reflects lipid peroxidation.

Aim:

The aim is to measure the level of superoxide dismutase (SOD) and Malondialdehyde (MDA) in apparently healthy students in selected universities in Ogun State.

Methodology:

A case-control study design was employed with 100 participants. Sixty apparently healthy students, twenty from each university which include Babcock, Olabisi Onabanjo and McPherson University, as case and 40 apparently healthy non-students as the control**.** Ethical approval was obtained. Blood sample was collected and dispensed into EDTA container, and analyzed using spectrophotometric method. The data generated was subjected to statistical analysis using SPSS version 22.0.

Results:

The study showed SOD mean values significantly higher ($p<0.05$) in non-students, 47.3± 23.1 U/m L than students, 43.2 ± 17.8 U/m L, while MDA levels in non-students also showed significant ($p<0.05$) increase 30.31± 3.5 nmol/m L than in students, 18.11± 11.9 nmol/m L.

Conclusion:

There is a strong associations of SOD and MDA levels in both students and non- students. Indicating and increased in one leading to a rise in other. SOD protects against oxidative damage and extends life span. MDA is a stable end product of lipid peroxidation and therefore can be used as an indirect measure of the cumulative lipid peroxidation.

Key Words: Superoxide dismutase, Malondialdehyde, lipid peroxidation and oxidative stress.

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RESEARCH

BUMLSRB202511006

Kerosene and Coconut Oil Mixture as Alternative Clearing Agents in Tissue Processing

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ABSTRACT

Background:

Clearing is a critical stage in tissue processing, which is the removal of alcohol from the tissues with the use of chemical agents prior to embedding.

Aim:

The aim of the study is to evaluate the use of Kerosene and coconut oil mixture as a clearing agent in histopathological preparation.

Methodology:

A total number of ten (10) adult male Wistar rats averagely weighing between 120g-150g were purchased at the Animal Facility of Babcock University, Ogun State. All the animals were mildly anaesthetized before sacrificed by cervical dislocation. The liver, kidneys, and lungs were harvested and immediately fixed in 10% neutral buffered formalin for 72 hours before processing by automation. The harvested organs were cleared using xylene as (control), kerosene, coconut oil, mixtures of kerosene and coconut oil in ratio 2:1, 1:1 and 1:2 as the test groups. The tissue sections were stained using Iyiola-Avwioro's H&E staining technique. Section and staining quality were evaluated by direct microscopic observation and graded.

Results

This study showed that kerosene, xylene, C-K (1:2), C-K (1:1) when singly used produced excellent result with a total grade point twenty (20) in clearing kidney and liver tissues, followed by C-K (1:2) with a total grade point eighteen (18) while excellent sections were observed from lung tissues cleared in all the clearing agents.

Conclusion

Kerosene, mixture of Coconut oil and Kerosene in ratio (1:2) is recommended as suitable clearing agents and less toxic to human use.

Key Words: Clearing agent, anaesthetize, microscopic, Kerosene, Xylene, automation

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BUMLSRB202511007
RESEARCH

Performance Evaluation of Two Automated Haematology Analyzers in a Public and Private Tertiary Hospital in Ogun State, Nigeria

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ABSTRACT

Background:

Automated hematology analyzers are used in the laboratories to perform complete blood counts most times instead of the manual methods.

Aim:

This study evaluated the performance of two automated hacmatology analyser in evaluation of complete blood count.

Methodology:

The performance evaluation of two automated hematology analyzers, Mindray BC-5300 and Sysmex XN-350, was conducted in the hematology laboratories of Babcock University and Olabisi Onabanjo University in Ogun State, Nigeria. This study utilized a sample size of 200 blood samples, which included both healthy individuals and patients with varying hematological conditions, ensuring a representative sample across different blood parameters. Each sample was analyzed concurrently using both analyzers to compare results across key blood indices, including red blood cells (RBC), white blood cells (WBC), hemoglobin concentration (Hb), mean cell volume (MCV), lymphocyte counts, platelet counts, and other indices of red cell morphology. All samples were handled following standard laboratory protocols, and quality control measures were implemented to maintain consistency. Statistical analysis was performed to assess the correlation between the results from both analyzers.

