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Rapid Assessment of Prevalence of Malaria among Patients of a Referral Hospital in Oweri South East Nigeria

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ABSTRACT

Malaria has social consequences and exerts a heavy burden on economic development in Nigeria. This study was undertaken to determine the prevalence of malaria among out and in patients attending a referral hospital in Owerri South-East Nigeria between January and October 2019. Two hundred and thirty-five patients consisting of 114 males and 121 females were engaged in the study after obtaining their consent. Capillary blood samples were collected from finger-pricked blood using Rapid Diagnostic Test kit (ICT COMBO, Core Diagnostic, U.K) for detection of *Plasmodium falciparum* and pan malaria antigen Pf/Pan for non-*falciparum* species. The data were collated and analysed with descriptive and chi-square statistics with significance set at 0.5. The result recorded an overall malaria prevalence of 62.55%. Female patients had significantly higher (77.72%) malaria prevalence than males (51.75%) ($p<0.05$). Age-related prevalence of malaria within the study period showed that malaria prevalence across the age groups exceeded 50%, except for the age group 40-49 years with a prevalence of 45.61%. However, the age-related prevalence of malaria was not significantly different, ($p>0.05$). The result reveals an active transmission of malaria parasites which constitute a public health burden. There is a need for improved effort in the prevention and control of this scourge.

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Introduction

Malaria is transmitted by a female anopheles mosquito, which bites and transmits one of four *Plasmodium* parasites: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, and *Plasmodium malariae*. Malaria is a disease that affects the majority of the developing world, particularly in tropical and subtropical regions [1]. The parasite *Plasmodium falciparum* is the most common and lethal of these parasites [2].

Malaria has social consequences and exerts a heavy burden on economic development [3]. An estimated 409,000 people die from malaria each year worldwide, and children aged under 5 years are particularly vulnerable, comprising 67% of all malaria deaths in 2019 [4]. Malaria is holoendemic in Nigeria, with a steady transmission rate throughout the year, which comprises of a distinctive rainy and dry season. Malaria-infected patients account for over 60% of outpatient hospital visits, 30% of admissions, 30% of under-five mortalities, 25% of baby mortalities, and 11% of maternal mortalities in Nigeria [5]. Variable factors, including mosquito vector efficiency and distribution, climate, environmental and climatic conditions as well as state of acquired immunity of the exposed individuals contribute to a wide distribution of malaria [6].

In the last decade, the fight against malaria and its vector in Nigeria and across Africa has not been less successful due to antimalarial drug resistance in the parasite, insecticide resistance in mosquitoes and the existence of some unstable predisposing factors. This has resulted in a fundamental shift in the behavior of malaria vectors, which are now just as deadly when confronted outdoors as they are when encountered indoors. Therefore, there is a need for a continuous survey of malaria prevalence which will offer useful information about the status of the disease and are important tools for assessing the impact and effectiveness of malaria control measures and programmes at local and national levels.

Methodology

Study Area

This study was conducted from January-August 2019 in a Private Hospital in Amakohia, Owerri, Imo State. Amakohia is a town in Owerri North Local Government Area in Owerri Senatorial Zone of Imo State. Owerri, the capital city of Imo state is one of the three zones in the state. It is located on latitude 5.485°N and longitude 7.035°E, South Eastern Nigeria. It is bordered on the east by the Otamiri River and on the south by the Nworie River. It has a population of around 401,873 people [7].

The study was selected based on convenience and on the level of health care the hospital provides within the state. It is a 20-bed capacity private hospital with wards and departments providing 24 hours emergency, surgical, medical and maternal/child health services.

Study Sample Size/ Population

The population of this cross-sectional survey research comprised males and females, 10 years and above, attending a private hospital in Owerri, Imo state. The proportion of individuals within this age group attending the health facility within the 8 month study

period was estimated to be 82% (0.82) of the total attendance. Therefore, the sample size formula for qualitative cross-sectional surveys used by was adopted [8]:

$n = z^2pq/d^2$

where: n = the desired sample size

z = the standard normal deviate, set at 1.96 corresponding to 95% confidence level

p = the proportion of persons 10 years and above attending the health facility for medical services within the study period q = 1.0 - p

d =precision/ absolute error tolerated, set at 0.05 [9]

$$n = \frac{1.96^2 \times 0.82(1-0.82)}{0.05^2} = 226 \text{ participants.}$$

Consequently, a total of 235 participants made up of 114 males and 121 females was then drawn from day-to-day clinical care of patients (direct observation/consultation-oriented).

