Full Length Research Paper

Prevalence of malaria infections among children aged six months to eleven years (6 months-11 years) in a tertiary institution in Benin City, Nigeria

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This study was designed to investigate the prevalence of malaria infections among children aged six months to eleven years (6months-11years) in a tertiary institution in Benin City of Edo State Nigeria, between January 2004 and December 2009. The study aimed at obtaining prevalence database for instituting intervention programmes. The population of the study was 7651 patients seen in Children Emergency Unit during the period under study. The sample which comprised 2,788(36.4%) patients admitted with malaria infections made up of 1,588 (57%) males and 1200(43%) females selected using structured checklist and cumulative records. The data were analyzed using descriptive and inferential statistics. The results revealed that out of the 7,651children admitted into children emergency during the six year period (2004-2009), 2788 had malaria fever. Children between the ages of ½ and 2 years had the highest prevalence of plasmodium infections (1633, i.e. 58.57%) compared with the other age groups with frequency of (1155, i.e. 41.43%). Plasmodium infections were commoner in the male than in the female subjects. 95 children died of malaria out of the 305 paediatric deaths recorded within the period of study. Mortality is higher amongst the males less than three years and in females more than eleven years. Anaemia is the major complication of malaria causing death and the least is cerebral malaria. Prevalence rates among children varied with age and gender. It is recommended that nurses should observe for signs and symptoms of anaemia and respiratory distress in children with malaria since they are the leading causes of death among children.

Keywords: Prevalence, Malaria and [1]/2-11years old children.

INTRODUCTION

Malaria is a major public health problem with an estimated two million children worldwide dying of it yearly. Regardless of the fact that it is one of the oldest recorded diseases, malaria remains one of the world's most deadly infectious diseases. It is arguably, the greatest menace to modern society in terms of morbidity and mortality. Though preventable, treatable and curable, there is no known immunity. This makes it an efficient and unrepentant killer. Several centuries after its discovery, malaria still remains a devastating human infection, resulting in 300-500 million clinical cases and three million deaths every year. (WHO, 2005).

Malaria is endemic throughout Nigeria. The Sahel

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regions and the high mountain area of the plateau states experience slightly lower rates of transmission malaria parasites. Malaria currently accounts for nearly 110 million clinically diagnosed cases per year, 60 percent of outpatient visits, and 30 percent hospitalisations. An estimated 300,000 children die of malaria each year. It is also believed to contribute up to 11 percent maternal mortality, 25 percent infant mortality, and 30 percent under-five mortality. It is estimated that about 132 billion Naira lost to malaria annually in the form of treatment costs, prevention and loss of work time in Nigeria (FMOH and NMCP, 2009).

Malaria is a complex disease due to its complex transmission process. The complexity of the disease vector (the anopheles mosquito) is only articulated by the complex life cycle of the parasite (plasmodium). The sub-Saharan African region has the greatest number of people exposed to malaria transmission and the highest malaria morbidity and mortality rates in the world (WHO, 2005). Malaria is known to have a negative impact on performance and learning in children (Holding et al, 2001). It also aggravates anaemia and malnutrition in children and pregnant women (Murphy et al., 2001). It is estimated that in Africa, malaria is responsible for over one million deaths yearly particularly of infants and young children (Angyo et al., 1996; Ofovwe et al., 2001).

Malaria usually presents with fever which may explain the frequent use of paracetamol and antimalarials for febrile children. These medicines are frequently adulterated in Nigeria, thus loosing their efficacy. In addition, they may become substandard as a result of chemical instability from inappropriate importation and storage conditions or due to poor quality control during their manufacture. (Bonati, 2009). Counterfeiting therefore has contributed to resistance of chloroquine and sulphadoxine-pyrimethamine to malaria parasites (FMOH, 2005b). Quinine or artemesinin derivatives have been recommended by the WHO for severe malaria treatment (WHO, 2006).

According to the World Health Organisation (WHO) World Malaria Report (2008), the number of annual malaria cases worldwide is actually decreasing, yet the impact of the disease burden remains an enormous challenge, for sheer numbers and threat to human life. Nigeria is one of Africa's hardest-hit, accounting for between 30 and 40 percent of malaria deaths on the continent (WHO, 2008). This magnitude of occurrence in this part of the world correlates with poverty, ignorance and social deprivations in the community (WHO, 2008). On the possible eradication of malaria, Arigbabuwo, (2010) opined that prevention is better than cure, advising that people should learn to maintain personal and environmental hygiene. In view of the negative socio-economic and health impacts of malaria on children, this retrospective study was carried out to examine the prevalence of malaria among children aged ½-11years in University of Benin Teaching Hospital (UBTH) from 2004-

2009. Consequently, the following research questions and a hypothesis were addressed.

Research Questions

What is the prevalence of malaria infection among children aged 6months-11 years under the studied period?