Results

It was revealed that both analysers showed positive strong correlations for all the red blood cells packed cell volume, mean copular haemoglobin concentration and white blood cells indices, All the assumed differences between the two analysers were within clinically acceptable limits, except those of mean cell volume, haemoglobin, lymphocytes and platelets. Mindray has the characteristics of showing a distinguish picture of red cell morphology of the complete blood count.

Conclusion

Both analyzers could be said to be indeed reliable and fit for haematological analysis which further gives additional diagnostic information through the blood pictures. This study recommends that Mindray BC-5300 and Sysmex XN-350 are clinically reliable and can be used for haematological analysis. Further analysis should be done to evaluate the linearity and precision between the two analysers.

Key Words: Hematology analyzer, Blood count, Performance, Mindray BC-5300, Sysmex XN-350

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RESEARCH

BUMLSRB202511008

Prevalence of Epstein Barr Virus Gamma-Immunoglobulin Antibodies and Associated Risk Factors among HIV Patients on HAART in Oyo State, Nigeria

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ABSTRACT

Background:

Epstein-Barr Virus (EBV) is a common infection globally and a significant opportunistic pathogen in immunocompromised individuals, including those with HIV. EBV contributes to infectious mononucleosis, lymphoproliferative disorders, and certain cancers.

Aim:

This study assessed the prevalence of EBV gamma-immunoglobulin (IgG) antibodies and associated risk factors among HIV patients on Highly Active Antiretroviral Therapy (HAART) in Oyo State, Nigeria.

Methodology:

Using a cross-sectional design, EBNA and EBV-VCA IgG antibodies were detected in serum samples of HIV patients using Juschek rapid diagnostic test kits. Participants' socio-demographic and clinical data were collected through structured questionnaires, focusing on factors potentially influencing EBV prevalence.

Results:

A high prevalence of EBV-VCA IgG antibodies (91.3%) was found, indicating widespread EBV exposure among the participants, while all tested negative for EBNA IgG antibodies, suggesting limited exposure to this antigen. Higher EBV-VCA IgG seroprevalence was observed in females (51.5%) and the 18–25 age group (32.0%). Socio-demographic factors, including age, tribe, marital status, education level, and occupation, showed statistically significant ($P<0.05$) correlations with EBV seroprevalence. Additionally, participants adhering to HAART showed higher EBV antibody positivity. Limited awareness of EBV was noted among participants.

Conclusion

The findings highlight significant EBV exposure and suggest associations with socio-demographic factors and HAART adherence among HIV patients in Oyo State. Increased health education on EBV and expanded research using longitudinal designs, larger sample sizes, and advanced diagnostics are recommended to better understand the implications of EBV in HIV patients.

Key Words: Epstein-Barr Virus, HIV, Seroprevalence, HAART adherence, Risk factors

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RESEARCH

BUMLSRB202511009

Effect of Oral Administration of *Vernonia amygdalina* Leaves Extract on Haematological Parameters in Guinea Pigs

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ABSTRACT

Background:

Hematological disorders have attained epidemic proportions in the world today. As a result, many people turn to medicinal plants for alternative treatment because it is cheap and readily available. Vernonia amygdalina (*V. amygdalina*), commonly known as bitter leaf, is widely used in traditional medicine across Africa for its therapeutic properties. Recent studies suggest that its bioactive compounds could influence hematological parameters, which are critical indicators of overall health and immune response.

Aim:

The aim of this research is to investigate the effect of *V. amydalina* extract on some haematological parameters in guinea pigs.

Methods:

A total number of sixteen (n=16) guinea pigs weighing 300g-500g used for this study were grouped based on similar weight with four rats per group (n=4). Group 1 was the Control. Group 2, Group 3 and Group D were the test groups administered with 400mg/kg, 600mg/kg and 800mg/kg leaves extract of *V. amydalina*. The guinea pigs were humanely sacrificed after 14 days of administration and whole blood collected from the heart through cardiac puncture. Hematological parameters and indices were determined from unclotted blood samples using an automated haematology analyser.

