

# Malaria Parasitaemia among Outpatients of Braithwaite Memorial Specialist Hospital (BMSH) Rivers State, Nigeria

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**Abstract-** A cross-sectional study to evaluate malaria parasitaemia among 1000 Outpatients (418 males and 582 females) in Braithwaite Memorial Specialist Hospital (BMSH) Rivers State, Nigeria was conducted. Blood samples were collected through venous procedure from the study subjects and the presence of malaria parasites was observed microscopically on thick and thin stained blood films prepared from each blood sample according to standard parasitological techniques. All data gotten were statistically analyzed using Chi-square test and analysis of variance (ANOVA) with a p-value less than 0.05 considered significant. *Plasmodium falciparum* was the only malaria parasite identified in this study. A total of 322 (32%) study subjects were infected with *P. falciparum* with males and females having infection rates of 135 (32%) and 187 (32%) respectively ( $P>0.05$ ). Age group 21 – 30 years had the highest malaria prevalence rate of 34% while 0 – 10 years and  $>40$  years both had the least prevalence rate of 30% ( $P>0.05$ ). Malaria intensity levels ( $>1000$  parasites/ $\mu\text{L}$ ) in relation to sex showed rates of 7% and 6% for males and females respectively ( $P>0.05$ ) while malaria intensity levels ( $>1000$  parasites/ $\mu\text{L}$ ) in relation to age showed a decrease in prevalence rates as the age increased with 0 – 10 years having the highest rate of 14% and  $>40$  years having the least rate of 1% ( $P<0.05$ ). This study showed that *P. falciparum* malaria is still significantly prevalent in Rivers State and more efforts in malaria treatment and prevention is vital in achieving total elimination of this deadly disease.

**Index Terms-** Prevalence, Plasmodium, Age, Sex, Rivers State

## I. INTRODUCTION

Malaria is a parasitic infection caused by different species of *Plasmodium* species and is mainly transmitted by the bite of an infected female *Anopheles* during a blood meal. Malaria is easy to diagnose and treat but is responsible for more deaths than any other infectious disease globally [Narasimhan and Attaran, 2003]. Thus, malaria is a great health challenge in developing countries including Nigeria [Nwakocha, 2007]. In sub-Saharan Africa, malaria is responsible for 40% public health expenditure, 30-50% in-patient admissions and 50% out-patient visits [Narasimhan and Attaran, 2003]. Although considerable efforts have been made to reduce the scourge of malaria infection, it still remains significantly prevalent in most countries in Africa especially in the sub-Saharan region. Malaria is holo-endemic in most parts of Nigeria, with a constant transmission throughout the year irrespective of the season (rainy or dry) [Federal

Ministry of Health, 2010]. Some factors such as cultural practices, topography, population densities, and personal habits affect the management and transmission intensity of malaria in Nigeria. Prevalence studies on households/communities and healthcare facilities are vital for generating data on malaria epidemiology, risk factors associated with infection and effective control strategies [Aina *et al.*, 2013]. The Government of Nigeria is making huge positive strides in the control of malaria despite some challenges especially in getting adequate baseline data on malaria prevalence in households/communities and healthcare facilities. The present cross-sectional study was conducted to evaluate malaria prevalence among some randomly selected Outpatients in a BMSH Rivers State, Nigeria.

## II. MATERIALS AND METHOD

### Study area and Study population

The study was conducted in Port Harcourt, Rivers State, Nigeria. Port Harcourt has a population of about 1,620,214 and is located at latitude 4.75°N and longitude 7.00°E [Ogbonna *et al.*, 2007]. A total of 1000 consenting Outpatients were randomly selected (systematic random sampling) for this study irrespective of age or sex at the Outpatient Department of Braithwaite Memorial Specialist Hospital (BMSH), Port Harcourt, Rivers State from January 2014 to June 2016. Ethical clearance was sought and obtained from the Rivers State Ministry of Health before the commencement of the study.

### Data collection

Information on the sex and age of all study subjects were obtained from hospital records. Five milliliters of venous blood was collected from each study subject, kept in Ethylene Diamine Tetra Acetic acid (EDTA) bottles and gently mixed properly. Thick and thin blood films were made on clean slides, labelled and air-dried as recommended by the World Health Organization [Agomo *et al.*, 2001]. Thick and thin blood films were stained with 5% Giemsa stain solution [Chesbrough, 2005]. The stained blood films were observed microscopically using oil immersion at x100 objective lens by two trained microscopists. The readings from a third senior microscopist were considered final when there were conflicting results between the first and second microscopists. Hundred microscopic fields were examined in all stained thick blood films before concluding the presence/absence of malaria parasites. Parasite density per microliter ( $\mu\text{L}$ ) was gotten by counting the number of parasites per 200 white blood cells on a thick blood film assuming a total standard WBC count

of 8000/μL. the degree of parasite intensity was graded as low (1 – 999 parasites/μL) and high (≥1000 parasites/μL) [Nwagha *et al.*, 2009].

$$\text{Parasites}/\mu\text{L} = \frac{\text{Number of asexual stages} \times 8000 \text{ leucocytes}}{200 \text{ leucocytes}}$$

**Data analysis**

All results in this study were analyzed using ANOVA and Chi-square test for paired and unpaired comparisons. A 95% confidence interval was used and a p-value less than 0.05 was considered significant.

