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PROJECT TITLE: COMPREHENSIVE REVIEW ON EFFICACIES OF ANTI MALARIAL DRUGS A CASE STUDY OF KANO STATE NIGERIA

Maryam Nasidi Nuhu [1], Halisa Sani Gadanya [2], Rabi'ah Shehu Kura
maryamnasidinuhu@gmail.com,

[1,2&3] Department of Chemistry
Sa'adatu Rimi college of Education Kumbotso Kano

ABSTRACT

Malaria remains a significant public health challenge in Nigeria, necessitating continuous evaluation of antimalarial drug efficacy and usage patterns. This study investigates the efficacy of antimalarial drugs consumed in Kano State, Nigeria, using a cross-sectional survey approach. Data were gathered from 321 respondents through a validated, semi-structured questionnaire. The study reveals a predominant use of Artemisinin-based Combination Therapies (ACTs), with 75% of participants favoring artemether. Approximately 97.5% of respondents reported antimalarial drugs as effective, though adverse effects such as nausea and dizziness were noted by 50%. This research emphasizes the importance of adherence to treatment guidelines, patient education, and ongoing pharmacovigilance to optimize treatment outcomes.

Keywords: Malaria, antimalarial drugs, ACTs, drug efficacy, treatment adherence.

INTRODUCTION

Malaria is a life-threatening disease caused by Plasmodium parasites transmitted to humans through the bites of infected female Anopheles mosquitoes (Obiebi, 2019). The disease is prevalent in tropical and subtropical regions, including sub-Saharan Africa, Southeast Asia, and parts of South America. Malaria can present with symptoms such as fever, chills, headache, muscle aches, fatigue, nausea, and vomiting. Malaria diagnosis is typically confirmed through laboratory testing, including microscopic examination of blood smears or rapid diagnostic tests (RDTs). Microscopic examination allows identification of the Plasmodium species, determination of parasite density, and assessment of the infection severity (Meremikwu et al., 2007). RDTs are rapid and provide qualitative results, detecting specific malaria antigens in the blood. The choice of antimalarial treatment depends on factors such as the species of Plasmodium, the severity of the infection, and drug resistance patterns in the region (Epidemiology, 2013; Gebresillassie & Gebreyohannes, 2018; Meremikwu et al., 2007; Newton et al., 2001). Artemisinin-based Combination Therapies (ACTs) are recommended as the first-line treatment for uncomplicated malaria in most malaria-endemic regions. Commonly used ACTs include artemether-lumefantrine, artesunate-amodiaquine, and dihydroartemisinin-piperaquine. For severe malaria cases, intravenous artesunate is the recommended treatment. Malaria prevention strategies include the use of insecticide-treated bed nets, indoor residual spraying with insecticides, and chemoprophylaxis for travelers to malaria-endemic regions. Insecticide-treated bed nets provide a physical barrier against mosquito bites and can be impregnated with insecticides to further repel and kill mosquitoes. Chemoprophylaxis involves taking antimalarial drugs before, during, and after travel to malaria-endemic areas to prevent infection. It's important to note that malaria treatment and prevention guidelines may vary based on factors such as the geographical region and the prevalence of drug resistance. Therefore, it is crucial to refer to the guidelines and recommendations provided by national and international health authorities for specific information.

ACTs (compared with monotherapies) serve to avoid the emergence of resistance worldwide. This equals, in economists' jargon, the avoidance of negative externalities, or the creation of global and intertemporal public goods. Preventing or delaying the emergence of resistance will save lives in future generations. Even if artemisinin resistance eventually emerges, slowing down its appearance increases the chance that high-risk individuals will have access to new and improved drugs when that time arrives.

Addressing the problems posed by malaria through focused research, surveillance, and policy interventions can help improve the efficacies of anti-malarial and anti-typhoid fever drugs, enhance treatment outcomes, and mitigate the impact of these diseases on public health.

