
Evaluation of Incidence of Asymptomatic Plasmodium Falciparum in a Peri-Urban Community in Ogun, Nigeria

A. Obafemi Solesi^{1*}, R. Ayodele Sowole², H. Nwakaego Adetoyi³,
B. Adebukunola Odugbemi⁴

^{1*}Department of Pharmacy Technician Programme, School of Basic Medical Sciences, Ogun State Polytechnic of Health and Allied Sciences, Ilese- Ijebu, Nigeria.

²Department of Medical Laboratory Technician, School of Basic Medical Sciences, Ogun State Polytechnic of Health and Allied Sciences, Ilese- Ijebu, Nigeria.

³Department of Environmental Health Science and Diseases control, Ogun State Polytechnic of Health and Allied Sciences, Ilese- Ijebu, Nigeria.

⁴Department of Community Health and Extension Worker, Ogun State Polytechnic of Health and Allied Sciences, Ilese- Ijebu, Nigeria.

Email: ²sowolemm@gmail.com, ³helenadetoyi@gmail.com, ⁴Bk.odugbemi@gmail.com
Corresponding Email: ^{1*}solesi.obafemi@gmail.com

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Abstract: Malaria has been a public health concern in most tropical and sub-tropical countries around the world with causative agents by five Plasmodium species. Malaria is a prominent disease of high-temperature regions with high morbidity, leading to socio-economic loss. Pregnancy asymptomatic Plasmodium species infection causes placental infection and anaemia; separation of infected red blood cells in the mother intervillous spaces of the placenta resulted in its infection and is associated with placental inflammation and fibrosis. Screening for individuals with asymptomatic infections to determine their prevalence and possibly control it is pertinent using sensitive cum precise diagnostic tools. This study aim's at evaluating the incidence of asymptomatic plasmodium falciparum in the study area. Two hundred and ten blood samples were collected randomly from Ogun State Polytechnic of Health and Allied Science, Ilese Campus; this constituted students and staffers with asymptomatic Plasmodium falciparum between February and March 2023. The students and staffers exhibiting any symptoms of Malaria infection, such as fever, nausea, chills, etc., and on anti-malaria drugs were excluded from the tested population. The male volunteer was 15.2% (32/ 210) while the female was 84.8%, reflecting the nature of the population's gender skewness being a female-dominated place. The age distribution, 17-26 years age group was high with 59%; 27-36 was 13.8%, 37-46 with 17.6%, 47-56; 7.6%, 57-65+ being lowest with 1.9%. The prevalence of plasmodium

falciparum in the blood of subjects in this study was 87%; the male infected was 18%, and the female was 68.6%.

Keywords: *Asymptomatic, Plasmodium Falciparum, Pregnancy, Tropical and Red Blood Cells.*

1. INTRODUCTION

Malaria has been a public health concern in most tropical and sub-tropical countries around the world with causative agents by five Plasmodium species; Plasmodium falciparum and P. vivax are the two major species that exert infectious pressure on the world, the transmission of the disease is through multiple bites of infected female Anopheles mosquitoes (WHO, 2022).

Malaria is a prominent disease of high-temperature regions with high morbidity, leading to socio-economic loss; in 2021, Malaria cases estimated to be about two hundred million, and deaths scored over half a million, ninety per cent of these deaths were from sub-Saharan Africa (WHO, 2022; WHO, 2003); Malaria is the primary cause of sickness and impoverishment in sub-Saharan Africa (Kilama, 2005).

Maternal-fetal complications are about 70% of pregnant women in Nigeria; worldwide, hundreds of millions of pregnant women are potentially infected with malaria-causing agents each year, and most of these cases and deaths result in Sub-Saharan Africa (Bauserman et al., 2019).

Exposure to malaria is predominant in sub-Saharan Africa; the four notable countries in that part of the continent recorded about 50% of all malaria deaths globally in 2021, with Nigeria having 26.6%, the Democratic Republic of the Congo recording 12.3%, Uganda 5.1% and Mozambique, at 4.1% (WHO, 2023).

