

The Occurrence of Malariaparasitaemia among Children between 1-15 years of Age Attending Talba Clinic Suleja Niger State, Nigeria

Adama D¹, Usman A.M², Abdullahi M³, OhiriN.W⁴, Usman J.M⁵, Adama S⁶

^{1,5}Department of Medical Laboratory Sciences, School of health Technology Minna Niger State, Nigeria

^{2,3,6}Federal Medical Centre Bida Niger state, Nigeria

⁴Newgate college of Health Technology, Minna Niger State, Nigeria
Email: Daudaadama[at]gmail.com

Running Title: *The Occurrence of Malaria parasitaemia among Children*

Abstract: *This study was conducted to find out the occurrence of malaria parasite infection among children between 1-15 years of age attending Talba Clinic Suleja Niger State, Nigeria. The samples collected was ninety seven (97) from children including both males and females. Two milliliter of venipuncture blood sample withdrawn from each of the 97 children was kept undisturbed in an anticoagulant sample container. Thick and thin blood smears for malaria were prepared. Both smear were flooded and viewed to check for the presence of malaria parasite under the bright field using high power objective lens. Malaria parasite were mostly domicile among 11-15 years of age (29.9%) while 1-5 and 6-10 had 5.2% and 13.3% infection respectively. The occurrence of plasmodium infection was significant among different sex groups in this present study (This suggest that the occurrence of these infection is sex dependent). The species in this community were found to be plasmodium falciparum. Public awareness can be created in order to further sensitize for the use of these interventions meant for children to live a malaria infection free life.*

Keywords: Talba, *P.falciparum*, Malaria infection, Suleja, Niger state, and Nigeria

1. Introduction

One of the highest causes of disease and death in Nigeria is Malaria Murray., *et al.* [1] and Udoh., *et al.* [2]. This disease can be averted though is constantly present to a greater extent in many locations of the universe and has proceed in a definite state uninterrupted [3]. Grievously affected children frequently die in many cases between the hours of 1- 72 hours (3days) after developing symptoms. The fetal nature of malaria parasite infection has left most of the surviving children are deficit of important nutrients thereby affecting their total physical and cognitive development [4]. Single celled protozoan parasites are microorganism that belongs to the genus plasmodium, they are the major causes of malaria, it is of the phylum apicomplexa and Krief., *et al.* [5] The five major plasmodium species of human are (*plasmodium falciparum*, *plasmodium vivax*, *plasmodium knowlesi*, *plasmodium malariae*, *plasmodium ovale*) [6]. The greatest damages are usually caused by *P. falciparum* and *P. vivax*, with *P. falciparum* being the most devastating. Death caused by severe malaria parasite infection (P.f) yearly is approximately 1-3 million Snow., *et al.* [7] The report according to [8] of all malaria incidence in the globe, Africa had 60% occurrence, 75% of worldwide Malaria cases are *P. Falciparum*, 80% of mortality cases are also been documented. Diverse forms of complications were in the increase such as abortion, still birth, low birth weight in and also deaths [9][10]

All over the world it is estimated that two-hundred and fourteen million (214 million episodes of malaria infection happens per annum and 3.2 million individuals are

susceptible of been infected [11]. A total of 438,000 deaths were estimated to have been caused by malaria parasite infection in 2015, especially in black Africans region where about 90% of the major malaria death cases happens [11]. Direct and indirect cases of children living in Africa yearly is estimated to be more than I million [12]

The threat posed by malaria in Nigeria is one of the highest so far, with occurrence of almost 51 million and 207,000 mortality documented per year (about 30% of total malaria cases are prevalence in Africa) while 97% of the total population which is (estimated to be 173million) is at the threat of the infection [3].

The need to have a true picture of the malaria parasite infection case incidence in Niger State would help in identifying the rate of malaria among children. This will intrigue the government and private individuals to map out strategies and to implement interventions in order to drastically bring down the burden of the disease. The experiment was performed with purpose to study the occurrence of malaria parasitaemia among children of 1-15 years of age attending talba Clinic, Suleja in Niger State, Nigeria based on major predisposing factors such as sex, Age range and Occurrence

2. Materials and Methods

Study Area

Suleja is a major town in Niger state. It is located at 9.18 latitude and 7.18 longitude. The distance from the state capital is about 104km away. The entire population of this

particular area 152,135. The men being 112,030 and women 103,045 respectively. The city is situated at elevation 421 metre above sea level [13]. The nature of rainfall here is bimodal; Light rain is experienced during February to April and heavy down pour in July to September. The average rainfall, temperature and precipitation is 1328mm, 26.3°C and 272mm respectively