Results:

The result showed that at 800mg/kg, *V. amygdalina* has a statistically significant ($p<0.05$) dose dependent decreased effect on the RBC, HB and HCT. There was a dose-dependent decrease in the mean group of the platelet count with no statistical effect ($p>0.05$). The leaves extract also exhibited an increase ($p>0.05$) in total white cell count.

Conclusion:

V. amygdalina exhibits a complex hematological profile that includes suppression of erythrocytic parameters at high doses, without a similarly significant impact on leukocytes or platelets. Further studies are warranted to explore the mechanisms behind these effects, to determine safe dosage limits, and to assess the clinical relevance of these findings, especially for potential applications in traditional medicine where *V. amygdalina* is commonly used.

Key Words: *V. amygdalina*, Hematological parameters, Guinea pigs, Medicinal plants, Hematotoxicity

BUMLS RESEARCH BULLETIN Vol. 1 Issue 1

REVIEW

BUMLSRB202511010

Digital Technology in Modern Medical Laboratory Research: Transforming Data Collection and Analysis

***Enitan, S. S., Ochei, J.O., Ileoma, E.O., Dada, M. O., Osakue, E.O. Oluwaloye, T.G., Akinjinmi, A.A. & Idowu, A.**

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ABSTRACT

Background

Digital technology is transforming medical laboratory research by improving the accuracy, efficiency, and reproducibility of data collection and analysis.

Aim

The purpose of this review is to explore the impact of digital technology on laboratory processes, focusing on advancements in data collection, processing, and interpretation.

Methodology

This narrative review draws on research articles and systematic reviews from reputable scientific databases, including Google Scholar, Scopus and PubMed. Keywords such as "digital technology in laboratories," "automation in data collection," "AI in laboratory analysis," and "cloud computing in medical research" were used to identify relevant studies published within the last decade. Sources were selected based on their focus on digital advancements in data handling, the impact on research reproducibility, and applications in fields like genomics and microbiology. Only peer-reviewed publications were included to ensure high-quality, credible findings on the integration of digital tools in medical laboratory research.

Results

Digital tools enhance data precision and speed while reducing human error, allowing laboratories to handle higher volumes of data with greater consistency. AI and machine learning reveal critical patterns in datasets, improving diagnostic accuracy. Cloud computing provides scalable resources, supporting studies in genomics and epidemiology. However, challenges such as data security, initial technology costs, and skill requirements are significant barriers to widespread adoption.

Conclusion

Digital technology is transforming medical laboratory science by enhancing data accuracy and efficiency, advancing personalized medicine, and expanding research—though cost and expertise remain challenges.

Keywords: Automation, Analytics, Data, Digital imaging, Personalized medicine

BUMLS RESEARCH BULLETIN Vol. 1 Issue 1

REVIEW

BUMLSRB202511011

Best Practices in Research Methodology for Medical Laboratory Science Students and Professionals

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ABSTRACT

Background:

Research methodology is critical in medical laboratory science, ensuring the accuracy and reliability of findings that directly impact patient care and public health. Understanding effective research practices is essential for both students and professionals in this dynamic field.

Aim:

This review aims to outline best practices in research methodology for medical laboratory science, covering key aspects such as study design, data collection, ethical considerations, and data analysis.

Methodology:

This narrative review synthesizes current literature on research methodologies in medical laboratory science, drawing from peer-reviewed articles accessed through databases like PubMed, Scopus, and Google Scholar. Key practices were identified based on their relevance to various research designs, including experimental and observational approaches.

Results:

Best practices include defining clear research objectives and hypotheses, conducting thorough literature reviews, selecting appropriate research designs, determining sample sizes, standardizing data collection processes, and maintaining ethical standards. Furthermore, rigorous data analysis and transparent reporting of findings are emphasized to enhance research quality and reproducibility.

Conclusion:

Implementing best practices in research methodology is essential for advancing medical laboratory science. By adhering to these guidelines, researchers can produce high-quality, reliable findings that contribute to the body of knowledge and improve patient outcomes. Continuous learning and collaboration with experts in the field further enhance research skills and methodologies.