Hypotheses

There is no significant association between the 6months-11 years old children's yearly prevalence of malaria and their gender.

There is no significant association between the aged 6months-11 years children's yearly prevalence of malaria and their ages.

METHODOLOGY

This study, a non-experimental descriptive design, was carried out in the Children's Emergency Department of University of Benin Teaching Hospital, Benin City, Nigeria from January 2004 to December 2009. University of Benin Teaching Hospital, Benin City established in 1973 is situated in Edo State of Nigeria. Edo State popularly known as the Heart Beat of Nigeria is a swampy region in the south-south geo-political zone of Nigeria. The Children's Emergency Department is situated in the emergency complex on the ground floor comprising of reception area, resuscitation area and a ward of 12 beds. Patients are transferred out of it after 48 hours.

Target Population

All the patients admitted in Children Emergency Department from January, 2004- December 2009 are the target population.

Sample and Sampling Technique

A total of 7651 case notes and ward records of Children aged ½-11 years admitted in Children's Emergency unit of UBTH formed the sample size which was selected through documentary sampling technique (cumulative record).

Instrument for Data Collection

To elicit data from the medical case notes of the children, a checklist was developed to which Medical Records of

Table 1. Prevalence of malaria from 2004-2009 in children aged ½-11 years.

Year	All Admitted Patients	Diagnosed Malaria Patients	Prevalence %
2004	589(49.1±51)	277(23.1±22.3)	47
2005	1126(93.8±36.7)	368(30.7±14.7)	32.7
2006	1607(113.9±34.9)	650(54.2±25.9)	54.2
2007	1420(118.3±32.9)	536(44.7±23.3)	37.7
2008	1322(110.2±36.4)	449(37.4±14.7)	34
2009	1587(132±38.5)	508(42.3±13.5)	32
Total	7651(1275±380)	2788(464±132)	36.4
Year	All Admitted Patients	Diagnosed Malaria Patients	Prevalence %

- All Admitted Cases (ADM PTS)
- Admitted Malaria Cases (MAL PTS)
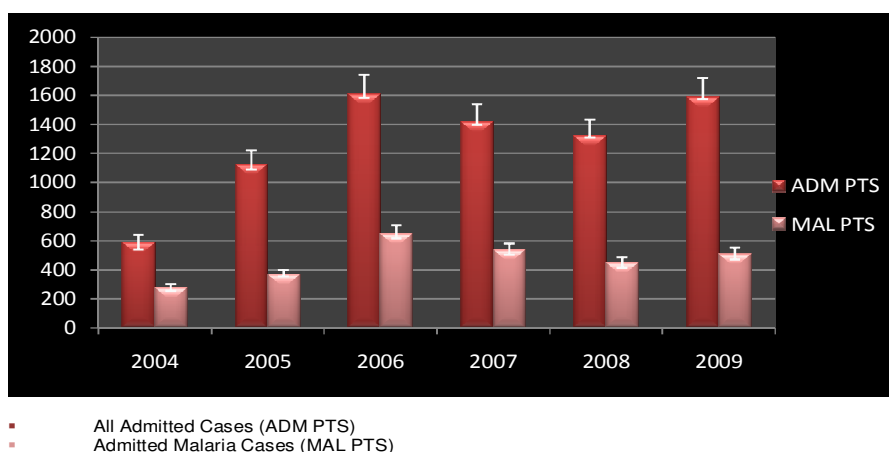
Figure 1. Bar chart showing six years (2004-2009), prevalence of malaria in children aged ½-11 years.

Children Emergency's departments UBTH supplied the necessary and relevant information regarding the target children vis-à-vis their malaria infections prevalence.

Validity and Reliability of Instrument

Instrument was validated by three health workers who authenticated the adequacy of the checklist. Reliability was established using a split half method on 20 children of the age bracket under study. A result of r=0.67 was obtained which is moderate enough for it to be used.

Method of Data Collection

Research assistants were trained for the collection of data using checklist to elicit information from the medical case notes in the emergency department of UBTH.

