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A retrospective study of *Plasmodium falciparum* infection in Ngaski Local Government of Kebbi State, North-west, Nigeria

ABSTRACT

Malaria remains a major cause of illness and death especially among children under 5 years. It is estimated that more than one million children living in Africa especially in remote areas with poor access to health services die annually from direct and indirect effects of malaria. Studies were carried out to determine the prevalence rate of *Plasmodium falciparum* among patients presenting with fever in General Hospital in Wara, Ngaski Local Government Area of Kebbi State, Northwest, Nigeria. Data were collected from Nine thousand and eighty-eight patients were collected from year 2014 through 2016 from Medical Record Department. Data were analyzed using Chi-square test. Out of the 9088 patients sampled, 5861(64.49%) were positive of the infection. Year 2015 had the highest visitation 3450 patients out of which 2393 (59.39%) were positive this was closely followed by year 2014 which had 2990 visitation out of which 1720 (57.52%) were positive of the infection and year 2016 had the lowest patients visitation 2648 of which 1748 (56.01%) were positive. There was significance difference in the prevalence of *P. falciparium* in three years. Result in this study showed that male had higher infection rate 2574 (77.16%) than female patients 3287 (57.15%). Subjects above 5 years of age had a higher infection rate 2913 (68.05%) and Subjects less than 5 years of age had a lower infection rate 2948 (61.32%). Chi square test shows that there is a significance difference between infection rate and sex.

Keyword: Malaria prevalence, *Plasmodium falciparum* infection, Ngaski

1.0 INTRODUCTION

Malaria is an infectious disease caused by Species of *Plasmodium* a parasitic protozoan and is transmitted by infected female Anopheles mosquitoes which infect the red blood cells [1]. According to WHO [2] Malaria remains the leading cause of mortality and morbidity in sub-Saharan Africa, with 208 million cases and 863,000 deaths reported in 2008 Depending on the region, malaria may be perennial or epidemic, and transmission stable or unstable.

It is characterized by cycles of chills, fever, pain, sweating, feeling tired, vomiting, and headaches. In severe cases it can cause yellow skin, seizures, coma, or death [1]. Symptoms usually begin ten to fifteen days after being bitten. If not properly treated, people may have recurrences of the disease months later [3].

Malaria is a common disease and it continues to be one of the most widely spread health hazards in tropical and subtropical regions. More than half of the world's population lives in the areas where they remain at risk of malarial infection [4].

WHO estimates that in 2015 there were 214 million new cases of malaria resulting in 438,000 deaths [5]. Olupot-Olupot and Maitland [6] have estimated the number of cases at between 350 and 550 million for *falciparum malaria*. The majority of cases (65%) occur in children under 15 years old and also pregnant women being at risk of the infection [7]. According to Hartman [8] About 125 million pregnant women are at

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risk of infection each year; in Sub-Saharan Africa, maternal malaria is associated with up to 200,000 estimated infant deaths yearly.

The number of new cases has declined by 25% globally and deaths from malaria have fallen by 42% [5]. However, current tools and treatments are insufficient to achieve elimination in many countries and the cost of maintaining these interventions has reached several billion dollars a year. The malaria vector has developed resistance to currently available insecticides and the parasites have also developed resistance to drugs and these resistant strains will spread. Infected individuals who are asymptomatic are the majority of those infected and they remain an ongoing source of transmission. Despite increasing efforts to control the disease, the burden of malaria has remained high in many African countries due to persistent high level of transmission [9].

An estimated 627,000 people died from malaria in 2012, 90% of them in Sub-Saharan Africa. Nigeria, the Democratic Republic of Congo, Uganda, Ethiopia and Tanzania account for 50% of the global deaths and 47% of all malaria cases [5]. The vast majority of cases occur in children under the age of five years and pregnant women [4].

Periodic study in this direction is critical and important to monitoring and evaluating malaria intervention programmes. The study therefore was aimed at knowing the status of *Plasmodium falciparum* infection in Ngaski Local Government of Kebbi State, Northwest, Nigeria.

