International Journal of Pharmaceutical Science Invention
ISSN (Online): 2319 – 6718, ISSN (Print): 2319 – 670X
www.ijpsi.org || Volume 4 Issue 5|| May 2015 || PP.27-31

The prevalence of *Plasmodium falciparum* in children below 12 years presenting with malaria infection in Sagamu community

[1]Okunye O L, [2,] Odeleye, F. O, [3,] Adeboye, S
[1, 2, 3,] *Department of Pharmaceutical Microbiology, Olabisi Onabanjo University, Ogun State*

ABSTRACT: *This study was conducted out to determine the prevalence of Plasmodium falciparum in children below 12 years presenting with malaria infection in Sagamu community. Two hundred samples of the children below 12 years of age comprises of 120 females and 80 males visiting Olabisi Onabanjo University Teaching Hospital were examined for malaria infection of which 140(70%) were confirmed by microscopy to be positive to Plasmodium falciparum. The gender ratio of the infected patients to microscopy were 80 females to 60 males . Of the total samples examined, 100 (71%) patients were recorded within the age group below 6 years while 40(29%) were above 6-12years of age. Thus, there is need for more awareness on the prevalence of Plasmodium falciparum especially amongst children and cases of fever and other malaise feelings.*

KEYWORDS: *Prevalence, Plasmodium falciparum, Malaria infection.*

I. INTRODUCTION

Malaria is a mosquito-borne infectious disease of humans and other animals caused by parasitic protozoans which is a type of single cell microorganism of the plasmodium. It remains one of the world's greatest childhood killers and is substantial obstacle to social and economic development in the tropics (Ekwebene, 2012).

The impact of the malaria burden is much more devastating among children particularly in sub Saharan African region. Almost all of the malaria deaths in sub-Saharan Africa occur in children below five years of age and this translates to the child mortality of nearly 1 million each year (Hopkins *et. al*., 2007). Malaria is the most prevalent tropical disease in the world today with about 216 million cases of malaria and an estimated 3.3 billion people reported at risk, thus malaria is still a major public health issue [W HO, 2011]. Each year, it causes disease in approximately 650 million people and kills between one and three million, most of them, young children in Sub-Saharan Africa (Hay *et.al.,* 2004). Indeed, a child dies of malaria every 30 seconds, a death toll of about 3000 children every day in the sub region alone [WHO, 2003, 2008].

The high burden of childhood *Plasmodium falciparum* is considered as more dangerous than the other three species (*P. vivax, P. malariae and P. ovale*) of the human malaria parasites because greater than 80% of malaria-related morbidity and mortality occurs in sub-Saharan Africa due to infections with Plasmodium falciparum [WHO, 2005]. *Plasmodium falciparum* is probably the single most important pathogen encountered by children growing up in sub-Saharan Africa. Symptoms usually begin ten to fifteen days after being bitten [WHO, 2014]. In humans, malaria is caused by *Plasmodium falciparum, Plasmodium malariae, Plasmodium ovale,Plasmodium vivax*and*Plasmodium knowlesi*(Muellerie*t.al*.,2007).

Everyone living in an endemic area becomes infected with *Plasmodium falciparum* during childhood. The sub-Saharan Africa remains the region with the highest burden of malaria accounting for nearly 90% of global malaria deaths because *Plamodium falciparum* is the predominant species and the most effective malaria vector. The *Anopheles gambiae* is the mosquito arthropod vectors aid the spread of this infection.

Sagamu is community in Ogun state, located 50 km north of Lagos state, in southwest Nigeria. The town is spread over 614 Km^2 (237/Sqm) with an estimated population of 228,382. A large proportion of the population commutes to the city of Lagos daily for work or other commercial activities. Malaria is highly endemic in the area, accounting for most outpatient visits in the health facilities. Transmission occurs all year around with an upsurge in the rainy season -June to September (Salako*et.al.,*1990). The community is served by several schools, hospitals (Primary Health Care Centers, Private and Tertiary Hospitals), banks and hotels.

Methods

Study area

This study was carried out in Olabisi Onabanjo University Teaching Hospital, Sagamu on the targeted population of 200 children below the age of 12 years old.; (80 males and 120 females) resident within sagamu community.

Samples collection

Blood Samples were collected from 200 Symptomatic patients presenting with cases of fever to the Department of parasitology of the Olabisi Onabanjo University Teaching Hospital. Thick film and thin films were made into triplicate from EDTA bottles within 10 minutes of collection.

Microscopy

Duplicate labeled slides were use for thick and thin blood film preparation Two drops of the blood was placed on the Slide for thick film and a drop was placed for thin film.

The thin film preparation:

The methyl alcohol fixed smears were placed in staining tray of Giemsa's solution for 30 minutes, the preparation were washed under running tap water and covered for about 15 second with buffer, the slide was allowed to dry in a draining rack and were examined with the oil immersion objective.

