

Prevalence of Malaria Parasites among Peoples in Fika and Potiskum Towns in Yobe State

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ABSTRACT

Malaria is a disease that is widely common in tropic and sub-tropic countries of the world. The disease is easily preventable, treatable and curable but remain a major public health problem in the sub-Saharan tropic majorly due to high level of Illiteracy, couple with negative attitude of Government. This study investigate the prevalence of malaria parasites among people in Fika and Potiskum towns in Yobe state. These was assessed using Rapid Diagnoses Test (RDT) and gold standard methods. The results revealed that the prevalence of malaria parasites are commonly among the age group of 0 – 12 years, on the gender bases however, indicated that female has the highest prevalence with the total of 3,838 for Fika General Hospitals and Dogo Nini ward Potiskum with 3,021 respectively. The study recommended that effective environmental sanitation, geared towards the clearing of bushes and gutters could substantially reduce the spread of vectors, hence reduce the incidence of malaria in endemic regions. Provision of adequate peadiatric drug formulations, targeted preventive interventions, and treatment guidelines for young infants. Other suggested measures include District Health Office and health extension workers should be involved and to increase mosquitoes nets distribution in the community, the District Health Office should also focus on reducing or eradicating malaria breeding sites by self-help group through community participation.

KEYWORDS: *Heamlysis, Anopheles mosquitoes, Merozoites, endemic, infanticide.*

1.0 INTRODUCTION

The malaria is a disease that is easily preventable, treatable and curable but remain a major public health problem. About hundred million clinical cases of malaria are reported yearly in the country. This situation is due primarily to inadequate and ultimately release of fund meant for malaria control activities (NPC, 2006). Malaria adversely affects all age groups in rural and urban communities in Nigeria. Successful control of malaria will increase productivity, improve health, reduce school absenteeism, reduce poverty and facilitate the attainment of the sustainable development goals (SDGs). The term Malaria refers to as human disease that is caused by sporozoan parasites, genus Plasmodium in the red blood cells, which is transmitted by the bite of infected female Anopheles mosquitoes. Plasmodium are organisms that cannot survive outside of their hosts (Deffrey and Sachs, 2001; WHO, 2012).

Malaria is one of the world's most vital public health challenges compromising development in countries with high level of Illiterate and accounting for up to an overwhelming 2.7 million deaths per annum (Gardner and Noor, 2002). More than 3 billion people (~40%) reside in areas of the world where malaria is prevalent. As such, the disease is largely responsible for the poor economic growth of these areas, which further contributes to more cases of malaria (Korenromp, Tran and Saier, 2005). Malaria is a complicated disease and its spread may be attributable to a variety of factors such as

ecological and socio-economic conditions, displacement of large population groups, agricultural malpractices causing an increase in vector breeding areas, parasite resistance to antimalarial drugs and vector resistance to insecticides.

In 1998, The World Health Organization (WHO) established a global partnership called Roll Back Malaria (RBM) in an attempt to halve the world's malaria frequency by 2010. Apart from RBM, a number of promising antimalarial drug and vaccine discovery projects have also been launched. This includes the Medicines for Malaria Venture (MMV) funded by a number of organizations including. The Bill and Melinda Gates Foundation, for the development of novel antimalarial. The latter has also contributed more than 300 million US dollars to the Malaria Vaccine Initiative (MVI) (<http://www.rbm.who.int>; WHO, 1998).

Malaria is one of the worldwide health problems, where Sub-Saharan Africa being the worsely affected (WHO, 2013). In Africa, malaria is not only a health problem but also a developmental problem (Gallup, Sachs and Mellinger, 2001). Studies within malaria endemic countries further suggested that economic growth is likely to go down by at least one percent (1%) due to this disease (Malaney and Russel, 2004).

This has pushed countries to allocate resources towards controlling or totally eliminating malaria. Concerted efforts that have been put in place include the use of insecticide-treated bed nets, indoor residual spraying for vector control,

chemotherapy and epidemic preparedness (Kokwaro, 2009; MOPHS, 2010).