MATERIALS AND METHODS

Study Design and Sampling

The team of researchers is staff of Department of Chemistry, Sa'adatu Rimi College of Education, Kumbotso Kano and possessed different disciplines (Biochemistry and Analytical chemistry). The participants comprised of both men and women randomly selected across different levels of college students within the department of chemistry in the college. The study was conducted between the first quarters of the study year. The sample size was estimated using the method prepared by Gebresillassie et *al.* 2018 (Gebresillassie & Gebreyohannes, 2018). A range of 300 to 1000 participants were selected for the study using a simple random sampling technique. The average age of the participants was 18 yrs. The inclusion criteria for participation in the study was; free will, age must be 18yrs and above, ability to read and understand English or Hausa language. Only participants that met the above requirements were allowed to participate in the study. The study protocol was subjected and approved by the college ethical research committee.

Study Questionnaire

The questionnaire (s) was prepared with the aid of few previously reported literatures. It consists of FIVE (5) distinct sections;(1) A, demographic characteristics of the respondents;

(2) General knowledge of participants with respect to Malaria (3) Awareness of Malaria ; (4) Symptoms and risk factors attributed to Malaria and Typhoid Fever; (5) Preferred Antimalarial and Antityphoid drugs. Barriers towards breast cancer screening. The questionnaire was written in English Language and was validated by a panel of experts comprising of Doctors, Clinical Pharmacists, Nurses, Midwifes, Specialized Health Care Workers, Medical Professors and Pathologists. Below is the sample of the questionnaire administered

Data Collection and Analysis

Data collection adopted the procedure reported by Obiebi, 2019 (Obiebi, 2019). Where data was collected with a semi-structured self-administered questionnaire and then analyzed with SPSS version 22, and expressed as frequencies with percentages. Level of adherence would be defined by the proportion of respondents whose prescription patterns conformed to the antimalarial drugs, dosage regimens, frequency and duration stipulated in the national antimalarial treatment guidelines particularly concerning the first drug of choice for complicated and uncomplicated malaria. The association between cadres of prescribers and level of adherence would be elicited with Chi-square. Interviews/Consultations with health care personnel would also be used to gather data on complications and strategies required to address malaria and typhoid treatments in Nigeria.

From the socio-demographic information age shows different variations with no specification.

Gender shows the following frequency

GENDER	FREQUENCY (N)	PERCENTAGE %
Male	**66.8**	**20.2**
Female	**143.3**	**43.3**
Prefer not to say	**120.8**	**36.5**

321 responses were obtained for occupation 50.2 was the highest percentage and is for employed participants and the lowest percentage goes for unemployed participants.

75% of participants presents fever as symptoms of malaria while 5% come up with either joint pain fatigue or sweat profusely. There were 316 responses on how the participants treat malaria, 61% use injections together with drugs while less than 2% use concoctions. 50% of participants experience suicide effects linked nausea and dizziness while less than 5% do not have any side effects. 97.5 % of participants found the malaria drugs to be very effective, effective or moderately effective. 51.6% off participants do not change their medication while 42.6% change medication due to inefficiency, allergy or adverse effects. 75% of participants participants use artemether.

DISCUSSION

Analysis and Discussion of Results

The study, "Comprehensive Review on Efficacies of Antimalarial Drugs: A Case Study of Kano State Nigeria," provides valuable insights into the usage patterns**,** perceptions**,** and outcomes of antimalarial drug **efficacy** among the participants**.**

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1. Socio-Demographic Analysis

- Gender**:** The gender distribution among participants indicates a higher frequency of females (43.3%) compared to males (20.2%), with a significant portion (36.5%) preferring not to disclose their gender. This distribution could influence the generalizability of the findings, particularly if gender-specific factors play a role in drug efficacy or treatment adherence.
- Age: Although the participants' average age was 18 years, variations in age were reported without detailed breakdown. This limitation in demographic stratification could obscure age-related differences in treatment outcomes or drug preferences.

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2. Treatment Approaches

- Symptoms and Diagnosis:

o 75% of participants identified fever as a symptom of malaria, aligning with standard diagnostic criteria.

o A small percentage (5%) noted alternative symptoms such as joint pain, fatigue, or profuse sweating. This variability highlights the need for comprehensive diagnostic strategies to capture atypical presentations.

