

## Prevalence of Malaria Parasitemia among Children between 1 - 10 Years Old Attending Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria

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### Abstract

This study investigated the prevalence of malaria parasites among children between 1 - 10 years old attending Federal medical Centre, Yenagoa, Bayelsa state, Nigeria. The samples were collected from 534 children (including males and females) between 1 - 10 years of age on admission in Federal Medical Center, Yenagoa, Bayelsa state. The malaria parasite were analyzed following standard procedures. General prevalence was 38.58%. Based on different ages, prevalence was 37.05% (1year old), 35% (2 years old), 40.91% (3 years old), 39.47% (4 years old), 50 % (5 years old), 52.17% (6 years old), 40 % (7 years old). The 8 years old, 9 years old and 10 years old recorded 66.7%, 50 % and 33.33% respectively. Furthermore, prevalence showed that malaria affects certain age grades more than the others. This suggests variations of innate immunity among a given population.

**Keywords:** Bayelsa State; Children; Malaria; Yenagoa

### Introduction

Malaria is one of the complex health challenges in SubSaharan Africa [1]. Okeke., *et al.* [2] and Okafor and Oko-Ose [3] reported that malaria is a major cause of morbidity and mortality. Malaria is a parasitic infection transmitted through mosquito bites [4-5] especially infected female *Anopheles* mosquitoes. According to Okafor and Oko-Ose [3], malaria is one of the deadly parasitic infections.

Malaria is a vector borne infectious disease caused by the genus *Plasmodium* and transmitted through bites from infected *Anopheles* mosquito from one person to another [2,6]. The main species that commonly cause malaria include *Plasmodium ovale*, *P. falciparum*, *P. vivax* and *P. malariae* [2,7]. Of these, *P. falciparum* and *P. vivax* are the most common in the tropics but mixed infections with two or more of the *Plasmodium* species are common [7]. Also, the main vectors of human malaria are *Anopheles gambiae*, *A. funestus*, *A. arabiensis* and *A. melas* [8]. Of these, *A. arabiensis* is most dominant in the Savannah areas and cities [8].

Nearly 50% of the global population is at risk of malaria [4]. Idowu [5] also estimated that over 40% of the world population is at risk of malaria especially in the poorest nations. Malaria leads to an estimated death of 2million children per annum worldwide [3]. Similarly, the Nigeria Malaria Fact sheet [9] reported that malaria affects 3.3 billion people in world in 106 countries and territories. In Africa, approximately 1million children in rural areas lacking access to health facilities die per annum from malaria related effects [8]. This could be due to high fatality rate of < 3days after developing the symptoms [8]. As such malaria is one of the world's greatest childhood killers and it is a substantial obstacle to social and economic development in the tropics.

Anaemia is one of the main complications of malaria leading to death [3]. Austin., *et al.* [1] reported that anaemia in children resulting from malaria could lead to blood transfusion by the patient probably due to high mortality rates. Malaria is preventable, treatable and curable. There is no known immunity, thus it is an efficient and unrepentant killer [3].

Malaria is endemic in several regions of the world especially in sub Sahara Africa. According to WHO, out of 216 million cases of malaria in 2010, 81% was in the African region [9]. For instance, it is endemic in Nigeria [10]. Nmadu., *et al.* [8] reported that malaria is holoendemic in the rural areas and mesoendemic in the urban areas. Nmadu., *et al.* [8] reported that malaria is a major cause of death in pregnant women and children < 5 years. Of the 655,000 malaria deaths in 2010, 91% was in the African Region, and 86% were children under 5 years of age [9]. Malaria is the 3<sup>rd</sup> leading cause of death in children after pneumonia and diarrheal disease in the world.

Approximately 50% of global malaria cases occur in Nigeria, Democratic Republic of Congo, Ethiopia, and Uganda [9]. As such malaria is the 2<sup>nd</sup> leading cause of death from infectious diseases in Africa, after HIV/AIDS leading to death of 1 out of 5 children under 5 years of age [9].