However, the country is still far from eliminating the disease due to inadequate diagnostic equipment in health facilities, improper, non-use of insecticide treated nets (ITNs) and non-compliance with treatment regimes (Schantz-Dunn and Nawal, 2009). For example, in malaria endemic areas especially around the lake and Coastal regions, three out of five children under five years of age sleep under ITN while majority 9 out of 10 of these children in the endemic lake region sleeps in a home that has not been sprayed (Pathania, 2014b). Currently, early treatment with effective antimalarial drugs is the main life-saving intervention but treatment is threatened by the increasing resistance of parasites to the existing drugs (Laxminarayan *et al.*, 2006). The reason surrounding intensification of drug resistance emanates from inappropriate use of antimalarial drugs (WHO, 2015a). The aim of the study is to assess the prevalence of malaria among people of Fika and Potiskum towns of Yobe State.

2.0 CURRENT ANTIMALARIALS

Various drugs have been developed and used in the fight against malaria. As with the vaccines, antimalarials target different stages of the parasite life cycle within the human host and specifically interfere with processes that are essential to parasite survival. Eradication of malaria with the use of antimalarials is, however, continuously compromised by the increased prevalence of parasite resistance to the small amount of available commercial drugs. Figure 1 shows the different stages of the parasite life cycle and drugs that specifically target these stages of parasite development.

The pre-erythrocytic, asexual intra-erythrocytic and sexual exo-erythrocytic stages are shown. The different intra-erythrocytic phases of malaria parasite development are also given. Finally, drugs that have been used at each stage are shown in the dashed boxes (Chauhan, Srivastava, and Olliaro, 2001).

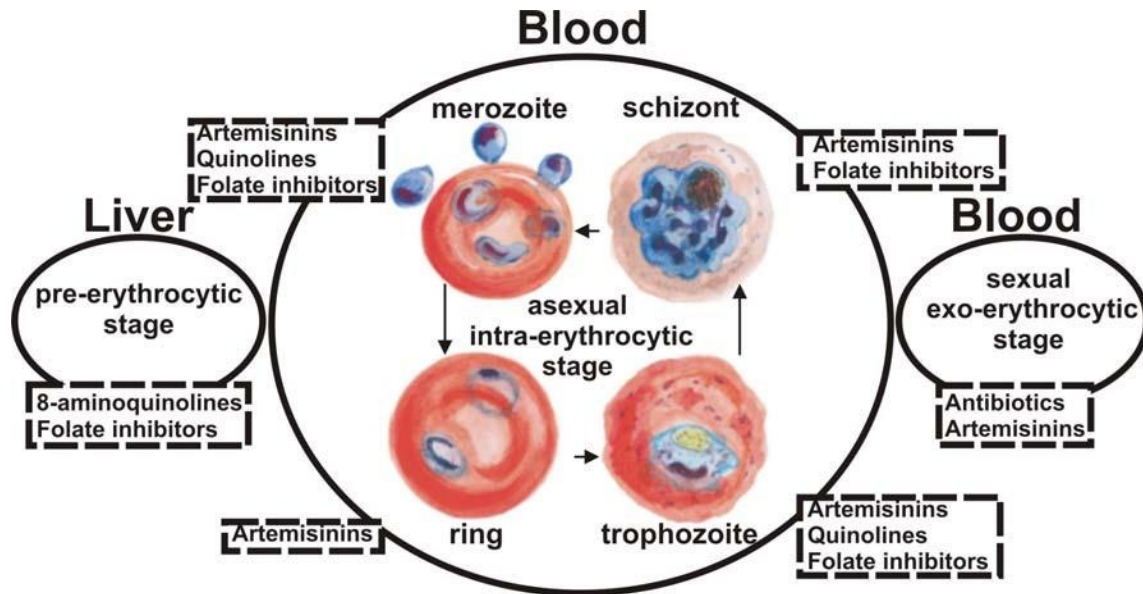


Figure 1: A schematic diagram of the parasite life cycle within the human host showing the targets of different antimalarials during the developmental stages. (Source: <http://www.cdc.gov/malaria/about/biology/index.html>)

The Prevalence

(a) Malaria is a leading cause of morbidity and mortality in the developing world, especially in sub-Saharan Africa where the transmission rate is highest and considered as a major impediment to economic development (Sachs and Malinet, 2002).