Sample Size

The investigation was basically performed on a specimen which cover of ninety seven (97) children, between the age range of 1 – 15 attending Talba Clinic Suleja Niger State, Nigeria. The hospital serves people from Eminene, Rijiyian, Bature area

Sample Collection

Ethylene diamine tetra-acetic acid (EDTA) tube were employed to collect blood samples. The tubes were labelled with the patient’s name, types of investigation, date, Age and sex. The presence of malaria parasite screened for within the month of June, 2019.

Staining Technique

The techniques used for staining and detection of malaria parasite in red blood cell sample collected was as suggested by [14]

Smear Preparation.

A well labelled thick and thin films were made on a grease free glass slides according to the world health organization (WHO) recommendation [15]. Giemsa stain was used to flood the thick and thin films and was then allowed to stand for 30 minutes. Clean water was used to wash the slide and the back side of the slides were subsequently wiped out using

cotton wool in order to remove the excess stain and water. The slides were then air dried in a draining rack.

Microscopic Examination

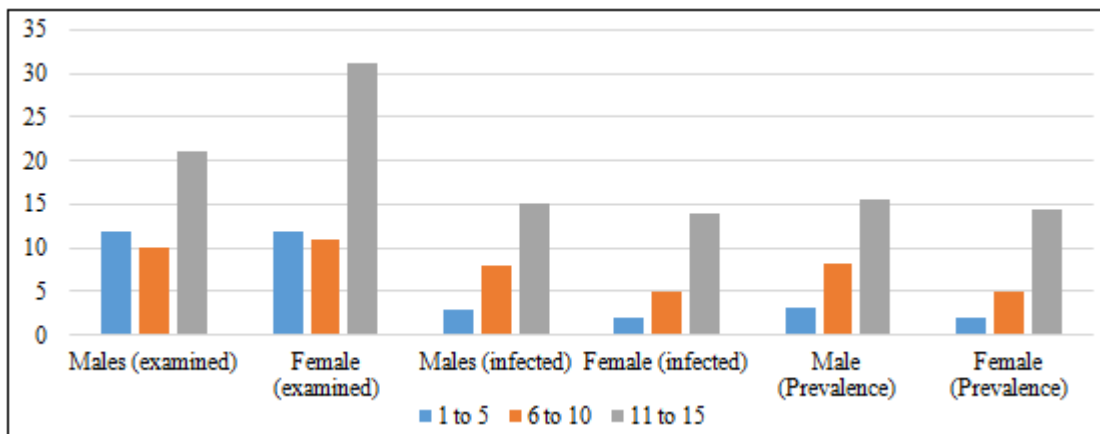
Malaria parasites were investigated from the stained slides. Immersion oil was added on the slides to cover approximately 10 millimeter in diameter. The smears were both examined microscopically with x100 objective lens. This is in line with Cheesbrough [16] and Mukherjee [17].

3. Results

Table 1: Malaria distribution is shown based on age and sex groups. Ages between 1-5, 12 males together with 12 females were tested in which 3(3.1%) and 2(2.1%) were infected with malaria parasite respectively. Also in ages range of 6-10, 10 males and 11 females were tested out of which 8(8.2%) males and 5(5.1%) female were positive respectively. Between 11-15 years of age 21 males and 31 female were diagnosed of which 15(15.5%) males and 14(14.4%) female were positive respectively. In total 43 males and 54 females underwent the investigation. While 26(26.8%) males and 21(21.6%) females were infected

Table 1: Distribution of Malaria parasite infection according to Age and Sex groups

Age (year)	Number Examined		Number infected		Prevalence (%)	
	Males	Female	Males	Females	Males	Females
1-5	12	12	3	2	3.1	2.1
6-10	10	11	8	5	8.2	5.1
11-15	21	31	15	14	15.5	14.4
Total	43	54	26	21	26.8	21.6



H₀: The malaria prevalence is independent of the sex

H₁: The malaria prevalence is dependent of the sex

α = 0.05

Test statistic = X²-test

Critical region: Reject H₀ if X² calculation > X² tab

Chi-square test was employed to calculate the overall distribution of plasmodium parasites by sex. This concluded that since the X² calculated = 8.38 is greater than X² = 5.99, we reject H₀ and conclude that the prevalence of malaria is sex dependent for male and female at α = 0.05 significance level and 2 degree of freedom respectively as shown below.