Nigeria is a large country with population of over 170 million. Over 97% of the Nigerian population is at risk of malaria. About 100 million cases are reported per annum leading to the death of about 300,000 [9]. Prevalence of 41 - 50% occurs in the North West, North Central and South West; 31 - 40% occurs in the South-South and North East and 21 - 30% occurs in South Eastern Nigeria in children between 6 to 59 months [9].

Prevalence studies and other community based malaria surveys are vital tools for assessing the impact and effectiveness of malaria control measures and programmes at local and national levels [10]. In Nigeria, several studies have been conducted on prevalence of malaria in children. Some of the locations include General Hospital Makarfi, Markarfi, Kaduna state [10], 2 -15 years old children visiting Gwarinpa General Hospital Life-Camp, Abuja [8], school children (4 - 12 years old) in Angiama community, Southern Ijaw local Government Area, Bayelsa state [4], children aged six months to eleven years (6 months - 11years) in a tertiary institution in Benin City of Edo State [3], Community survey and patients attending outpatient unit of hospital in Anambra state [2], Isu community in Onicha Local Government Area of Ebonyi State, Southeast Nigeria, Isu Community [7]. But information about the prevalence in 0 - 10 years old children receiving treatment from Federal Medical Center, Yenagoa is scarce in literature, hence the need for this study.

## **Materials and Methods**

### **Study Area**

Bayelsa state has vast wetland and sedimentary basin characterized by depression and fishing is the major occupation of the natives of the area [6]. Yenagoa metropolis, is the capital of Bayelsa state. Several water bodies are found in the area including rivers, creeks, creeklets etc, which empties into the Atlantic Ocean [6]. Wastes including solid, and sewage are dumped into the water bodies especially in communities aligning surface water bodies [11]. The climatic condition of the area is peculiar to other areas in the Niger Delta region of Nigeria and have been widely reported by Ogamba., *et al* [12-14].

### **Study Population**

The study population was made up of 534 male and female children of 1 - 10 years of age. The children presented the symptoms of malaria and were on admission in the Children Department (Ward) in Federal Medical Centre, Yenagoa, Bayelsa state. The study was carried out between January to April 2016. Ethics Committee of the Federal Medical Centre, Yenagoa, Bayelsa state approved the experimental protocol and the parents of the patients were notified of the study.

### **Sample collection and Laboratory Procedures**

Blood samples were aseptically collected from the left thumb of the respondents using a sterile lancet. Before collection, the thumb was cleaned with cotton wool dampened with 70% ethanol to remove dirt and oils from the ball of the finger. Then the thumb was stroked to stimulate blood circulation and gentle pressure was applied on the finger before it was gently punctured by the sterile lancet [15,16]. Thick and thin blood films were made on clean slides and labeled accordingly as recommended by the World Health Organization (WHO) [15,16]. Microscopy was carried out according to the method previously described by Cheesbrough [15] and Mukherjee [16]. Rapid diagnostic test kit manufactured by Orchid Biomedical System, Verma G09-403722, India, was used to examine blood samples for Plasmodium

parasites using the manufacturer’s guidelines. The kit works on the principle of immunochromatographic methods capturing *Plasmodium* antigen in the blood against its specific antibody in the buffer.

**Statistical Analysis**

Cross tabulation was carried out using SPSS version 16. Significance difference was determined by Pearson chi square at  $P < 0.05$  to determine whether the prevalence was significantly different or not. The percentage occurrence was computed and Microsoft excel was used to plot the chart.