(b) Malaria is a disease which can be stopped and is a curable disease. Its causative agent is plasmodium species. The parasite is transmitted throughout the world by a specific number of anopheles vector mosquitoes. It is basically an environmental disease since it requires specific habitat with surface water reproduction or adult mosquito survival and development rate of both the vectors and parasite population are influenced by temperature (Ceccata et al., 2005).

(c) There are various reasons for the continuation and re-emergence of malaria, for example economic reasons declining control programs and mosquitoes/parasite adaptation to pesticides, drugs, and environmental changes, all contribute or play a vital role in the development and increase of malaria disease. In some countries, especially in Africa, the movement of population for political or economic reasons creates another dangerous factor for the spreading of malaria. Similarly, migrants and refugees may bring a new parasite to a new area and increase transmission in settled populations (Giada et al., 2003).

3.0 METHODS

a) Microscopy Method (Gold Standard)

A *thin film* was prepared by placing a drop of blood in the center of a microscope glass slide and using the corner of a clean slide to spread the blood to cover an area of about

10 mm². The slides was labeled using the respective patient numbers assigned at the laboratory. The slides was air dried and stained with 5% Giemsa's solution for 20 minutes, this was carried out for identification and quantitation of asexual *P. falciparum* species. The slides was rinsed under mild running tap water and allowed to air-dry. For the *Thick film*, a small drop of blood was placed at the centre of the grease free slide and spread with the edge of another slide in a repeated coil shaped to a diameter approximately 2cm. The slides was labeled and left horizontally while drying and was kept well to prevent them from dust. It was stained using 5% Giemsa stain for 20 minutes and observed microscopically under X100 oil objective lens and result was record.

b) Rapid Diagnostic Test (RDT)

A rapid lateral flow immuno-chromatographic *in vitro* antigen detection test kit Histidine rich protein 2 *Plasmodium falciparum* (HRP2Pf) was used to detect malaria in patient's blood samples according to the manufacturer's instructions. About 5 µl of blood sample

was collected using a micro-pipette provided, the whole blood was added into the "S" well and 60 µl assay buffer solution added to the "A" well and result was read after 20 minutes. The diagnostic sensitivity and specificity was determined according to World Health Organization standard, positive and negative predictive value was performed according to Manufacturer's recommendations.

4.0 RESULTS

The result of these study showed that the prevalence of malaria parasite among people attending general hospital Fika and Dogo Niniward in Potiskum towns in Yobe State. The results were shown in Bar charts below:

4.1 Age distribution

Age distribution of the patients with prevalence of malaria parasite attending general hospital, primary healthcare in Fika and Dogo Niniward ward Potiskum towns. The age groups distribution for General hospital Fika was shown in figure 2 and Dogo Nini ward Potiskum was presented in figure 3.

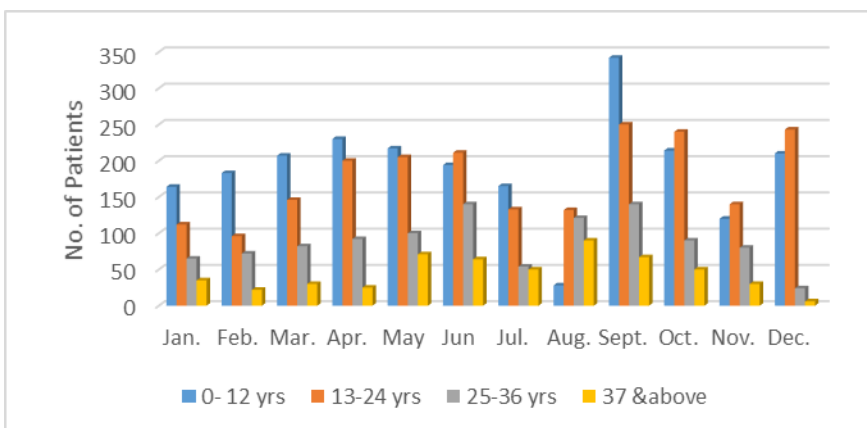


Fig. 2. Bar chart of Malaria parasites among people attending General Hospital Fika Town based on age groups from January to December, 2021