Keywords: Research, Methodology, Data, Ethical considerations, Producibility

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REVIEW

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Advances in Research Collaboration: Building Effective Partnerships across Laboratories and Disciplines

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ABSTRACT

Background:

As global scientific challenges grow more complex, traditional research approaches often fall short in addressing multifaceted issues like climate change, health crises, and technological development. Solving these problems increasingly demands expertise and insights from multiple areas of specialization, disciplines and institutions.

Aim:

This review explores the advancements, tools, and strategies that have made cross-disciplinary research collaborations more effective, analyzing the potential and challenges in uniting laboratories and fields to drive innovation.

Methodology:

Key factors supporting collaborative research were examined through a comprehensive literature review utilizing databases such as PubMed, Scopus, and Google Scholar. This review focused on technological tools that enhance collaboration, including digital platforms, data-sharing systems, and computational resources. In addition, effective strategies for maintaining constructive partnerships—such as clear goal-setting, open communication, and agreements on intellectual property—were identified from relevant studies. The analysis also included case studies of major collaborative projects, including the Human Genome Project and the development of COVID-19 vaccines, sourced from peer-reviewed articles and publications within these databases. This approach ensured a robust understanding of current practices and challenges in research collaboration across disciplines.

Results:

Collaboration in research has been significantly enhanced by digital communication tools and cloud-based platforms that facilitate data sharing, project management, and collective problem-solving. The review highlights the effectiveness of cross-disciplinary teams in addressing complex issues when they employ structured communication and shared goals. However, challenges such as disciplinary differences, data security, and resource allocation often hinder collaboration.

Conclusion:

Effective research collaboration offers immense benefits, demonstrated by groundbreaking projects that changed their fields and improved global health and understanding. Continued investment in technology, training, and supportive policies will further enable cross-disciplinary efforts. As collaboration becomes increasingly essential for addressing global challenges, a structured approach combining trust, technology, and shared purpose will be key to future breakthroughs in science and innovation.

Key words: Collaboration, Interdisciplinary, Research, Innovation, Partnerships

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REVIEW

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Scaling up Malaria Molecular Surveillance in Africa: Current Challenges and Future Prospects

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ABSTRACT

Background:

Malaria poses a severe public health threat in Africa, contributing to approximately 95% of global malaria cases and deaths. The rapid spread of drug-resistant Plasmodium strains demands an efficient and scalable approach to monitoring, essential for targeted malaria control and elimination efforts. Molecular surveillance, which uses genetic analysis of malaria parasites to trace transmission and resistance patterns, has become increasingly vital. However, substantial challenges, including limited infrastructure and technical capacity, impede the widespread implementation of this surveillance across Africa.

Aim:

This review examines the current challenges and opportunities for scaling up malaria molecular surveillance in Africa and explores potential strategies to strengthen surveillance capacity to better monitor drug-resistant malaria strains across the continent.

Methodology:

Data for this review were obtained from reputable sources, including PUBMED and Google Scholar, focusing on studies and reviews published between 2015 and 2024. Inclusion criteria encompassed articles discussing malaria molecular surveillance in Africa, with particular emphasis on genomic tools, funding, political initiatives, and capacity-building programs. Key initiatives reviewed include the MalariaGEN consortium and the WHO Global Technical Strategy for Malaria 2016-2030, both promoting genomic analysis for enhanced control and elimination efforts.

Results:

Findings highlight that although recent advancements in genomics and increased funding present unique opportunities for scaling molecular surveillance, infrastructural and technical gaps persist. Initiatives like the African Society for Malaria Research (ASMR) and the Malaria Capacity Development Consortium (MCDC) are crucial for addressing these gaps by providing essential training and support to local researchers and health professionals.

Conclusion

While scaling malaria molecular surveillance in Africa is challenging, it remains achievable with targeted investments in infrastructure, capacity-building, and continued collaboration between governments, research institutions, and funding bodies. Enhanced molecular surveillance will be instrumental in combating malaria and managing drug-resistant strains, supporting the broader goal of malaria elimination across Africa by 2030.