The thick film preparation: The smear dried blood protected from dust and flies after 18 hours were stained with Giemsa's and were allowed to stay for 45 minutes, the preparation was flooded with buffered water and were washed gently in the water. The slides were allowed to dry and were examined with the oil immersion objective.

Rapid diagnostic test

A drop of about (20µL) of the blood sample was taken with a pipette dropper to the one step malaria anti-*plasmodium falciparum* serum well, (90 µL) of the diluents buffer was added to the sample. The result was read and interpreted within 5-15 minutes .

II. RESULTS

In this study, 200 blood samples of infected patients were examined, Of the total samples collected, there were 120 female and 80 male samples. The total number of samples confirmed with malaria infection caused by *plasmodium falciparum* was 140 children of which 80 were females while 60 males children were recorded in the ratio of 4:3 respectively. For the rapid diagnostic test, amongst 140 samples observed, 43(30.7 %) tested positive for malaria caused by *Plasmodium falciparum* while 97(69.3%) tested negative as shown in Table1 and Table 2 below.

TABLE 1.0 : PERCENTAGE SAMPLE DISTRIBUTION

GENDER DISTRIBUTION	Total samples	Infected samples	Percentage (%)
Male	80	60	43
Female	120	80	57
Total	200	140	100

TABLE 2.0: AGE AND GENDER DISTRIBUTION OF THE INFECTED SAMPLES

AGE GROUPS (YEARS)	TOTAL	NUMBER OF MALES	PERCENTAGE OF MALES(%)	NUMBER OF FEMALES	PERCENTAGE OF FEMALES(%)
≤1	41	23	38.3	18	22.5
1-3	32	11	18.3	21	26.25
4-6	27	14	23.3	13	16.25
7-9	21	5	8.3	16	20
10-12	19	7	11.7	12	15

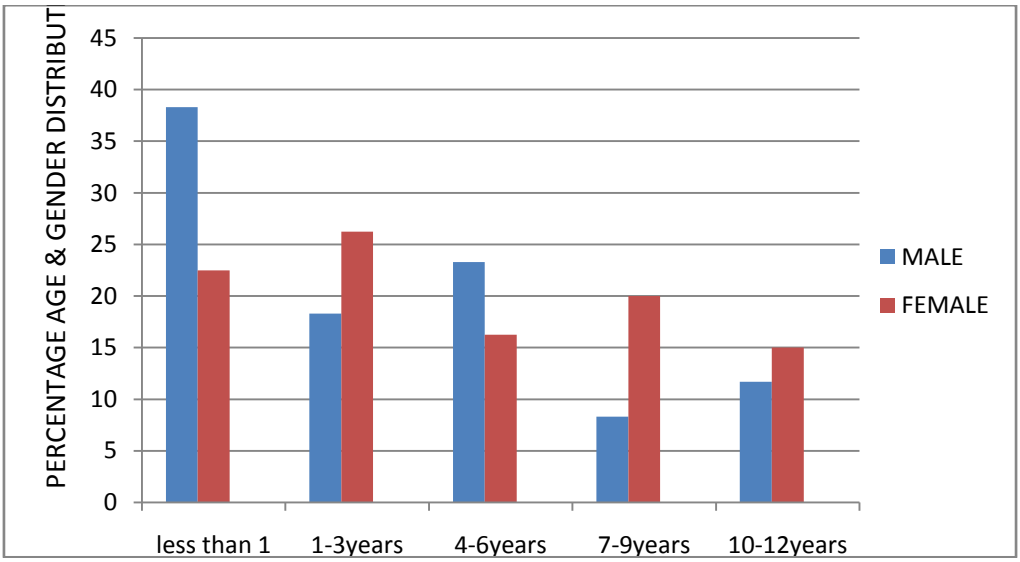

FIG 3.1: Showing the percentage age and gender distribution of infected samples

TABLE 3.0 DISTRIBUTION OF DIAGNOSTIC METHOD

Age range(year)	**Frequency**	**MICROSCOPY (Thick and thin)**	**RDT**	
			Positive	**Negative**
Below 1	41	41	13	28
1-3	32	32	10	22
4-6	27	27	8	19
7-9	21	21	7	14
10-12	19	19	4	15
TOTAL	140	140	42	98

III. DISCUSSION AND CONCLUSION

Two samples presenting with the symptoms of malaria fever were examined in this study. Of the 200 samples examined, 6o samples were tested negative to malaria infection, though presented with malaria symptoms, the absence of *Plasmodium falciparum* in these samples which could non-malarial parasitic infections or bacteria presence, having similar symptoms to malaria, examples of such conditions are cold, flu, some viral infections, rickettsia(tick bite diseases), hepatitis – causing jaundice; acute renal(kidney) failure – causing diminished urine output; diabetes – causing deepacidotic breathing gastroenteritis, typhoid fever, meningitis, high temperature(fever), chills, headache, sweats, tiredness, nausea/vomiting, dry cough, muscle ache (Nordqvist, 2013).