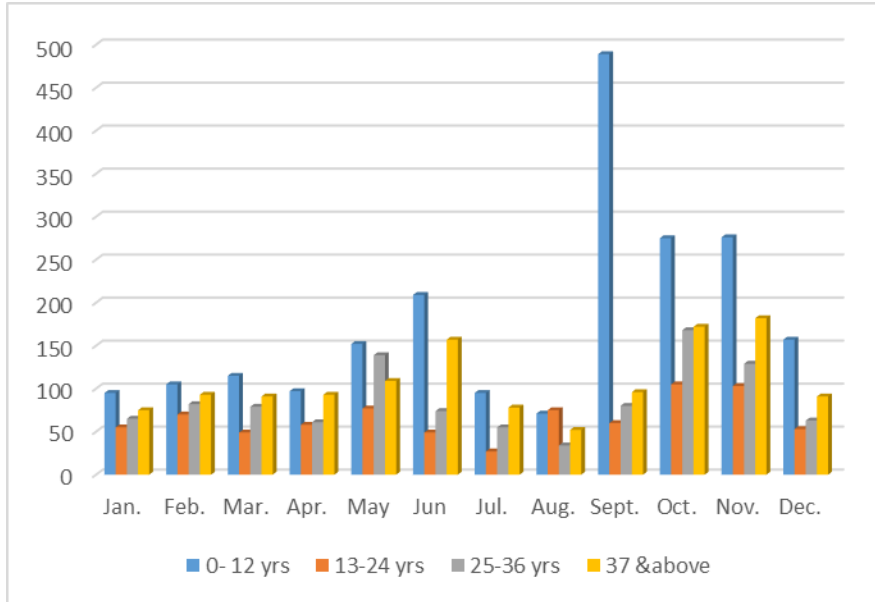
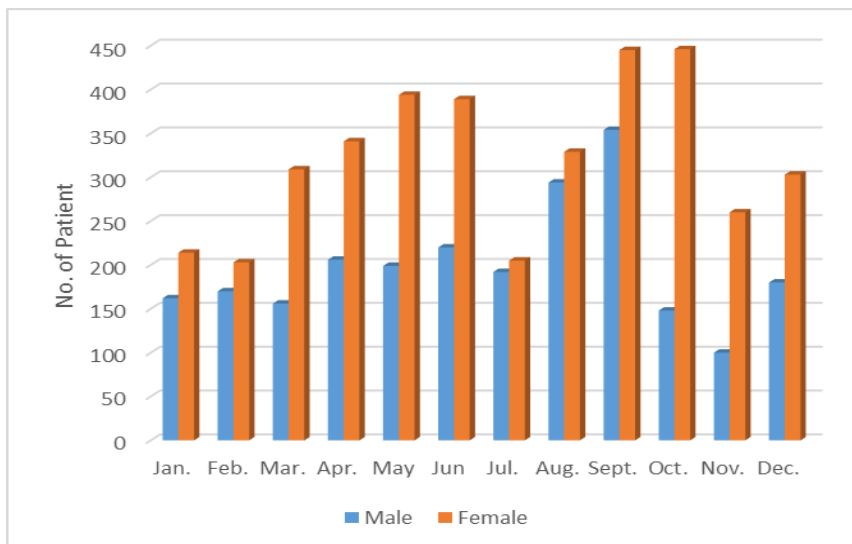


Fig. 3. Bar chart of Malaria parasites among people in Dogo Nini Potiskum based on age group from January to December, 2021

Gender Distribution of Patient with Prevalence of Malaria Parasite

Gender distribution of the patients with prevalence of malaria parasite attending general hospital, primary healthcare in Fika

and Dogo Niniward in Potiskum towns. The Gender Distribution for General hospital Fika was shown in figure 4. and Dogo Nini ward Potiskum was presented in figure 5.