**III. RESULTS**

The only *Plasmodium* parasite identified in this study was *P. falciparum*. A total of 322 (32%) study subjects were infected with *P. falciparum* with males and females having infection rates of 135 (32%) and 187 (32%) respectively (P>0.05) [Table 1]. According to age, study subjects between 21 – 30 years had the highest malaria prevalence of 34% while those between 0 – 10 years and >40 years both had the least malaria prevalence rate of 30% (P>0.05) [Table 2]. Malaria intensity levels ≥1000 parasites/μL in relation to sex showed rates of 7% and 6% for males and females respectively (P>0.05) [Table 3]. Also, malaria intensity levels ≥1000 parasites/μL in relation to age showed a decrease in prevalence rates as the age increased with study subjects between 0 – 10 years having the highest rate of 14% while those >40 years had the least rate of 1% (P<0.05) [Table 4].

**Table 1: Malaria prevalence in relation to sex**

SEX	NE	NI (%)
Male	418	135 (32)
Female	582	187 (32)
<b>TOTAL</b>	<b>1000</b>	<b>322 (32)</b>

NE = Number Examined; NI = Number Infected

**Table 2: Malaria prevalence in relation to age**

AGE (YEARS)	NE	NI (%)
0 – 10	101	30 (30)
11 – 20	226	69 (31)
21 – 30	266	90 (34)
31 – 40	195	69 (35)
>40	212	64 (30)
<b>TOTAL</b>	<b>1000</b>	<b>322 (32)</b>

NE = Number Examined; NI = Number Infected

**Table 3: Malaria intensity levels ≥1000 parasites/μL in relation to sex**

SEX	NE	NI (%)
Male	418	28 (7)
Female	582	36 (6)
<b>TOTAL</b>	<b>1000</b>	<b>64 (6)</b>

NE = Number Examined; NI = Number Infected

**Table 4: Malaria intensity levels ≥1000 parasites/μL in relation to age**

AGE (YEARS)	NE	NI (%)
0 – 10	101	14 (14)
11 – 20	226	24 (11)
21 – 30	266	18 (7)
31 – 40	195	5 (3)
>40	212	3 (1)
<b>TOTAL</b>	<b>1000</b>	<b>64 (6)</b>

NE = Number Examined; NI = Number Infected

**IV. DISCUSSION**

The overall prevalence of malaria in this study was 32%. This rate is higher than 6.8% reported in Calabar [Uko *et al.*, 1998] and 7.3% reported in Port Harcourt [Ibeziako *et al.*, 1980]. It is comparable to 29% reported in Abakaliki [Nwonwu *et al.*, 2009], 34.5% reported in Ogun State, Nigeria [Idowu *et al.*, 2015], 35.7% reported in Kaduna State, Nigeria [Umaru and Uyaiabasi, 2015] and 38.7% reported in Kano State, Nigeria [Mohammed *et al.*, 2015] but lower than 66.8% reported in Ogun State, Nigeria [Oyetunde *et al.*, 2015], 67.5% reported in Port Harcourt [Wariso and Oboro, 2015] and 71.4% reported in Cross River State, Nigeria [Udoh *et al.*, 2013]. The malaria prevalence rate recorded in this study could be attributed to environmental factors and malaria transmission dynamics which predisposed humans to contracting malaria infection as well as the high amount of rainfall which leads to flooding due to blocked/unavailable drainage systems which encourages the breeding of mosquito vectors, wrong behavioral attitudes of people and crowded human settlements. Also, an epidemiological survey conducted in the six geopolitical zones of Nigeria reported a higher malaria prevalence in the southern parts than in the northern parts of the country [Federal Ministry of Health, 2010]. There was no significant difference in malaria prevalence among males and females with both groups having 32% malaria prevalence rate. Also, malaria intensity levels >1000 parasites/μL was not significant in males and females. This shows that malaria infection and increased parasitemia levels are not influenced by human gender. Malaria prevalence was highest in groups 21 – 30 years and 31 – 40 years. These age groups comprise of youths whose behavior and activities could predispose them to frequent contacts with malaria vectors. The

level of malaria parasitemia reduced significantly as the age increased with age groups 0 – 10 years and >40 years having the highest and least rates of 14% and 1% respectively ( $P < 0.05$ ). Children below 10 years have still not acquired enough immunity to malaria and other infectious diseases due to their developing immune systems. Also, as individuals in holo – endemic malaria regions get older, they acquire some level of increased immunity to malaria infection due to previous malaria infections. The World Health Organization reported that younger people in malaria – endemic regions were more susceptible to contracting malaria infection than older people especially in holo – endemic regions [World Health Organization, 2003].

