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Epidemiology Survey of Malaria Infection Among Patients Attending General Out-Patient Department of Borno State Specialist Hospital Maiduguri, Borno State.

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ABSTRACT

A cross-sectional study of Epidemiological survey of Malaria infection among patients attending General out-patient Department of Borno State Specialist Hospital was carried out among children. Variables assessed were thick blood film for malaria parasites, PCV, age and sex respectively. PCV was assessed using AB Jovan microhaematocrit centrifuge. Anaemia was defined as PCV less than 3%, the range of PCV values 25-29% was considered mild, 20-24% moderate while less than 29% was considered severe anaemia. A total of 211 patients were surveyed comprising 118 (55.9%) males and 73 (44.10%) females, one hundred and twenty two 122 (57.8%) of the study population were pre-school children and 89 (42.2%) infants. One hundred and thirty 130 (61.6%) of the children had malaria parasite in their blood film. Malaria infection of these (35.1%) were males while 56 (26.5%) were females but the difference was not found to be statistically significant (P>0.005). infection rate was higher among the pre-school children 32 (38.8%), than the infants 48 (22.8%) and the difference was found to be statistically significant (P>0.005). the study indicated a strong correlation between age, anaemia and prevalence of malaria parasites.

Keywords: Epidemiological, Survey, Malaria Infection, Patients, Attending, Specialist Hospital, Maiduguri.

INTRODUCTION

Malaria is the six leading cause of disability among children under five years of age in the developing world (Panel 18, 1998, WHO, 1996). Some 600,000 young children die of malaria alone each year while over one million die of malaria in conjunction with other illness at a rate of a child every second (Panel 18, Roll Back Malaria 1998).

Malaria parasites cause life-threatening protozoan disease called malaria. It is the most important of all the tropical diseases in terms of morbidity and mortality (Agyepong *et al.* 1995). Malaria parasites belong to the genus plasmodium which includes over 125 species infecting reptiles, birds and mammals. This genus is subdivided into 10 subgenera. Human and primate malaria parasites belong to the sub-genera plasmodium Laverania. Malaria parasites infecting humans belong to four species: *Plasmodium* (Laverania), *Falciparum*, *Plasmodium vivax, Plasmodium ovale* (Gilles, *et al*, 1993).

More than 300-500 million individuals throughout the world are infected with malaria, and 1.5-2.78 million people a year, most of whom are children are being killed by the disease. The incidence of malaria is increasing due to resistance of vectors to insecticides and drug resistant

parasites. In India, *Plasmodium falciparum* are common, a few cases of *Plasmodium malariae* and *Plasmodium ovale* have also been reported (Miller, *et al* 1994).

High malaria transmission occurs mostly in Africa, South of the Sahara, where *P. falciparum* predominates and causes an estimated 90% of death attributed to Malaria worldwide. High transmission also occurs in other areas of the world (e.g Papua New Guinea). Areas of low to moderate malaria transmission are found mostly in Asia and the Americas and also in substantial parts of Africa and in countries where control activities are well developed (Midha, *et al.* 1981).

In malaria endemic developing countries, on the contrary, economic and logistic reasons force entire populations to rely exclusively on self diagnosis and treatment, even in the case of moderate fever (Sowunmi *et al* 1993). Malaria parasites exhibits a complex life cycle, involving alternating cycles of asexual division (Schizogony) occurring in man (intermediate host) and sexual development (sporogony) occurring in female anopheles mosquito (definitive host). Therefore, malaria parasites exhibits alteration of generation and alternation hosts (Arora *et al* 2001). The metabolism of the malaria parasite is largely dependent on the digestion of red cell haemoglobin which is transformed into malaria pigment. Pigment is absent in the ring stage and becomes detectable only in late trophozoite and the Schizont stage. The malaria pigment may be yellowish-brown or dark brown in colour (Miller *et al* 1974). It is then important to process thick films as soon as possible to permit complete dehaemoglobinization (Shute 1988 and Gilles 1993).

Giemsa staining is the most commonly used method for both thin and thick films all over the world for the quality of the stain and for greater importance, its stability in tropical climates (Ferreira 1990).

MATERIALS AND METHODS

Study Area

The cross-sectional study was undertaken in General Out-patient Department (G.O.P.D) of the Borno State Specialist Hospital, Maiduguri, Borno State.