Prevalence of Malaria Parasites among Peoples in Fika and Potiskum Towns in Yobe State

Fig. 4. Bar chart showing Malaria parasite among people attending General Hospital Fika Town based on gender from January to December, 2021

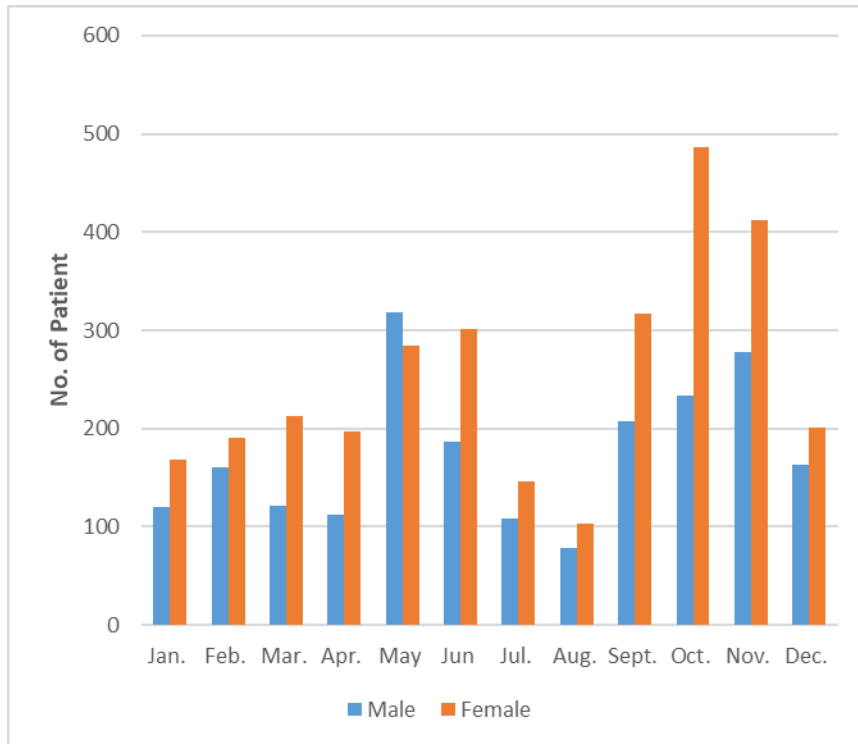


Fig. 5. Bar chart Showing Malaria parasite among people in Dogo Nini Potiskum based on Gender from January to December, 2021

5.0 DISCUSSION

Malaria is one of the world's most vital public health challenges compromising economic growth in developing countries and accounting for up to an overwhelming 2.7 million deaths per annum (Gardner *et al.*, 2002). More than 3 billion people (~40%) reside in areas of the world where malaria is prevalent. As such, the disease is largely responsible for the poor economic growth of these areas (Korenromp, Tran, and Saier, 2005). Malaria is a worldwide health problem where Sub-Saharan Africa

being the worst hit (WHO, 2013). In Africa, malaria is not only a health problem but also a development problem (Gallup and Sachs, 2001). Studies within malaria endemic countries further suggest that economic growth is likely to go down by at least one percent (1%) due to this disease (Malaney and Russel, 2004), being the worst in sub-sahara Africa, this has pushed countries to allocate resources towards controlling or eliminating malaria. Concerted efforts that have been made including the use of insecticide-treated bed nets, indoor residual

spraying for vector control, chemotherapy and epidemic preparedness (Kokwaro, 2009; MOPHS, 2010).