2.0 Methodology

2.1 Study Area

This study was carried out in Ngaski Local Government Area of kebbi state, Northwest Nigeria and it is on the Shore of Kainji Lake. Its headquarters are in area in the town of wara. The Local Government is in the Southern part of Kebbi State and sharing boundaries with Yauri Local Government at the North, Magama Local Government area at the North East and South West by River Niger and New Bussa all in Niger State. The town lies between latitude 10^0 05' N and Longitude 4^0 10' E of the equator. It has an area of 2,633km2 and a population of 124,766 according to 2006 national census [10]. The state consists primarily of Sudan savanna type vegetation, with an annual mean rainfall of 800-900 mm, a temperature that ranges between 25–40 °C and a relative humidity of 47.43 %. The town has two seasons. The rainy season usually runs from April-October and the dry season November- March. The main occupation of the people is farming.

2.2 Study subjects

Data were collected from Medical Record/Health Information System Department of General Hospital, Wara, Ngaski Local Government Area of kebbi State, Nigeria. These set of age group are chosen because they are the most susceptible to malaria (under 12yrs).

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2.3 Ethical Approval

The Wara General Hospital Management Board gave the ethical approval for this study and the Head of Department, Medical Record/Health Information Department was notified and permission granted to obtain the data.

2.4 Epidemiological data

The summary of the data for the assessment of prevalence was collected for the period of three (3) years (2013-2016).

2.5 Data Analysis

Data obtained were summarized and analyzed using Chi Square test. (P=0.05)

3.0 RESULTS

The result in table 1 shows the number of patients presented with fever within three years. Out of the 9,088 patients sampled, 5,861 (64.49 %) were positive. Year 2015 had the highest visitation 3450 patients out of which 2393 (59.39%) were positive this was closely followed by year 2014 which had 2990 visitation out of which 1720 (57.52) were positive of the infection and year 2016 had the lowest patients visitation 2648 of which 1748 (56.01%) were positive. There was significance difference in the prevalence of *P. falciparium* in three years.

Table 1: prevalence of *Plasmodium falciparum* in Wara for three years

Year	No. examined	No. positive	Percentage prevalence (%)
2014	2990	1720	57.52
2015	3450	2393	59.39
2016	2648	1748	56.01
Total	**9088**	**5861**	**64.49**

The result in table 2 showed distribution of *P. falciparum* based on age and sex. Out of the 3336 male patients examined 2574 (77.16%) were positive and 5752 female patients were examined 3287 (57.15%) were positive. Patients above 5 years of age had a higher infection rate 2913 (68.05%) and children less than 5 years of age had a lower infection rate 2948 (61.32%). Chi square test shows that there is a significance difference between infection rate and sex. Figure 1 shows the prevalence of *P. falciparium* infection base on age, age 5 and above had a higher infection rate, out of the 4281 patients sampled 2913 (68.05%) were infected and age ≤ 5 years had a lower infection rate, out of the 4807 patients sampled, 2948 (61.32%) were positive of the infection.

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Table 2: Distribution of *P. falciparum* based on age and sex at the General Hospital Wara

Age(years)	Sex					
	Male			Female		
	No examined	No Positive	% Prevalence	No examined	No Positive	% Prevalence
≤ 5	1936	1295	66.89	2871	1653	57.58
5above	1400	1276	91.14	2881	1634	56.71
Total	**3336**	**2574**	**77.16**	**5752**	**3287**	**57.15**

Table 3 shows the prevalence of infection based on sex and age. When age was considered, children above five years of age had the highest rate of infection in the year 2016, 1511 (63.1%) followed by children below five years of age 1033 (60.1) and the lowest infection rate was seen in children less than five years of age in 2015 (882 (36.9). Chi-square test shows a significance difference.

Table 3: shows the distribution of malaria in relation to age and sex from 2014-2016

Data Obtained			NO Examined		No of Positive Cases		
Year	**Age (years)**	**Male**	**Female**	**Total**	**Male**	**Female (%)**	**Total (%)**
2014	0≤5	642	910	1552	491(28.5)	542(31.5)	1033(60.1)
	5 and above	458	980	1438	328 (19.1)	359(20.9)	687(39.9)
	Total	**1100**	**1890**	**2990**	**819 (47.6)**	**901(52.4)**	**1720(57.52)**
2015	0≤5	952	1001	1953	412 (17.2)	470 (19.6)	882(36.9)
	5 and above	516	981	497	606 (25.3)	905 (37.8)	1511(63.1)
	Total	**1468**	**1982**	**3450**	**1018 (42.5)**	**1375 (57.5)**	**2393(59.39)**
2016	0≤5	342	960	1302	392(22.4)	641(36.7)	1033 (59.1)
	5 and above	426	**920**	**1346**	345 (19.7)	370 (21.2)	715 (40.9)
	Total	**768**	**1880**	**2648**	**737 (42.2)**	**1011(57.8)**	**1748(56.01)**

Figure 1 Pie-chart shows the percentage distribution of infection base on age. Out of the 5480 children less than 5 years examined 2058 (68.05%) were infected and children above 5 years had a lower infection. Out of the 4281 examined 2900 (60.32%) were positive.