Method of Data Analysis

Descriptive statistics using SPSS package 2007was used to analyse the data obtained, mean ±SD; chi-square,

P-value < 0.05 were taken as statistical variable of relevance.

Ethical consideration

The study was approved by the staff of Children's Emergency unit of University of Benin Teaching Hospital Nigeria.

RESULTS

A total of seven thousand six hundred and fifty one patients (7,651) were admitted into children emergency unit during the five year period (2004-2009). Two thousand seven hundred and eighty five patients (2,785) were provisionally diagnosed as having malaria fever during the six years period. This number represents 36.4% of cases presenting with malaria (Table 1 and figure 1)

Table 1 shows that the year 2006 recorded the highest prevalence of malaria with 650 (54.2%) of cases, followed by the year 2009 with a prevalence of 508 (42.3%) and the least being 2004 with a prevalence of 277 (23.1%). This scenario is presented graphically in

Table 2. Distribution of yearly malaria occurrences according to gender

Years	Frequency (Prev. %) Male	Frequency (Prev. %) Female
2004	160 (57.8)	117(42.2)
2005	211(57.3)	157(42.7)
2006	348(53.5)	302(46.5)
2007	306(57.1)	230(42.9)
2008	269(59.9)	180(40.1)
2009	294(57.9)	214(42.1)
Total	1588(57)	1200(43)
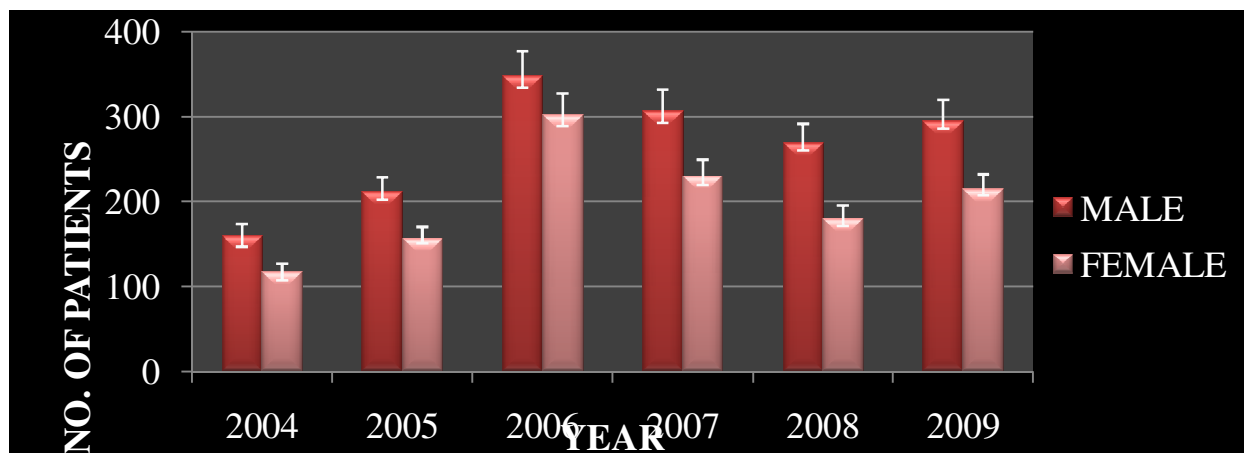
Figure 2. Bar chart showing the prevalence of malaria in males and females aged ½ - 11yrs.

Table 3. Summary table of chi-square analysis of yearly occurrence and gender.

Years	Male fo.	Male f.e.	Female fo	Female f.e.	Row Total
2004	160	157.77	117	119.22	277
2005	211	209.6	157	158.39	368
2006	348	370.22	302	279.77	650
2007	306	305.29	230	230.70	536
2008	269	255.74	180	193.25	449
2009	294	289.34	214	218.65	508
Column Total	1588		1200		2788

figure 1.

Table 2 shows that of the 2788 children with malaria, 1588 were males and 1200 were females. The prevalence of malaria infections appears higher among males (57%) than among females (43%) (Table 2 and figure 2)

Figure 2 shows that more males were diagnosed with malaria from 2004 – 2009; with the highest prevalence recorded in 2006 followed by 2007 and the least being in 2004.Testing Hypothesis 1: There is no significant association between the children's yearly occurrence of malaria and their gender.

Calculated X^2 =3.196, DF =10, Tabular X^2 =18.307, P-value = 0.05.

