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The Prevalence of Malaria Infection Among Patients Attending the Health Centre of the Federal University of Technology, Akure, Nigeria.

Abstract

Aim: This study determined the prevalence of malaria among patients that reported for malaria test at the Health Centre of the Federal University of Technology, Akure between January and December 2015. **Place and Duration of Study:** The research was carried out in the Health Centre of the Federal University of Technology, Akure, Ondo State, Nigeria between January to December 2015.

Methodology: Prior the commencement of the research work, approval was given by the Health Research Ethics Committee (HREC) of the University. A total of 2,616 patients were examined, out of which 1,253 were males and 1,363 were females. Information about sex, age, status (Student and Staff) and date of collection of each patient whose blood sample was collected were recorded. Malaria parasite screening was done using the thick blood film microscopy technique with Giemsa stain while Chi-square analysis was used to analyze the data obtained from the study.

Results: The results showed that the highest prevalence of 91.1% was recorded among the children aged 1-10, followed by age 21-30 (79.7%) while the lowest prevalence of 56.8% was recorded among the age group above 60 years. Also, high prevalence of 79.7% was recorded during wet season (March to October), while a lower prevalence of 75.4% was recorded during dry season (November to February) with significant difference at P = 0.001.

Conclusion: The result showed that there was high prevalence of malaria infection throughout the year among the patients. Thus there is a need for public enlightenment on the importance of environment void of mosquito breeding sites.

Key words: Prevalence, Malaria infection, Patients, Health Centre.

1. Introduction

Human malaria is a protozoan disease that is widely distributed in the tropics [1]. It is caused by the protozoan parasite of the genus *Plasmodium*. The disease is transmitted to man through the bite of an infected arthropod vector of some species of *Anopheles* mosquito.

Five species of *Plasmodium* can infect and be spread by humans [2]. Out of the five, most deaths are caused by *Plasmodium falciparum* but *P. vivax, P. ovale and P. malariae* generally cause a milder form of malaria [2],[3]. In this part of the globe, *P. falciparum* is the major cause of most severe form of malaria which accounts for over 60% outpatient visits and 30% hospital admission in Nigeria [4].

Malaria is a complex disease that varies widely in epidemiology and clinical manifestation in different parts of the world. This variability is caused by some factor such as the species of malaria parasites that occur in a given area, their susceptibility to commonly used or available antimalarial drugs, the distribution and vectorial capacity of mosquito vectors, climate and other environmental conditions and the behaviour and level of acquired immunity of the exposed human populations. In particular, young children, pregnant women, and non-immune visitors to malaria endemic areas are at greatest risk of severe or fatal illness [5].

With the rate of death cases recorded annually due to malaria infection, there is therefore a need for constant research to be carried out in endemic areas to constantly know the prevalence of this infection and all possible factors that could be responsible for the prevalence.

2. Materials and Methods

2.1 Study Area

Federal University of Technology (FUTA) is located in Akure the capital city of Ondo State, Southwest of Nigeria. Akure is located in the rain forest zone between latitude 7°15'0"N and longitude 5°11'42"E. Akure has two seasons, which includes the rain (wet) season that ranges from March to October and the dry

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season that ranges from November to February. Akure has an average annual rainfall of 2378 mm, with temperature ranging from 25.2 to 28.1℃ and relative humidity of 80%.

2.2 Ethical clearance

Prior the commencement of the research work, approval was given by the Health Research Ethics Committee (HREC) of the University, the chief medical director of the health Centre and from patients for collection of blood who were clearly informed on the aims and objectives of the research.

2.3 Blood Sample Collection

With the use of needle and syringe, through the vein, two to three milliliter of blood samples were collected randomly from Patients who came for malaria test in the Health Centre, after collection, the blood samples were transferred into an ethylendiamine tetra-acetic acid (EDTA) container to prevent coagulation of the blood sample. The collection was done from January 2015 to December 2016.

2.4 Malaria Parasite Screening

Thick blood film microscopy was done for malaria screening. With the use of pasture pipette, two-three drops of blood in the EDTA container was taken and placed on a clean grease-free glass slide, the blood on the slide was allowed to dry after which the film was stained with Giemsa stain for 15 minutes [6]. After 15 minutes, the stain was washed off rapidly with distilled water and allowed to dry. Two drops of immersion oil was added to the film and then view under the microscope at x100 objective lens for characteristics features of malaria parasite [7].

2.5 Weather data collection

Data of average rainfall and temperature of each month in year 2015 was obtained from the Metrology Department of the Federal University of Technology, Akure.

2.6 Statistical Analysis

Prevalence was calculated using the fomular; Prevalence= $\frac{Numbers\ of\ Positive\ Samples}{Total\ Number\ Examined}$×100.