For Infected Males

Observed (O)	Expected (E)	(Observed-Expected)	(Observed-Expected) ²
3	8.67	-5.67	32.15
8	8.67	-0.67	0.45
15	8.67	6.33	40.07
			72.67

$$X^2 = \sum \frac{(O-E)^2}{E} = \frac{72.67}{8.67} = 8.38$$

Degree of Freedom – df = n-1 (n=3)

3-1 = 2

X² tab @ 0.05 = 5.99

For Infected Females

Observed (O)	Expected (E)	(Observed-Expected)	(Observed-Expected) ²
2	7.0	-5	25
5	7.0	-2	4
14	7.0	7	49
			78.0

$$X^2 = \sum \frac{(O-E)^2}{E} = \frac{78.0}{7.0} = 11.2$$

Degree of Freedom – df = n-1 (n=3)

3-1 =2

X² Tabulated @ 0.05 =559

X²=Chi-square

Σ = Summation

O = Observed frequency

E = Expected frequency

Table 2: Species of plasmodium seen during diagnosis of children 1-15 years of age

Variation in (ages)	1-5		6-10		11-15	
	No of Positive	%	No of Positive	%	No of Positive	%
Plasmodium falciparum	5	20	13	62	29	55
Plasmodium.malariae	0	0	0	0	0	0
Plasmodium ovale	0	0	0	0	0	0
Plasmodium vivax	0	0	0	0	0	0
Examined number	5	20	13	62	29	55

4. Discussion

This study has shown that the highest cases of malaria infection occurs in children between the ages range of 11-15 years old (table 1).The reason for this group of individuals having this rate of infection may be due to the reason that children of these age range are expected to have a higher bite at the night by vectors that harbor plasmodium because they participate in more outdoor activities when compared with the little children. The findings of this study is in line with immediate past reports that says that the frequency of insecticide treated (ITNs) used were statistically significant among the youngest children, more especially those less than five (5) years of age and heads of the homes, and this may also be as a result of inadequate ITNs per household smith., *et al.* [18]. Hence, this study suggests that the number of ITNs accessible to household should be increase in order to attain world wide scope coverage in the affected communities. Likewise, another investigation shows that boys of the ages of puberty have the lowest degree on the use of ITNs Garley., *et al.* [19]. Previously, studies in Abia and Plateau reveals that occurrence of plasmodium infection was not in relation with age, with the high intensity among children between ages of 5-9 years Noland.,*et al.* [20]. On the opposite recent investigation was carried out among the Kenyans school children and it was found out that plasmodium falciparum infection declines with increase in age, and those with age between 11-15 years had 0.78 odds of infection compared with those aged 5-10 years Kepha., *et* [8] WHO/UNICEF (2005) world malaria report. WHO Geneva, Switzerland

[9] WHO (World Health Organization) (2012) Evidence Review Group: intermittent preventive treatment of malaria in pregnancy (IPTP) with Sulfadoxine-

al. [21].Other study on the prevalence show reduced plasmodium infections with ages (6-10 and 11-15 years).This may be due to the fact that the children of this age range had immunity built against the microorganism. The occurrence of parasitic infection among sex groups. This present study was said to be significant at 0.05, this indicate that the infection is sex dependent (table 1).This study shows that there was more infection among males than the females, this is in agreement with the study that reveals better immunity in females to parasitic diseases and this was as a result of the genetic and hormonal factors [23]

5. Conclusions

The research result of 97 children (1-15 years old) sample size, 47(48.4%) had malaria parasite infection, out of which children between 11-15 years of age were found to have the greater percentage (29.9%) of parasitic infection, this was followed by 6-10 and 1-5 years age groups respectively as revealed in Table 1. The highest causative agent was plasmodium falciparum which was shown in Table 2. In order to prevail on the present menace of infection these recommendations are made; Health education sensitization campaign to impact knowledge that may lead to reduction of reservoirs of malaria infection. Subsidized and free ITNs should be accessible to mothers, this will enhance malaria control among all categories of children. More health personnel should be recruited by the government in order to further equipped the health facilities in the rural areas so as to further increase control and prevention rate of this parasitic infection