The chi-square value of 3.196 at ten (10) degree of freedom is less than the critical value of 18.307 at p-value of 0.05. This suggests that there is no influence of gender in the yearly occurrence of malaria infection in children under investigation. Hence, the computed chi-square is statistically not significant and the null hypothesis is accepted.

Table 4 shows that generally children aged ½ - 2 years recorded the highest prevalence (58.6%); followed by the age group 3 – 5 years (30.5%) and the least being age group 9 – 11 years (2.9%).

Figure 3 shows that the prevalence of malaria from 2004 -2009 was highest in age group ½ - 2 years followed by age group 3 – 5 years and the least being

Table 4. Showing the distribution of yearly malaria occurrences according to the children's ages.

Year	Age ½-2	Age 3–5	Age 6–8	Age 9–11
2004	160	89	21	7
2005	207	131	25	5
2006	401	191	42	16
2007	292	175	53	16
2008	269	123	37	20
2009	304	141	47	16
Total	1633(58.6%)	850(30.5%)	225(8.1%)	80(2.9%)
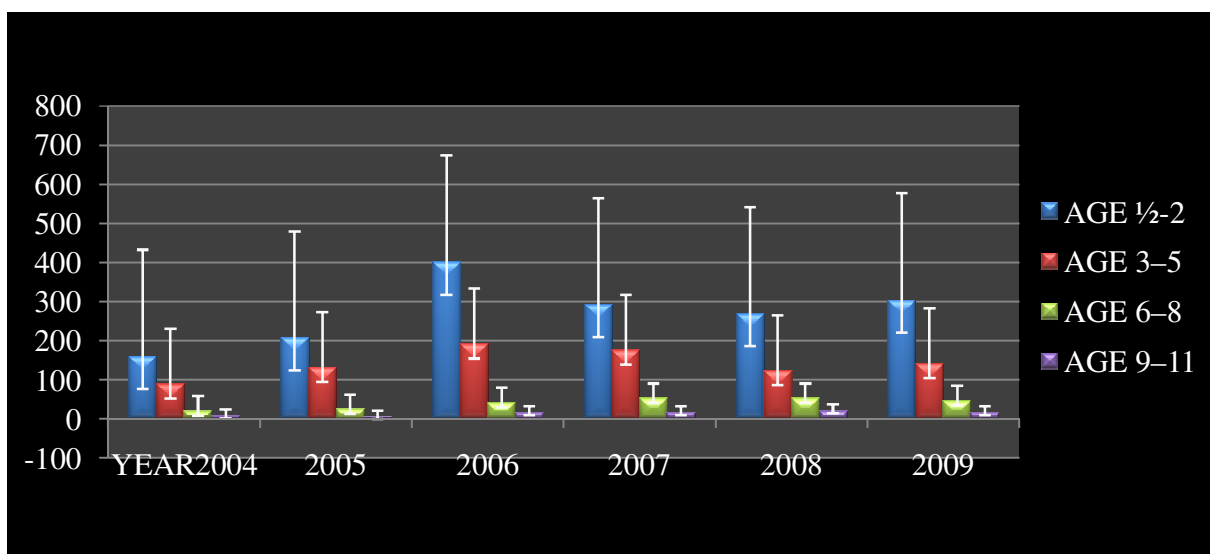
Figure 3. Bar chart showing the prevalence of malaria among the children by age and gender.

Table 4. Summary table of chi-square analysis of yearly occurrence and age.

Years	Age ½-2 f.o	f.e	Age 3–5 f.o	f.e	Age 6–8 f.o	f.e	Age 9–11 f.o	f.e	Total
2004	160	162.2	89	84.45	21	22.35	7	7.94	227
2005	207	215.54	131	112.19	25	29.69	5	10.55	368
2006	401	380.72	191	198.17	42	52.45	16	18.65	650
2007	292	313.94	175	163.14	53	43.25	16	15.38	536
2008	269	262.99	123	136.89	37	36.23	20	12.88	449
2009	304	297.54	141	154.87	47	40.99	16	14.57	508
TOTAL	1633		850		225		80		2788

that of 9 – 11 years olds.

Testing Hypothesis 2: There is no significant association between the aged 6months-11 years children's yearly prevalence of malaria and their ages.

Calculated X^2 = 338.280, DF =15, Tabular X^2 =24.996, P-value =0.05.

The chi-square value of 338.280 at fifteen (15) degree of freedom is greater than the critical value of 24.996 at p-value of 0.05. This suggests that there is influence of age in the yearly occurrence of malaria infection in children. Hence, the computed chi-square is statistically significant and the null hypothesis is rejected. Therefore, there is significant association between the children's yearly occurrence of malaria infections and their ages.