However, 140 samples tested were positive for malaria infection, eliciting the prevalence of malaria in Sagamu community, which agreed with the findings of Ekwebene, that malaria remains one of the world's greatest childhood killers and is substantial obstacle to social and economic development in the tropics (Ekwebene, 2012).

Though, there is relatively low variation in the gender distribution of the parasite in this study in the ratio of 80(57%) to 60(43%) as elicited in Table 2.0 , the disparity in values amongst both genders affects both sexes and susceptibility to malaria infection is not influenced by gender (Okonko et al., 2012), This also agreed with the finding of (Mbanugo and Ejim 2000) who reported that sex did not affect the prevalence among children.

All the 140 positive samples examined for malaria infection were caused by *plasmodium falciparum* which is in line with the findings of World Health Organization 1992 who report that sub-Saharan Africa had the highest burden of malaria accounting for nearly 90% of global malaria deaths caused by *Plasmodium falciparum* l [WHO,1992] and also with the findings of Achidi et.al., 1997.

Also, samples less than 1year had the highest number of samples with 41,followed by samples between ages 1-3years with a total number of 32. Samples between ages 4-6years had 21 patients while subjects between ages 7-9years and 10-12years had 21 and 19 infected patients. The prevalence of malaria is lower among children above 6 years, in this study could be attributed to developed immunity against plasmodium parasite (Brown, 1980) as a results previous exposure to infective mosquitoes each year and become clinically immuned (Greenwood *et.al*.,1987).

All the 140 samples tested positive for malaria infection caused by *Plasmodium falciparum* using the microscopy technique. The use rapid diagnostic test kit, for patients below 1year elicited 13 positive while 28 negative, In patients between 1-3years;10 were tested positive while 22 tested negative, for patients between 4-6years; 8 were tested positive while 19 were negative, for patients between 7-9years, 7 were recorded to be positive while 14 were tested negative and in patients between 10-12years, 4 were tested positive and 15 were negative to t rapid diagnostic test. 30% of the samples examined were RDT positive while 70% were RDT negative. The microscopy tests elicited 100% positive on the samples examined, thereby indicating the effectiveness of microscopy method of diagnosis over Rapid Diagnostic Test kit, which agreed with the findings that microscopic detection and identification of plasmodium species in Giemsa- stained thick blood film(for screening the presenting malaria parasite) and thin blood films for species' confirmation) remains the gold standard for laboratory diagnosis (McMorrow*et.al*., 2008).

The rapid diagnostic test kit may have provided such results because the kit used is an antibody based thereby can only indicate a positive result when the body's immune system has produced antibodies of all isotypes (IgG, IgM, fgA) specific to *Plasmodium falciparum* . Thereby, a negative result doesn't preclude the possibility of malaria *Plasmodium falciparum.*

The prevalence of *Plasmodium falciparum* in children below the age bracket of 12 years old in this study justifies the initial findings of many authorities on the epidemic of malaria infection in sub-sahara Africa which could be attributed to many cultural lifestyle and environmental problems. It is therefore recommended that the general public must be aware of the complications of *Plasmodium falciparum* and be encouraged to maintain clean environment, provide adequate balanced diet that boos immunity against malaria infection. Also, the use of bed nets should be encouraged to reduce transfer of infection

