



Prevalence of Malaria Parasites among Pregnant women and Children under five years attending General hospital in Ikole, Ekiti State, Nigeria

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Abstract

Malaria is a major public health problem in Nigeria. The study was carried out to determine the prevalence of malaria among pregnant women and children below 5 years in Ikole, Ekiti State, Nigeria. A total of 480 samples were collected which comprised of 380 from pregnant women and 100 from children under five years. Malaria parasites were examined microscopically on thick and thin blood smear stained with Giemsa stain, personal data were collected orally and from file records and were analyzed using Chi-square test. *Plasmodium falciparum* was identified to be the most predominant in the sampled groups. The results showed that out of 380 pregnant women sampled, 153 (40.3%) were positive for malaria parasites while out of 100 children sampled, 63 (63%) were also positive. The highest prevalence of malaria parasites (51.8%) and (71.1%) were observed in ages 36-39 and 3-4 for pregnant women and children respectively. Multigravidae pregnant women recorded higher prevalence of (41.7%) while (37.5%) prevalence was observed in primigravidae. Women in the first trimester were more infected with malaria parasites (75.0%) than those in second trimester (23.2%) and third trimester (51.9%). Pregnant women with genotype AA had the highest prevalence (49.5%) of malaria parasites while the highest prevalence of (76.1%) was also recorded in women with blood group O with least prevalence of (53.6%) in blood group AB. In children under five years of age, females were more positive (66.7%) with malaria parasites than males (58.1%) however, there was no significant difference. Children with genotype SS recorded a prevalence of (87.5%) but the number sampled was very low. Statistical analysis showed a significant difference in genotype types ($P < 0.05$). Malaria infection showed a high level of endemicity in the study area, hence, there is need to incorporate the laboratory components into the RBM strategy by enhancing parasite diagnosis at all levels of health care.

Keywords: Children, Pregnant women, Malaria parasite, Genotype, Gravidity, Nigeria.

Introduction

Malaria kills more than one million people every year, most of them in Sub Saharan Africa, where malaria is a leading cause of death for children under five years and pregnant women (WHO, 2008). In Sub Saharan Africa, malaria in pregnancy is predominantly asymptomatic and yet a major cause of severe maternal anaemia and low birth weight babies strongly associated with marked increase in infant mortality (Adefoye, 2007).

Malaria is endemic in Nigeria and its existence is well recognized and surveys reporting the prevalence in various communities in Nigeria (Epidi *et al*, 2008; Onyido *et al*, 2010; Opara *et al*, 2011). Available records show that at least 50 percent of the population of Nigeria suffers from at least one episode of malaria each year (Ejezie *et al*, 1991). High level of malaria endemicity, parasite resistance to affordable drugs and inadequate access to treatment facilities has contributed to making the disease the leading killer of children, accounting for an estimated 300,000 deaths each year. Also, many researchers have reported high prevalence rates of malaria in pregnancy in different parts of the country, ranging from 19.7% to 72.0% (Okwa, 2003), with anaemia, pregnancy miscarriages and low birth weight of babies identified as the most debilitating effects of the disease which accounts for 11% of maternal deaths in the country (Federal Ministry of Health, 2000).

Transmission of malaria is intense and stable in Nigeria because the intensity of attack remains constant throughout the year or from year to year (Federal Ministry of Health, 2000). Okwa *et al*, (2009) reported that malaria is holoendemic in Nigeria, with *Plasmodium falciparum* accounting for ninety five percent of all infections in the country and *P. malariae* accounting for the remaining 5%. Malaria is a serious disease affecting adults and children but it is more severe among children and pregnant women (Jimoh *et al*, 2007; Obi *et al*, 2012). This study was carried out to determine the prevalence rates of malaria in pregnant women and children below five years in Ikole, Ekiti State, Southwest Nigeria.

Methodology

Study Area and Population

Ekiti State is one of the thirty-six States which constitute the Federal Republic of Nigeria. The study was carried out in Ikole which is a local Government headquarter. Most of the residents are mainly farmers while some are traders and civil servants.

Data Collection

Prior to data collection, permission was obtained from the state Ministry of Health and from the Chief Medical Director of Ikole General hospital. The parental consent of the children sampled was obtained and that of the pregnant women. 380 pregnant women and 100 children below five years of age who visited the hospital were involved. Structured Questionnaire was used to obtain information such as age, stage of pregnancy, gravidity, period of last episode of malaria and bio-data. Data collection was between May and September, 2014.