DISCUSSION OF FINDINGS

This work shows that a total of seven thousand six hundred and fifty one patients (7,651) were admitted into children emergency unit during the six year period (2004-2009). Two thousand seven hundred and eighty eight patients (2788) were provisionally diagnosed as having malaria fever during the six year period (2004-2009). This number represents 36.4% of cases presenting with malaria. Malaria currently accounts for nearly 110 million clinically diagnosed cases per year, 60 percent of outpatient visits, and 30 percent hospitalizations (FMOH, 2009) which were almost in line with the present finding of 36.4%.

This study has shown the overall prevalence of malaria (36.4%) infections (Table 1) among children seen in the Children Emergency of University of Benin Teaching Hospital, Benin City Nigeria. This agrees with the previous work that reported 27% prevalence of malaria parasite among school children from a rural village in western Nigeria (Ademowo, 1995).However, this finding was lower when compared to 80% malaria parasite prevalence reported among school children in the malaria-endemic village of Erunmu in southwest Nigeria (Adeyemo, 1999). The low prevalence of malaria in this study could be attributed to the effect of some preventive measures against malaria adopted by some people residing in the hospital catchment area. This study was carried out in a tropical rainforest zone and the study revealed that malaria was prevalent during the rainy season in the area between the months of May and November (Figure 4). Rainfall is known to increase the prevalence of malaria since it provides more breeding sites for the vector of malaria (Ukoli, 1992).

In this study, it was found that children between the ages of ½ and 2 years had the highest prevalence of plasmodium infections (Table 2) compared with the other age groups. This may be due to the fact that at that age, their immunity to parasitic infections has not been fully developed as pointed out by Stephenson, (2004). This observation was in line with reported high prevalence of Plasmodium infections in younger children as reported by Ani, (2004). Who asserted that prevalence of parasitic infections has been found to reduce with age. The prevalence of parasitic infections among the different age groups in the present study was statistically significant with the calculated X^2 = 338.280 at 15 degrees of freedom being greater than the tabular value of 24.996 at p-value (p < 0.05). This indicates that the occurrences of these infections were age dependent. A similar trend was also observed for children in Awka (Mbanugo and Ejims, 2000) and coastal dwellers of Lagos State (Nebe et al, 2002).

Gender distribution and prevalence of malaria infections

The present study has shown that Plasmodium infections might appear to be more common in the male than in the female subjects. However, it failed to show statistically significant calculated X^2 of 3.196 at 10 degree of freedom being less than the tabular value of 18.307 at p-value (p < 0.05). The present result conforms with the recorded higher prevalence of Plasmodium infection in male than in female school children in Ebonyi and Edo States, Nigeria as reported by Ani (2004). The higher prevalence of Plasmodium infection in males than in females may be attributed to the fact that males expose their bare bodies more than females especially when the weather is hot. Thus, such males are more likely to be bitten by mosquitoes. Females, on the other hand, are usually not exposing most parts of their bodies and tend to stay indoors, helping out with household chores. This reduces their contact with the mosquito vector as pointed out. Also, studies have shown that females have better immunity to parasitic diseases which is attributable to genetic and hormonal factors Zuk, et al., (1992). This issue is highly contestable because at this age of children under this present study, hormonal influence is not marked.

SUMMARY AND CONCLUSION

In summary, this study has shown that malaria infections are prevalent among children of ½-11years olds in Edo State, Nigeria. Children aged six months to five are the most vulnerable to malaria infections and deaths. Prevention of malaria through measures such as the use of insecticide-treated nets (ITNs), for improvement in infant health and survival is limited to few families in the study area. The major cause of death among children with malaria is anaemia and complications are more in males than females.

In conclusion, Malaria still kills an unacceptable number of Nigerian children each year, and blights the life of many millions more. This calls for judicious application of scientific advances which make it possible to dramatically reduce this burden of malaria infection among school age children.

RECOMMENDATIONS

This calls for judicious application of scientific advances which make it possible to dramatically reduce this burden of malaria infection among school age children.

There is also a critical need to direct more attention to the reduction of malaria occurrence by nurses instituting preventive interventions on malaria infection in young children bearing in mind its' high mortality rate due to poor development of immune systems by such children. Again, proper observations should be made to exclude the presence of aenemia, which is the most common cause of death in malaria infection in children.

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