References

- [1] Murray C.J, Rosenfield L.C, Lim SS, Andrews K.G, Foreman K.J, Haring D, *et al.* (1980 and 2010)global malaria motality between a systemic analysis Lancet 2012;379:413-31. View Article pubmed Google Scholar
- [2] Udoh EE, oyo-ita AE, Odey FA, Eyong KI, Oringange CM, Oduwole OA, *et al.*(2013) malanometric indices among Nigeria children in a rural setting. Molar retreat; 716805. Pubmedpubmed central Google Scholar.
- [3] WHO (World Health Organization) (2014) world malaria report. Geneva: World Health Organization
- [4] WHO(World Health Organization) (2002) world malaria report Geneva: World Health Organization
- [5] Krief S *et al.*, (2010). On the Diversity of Malaria Parasites in African Apes and the Origin of *P. falciparum* from Bonobos. *PLoSPathog*;6(2):1000765.
- [6] N.J White (2008) “plasmodium Knowlesi: the fith human malaria parasite”, clinical infection Disease, Vol. 46, no. 2, pp.172-173
- [7] RW Snow,CAGuerra,AM Noor, HY Myint, SI Hay (2005) *the global distribution of clinical episodes of Pf malaria*”, *Nature*, Vol. 434, no. 7030, pp, 214-217 pyrimethamine (SP) WHO Headquarter, WHO Geneva, Switzerland,
- [10] P.E, Duffy and M. Fried (2005)“Malaria in pregnant woman,” current topics in microbiology and

- immunology, Vol. 295, pp.169-200, R.W Snow, C.A Geurra,
- [11] WHO(World Health Organization) (2015) world malaria report Geneva: World Health Organization
- [12] Fawole, O.I. & Onadeko M.O. (2001). Knowledge and Management of Malaria in Under Five Children by Primary Health Care Workers in Ibadan South East Local Government Area. Nigeria. *Post Graduate Medical Journal*. 8 (1): 1-5.
- [13] Cheesbrough; M (2003); *District Laboratory. Practice in Tropical Countries*. PCV and red cell indices. Cambridge University press Edinburgh, United Kingdom. 310 -313.
- [14] Smith T, Hill JL, Genton B, Muller I, Booth M, Gibson N, et al. (2001) Associations of peak shifts in age-prevalence for human malaria with bednet coverage. *Trans R Soc Trop Med*. 95:1-6
- [15] Garley AE, Ivanovich E, Eckert E, Negroustoueva S, Ye Y (2013). Gender differences in the use of insecticide treated nets after a universal free distribution campaign in Kano State, Nigeria: post-campaign survey results *Malaria Journal*.;12:119. doi: 10.1186/1475-2875-12-119. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [16] Noland GS, Graves PM, Sallau A, Eigege A, Emukah E, Patterson AE, et al. (2014) Malaria prevalence, anemia and baseline intervention coverage prior to mass net distributions in Abia and Plateau States, Nigeria. *BMC Infect Dis*; 14:168. doi: 10.1186/1471-2334-14-168. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [17] Kepha S, Nikolay B, Nuwaha F, Mwandawiro CS, Nankabirwa J, Ndibazza J, et al. (2016) *Plasmodium falciparum* parasitaemia and clinical malaria among school children living in a high transmission setting in western Kenya. *Malaria Journal*;15:157. doi: 10.1186/s12936-016-1176-y. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
- [18] Brown B. A. (1980). *Hematology: Principles and Procedures*. Lea & Febriger, Philadelphia. Third Edition, 75 – 87
- [19] Krongstad D.J (1996). Malaria as a re-emerging disease epidemiology. *Rev*. 18:77-89
- [20] WHO (World Health Organization) (2000) Press Release *WHO/48 Fact Sheet* 5th July 2000. Geneva W.H.O publications: 1 – 18.
- [21] Cheesbrough M. (2000). “*District laboratory practice manual in Tropical Countries*. Part 2”. Cambridge University Press
- [22] Mukherjee KL. (2006). “*Medical Laboratory Technology: A Practical Manual for Routine diagnostic Test*”. Tata McGraw-Hill Publishing Company Limited, New Delhi, India 1
- [23] WHO (World Health Organization) (2010a). Basic malaria microscopy part 1. Learner’s guide second edition Geneva: world health organization (http://www.who.int/publication/malaria_microscopy_QA_manual.pdf ua=1. Accessed 15 october 2014)
- [24] The world Gezetteer Achieved from the original on (2007)-09-30. Retrieved -03-27