Key Words: Malaria, Molecular Surveillance, Drug Resistance, Genomic Analysis, Africa

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The Impacts of Proteogenomics on Precision and Personalized Medicine

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ABTRACT

Background:

Proteogenomics, an integrative field that combines genomics and proteomics, has emerged as a transformative approach in precision and personalized medicine. By leveraging both genetic and protein-level information, it enhances our understanding of complex disease mechanisms, particularly in conditions like cancer, where molecular diversity complicates treatment.

Aim:

This review aims to assess the impact of proteogenomics on the identification of disease biomarkers, the development of targeted therapies, and the personalization of treatments in precision medicine.

Methodology:

We conducted a comprehensive review of proteogenomics research focused on precision medicine applications, sourcing data from clinical studies and trials published between 2010 and 2024 in leading biomedical databases such as PubMed, Scopus, and ClinicalTrials.gov. Studies were included if they examined proteogenomic-based biomarker discovery, therapeutic target identification, or personalized treatment approaches, with priority given to large cohort studies and clinical trials.

Results:

Our review found that proteogenomics has significantly advanced biomarker discovery, identifying disease-specific proteins and post-translational modifications that improve diagnostic accuracy and predictive power for treatment responses. Additionally, proteogenomics has identified numerous therapeutic targets and patient-specific genetic variations that impact drug efficacy, thus supporting the development of more precise and individualized treatment plans. Furthermore, proteogenomic data have facilitated drug development by elucidating disease mechanisms and guiding drug candidate prioritization.

Conclusion:

Proteogenomics holds substantial potential for advancing precision medicine by enabling more accurate diagnoses, targeted treatments, and personalized therapeutic approaches. However, challenges related to data integration, methodological standardization, and cross-disciplinary collaboration must be addressed to fully realize its clinical impact. As the field matures, proteogenomics is poised to significantly enhance healthcare outcomes through a more individualized approach to disease management.

Key Words: Proteogenomics, Precision Medicine, Personalized care, Biomarkers, Therapeutic Targets

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REVIEW

Novel Approaches in the Laboratory Diagnosis and Clinical Management of Tumors

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ABSTRACT

Background:

Recent advancements in tumor diagnostics and clinical management are revolutionizing oncology, offering more precise, personalized approaches that promise to improve patient outcomes. Traditional methods such as imaging and biopsies are being increasingly augmented by molecular diagnostics, artificial intelligence (AI), and advanced therapeutic options, leading to significant strides in early detection, treatment selection, and monitoring.

Aim:

This review aims to evaluate the impact of novel diagnostic and treatment approaches, including molecular diagnostics, AI-assisted imaging, and immunotherapy, on the accuracy of tumor detection, treatment precision, and patient survival outcomes.

Methodology:

A comprehensive literature review was conducted, drawing from sources like Nature Reviews Cancer, Journal of Clinical Oncology, and The Lancet Oncology, alongside guidelines from the American Society of Clinical Oncology (ASCO) and the European Society for Medical Oncology (ESMO). Inclusion criteria encompassed peer-reviewed studies from the past five years on molecular diagnostics (e.g., next-generation sequencing and ctDNA analysis), AI in oncology, and precision therapies, including targeted therapies and CAR T-cell treatment.

Results:

Findings indicate that molecular diagnostics and ctDNA significantly improve tumor characterization and monitoring. AI enhances diagnostic accuracy by analyzing imaging and histopathological data, while personalized therapies, such as immune checkpoint inhibitors, yield promising results in previously untreatable cancers. Advanced radiotherapies further reduce collateral tissue damage.

Conclusion:

The integration of molecular data, advanced imaging, and targeted treatments in oncology is driving a shift toward more personalized, precise cancer care. Despite challenges related to accessibility and cost, these innovations hold considerable potential to improve patient survival and quality of life, marking a critical evolution in cancer management.

Key Words: Tumor Diagnostics, Molecular Profiling, Precision Oncology, Immunotherapy

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