Prevalence of Malaria *Plasmodium* among Children in Abeokuta, Nigeria

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Abstract
This study was carried out in Abeokuta, Ogun State, South Western Nigeria between April 2013 and August, 2013. A total of 76 subjects; (32 males and 44 females) blood samples were collected from subjects within age 10 years old attending, Federal Medical Centre, Abeokuta, Ogun State. Thick and thin blood films were prepared for each person.These were stained using field's stain A (eosin) and field's stain B (methyl azure). The stained films were examined under the microscope, using oil immersion at 100x magnification. Twenty four (31.6%) of the blood samples showed presence of *Plasmodium* which indicate positive results while 52(68.4%) did not showed presence of *Plasmodium* which indicate negative results. Thus, this study further confirmed the presence of Plasmodium among children in Abeokuta, Nigeria. General surveillance and public health education to stop the spread of the malaria among children in Abeokuta and indeed the whole society is advocated.
[Olasunkanmi OI Akingbade OA, Akinjinmi AA, Okerentugba PO, Onajobi IB, Okonko IO. **Prevalence of malaria *Plasmodium* among children in Abeokuta, Nigeria.** *Academ Arena* 2013;5(10):44-47] (ISSN 1553-992X). http://www.sciencepub.net/academia. 8
Keywords: Prevalence, malaria *Plasmodium*, children, Abeokuta, Nigeria

Introduction

Malaria caused by protozoan parasites of the genus *Plasmodium*, remains the most prevalent tropical disease in the world today. Each year, it causes disease in approximately 650million people and kills between one to three million, most of them, young children in sub-Saharan Africa (Ekwebene, 2012). It is one of the deadly widespread of all parasitic diseases in the world (Guinovart *et al*., 2006; Vaughan *et al*., 2008). The four known species of *Plasmodium* genus that cause human malaria are *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale and Plasmodium malariae* (Duchemin *et al*., 2001) and they contribute to majority of human health problem in malaria endemic regions of the world (Mohan and Ramaswamy, 2007). They are spread from one person to another through the bites of haematophagous anthropophilic female adults of mosquitoes belonging to the insect genus *Anopheles*. These adult female *Anopheles* mosquitoes are, hence said to be carriers or malaria parasites.

Over 500 million people suffer clinical malaria episodes annually caused by *Plasmodium* infection alone resulting in a conservative estimate of 1 million deaths (Guinovart *et al*., 2006; Vaughan *et al*., 2008). Malaria affects people particularly in tropical and sub-tropical regions of the world. Its remains the most complex and overwhelming health problem facing humanity (Ekwunife *et al*, 2011).

Malaria is characterized by periodic bouts of severe chills and high fever. It is one of the most significant public health problems in Nigeria and the commonest cause of ill health in Africa (WHO, 1992). In Nigeria, statistics show that malaria accounts for 25% of under-five mortality, 30% of childhood mortality and 11% of maternal mortality. All Nigerians are at risk of malaria and the problem is compounded by the increasing resistance of malaria to hitherto cost-effective antimalaria drugs (Robert *et al*., 2003).

Nigeria is known for high prevalence of malaria and it is a leading cause of morbidity and mortality in the country. Records have shown that at least 60 percent of the Nigerian population suffers from at least one episode of malaria each year (Ekwebene, 2012).

Malaria remains one of the world's greatest childhood killers and is substantial obstacle to social and economic development in the tropics (Ekwebene, 2012).

The signs and symptoms of malaria typically begin 8–25 days following infection (Fairhurst and Wellems, 2010) however, symptoms may occur later in those who have taken antimalarial medications as prevention. (Nadjm and Behrens, 2012). Initial manifestations of the disease—common to all malaria species—are similar to flu-like symptoms (Bartoloni and Zammarchi, 2012) and can resemble other conditions such as septicemia, gastroenteritis, and viral diseases (Nadjm and Behrens, 2012). The presentation may include headache, fever, shivering, joint pain, vomiting, hemolytic anemia, jaundice, hemoglobin in the urine, retinal damage (Beare *et al*, 2006) and convulsions.

Consequences of severe malaria include coma and death if untreated, young children are especially vulnerable in endemic areas. Treatment is often less satisfactory and the overall fatality rate for all cases of malaria can be as high as one in ten. Children with malaria frequently exhibit abnormal posturing, a sign indicating severe brain damage. It causes cognitive impairment, which is more in children (Ekwebene, 2012).

The aim of this study is to determine the prevalence of malaria *plasmodium* among children within age 10years old in Abeokuta, Nigeria.

Methods

Study area

This study was carried out in Federal Medial Centre, Abeokuta between April, 2013 and August, 2013. Abeokuta is the capital city of Ogun State located in the forest zone of south western Nigeria.

Study population

A total of 76subjects; (32 males and 44 females) blood samples were collected from subjects within age 10 years old attending, Federal Medical Centre, Abeokuta, Ogun State.

Samples collection

The blood samples were collected using venepuncture technique. A tourniquet was fastened to the upper arm of the patient to enable the index finger feel a suitable vein. The site of the collection was cleansed with methylated spirit (methanol) and venepuncture made with the aid of a 21 G needle attached to a 5 mL syringe. The blood samples collected were transferred into an EDTA bottle immediately. Thick and thin blood films were prepared for each person according to the technique outlined by Cheesebrough (2004).

Laboratory Analysis

The air dried thick and thin blood films were stained using field's stain A (eosin) for 5 seconds, washed off gently in clean water, dipped in field's stain B (methyl azure) for 5seconds and washed off in clean water and air-dry. The stained films were examined under the microscope, using oil immersion at 100x magnification to observe for *Plasmodium* parasites. Presence of ring forms of *Plasmodium* and Trophozoites of *Plasmodium* indicate positive results. A blood smear was considered negative if no parasite is seen after 10 minutes of search under 100 high power fields of microscope.