The data generated were analyzed using the Statistical Package for the Social Sciences (SPSS) version 19. The statistical parameter that was used for the analysis of the data was the Pearson's Chi-Square Test, P at 0.05. All chats were created using Microsoft Excel.

3. Results

3.1 Prevalence of Malaria among Patients

The results of tests that were carried out on patients who came for malaria test showed that a total of 2,616 people were tested for malaria parasite out of which 2,058 (78.7%) were positive for malaria parasite.

3.2 Monthly Prevalence of Malaria infection in relation to mean rain fall and temperature

The month of November with an average rainfall and temperature of 78mm and 27.2^{0}C respectively recorded the highest prevalence of 95.6% of malaria infection while the month of October with an average rainfall and temperature of 287mm and 26.2^{0}C respectively recorded the lowest prevalence of 45.2% of malaria infection. Statistical analysis revealed that there was a significant difference (P = 0.01) in the prevalence of malaria for the months (Figure 1a and Figure 1b).

3.3 Prevalence of Malaria infection in relation to Sex.

A total of 1,253 male and 1,363 female Patients were tested out of which 973 (77.7%) and 1,085 (79.6%) were positive respectively. There was significant difference in the prevalence of malaria infection between the sexes (P = 0.001) (Figure 2).

3.4 Prevalence of Malaria infection in relation to Status

Figure 3 shows the Prevalence of Malaria infection in relation to Status. A total of 1,878 Students were tested out of which 1,592 (84.8%) were positive while out of 738 Staff that were tested 466 (63.1%) were positive. Statistical analysis showed that the prevalence of malaria was statistically significant (P = 0.001).

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3.5 Prevalence of Malaria Infection in relation to Age Group

Figure 4 shows the prevalence of malaria infection in relation to age group. Highest prevalence of malaria infection of 91.1% was recorded in the age group 1-10 years, followed by age groups 21-30 (79.7%), 11-20 (79.2%) while the lowest prevalence rate was recorded in age group above 60 years (56.8%). Statistical analysis revealed that there was a significant difference (P = 0.027) in the prevalence of malaria in the age groups.

3.6 Seasonal Prevalence of Malaria infection among Patients

From November to February 2015 (dry season), a total of 601 Patients were tested for malaria parasite out of which 460 (75.4%) were positive; while between the months of March to October (wet season), a total of 2,006 Patients were tested for malaria parasite out of which 1,598 (79.7%) were positive. Statistical analysis showed that the prevalence of malaria was statistically significant between the seasons (P = 0.001) (Figure 5).

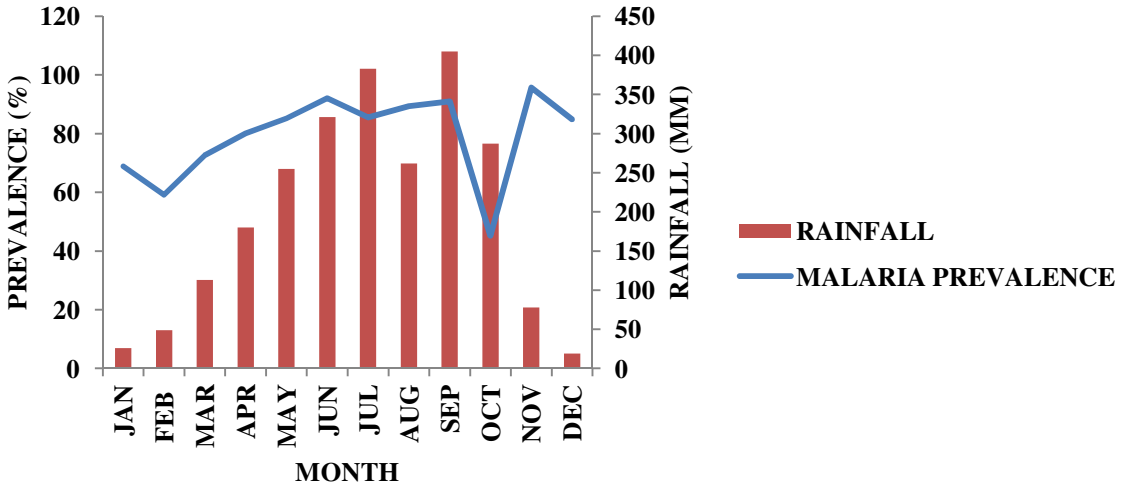

Figure 1a: Monthly Prevalence of Malaria infection among Patients in relation to the monthly mean rainfall in the study Area.
x^2=333.943, df = 1, P = 0.001