- Drug Usage:

o Artemether was the most frequently used medication, with 75% of participants favoring it. This aligns with global recommendations of Artemisinin-based Combination Therapies (ACTs) as first-line treatment.

o 61% of participants preferred combining injections with oral medications, suggesting a belief in the increased efficacy of combination therapy.

o A minor fraction (<2%) reported using traditional concoctions, indicating residual reliance on unvalidated treatments.

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3. Drug Effectiveness and Side Effects

- Efficacy:

o An overwhelming 97.5% of participants reported that antimalarial drugs were very effective, effective, or moderately effective. This demonstrates high confidence in current treatment regimens.

o However, the 42.6% who changed medications due to inefficacy, allergies, or adverse effects underscores ongoing challenges with individual drug responses.

- Side Effects:

o The most common side effects included nausea and dizziness, affecting 50% of participants, while less than 5% reported no side effects. These findings emphasize the need for patient education and management of adverse reactions.

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4. Adherence and Prescription Patterns

- Adherence:

o Approximately 51.6% of participants adhered to their initial prescriptions. The 42.6% who altered their regimens due to inefficiencies or side effects point to gaps in initial drug selection and patient support.

- Prescription Practices:

- Adherence to national antimalarial treatment guidelines was a critical parameter, but the study does not detail the extent to which prescriptions align with these guidelines. A deeper analysis of prescribers' adherence and its association with treatment outcomes would be valuable.

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5. Implications and Recommendations

- Policy and Education:

- Targeted educational campaigns could address misconceptions about traditional remedies and promote awareness of ACTs.
- Strengthening adherence to national treatment guidelines among healthcare providers can standardize care and improve outcomes.

- Further Research:

- Investigating the pharmacogenomics of antimalarial drugs in the local population could explain variability in efficacy and side effects.
- Expanding the demographic scope beyond young adults to include children and older adults could provide a more holistic understanding.

The study underscores the importance of aligning treatment strategies with patient needs, healthcare provider practices, and evidence-based guidelines to enhance antimalarial efficacy and reduce disease burden.

This study on the efficacy, adherence, and perception of antimalarial drug usage in Kano State, Nigeria, offers valuable insights into current treatment practices and patient experiences. The high usage of artemether and adherence to Artemisinin-based Combination Therapies (ACTs) aligns with global treatment guidelines and demonstrates their recognized efficacy. However, the significant percentage of participants who modified their treatment due to inefficacy, side effects, or other factors underscores persistent challenges in drug response and prescription practices. Furthermore, the reliance on traditional remedies by a small fraction indicates the need for enhanced health education to improve public trust in validated medical treatments. Gender imbalance and the limited age range of participants highlight areas for improvement in future studies to ensure comprehensive demographic representation.

In summary, while the findings reaffirm the effectiveness of ACTs, gaps in adherence, prescription patterns, and management of side effects call for strategic policy interventions, better patient education, and continued research on pharmacogenomics to optimize antimalarial treatment outcomes.

Recommendations

1. Policy and Regulatory Measures
- Strengthen enforcement of adherence to national malaria treatment guidelines by healthcare providers to ensure consistency in prescription practices.
- Integrate routine monitoring and evaluation of antimalarial drug efficacy and patient outcomes to inform public health policy.
2. Educational Initiatives
- Conduct targeted public health campaigns to dispel misconceptions about traditional remedies and emphasize the importance of ACTs.
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- Increase awareness of side effect management strategies to promote treatment adherence and improve patient experiences.

3. Further Research
- Expand future studies to include a more diverse demographic profile, particularly children, older adults, and varied socioeconomic groups, to capture a broader spectrum of treatment responses.

- Investigate genetic factors affecting individual drug responses in the local population through pharmacogenomic studies, enhancing personalized medicine approaches for malaria treatment.

4. Healthcare Capacity Building

- Provide continuous training for healthcare workers on updated malaria management protocols and patient-centered care practices to enhance treatment quality.

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