Ethical Clearance

Ethical approval for this study was obtained from the Research and Ethics Committee of Department of Environmental and Applied Biology, Imo State University, Owerri. The consent of the hospital management was also obtained following detailed explanation of the study objectives in order to enhance participation. Full verbal explanation of the study was given to selected individuals and verbal informed consent obtained before inclusion as participants. Participants were given the option of refusing to participate in the study or withdrawing at any moment during the evaluation. Throughout the study, privacy and secrecy were preserved.

Data Collection

Data was collected with the help of assistants comprising of doctors and laboratory scientists. Data was collected via detailed history taking, accompanied by laboratory evaluation for malaria. For the malaria testing, capillary blood samples were collected from a finger-pricked blood using using Rapid Diagnostic Test kit (ICT COMBO, Core Diagnostic, U.K) for detection of *Plasmodium falciparum* and pan malaria antigen Pf/Pan for non-*falciparum* species. In the end, data obtained was analysed and reported.

Statistical Analysis

Data obtained from the empirical study were analysed and interpreted using descriptive statistics. Chi-Square test was used to test the association between sex, age and occurrence rate of malaria. Five (5%) level of probability was considered significant ($p < 0.05$).

Result

The sex related prevalence of malaria infection among patients attending the referral hospital is shown in table 1. The result revealed that of 234 patients examined, 147 were infected with *Plasmodium falciparum* giving an overall malaria prevalence of 62.55%.

Table 1: Sex Related Prevalence of Malaria

Sex	Number examined	Number infected	Prevalence (%)
Male	114	59	51.75
Female	121	88	72.72
Total	235	147	62.55

The result showed 77.72% (88) of 121 females examined had a malaria parasite which was significantly higher than 51.75% (59) recorded among 114 males examined. (χ^2=11.0224;df=1 p(0.0009)<0.05).

Table 2 reveals the age related prevalence of malaria infection among patients attending the referral hospital

Table 2: Age-Related Prevalence of Malaria

Age (years)	Number examined	Number infected	Prevalence (%)
10-19	51	30	(58.82)
20-29	28	17	(60.71)
30-39	41	29	(70.73)
40-49	37	26	(45.61)
50-59	29	19	(65.51)
≥60	49	26	(53.06)
Total	235	147	

Age-related prevalence of malaria within the study period showed that malaria prevalence across the age groups exceeded 50%, except for age group 40-49 years with a prevalence of 45.61%. Age group 30-39 years had the highest malaria prevalence of 70.73%. However, the age related prevalence of malaria was not significantly different (χ^2=4.448; def=5; p (0.4869) >0.05).

Discussion

Malaria is a serious public health concern in Nigeria. The results of this study revealed a high prevalence of malaria (62.55%). It is lower than the prevalence of 76% reported by Ukpai and Ajoku, (2001) in Owerri municipal amongst out-patients attending clinics but higher than 25.5% recorded [1]. The prevalence reveals active transmission of *plasmodium* encouraged by the enabling environment. The study area is a tropical area with record in literature on the preponderance of enabling environment for malaria infection like adequate breeding sites, poverty, exposure to infected mosquitoes to mention but a few. However, the 62.55% prevalence could be an over estimation of the status in nature as only hospital patients were assessed. Has noted that studies among hospital patients are sometimes biased because they are focused on sick individuals who seek medical attention in the clinics thus explaining the very high prevalence [1].

Females significantly had more cases of malaria infection than males. There are conflictory reports on sex-related infections of malaria. Reported more infections in males (78.0%) in Imo State while 2012 reported more infections in females [10,11]. The highest infection in females observed in this study may be due to differences in exposure. In addition, the female samples also consisted of pregnant women who naturally have a compromised immunity which may have accounted for the higher prevalence in females.

The age-related prevalence was not significantly different. This contrasts reports which found a significant age-related infection in their study [1]. The age groups may have been equally exposed.

This study has shown that malaria still constitutes serious a public health concern to people of every age group, despite the enormous effort directed towards its prevention in Owerri. This information is invaluable in public enlightenment on the scourge of the diseases and should provide incentives for individuals, non-governmental organizations and government in doubling their efforts tailored toward prevention, control and treatment of malaria.

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