The General hospital Fika based on the data collected from the study indicated that the prevalence of malaria parasite is commonly among the age group of 0 – 12 years children in the January to March account for the number of 554 of patients group, the age of 13 – 24 scored 354 patients, 25 – 36 years has a number of 219 patients, while the age group of 37 years and above has a total number of 87. The month of April to June has indicated that prevalence of malaria are commonly among the children age of 0 – 12 years with number of 641 patients, followed by 13– 24 years with a total number of 616 patients, the age group of 25 - 36 account the total number of 332 while the age group of 37 and above account for 160 patients. The month of July to September also indicated that malaria parasite are commonly the children age group of 0 -12 years which account the total number of 535 followed by the age group of 13 – 24 years which account the total 515, followed by the age group of 25 – 36 years which account 311 while elderly with age of 37 and above account the number of 207.

The study also indicated that in the months of October to December the prevalence of malaria parasites are commonly occurred among the children age group of 0 -12 years which account the number of 544, followed by the age of 13 – 24 years with the total number of 623, the age of 25 – 36 years which account the number of 194 while the age group of 37 years and above account the number of 86. The study also revealed that

the prevalence of malaria parasite based on the gender, status indicated that female has the highest number with the total of 3838 while the male has a total number of 2,381.

Based on the results from the data collected from Dogo Nini ward Potiskum, the study revealed that the prevalence of malaria parasites are more affected among the age group of 0 – 12 years children in the January to March with the number of 315, while the age group of 37 years and above has a total number of 259, the age of 25 – 36 years has a number of 226 followed by 13 – 24 has followed with total number of 174. The month of April to June has shown that prevalence of malaria are commonly among the children age of 0 – 12 years with number of 458, followed by elders age group of 37 years and above with number 359, followed by 25 – 36 years with total number of 274 while 13– 24 years with a total number of 184. The month of July to September also Shows that malaria parasites are commonly among the children of age group of 0 -12 years which account the total number of 655, followed by the age of 37 and above account the number of 226, followed by the age group of 25 – 36 years which account 169 followed the age group of 13 – 24 years which account the total 162.

The study also indicated that in the months of October to December the prevalence of malaria parasites are commonly occurred among the children age group of 0 -12 years which account the number of 708, followed by the age of 37 years and above with total number of 445, the age of 25 – 36 years which account the number of 360 while the age group of 13 -24

years with a total number of 261. The study also indicated the prevalence of malaria parasite based on the gender as well as the status shows that female has the highest number with the total of 3021 while the male has a total number of 2,088.

5.1 Conclusion

Malaria, especially the predominant *Plasmodium falciparum*, is an important public health problem among the adult inhabitants of the study area. Males and those in the age group of 0–12 years are highly vulnerable groups for malaria positivity, and factors like travel history and availability of stagnant water around dwelling are the risk factors of occurrence, malaria prevalence is commonly in the month August and some in September.

The prevalence of malaria parasite observed in this study Dogo Nini ward revealed that malaria was still widespread in the study area. It was observed that malaria parasite was most prevalent between ages groups 0 - 12, but the difference between the age groups was not significant females had a higher prevalence of malaria infection than males. The prevalence of malaria is now becoming contagion especially in developing countries such as Nigeria. The issue of malaria has now become a major challenge for medical practitioners and this is becoming a public health concern.

5.2 Recommendations

The results obtained in this study areas should serve as a baseline for further treatment activities, particularly those months where the prevalence are obvious.

Awareness to educate people especially the rural communities should be intensified. The vulnerable age group 0-12 years should use ITN and Spray of insecticides.

Therefore, during the implementation of malaria prevention and control activities, special consideration should be given to personnel who travel and work away from home.

The Health Office and health extension workers should be directed to work to increase mosquitos nets distribution in the community and focus on reducing or eradicating vector breeding sites through community participation.

It is suggested that effective environmental sanitation, geared towards the clearing of bushes and gutters could substantially reduce the spread of Vectors, hence reduce the incidence of malaria in these regions.

Provision of adequate pediatric drug formulations, targeted preventive interventions, and treatment guidelines for young infants.

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