Sample collection and parasitological screening:

Blood sample for parasite estimation, blood group determination and genotype assay were collected using venepuncture method as described by Cheesbrough, (1992). Preparation of thick and thin blood films was carried out using Giemsa staining method. The slides were interpreted according to WHO (1991) protocol. Blood group were determined using the commercial anti-A, B and D blood grouping sera as described by Manson *et al*, (1977). Also, haemoglobin electrophoresis was performed on cellulose acetate to determine the genotype (Dacie and Lewis, 1991).

Statistical Analysis

The data was analyzed using Chi-square at 5% level of significance.

Results

Out of the 380 samples collected from the pregnant women, 153 (40.2%) were positive for malaria infection. Of the 128 primigravidae sampled, 48(37.5%) were infected with malaria parasite while the highest prevalence of 105(41.7%) was obtained from 252 multigravidae sampled (Table 1). Statistical analysis showed that there was significant difference ($p < 0.05$) in the prevalence of malaria parasites according to parity. As for the gestational periods, the highest prevalence of 40(75.5%) was observed in 53(13.9%) first trimesters. Chi-square analysis revealed a significant difference in the trimesters ($p < 0.05$) (Table 1).

In the pregnant women the age group 40-43 had the highest prevalence of infection 5(83.3%) out of 6(1.6%). Chi-square analysis revealed that there is a significant difference ($p < 0.05$) in the age range (Table 2).

Table 3 shows that the highest prevalence of malaria infection 4(66.7%) out of 6(1.6%) was observed in pregnant women with genotype SS, followed by genotype AA with (49.5%) while those with genotype AS had the least prevalence (29.4%).

Pregnant women with blood group B recorded the highest prevalence of (74.0%), followed by blood groups A (54.8%), AB (53.6%) while the least prevalence of malaria infection was observed in blood group O (30.0%). Out of 100 children examined for malaria parasites, 63 (63%) were infected. Females 38(66.7%) were more infected than males 25(58.1%), however there was no significant difference ($p > 0.05$). The highest prevalence of malaria parasite (63.8%) was observed in 3-5 age groups while the least prevalence of (62.0%) was observed in age group 3-5. The degree of susceptibility of different genotype to malaria parasite as observed in the children sampled revealed that genotype SS recorded the highest prevalence of 7(87.5%) out of 8 children in this category, followed by genotype AA 27(84.4%) while the least prevalence was observed in genotype AS (48.3%) (Table 4).

Table 1: Prevalence of Malaria Parasites by Gravidity and Trimester

Pregnancy Gravidity	No examined	No positive	Percentage positive (%)
Primigravidae	128	48	37.5
Multigravidae	252	105	41.7

Trimesters	No examined	No positive	Percentage positive (%)
First	53	40	75.4
Second	198	46	23.3
Third	129	67	51.9

Total	No examined	No positive	Percentage positive (%)
Total	380	153	40.3

Table 2: Prevalence of Malaria Parasites by Age Groups

Age Group	No examined	No Positive	Percentage Positive
20-23	80	21	26.3
24-27	60	29	48.3
28-31	102	47	46.1
32-35	94	31	33.0
36-39	35	18	51.4
40-43	9	2	22.2

Total	No examined	No Positive	Percentage Positive
Total	380	153	40.3

Table 3: Prevalence of Malaria Parasite by Genotype and Blood group

Genotype	No examined	No Positive	Percentage Positive (%)
AA	194	96	49.5
AS	180	53	29.4
SS	6	4	66.7

Blood group	No examined	No Positive	Percentage Positive (%)
A	42	23	54.8
B	50	37	74.0
AB	28	15	53.6
O	260	78	30.0

Total	No examined	No Positive	Percentage Positive (%)
Total	380	153	40.3

Table 4: Prevalence of Malaria Parasite among Children in relation to sex, blood group and Genotype

Genotype	No examined	No Positive	Percentage Positive (%)
AA	32	27	84.4
AS	60	29	48.3
SS	8	7	87.5
Total	100	63	63.0

Sex	No examined	No Positive	Percentage Positive (%)
Male	43	25	58.1
Female	57	38	66.7

Age	No examined	No Positive	Percentage Positive (%)
0-2	42	26	62.0
3-5	58	37	63.8

Discussion

Results showed that the prevalence of malaria varied considerably between ages, gravidity, trimester, genotypes and of blood group of the pregnant women screened. This study revealed that 153(40.3%) of the 380 screened had detectable *Plasmodium falciparum* in their blood sample. This percentage is slightly higher than those of Egwunyenga *et al*, (2001) but lower to the findings of Iwueze *et al*, (2014) and Okwa *et al*, (2004).