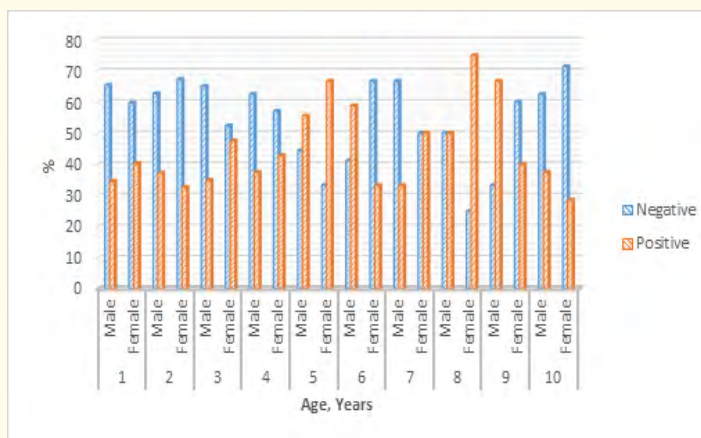
**Results**

The prevalence of malaria parasite in children of 1 - 10 years of age in the study area with a total population size of 534 Children were examined. The degree of parasitaemia versus sex of various age groups in Federal Medical Center Yenagoa, Bayelsa State, is presented in Table 1 and the percentage distribution of the degree of parasitaemia versus sex is presented in Figure 1. The overall prevalence rate was 38.58%.

Age/Years	Sex	Degree of Parasitaemia			Significance Level at P = 0.05
		Negative(-Ve)	Positive(+Ve)	Total	
1	Male	104	55	159	Significant, i.e. level of Parasitaemia is not independent of sex
	Female	71	48	119	
	Total	175 (62.95%)	103 (37.05%)	278	
2	Male	32	19	51	Not Significant, i.e. level of Parasitaemia is not independent of sex
	Female	33	16	49	
	Total	65 (35%)	35 (65%)	100	
3	Male	15	8	23	Not Significant, i.e. level of Parasitaemia is not independent of sex
	Female	11	10	21	
	Total	26 (59.09%)	18 (40.91%)	44	
4	Male	15	9	24	Significant, i.e. level of Parasitaemia is not independent of sex
	Female	8	6	14	
	Total	23 (60.52%)	15 (39.47%)	38	
5	Male	4	5	9	Significant, i.e. level of Parasitaemia is not independent of sex
	Female	2	1	3	
	Total	6 (50%)	6 (50%)	12	
6	Male	7	10	17	Significant, i.e. level of Parasitaemia is not independent of sex
	Female	4	2	6	
	Total	11 (47.82%)	12 (52.17%)	23	
7	Male	4	2	6	Not Significant, i.e. level of Parasitaemia is not independent of sex
	Female	2	2	4	
	Total	6 (60%)	4 (40%)	10	
8	Male	1	1	2	Not Significant, i.e. level of Parasitaemia is not independent of sex
	Female	1	3	4	
	Total	2 (33.33%)	4 (66.66%)	6	

9	Male	1	2	3	Not Significant, i.e. level of Parasitaemia is not independent of sex
	Female	3	2	5	
	Total	4 (50%)	4 (50%)	8	
10	Male	5	3	8	Not Significant, i.e. level of Parasitaemia is not independent of sex
	Female	5	2	7	
	Total	10 (66.66%)	5 (33.33%)	15	

**Table 1:** Degree of Parasitaemia versus sex of Federal Medical Center (FMC), Yenagoa, Bayelsa State.



**Figure 1:** Percentage Occurrence of Malaria in Children between the Ages of 1-10 Years.

A total of two hundred and seventy eight (278) 1-year old children were examined. 55 (34.6%) male and 48 (40.3%) female children tested positive respectively. Statistically, there was significant difference ( $p < 0.05$ ). For the 2 years old a total of One Hundred (100) children were examined. 19 (37.3%) males and 16 (32.7%) females were positive. The result showed no significant difference at ( $p \geq 0.05$ ). In the 3 years old, 8 (34.9%) males and 10 (47.6%) females were positive. The result showed no significant difference at ( $p \geq 0.05$ ).

Ages 4, 5 and 6 years old, 9 (37.5%) males and 8 (57.1%) females, 5 (55.6%) males and 1 (66.7%) females, 10 (58.8%) males 2 (33.3%) females were positive respectively. Statistically, there was significant difference ( $p < 0.05$ ). In the ages 7, 8, 9, and 10 years old, 2 (33.3%) males and 2 (50.0%) females, 1 (50.0%) male and 3 (75.0%) females, 2 (66.7%) males and 2 (40.0%) females and 3 (37.5%) males and 2 (28.6%) females were positive respectively. The result showed no significant difference at ( $p \geq 0.05$ ).