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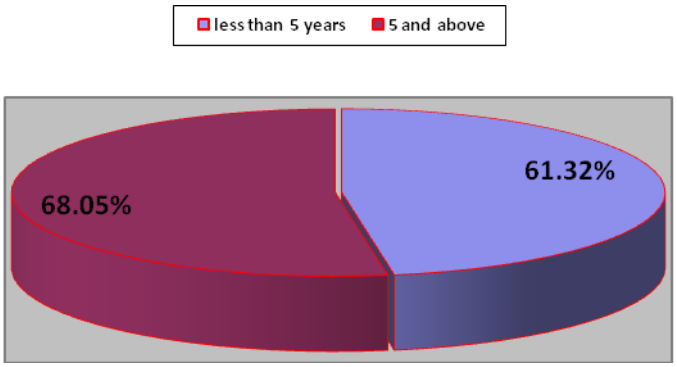

Figure 1 Pie-chart showing percentage distribution of infection base on age

4.0 DISCUSSION

The overall prevalence of 64.50 % reported in this study confirmed the statement that Nigeria is known for high prevalence of malaria and it is a leading cause of morbidity and mortality in the country [4, 11]. The prevalence of 64.50 % reported in this study is higher than the 59.60% reported by Singh [12] in Aliero, 29.2 % reported by Fana [13] in Argungu local government within the same Kebbi state and 56.0% reported by Singh [12] in Sokoto North-west Nigeria. The result obtained in the study was also higher when compared to the study outside the same ecological zone as Sam-Wobo [14] reported a prevalence of 53.5% in Ogun State. The increase in the prevalence when compared with past studies in the same ecological zone may be attributed to low control in the study area and also the presence of stagnant water which may have promoted the breeding of the malaria vector. The result of this study is lower when compared with the report of Aribodor [15] in Idiowu and 76% reported by Aribodor [15]in Azia all in Anambra state Southeast Nigeria and Adefioye [16] and Marielle [17] recorded a prevalence of 72 and 70% among pregnant women in Oyo state, Nigeria and Gabon, respectively. The low prevalence recorded in the study area when compared to the aforementioned report may be associated with unfavourable environmental condition that promotes the breeding of the malaria vectors and parasites.

It was observed in this study that children with age's ≤5 years had the highest prevalence of *P. falciparium* infection as compared with age 5 and above. This may be attributed to the fact that at that age ≤5 have their immunity to parasitic infections not fully developed. Although it has been established that the immunity derived from mothers could be very effective in younger children but the inability of children of this age to ward-off induced mosquito attacks predisposed them to the infection. Infection rate in Children above 5 years of age was found to be lower this may be attributed to the fact that older children have developed immunity against *P. falciparium* [18]. The prevalence of parasitic infections among the different age groups in

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the present study was not significant (P< 0.05) indicating that the occurrences of these infections on these age groups were the same.

Prevalence of *P falciparium* was statically significant (P>0.05) as the Male subjects were found to be more infected than the female. The study is consistent with the previous reports discussed elsewhere ([19, 20, 21, 22, 23]). However, males were at higher risk of malaria infection due to exposure, and inherent and cultural determinants [24, 25]. According to Krogstad [26] females have better immunity to parasitic diseases and this was attributed to genetic and hormonal factors.

CONCLUSION

The study revealed a high prevalence of *P. falciparum* among rural populations in Kebbi State may be due to the geographical area of the study location because it is closer to River Niger. Hence, there is need for urgent control measures to reduce malaria prevalence significantly in this local Government. Also Public health education campaign be organised to create awareness that may lead to reduction of vectors of malaria infection and control of the disease especially in young children, Insecticide Treated Nets (ITN) should be made available to mothers so that the for children and they should be treated with antimalaria drugs every three months to prevent malaria and to kill (if any) the early stage of malaria parasite.

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