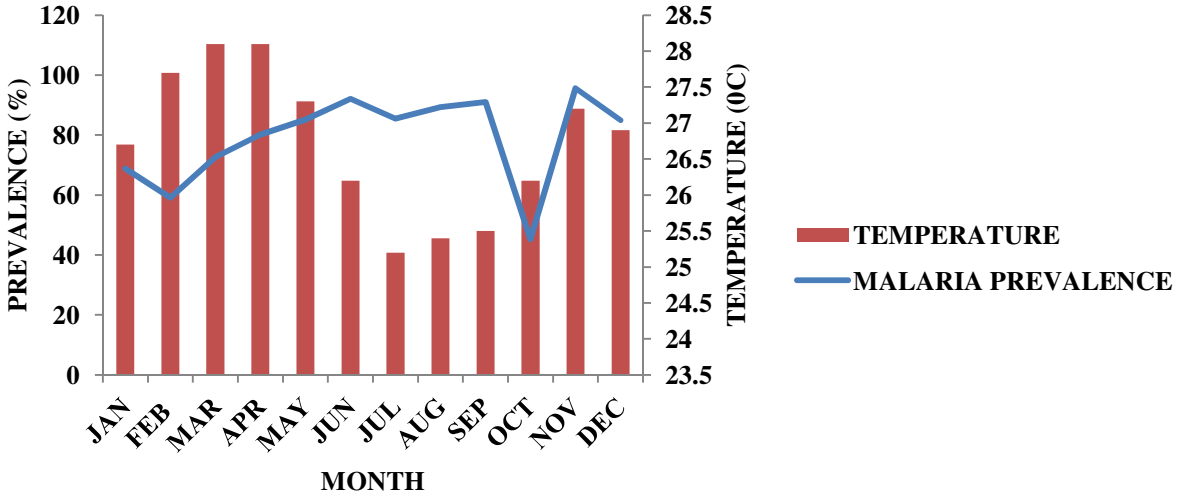

Figure 1b: Monthly Prevalence of Malaria infection among Patients in relation to the monthly mean temperature in the study Area.

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x^2=333.943, df = 1, P = 0.001

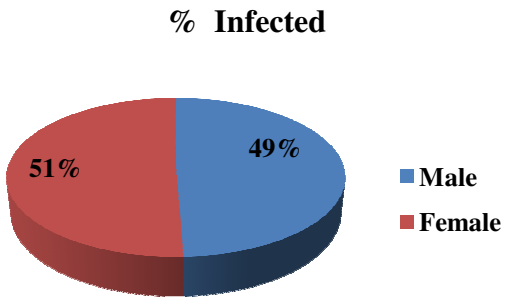

Figure 2: Prevalence of Malaria infection in relation to Sex.
x^2 =117.901, df = 1, P = 0.001

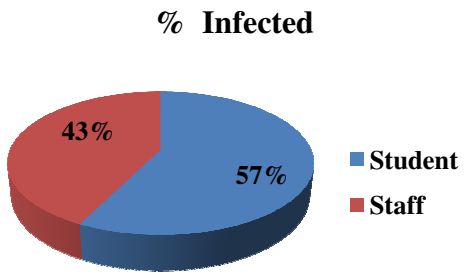

Figure 3: Prevalence of Malaria infection in relation to Status.
x^2=117.901, df = 1, P = 0.001

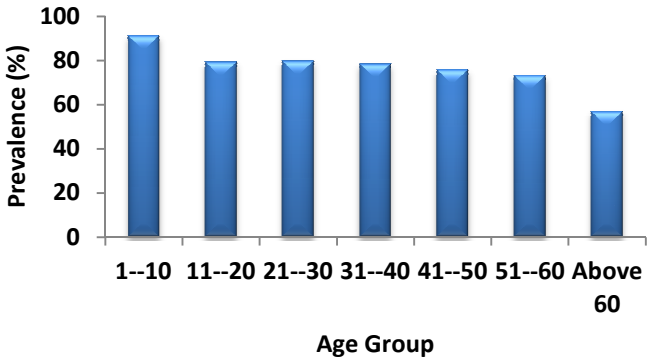

Figure 4: Prevalence of Malaria Infection in relation to Age Group
x^2= 14.294, df = 6, P = 0.027

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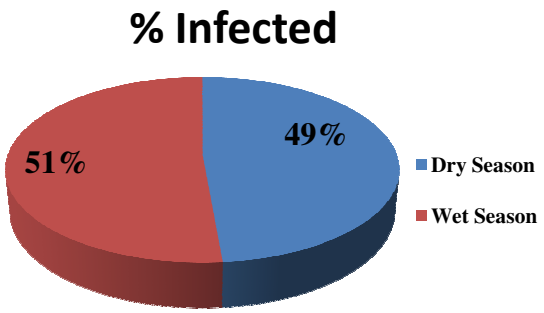

Figure 5: Seasonal Prevalence of Malaria infection among Patients
$x^2 = 117.901$, df = 1, P = 0.001

4. Discussion

The prevalence and distribution of malaria was evaluated among patients that reported for malaria test at the Health Centre of the Federal University of Technology, Akure between January to December 2015. During the study, the main species of *Plasmodium* found is *Plasmodium falciparum* which has been known to be the major cause of malaria in Africa.