### Discussion

Prevalence of malaria found in this study had some similarity with the work of other authors. For instance, Umaru and Uyaiabasi [10] reported prevalence of 35.7% for children  $< 5$  and  $> 15$  in patient attending General Hospital Makarfi, Kaduna state. Ani., *et al.* [7] reported prevalence of 37.5% in Isu community in Ebonyi state. But lower than the values previously reported by some authors. Nmadu., *et al.* [8] reported prevalence of 64% in 2 -15 years old children visiting Gwarinpa General Hospital Life-Camp, Abuja. Abah and Temple [4] reported prevalence of Study of prevalence of malaria parasite among asymptomatic primary school children in Angiama community, Southern Ijaw local Government Area, Bayelsa state as 63.3%. Okeke., *et al.* [2] reported overall prevalence of malaria in a community survey and patients attending outpatient unit of an hospital in Anambra State as 46.30 % and 94.60 % respectively. Observed difference could be due to variations in target population. The variation could be associated with socio- economic and general life pattern of the

people of a given demography. Also it could be due to the fact that this study was conducted just before the onset of the raining season which is the best season for their breeding.

Based on Figure 1, the level of parasitemia is higher in children of 5, 6, 8 and 9 years. This observation is comparable to the work of Austin, *et al.* [1], who reported that higher levels of parasitemia occur between 5 - 9 years in both males and females. The authors further reported that children had medium levels of parasitemia, which typically decreases as the age increases. Furthermore, Umaru and Uyaiabasi [10] reported children between 5 - 15 years had a higher infection rates compared to children < 5 and >15 years. Nmadu, *et al.* [8] reported that malaria infection was found to be most prevalent among 2 - 5years old, (29%) while ages 6 - 10 and 11 - 15years had 17.5% infection rates respectively. Abah and Temple [4] reported prevalence of malaria parasite among asymptomatic primary school children in Angiama and showed that children within the ages of 4 - 6years were more infected (41.1%) than children in other age ranges (7 - 9years 36.3% and 10 - 12years 22.6%). Okafor and Oko-Ose [3] reported that children between the ages of ½ and 2 years had the highest prevalence of Plasmodium infections (158.57%) compared with the other age groups (>2 - 11)with frequency of 41.43%.

Based on gender, male children generally suffered more malaria bouts compared to their female counterpart. This is in consonance with the study of Umaru and Uyaiabasi [10] reported that males were more prone to malaria than females. Nmadu, *et al.* [10] reported prevalence based on gender to include male (67%) and female (61%) in children. Abah and Temple [4] reported prevalence of 56.8% and 43.2% for males and females respectively in children between 4 - 12 years. Okafor and Oko-Ose [3] reported prevalence of 57% and 43% for male and female children aged six months to eleven years (6 months - 11 years).

In the 1 - 3 year old children, the prevalence was fairly low and could be attributed to the presence of maternally derived antibodies, social life style, awareness, prevention, early report of cases etc by parents. Furthermore, in 2 - 3 years old, there is loss of immunity derived from the mother, social status, irregular immunization. In the 4 years old children the prevalence was fairly high and this could be attributed to social status and life style, poor prevention, late report of cases etc by parents. The high prevalence could be attributed to exposure of children to mosquito bites from their various environments and less protective measures. Low immunity may also contribute to high prevalence rate of malaria. In 8 - 10 years old children, high prevalence of malaria in this community could be attributed to the environment with lots of water which encourages vector breeding since epidemiologic patterns of malaria infection are governed by environmental parameters that regulate vector populations of mosquitoes. It appears that as they grow older, they become more careful with precautionary measures against the transmission of malaria parasite infections and are more likely to adhere to instructions of sleeping under insecticide-treated nets.

## **Conclusion**

Malaria remains the leading cause of death in children under 6 years in this region. The prevalence of malaria in infants and children between 1 - 10 years is high, which is in agreement with the findings of other workers in malaria endemic countries. It was observed that children of ages 3, 5, 6, 8 and 9 years have high prevalences of malaria. This study has shown an overall prevalence of malaria of 38.58% infections among children examined in children attending Federal Medical Center (FMC) Yenagoa, Bayelsa State. This result shows that the prevalence of malaria is still relatively high in the study area.

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