The prevalence of malaria infection was higher in multigravidae 105(41.7%) than in primigravidae 48(37.5%) in this study, which may be as a result of lack of specific immunity to malaria infection and the immunological changes in host during pregnancy or due to low level of Antibodies against Variant Surface Antigen (VSA). This result corroborates the works of Paulo *et al*, (2012) in Luanda Angola where the multigravidae had the highest prevalence of malaria infection. Blood group B was more significantly infected than other blood groups, region, this result might be as a result of strong association between rosette formation and ABO blood group with groups A & B RBCs forming rosette more than group O (Udonsanpetch *et al*, (1995). Most recently, it was confirmed that group A targets formed the strongest rosette.

The prevalence of malaria parasite observed in this research work was higher than 56.9% reported in a similar study in Jos, Nigeria by Ikeh *et al*, (2008). The variation in prevalence of malaria parasite among the children sampled could be attributed in part to the difference in malaria transmission pattern, season of conducting the study and the use of malaria prevention tools. Malaria affects all ages and sexes, although studies have shown that females have better immunity to parasitic diseases which is attributable to genetic and hormonal factors (Zuk *et al*, 1992).

Conclusion

Results of this study indicate that there is active transmission of malaria in the study area. The high prevalence observed, might be attributed to the period of study (May- September) which is the period of maximum rainfall in Nigeria. Despite all Government controls efforts, malaria infection still remain a leading cause of morbidity and mortality in Africa, therefore there is need for better environmental conditions and intensified campaign on the use of Insecticide Treated Nets (ITNs).

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References

- O.A Adefoye, O.A Adeyeba., W.O Hassan and O.A Oyeniran (2007). Prevalence of Malaria Infection among pregnant women in Osogbo South West Nigeria. *American-Eurasian Journal of Scientific Research* 2(1): 43-45.
- Cheesbrough M (1992). *Distinct Laboratory Practice in Tropical Countries* part 1, Cambridge University press, United Kingdom, pp 239-258.
- Dacie J.V and Lewis S.M (1991). *Practical Textbook of Haematology*, 7th Edn, Churchill Livingstone Edinburgh London, UK.
- Egwunyenga A.O., Ajayi J.A., Nmorsi O.P., Dublinska P.D (2001). *Plasmodium* Intestinal helminthes co-infection among pregnant Nigeria women. *Mem Instr Oswaldo Cruz*: 96(8): 1055-59.
- Ejezie G.C., Ezednachi E.N., Usanga E.A., Gemade E.I., Ikpat N.W., Alaribe A.A (1991). Malaria and its retreatment in rural villages of Aboh Mbaise, Imo State, Nigeria. *Acta Tropica*. 48:17-24.
- Epidi T.T., Nwani C.D., and Ugorji P.N (2008). Prevalence of malaria in blood donors in Abakaliki metropolis, Nigeria. *Scientific Research and Essay*, 3(4). 162-164.
- Federal Ministry of Health. Malaria situation analysis document (2000). Federal Ministry of Health; p.14.
- Ikeh E.I., Peletiri I.C., Angiyo I.A (2002). The prevalence and intensity of malaria parasite in children at Jos University Teaching Hospital, Nigeria. *Highland Med. Res. Journal* 1: 9-10.
- Iwueze M.O., Okwusogu M.I., Onyido A.E., Okafor F.C., Nwaorgu O.C and Ukibe A.E (2014). Prevalence, Intensity and Clinical profile of malaria among pregnant women attending antenatal clinics in Onitsha North Local Government Area, Anambra State, Southern Nigeria. *The Bioscientist* 2(1): 17-19.
- Jimoh A., Sofola O., Petu A., and Okorosobo T. (2007). Quantifying the economic burden of infection in Nigeria using the willingness to pay approach. *Cost Eff Resour Alloc*, 5:5-6.
- Manson S.J., L.H Miller., T. Shroshi., J Dvorak and M.H McCiannis (1977). The Duffy blood group determinant, their role in susceptibility of human and animal erythrocyte to *Plasmodium knowlesi* malaria. *British Journal of Haematol*, 36:235-237.
- Obi R.K., Okangba C.C., Nwannebu F.C., Ndubuisi U.U., Orji N.M (2010). Prevalence in *Plasmodium falciparum* malaria. *Africa Journal of Biotechnology*, 9(10):1397-1401.
- Okwa O.O (2003). The status of malaria among pregnant women; a study in Lagos, Nigeria. *Afr. J. Reprod. Health*. 7: 77-83.
- Okwa O.O (2004). Preliminary Investigation on malaria in Sick cell patients among pregnant women and infants in Lagos, Nigeria. *Nigeria Journal Parasitol* 25: 81-85.