The malaria endemic areas are mostly with warm temperatures and heavy rainfall; this feature favoured mosquito breeding. Past studies showed that after being infected with malaria parasites, clinical immunity is gained and partially develops depending on variations such as endemicity, mode of prevention engaged and multifactor of co-morbid situations (Adefioye et al., 2007⁷); studies have pointed out that escalated poverty levels, retrained accessibility to quality health care, and unprotected exposure to mosquito bites in rural communities hamper the vigour and ability to maintain partial immunity, particularly in old age (Remais et al., 2013); this necessitates campaign for malaria prevention programs such as the use of Long-Lasting Insecticide Nets (LLINs), Indoor Residual Spray (IRS), and the emergence of other strategies to minimize the incidence of asymptomatic plasmodium infections, with emphasis in villages (Chukwuocha et al. 2016).

The medical implication of asymptomatic malaria may be different in various epidemiological zones; in endemic areas, asymptomatic parasitemia confers partial immunity

(Staalsoe and Hviid, 1998) and possibly guard against clinical disease resulting from new infections (Farnert et al., 2009).

Asymptomatic Plasmodium species infection (API) is an observation of Plasmodium species in the blood with no evidence of clinical signs and symptoms of malaria (WHO, 2017). Although there is no scientific definition for this condition, and reports from other scholars showed that over 70% of asymptomatic infections were caused by *P. falciparum* little information is reported for other Plasmodium species (Harris et al., 2010).

Mayengue et al., 2004¹⁴ reported that pregnancy asymptomatic Plasmodium species infection causes placental infection and anaemia; separation of infected red blood cells in the mother intervillous spaces of the placenta resulted in its infection and is associated with placental inflammation and fibrosis; also triggers the infected site swollen with invasive penetration of immune cells like macrophages, monocytes and lymphocytes and is called inflammatory placental malaria Ordi et al., 2001, this blockage affects nutrient and air exchanges between the mother and the foetus causing increased fetal mortality, prematurity, low birth weight, abortion, stillbirths and fetal anaemia (Tilahun et al., 2020).

Despite vigorous campaign on malaria control strategies- Roll Back Malaria, the Multilateral Initiative on Malaria and the use of artemisinin-based manipulation therapy, malaria continue to pose a risk to the well-being of children in Nigeria: World Health Organisation, 2019 reports that Nigeria accounts for 25% of the malaria burden of the entire African continent. Screening for individuals with asymptomatic infections to determine their prevalence and possibly control it is pertinent using sensitive cum precise diagnostic tools. This study aim's at evaluating the incidence of asymptomatic plasmodium falciparum in the study area.

2. METHODS

A. Sample Collection

Two hundred and ten blood samples were collected randomly from Ogun State Polytechnic of Health and Allied Science, Ilese Campus; this constituted students and staffers with asymptomatic Plasmodium falciparum between February and March 2023. The students and staffers exhibiting any symptoms of Malaria infection, such as fever, nausea, chills, etc., and on anti-malaria drugs were excluded from the tested population.

B. Laboratory Analysis

A two-millilitre of blood drawn from a peripheral vein into an EDTA bottle use for preparing thick, thin blood film and cell volume, thick and thin blood films prepared using the technique described by Hanscheid (1999) and Cheesbrough (2006¹⁹); two glass slides labelled for each volunteer, blood was drop on a clean and grease-free glass slide to air-dry, smears made using 6 μ L and 2 μ L for thick and thin blood respectively, the thin smear made on the glass slide translucent enough to read through it, fixed in absolute methanol for 5s and allowed to air-dry thoroughly before staining. The air-dried thick blood films at 25°C were stained with 5% Giemsa stain for 25 minutes, water rinsed, and air-dried again. The slides, were microscopically examined using an oil-immersion lens (100x magnifications). The

parasites count of 1-10 plus for every 100 thick film fields accepted as positive result. The thin blood films were air-dried but fixed with 100% methanol for 60 s, stained with 3% Giemsa stain for 30 min, water rinsed, air-dried, and microscopically examined for Plasmodium species identification.