2.5. Data Analysis

The prevalence for malaria *Plasmodium* was calculated by using patients with positive samples as numerator and the total numbers of patients enrolled in this study as denominator. The data generated from this study were presented using descriptive statistics. The data was subjected to Fisher's Exact Test for comparison of proportions to determine any significant relationship between infection rate, age and gender.

Results

A total of 76 blood samples were collected, thirty two were from male children while forty four were from female children. Children within age ≤ 1 had highest number while children within age ≤ 5 had the least number. The age and sex distribution of the children were in table 1 below.

Table 1*:* Age and Sex distribution of children tested.

Age groups (Years)	No. Males (%)	No. Females (%)	Total (%)
≤ 1-5	13	22	35
6-10	19	22	41
Total	32	44	76

Of the 76 children screened for the presence of malaria *Plasmodium*, 24(31.6%) had presence of *Plasmodium* which indicate positive results while the remaining 52(68.4%) had no *Plasmodium* which indicate negative results (Table 2). Table 2 shows the prevalence of malaria *Plasmodium* in relation to ages of children. It showed that children ≤ 5 years old (34.2%) had higher prevalence of malaria *Plasmodium* than age 6-10 years (29.3%). However, this difference was not significant (P>0.05).

Table 2: Prevalence of positive malaria *plasmodium* among children in relation to age

Age groups (Years)	No. Tested (%)	No. Positive (%)
≤ 1-5	35(46.1)	12(34.2)
6-10	41(53.9)	12(29.3)
Total	76(100.0)	24(31.6)

The distribution of malaria *plasmodium* between the sexes showed that out of the 32 male

children screened, 10 (31.2%) were positive for malaria *plasmodium* while 22 (68.8%) were negative for malaria *plasmodium*. Among the 44 female children screened, 14(31.8%) were positive for malaria *plasmodium* while 30(68.2%) were negative for malaria *plasmodium*in (Table 3). However, this difference was not significant (P>0.05).

Table 3: Distribution of malaria *plasmodium* among children in relation to sex

Sex	No. Tested (%)	No. Positive (%)
Males	32(42.1)	10(31.2)
Females	44(57.9)	14(31.8)
Total	**76(100.0)**	**24(31.6)**

Discussion

The study determines the prevalence of *Plasmodium* infection among children within age 10 years old in Abeokuta. The result showed that the prevalence of *Plasmodium* infection among children within age 10 years old is 31.6%. This is lower compared to the prevalence of 59.9% reported in a study by Ojo and Mafiana (2005) among children <15 years in Abeokuta, Southwestern Nigeria and 51.5% documented in a study by Epidi*et al*. (2008) in Abakaliki, Southeastern Nigeria. It is also lower than 45.0% prevalence reported for placental malaria (PM) among HIV infected mothers in rural Rwanda (Bulterys et al., 2011).

The 31.6% overall prevalence of *P. falciparum* amongst children reported in this study is comparable to the 30.0% reported by Okonko et al. (2012) among children in Ibadan. It is also comparable to the 24.3% reported by Kuadzi et al. (2011) among children in Ghana. Similar prevalence has also been reported previously in Ibadan, Nigeria (Okonko *et al.*, 2010).

The 31.6% overall prevalence of *Plasmodium falciparum* infection in the study population is higher compared to the 9.34% reported by Greenberg et al. (1991) among children in Kinshasa, Zaire. Atif *et al*. (2009) reported an incidence rate of 10.5% malaria infection among patients in Hyderabad, Sind, Pakistan. In other West African urban areas, malaria prevalence ranges from 2% to 16% have been reported with large variation between communities (Sabatinelli *et al*., 1986).

Malaria affects all ages and both sexes. This present findings showed no significant difference between sexes for malaria infection (31.8% vs. 31.2%, P >0.05). A predominance of malaria infections in males has been documented in some cases, but there is no scientific evidence to prove the higher prevalence being related to gender as susceptibility to malaria infection is not influenced by gender (Abdullahi *et al*., 2009; Okonko et al., 2012).

With regards to the age distribution of the children, this study showed no significant difference between age groups and malaria infection (34.2% vs. 29.3%, P >0.05). This deviates from what was reported in some studies.

The prevalence rate in this study still showed that, malaria is still a burden in Nigeria, particularly in Abeokuta, despite all that has been done. The result showed that malaria affects all the age groups, and both sexes. The prevalence of *P. falciparum* in these subjects is a reflection of the prevalence of malaria *Plasmodium* in the population.

Majority of the subjects screened lived in urban areas. The stagnant drainage systems in Abeokuta Metropolis might be one of the environmental conditions that favoured the breeding of mosquitoes that act as vectors of malaria *Plasmodium* in this area.

Community participation and health education strategies gear in promoting awareness of malaria and the importance of control measures can be used to reduce the incidence of malaria in Africa. Mosquito nets will help keep mosquitoes away from people and significantly reduce infection rates and transmission of malaria. Nets treated with an insecticide kill the mosquito before it has time to find a way past the net.

Mass treatment as a means to reducing *P. falciparum* transmission was used during the first global malaria eradication campaign and is increasingly being considered for current control programmes (Okell et al., 2011). Malaria can be greatly reduced in Nigeria through vector control programs, in conjunction with monitoring and treatment of infected humans.

Other factors such as, the draining of wetland breeding grounds for agriculture and changes in water management practices, and advances in sanitation. Other malaria preventive measures such as use of insecticide-treated mosquito nets should also be emphasized during counseling sessions (Imani et al., 2011). Finally, according to World Health Organization (1992), prompt and accurate diagnosis of malaria is the key to effective disease management and therefore it is one of the main interventions of the global malaria control strategy.

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