REFERENCES

[1]. Annal Tropical Medical Parasitology 1990, 84:435-445.
[2]. Bartoloni A, Zammarchi L (2012). "Clinical aspects of uncomplicated and severe malaria".Mediterranean Journal of Hematology and Infectious Diseases4 (1): e2012026.
[3]. Beare NA, Taylor TE, Harding SP, Lewallen S, Molyneux ME (2006)."Malarial retinopathy: A newly established diagnostic sign in severe malaria". American Journal of Tropical Medicine and Hygiene75 (5): 790–7.
[4]. Cerami C, Frevert U, Sinnis P, Takacs B, Clavijo P, Santos MJ, Nussenzweig V. 1992. The basolateral domain of the hepatocyte plasma membrane bears receptors for the circumsporozoite protein of Plasmodium falciparum sporozoites. Cell. 1992;70(6):1021-33.
[5]. Department for International Development DFID.Fact Sheet-Malaria 2004. http://www.dfid.gov.uk/pubs/files/malaria-factsheet.pdf
[6]. Dondorp AM, Ince C, Charunwatthana P, Hanson J, van Kuijen A, Faiz MA, et.al., 2008. Direct in vivo assessment of microcirculatory dysfunction in severe falciparum malaria. J Infect Dis ;197(1):79-84.
[7]. Ekwebene O. 2012. Malaria: Prevalence and control infants and pregnant women: Nigeria.
[8]. Fairhurst RM, Wellems TE (2010). "Chapter 275.Plasmodium species (malaria)". In Mandell GL, Bennett JE, Dolin R (eds). Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases2 (7th ed.). Philadelphia, Pennsylvania: Churchill Livingstone/Elsevier. pp. 3437–3462. ISBN 978-0-443-06839-3.
[9]. Florens L, Washburn MP, Raine JD, Anthony RM, Grainger M, Haynes JD, et al. 2002.A proteomic view of the Plasmodium falciparum life cycle. Nature ;419(6906):520-6.
[10]. Greenwood BM, Bojang K, Whitty CJ, Targett GA (2005)."Malaria".Lancet 365:
[11]. Hay S, Guerra C, Tatem A, Noor A and Snow R (2004). "The global distribution and population at risk of malaria: past, present and future." Lancet 4(6):327-236.
[12]. Hopkins, H., Talisuna, A., Whitty, C.J.M. &Staedke, S.G. (2007) Impact of home based management of malaria on health outcomes in Africa: a systematic review of the evidence. Malaria Journal 6, 134.
[13]. Idro, R, Otieno G, White S, Kahindi A, Fegan G, Ogutu B, Mithwani S, Maitland K, Neville BG, Newton CR. (2007). "Decorticate, decerebrate andopisthotonic posturing and seizures in Kenyan children with cerebral malaria". Malaria Journal 4 (57). Online biomed Central.
[14]. McMorrowwMI,MasanjaMI,AbdullaSM,KahigwaE,Kachur SP2008. Challenges in routine implementation and quality control of rapid diagnostic tests for malaria-RufijiDistruct,Tanzania.Am J Trop medicine hyg.;79:385-390.
[15]. Mutis MCS, Martinez-Espinosa FE, Albuquerque BC, et al2005. Malária. In: Coura JR. Dinâmica das doençasinfecciosasparasitárias. Rio de Janeiro: Guanabara Koogan; p.833-58.
[16]. Nadjm B, Behrens RH (2012). "Malaria: An update for physicians". Infectious Disease Clinics of North America26 (2): 243–59.
[17]. Nations Children's Fund; 2005.http://rbm.who.int/wmr2005

[18]. Ojurongbe O, Ogungbamigbe TO, FagbenroBeyioku AF, Fendel R, Kremsner PG, Kun JF 2007. Malaria Journal 6: 41. Rapid detection of Pfcrt and Pfmdr1 mutations in *Plasmodium falciparum* isolates by FRET and in vivo response to chloroquine among children from Osogbo, Nigeria.
[19]. Salako LAS, Ajayi FO, Sowunmi A, Walker O: Malaria in Nigeria. A revisit.
[20]. Siqueira-Batista R, Gomes AP, Ramos Júnior AN, et.al., 1999. Malária (Parte 1 de 2) J Bras Med; 77:30-7.
[21]. Snow, R.W., Korenromp, E.L. &Gouws, E. (2004) Pediatric mortality in Africa: Plasmodium falciparum malaria as a cause or risk? American Journal of Tropical Medicine & Hygiene 71, page 16–24.
[22]. Trampuz A, Jereb M, Muzlovic I, PrabhuR(2003). "Clinical review: Severe malaria." Critical Care 7 (4): 315-23.
[23]. Uneke, C.J. (2009a) Impact of home management of Plasmodium falciparum malaria on childhood malaria control in sub-Saharan Africa. Tropical Biomedicine 26, 182–199.
[24]. Vaughan, A. M., Aly, A. S. I., and Kappe, S. H. I. (2008). Malaria parasite Pre-Erythrocytic Stage Infection: Gliding and Hiding. Cell Host and Microbe 4, 209 - 218.
[25]. Wernsdorfer WH, McGregor I, editors. Malaria: principles and practice of malariology. Edinburg: Churchill Livingstone; 1988.
[26]. White NJ, Breman JG. Malária. In: Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL, Loscalzo J. Harrison 2008 medicinainterna. 17a ed. Rio de Janeiro: McGraw-Hill do Brasil; p. 1280-94.
[27]. WHO (1997) World malaria situation in 1994.Weekly Epidemiological Record 72, 285-290.
[28]. WHO Severe falciparum malaria. World Health Organization, Communicable Diseases Cluster Trans R Social Tropical Medicine Hygiene 2000;94Suppl 1:S1-90. Review.
[29]. World Bank, 1993.World Development Report 1993: Investing in Health. New York: Oxford University Press.
[30]. World Health Organization, 1996. World malaria situation in 1993.Weekly Epidemiology Record 71:17–22.