3. RESULTS AND DISCUSSION

The result was gathered through the collection of two hundred and ten (210) blood samples from Ogun State Polytechnic of Health and Allied Science, Ilese-Ijebu.

A. Gender Distribution of Sample Collection

Table 1: Gender Distribution

Gender	Frequency	Percentage
Male	32	15.2
Female	178	84.8
Total	210	100

Table 1 above shows the gender of the subject blood sample of Ogun State Polytechnic of Health and Allied Science, Ilese-Ijebu. A 15.2% of males test and 84.8% of the females test.

A. Age Group Distribution of Subjects Collected

Table 2: Age distribution

Age (year)	Frequency	Percentage (%)
17-26	124	59
27-36	29	13.8
37-46	37	17.6
47-56	16	7.6
57-65+	04	1.9
Total	210	100

Table 2 shows that 59% of the subjects were between the ages of 17-26 yrs., 13.8% were in the age group of 27-36 yrs., 17.6% were in the age range of 40-49 yrs., while 7.6% falls within the ages of 47-56 yrs., and 1.9% were in the age bracket of 57-65+.

B. Distribution of Plasmodium falciparum among subjects in Ilese, Ogun, Nigeria in relation to gender

Table 3: According to their gender

Sex		Negative sample		Positive sample	
		(f)	(%)	(f)	(%)
Male	32	12	37.5%	20	62.5%
Female	178	70	39.3%	108	60.7%

F= frequency
%= percentage

C. Prevalence distribution of Plasmodium falciparum by age of the subjects in Ilese, Ogun, Nigeria

Table 4: showing prevalence of infection in the study area

Age (years)	No. of samples examined (%)	No. of positive samples (%)	No. of male samples (%)	No. of positive male samples (%)	No. of female samples (%)	No. of positive female samples (%)
< 46	190(90.5)	87(67.9)	30(93.8)	18.8(94)	113(63.5)	68.6(63.5)
<65	20(9.5)	41(32.0)	02(6.3)	1.2(06)	65(36.5)	39.4(36.5)
Total	210(100)	128(100)	32(100)	20(100)	178(100)	108.0(100)

4. DISCUSSION

The malaria endemic areas are mostly with warm temperatures and heavy rainfall; this feature favoured mosquito breeding. Past studies showed that after being infected with malaria parasites, clinical immunity is gained and partially develops depending on variations such as endemicity, mode of prevention engaged and multifactor of co-morbid situations (Adefioye et al., 2007); the medical implication of asymptomatic malaria may be different in various epidemiological zones; in endemic areas, asymptomatic parasitemia confers partial immunity (Staalsoe and Hviid, 1998) and possibly guard against clinical disease resulting from new infections (Farnert et al., 2009). In this study, the male volunteer was 15.2% (32/210) while the female was 84.8%, reflecting the nature of the population's gender skewness being a female-dominated place, as shown in Table 1. The age distribution, 17-26 years age group was high with 59%; 27-36 was 13.8%, 37-46 with 17.6%, 47-56; 7.6%, 57-65+ being lowest with 1.9%. The age group between 17-26 years strongly indicated that the study was conducting in a tertiary institution, where young adults populated. This study agreed with the work of Mgbemena et al. 2016, where students between 16 – 22 years old had the highest infection rate at 28.28%. The asymptomatic distribution of the subjects according to gender male with positive infection without any clinical manifestation was 62.5% (20/ 32) and the female with 60.7% (108/178). The prevalence of plasmodium falciparum in the blood of subjects in this study was 87%; the male infected was 18%, and the female was 68.6%. , according to Abdullahi et al. (2009), the infection rate in males was 30.24% higher than in females with a 24.47% infection rate.

5. CONCLUSION

The study revealed that asymptomatic plasmodium falciparum infection is prevalent in the study area, and the participants are potential reservoirs of transmission.

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