## V. CONCLUSION

The data from this study showed that malaria is still significantly prevalent in Rivers State and thus, is a serious health issue especially among children between 0 – 5 years. The study provides baseline data which is vital for the planning and implementation of effective malaria control measures in Rivers State by individuals, Government and Non-Government agencies.

## REFERENCES

- [1] Agomo, P., Okonkwo, C., Asianya, O., Okoh, H. and Nebe, O. (2001). Comparative evaluation of Immuno – Chromatographic test (ICT) and Parasight® - F for the rapid diagnosis of *falciparum* malaria in Nigeria. *African Journal of Clinical and Experimental Microbiology* **2**: 45.
- [2] Aina, O., Agomo, P., Olukosi, Y., Okoh, H., Iwalokun, B. and Egbuna, K. (2013). Malariometric survey of Ibeshe community in Ikorodu, Lagos State: dry season. *Malaria Research and Treatment* **2013**: 487250.
- [3] Cheesbrough, M. (2005). District laboratory manual for tropical countries. 2<sup>nd</sup> Edition Update Vol 1. Bulterworth – Heinemann Ltd. Oxford ox28DP. Pp 249.
- [4] Federal Ministry of Health (2010). Technical Report of Drug Efficacy studies 2009 – 2010. Federal Ministry of Health Abuja, Nigeria.
- [5] Ibeziako, P., Okerengwo, A. and William, A. (1980). Malaria immunity in Pregnant Nigerian Women and their babies. *Journal of Gynaecology and Obstetrics* **18**: 147 – 149.
- [6] Idowu, A., Odeyemi, M. and Babalola, S. (2015). Assessment of accuracy and effectiveness of rapid diagnostic test for malaria diagnosis at Primary Health centres in Abeokuta, Nigeria. *International Journal of Tropical Disease and Health* **8**(3): 90 – 97.
- [7] Mohammed, Y., Dabo, N., Kawo, A. and Yakubu, A. (2015). Comparison of microscopic examination and rapid diagnostic tests used to diagnose malaria among pregnant women in Kano, North – western Nigeria. *International Journal of Science and Technology* **5**(2): 1 – 6.
- [8] Narasimhan, V. and Attaran, A. (2003). Roll Back Malaria. The scarcity of International aid for malaria control. *Malaria Journal* **2**: 8.
- [9] Nwagha, U., Ugwu, V., Nwagha, T. and Anyaehie, B. (2009). Asymptomatic *Plasmodium* parasitemia in pregnant Nigerian women: almost a decade Roll Back Malaria. *Transactions of the Royal Society of Tropical Medicine and Hygiene* **103**(1): 16 – 20.
- [10] Nwakocha, A. (2007). Malaria – current trends. Proceedings of the Directorate of Research and Publications. *Journal of College of Medicine* **1**: 4 – 6.
- [11] Nwonwu, E., Ibeke, P., Ugwu, J., Obarezi, H. and Nwagbara, O. (2009). Prevalence of malaria parasitemia and malaria related anaemia amongst pregnant women in Abakaliki Southeast Nigeria. *Nigerian Journal of Clinical Practice* **12**: 182 – 6.
- [12] Ogbonna, D., Amangabara, G. and Ekere, T. (2007). Urban solid waste management. *Management of Environmental Quality* **18**(1): 71 – 88.
- [13] Oyetunde, T., Akinwale, F. and Isaac, O. (2015). Comparative assessment of microscopy and rapid diagnostic test (RDT) as malaria diagnostic tools. *Research Journal of Parasitology* **10**: 120 – 126.
- [14] Udoh, E., Oyo – Ita, A., Odey, F., Eyong, K., Oranganje, C., Oduwale, O., Okebe, J., Esu, E., Meremikwu, M. and Asindi, A. (2013). Malariometric indices among Nigerian children in a rural setting. *Malaria Research and Treatment* **716805**: 4
- [15] Uko, E., Emeribe, A. and Ejezie, G. (1998). Malaria infection of the placenta and Neonatal Low Birth Weight in Calabar. *Journal of Medical Laboratory Science* **7**: 7 – 20.
- [16] Umaru, M. and Uyaiabasi, G. (2015). Prevalence of malaria in patients attending the General hospital Makarfi, Makarfi Kaduna State, North-Western Nigeria. *American Journal of Infectious Diseases and Microbiology* **3**(1): 1 – 5.
- [17] Wariso, K. and Oboro, I. (2015). Diagnosis of malaria among blood donors in Port Harcourt, Nigeria: Microscopy or Rapid Diagnostic Tests? *Advances in Microbiology* **5**: 358 – 363.
- [18] World Health Organization (2003). African Malaria Report, Geneva. WHO.

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