The 78.7% overall prevalence of malaria infection recorded among the patients was high which correlates with 76.8% prevalence recorded by [8] among students in Igbinedion University Okada, Nigeria and 77.4% prevalence recorded in Owerri by [9]. However, the result is dissimilar to 4.5% prevalence recorded by [1] in Edo State and 6.0% prevalence recorded in Maiduguri by [10]. The variation in the prevalence of malaria infection in different part of the country might be attributed to different climatic factors [1]. The high prevalence of malaria infection in the study area might be attributed to several factors such indiscriminate disposal of waste, poor drainage, abandoned wells, and vegetation which can harbour and serve as breeding site for female *Anopheles* mosquito [11].

In respect to monthly malaria prevalence, the pattern of distribution of malaria infection between January to December revealed that there was high prevalence of the infection throughout the year. The highest prevalence was recorded in the month of November which has low average rainfall and high average temperature. This could also be attributed to the presence of *Anopheles* species such as *Anopheles funestus* that thrives well during little or no amount of rainfall [12]. The month of October with high average rainfall and low average temperature recorded the lowest prevalence. Ideally, the weather condition of October ought to favour high prevalence of malaria infection than November but reverse is the case; this could be as a result of a situation known as premonition which is a condition in which there is presence of parasitaemia but the disease is absent and sometimes individuals carry the parasites in their blood without the disease manifestation [1]. Also, the life cycle stage of the parasite in most of the examined patients could still be in the pre-erythrocytic schizogony stage (in the liver) which is not yet in the blood where the parasite can be diagnosed or disease condition can manifest.

Comparing the prevalence of malaria infection between male and female patients, it was observed that prevalence of malaria among the female patients was higher than the prevalence among the male patients. Higher prevalence among female than male was also observed by [8]. Genotype of patients attending the health centre could be attributed to high prevalence of the infection among the female patients than the male patients, the number of female patients examined might have been dominated with genotype AA which is highly susceptible to malaria infection while the number of male patients that were examined might have been dominated with either genotype AS or SS which are less susceptible to malaria infection than genotype AA. Also, exposure between the two groups might also be a factor; female patients might have been at high risk of exposure to the infection than male patients.

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High prevalence of infection was recorded among students than staff which is similar to the high prevalence also recorded by [8] among students of Igbinedion University Okada, Nigeria. This high prevalence is likely to be caused by habits of students like indiscriminate dumping of used cans, unkept environment, improper disposal of refuse that can lead to blockage of drainages, the presence of stagnant pool of water and so on which can harbour water that serves as a breeding site for *Anopheles* mosquito vectors. Other likely pre-disposing factors might be as a result of overcrowding in hostels which could increase the chance of malaria parasite transmission.

Among the age groups, it was observed that pattern of prevalence of malaria infection within the age decreases as the age group increases with the exception of age group 11-20 and 21-30, it was observed that age group 11-20 had lower prevalence than age group 21-30 which is the age group category of the students. Though all the age groups were susceptible to the infection, differences in habits could be as a result of the different prevalence values within the different age group [1]. The highest prevalence that was observed among children (age group 1-10) could be as a result of absence of acquired immunity among this age group which makes them to be highly susceptible to the infection; this reason could also be the cause of high prevalence among patients within age group of 11-20 [1]. The higher prevalence that was recorded among the students age group (21-30) than the teenage group (11-20) could be as a result of the student been exposed to an environment that enhances the transmission of the parasite. Older age groups that recorded lesser prevalence could be as a result of the adult having acquired immunity which they might have developed due to previous exposure to the infection [12].

5. Conclusion

This research has revealed that there was high prevalence of malaria infection in the study area. The study showed that patients within the children age group (1-10) are mostly susceptible to malaria infection, also, patterns of distribution of the disease in different seasons and among different groups is in a very high rate, therefore there is a need for constant check on all possible predispositional factors that could be responsible for this high prevalence, especially on the aspect of eradication of breeding sites of the *Anopheles* vectors which could be achieve through public enlightenment

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