Sampling Method

Every patient that was seen in the consulting room was eligible to participate in the study. Two hundred and eleven patients, who were encountered during the survey period and whose mothers or himself agreed to participate after informed consent was obtained, constituted the study population; blood collection, thick film preparation, staining procedure and blood film examination for malaria parasite.

In children the ball of the fourth finger was punctured with sterile lancet after cleaning with methylated spirit soaked swab. Blood collection and thick film were prepared. Whereas in adult blood film are prepared directly from capillary blood or EDTA (sequestrene) anticoagulated venous blood can also be used provided the blood films are made soon after collecting the blood (within 30 minutes) as described by Gilles, (1993).

Two films were made for each patient, the dried film were stained in trough containing 3% Giemsa stain in Buffer pH 7.2. Dehaemoglobinization and staining took place simultaneously

for 45 minutes. After staining slides were rinsed in buffer and allowed to drain dry. The stained blood slides were examined under light microscope for asexual forms of plasmodium specie per thick film filled.

Determination of Packed Cell Volume (PCV)

Capillary tube was used to collect blood from each patient's punctured finger ball or EDTA (sequestrene) anticoagulanted venous blood. PCV was measured using Hawksley, micro-centrifuge (Lancing United Kingdom) and haematocrit reader. Anaemia was defined as PCV less than 30% PCV, and PCV values ranging from 25-29% was considered mild, <20-24% was considered moderate/severe anaemia (WHO 1986).

Data Analysis

Data collected were analysed using PEPI, the computer programme for Epidemiological studies. Association was established using chi-square test at 95% confidence limit.

RESULTS

Of the 211 patients studied, 118(55.9%) were males and 93(44.1%) were females while majority of the children 122(57.8%) were between 12 and 59 months while 89(42.2%) were infants. There was however no statistical difference between ages ($x^2 = 0.60$, df = 1, p = 0.44).

The prevalence of malaria infection by age and sex of 211 blood films were examined 130 (1.6%) were infected while 81(38.4%) were negative. Of the 89 infants examined, 48 (22.8%) had malaria parasite in their blood film while 82 (38.8%) of 122 pre-school children were infected. Infection rate was higher among the pre-school than in infants and the difference was found to be statistically significant ($x^2 = 3.84$, df =1, p = 0.05). Of the 118 males examined, 74 (35.1%) were infected while the corresponding figure for females infected was 56 (26.5%) out of 93. Although, more males than females were malaria parasite positive, the difference were not found to be statistically significant ($x^2 = 0.14$, df = 1, p = 0.71).

However, the determination of packed cell volume (PCV) and percentage of prevalence of malaria parasitaemia indicate that children without anaemia and those with anaemia were considered, the difference was found to be statistically significant ($x^2 = 13.85$, df = 2, p = 0.001).

DISCUSSION

The prevalence of malaria observed in this study was 61.6%. The high prevalence of malaria could be attributed to the geographical location of Maiduguri, Borno State which enhances their developmental stage and life cycle (Malaria in Nigeria 1991). It is also important to take note that malaria cases reaching the hospital in Nigeria could be said to be the tip of the iceberg. Since a high proportion of cases are managed at home.

The prevalence of malaria infection was statistically higher among the pre-school children than infants, which suggests that age is an imperative factor in the aetiology of malaria among the studies population.

The pre-school children are particularly vulnerable due to lack of partial immunity from surviving repeated infections enjoyed by adults (Africa malaria report (1) 2003). Evidence (Langgraf *et al*, 1994) shows that females are naturally more protected against malaria than males and variety of other parasitic diseases due to genetic and hormonal factors. It is not

surprising therefore that more males than females have malaria parasitaemia similar to the findings of Afolabi *et al* (1997) in Lagos.

CONCLUSION

In conclusion the study indicted a strong correlation between age, anaemia and malaria parasitaemia. Good nutrition and improved feeding system is a pre-requisite for heath as it helps to build up immunity against infection. Malaria and anaemia are important causes of morbidity and mortality in this population and so malaria prevention strategies will tremendously reduce the burden of the disease in the region (Borno State).

Table 1: Age and Sex Distribution of Study Population

Age (in month)	Male		Female		Both Sexes	
	No.	%	No.	%	No.	%
<12 months	47	23.3	42	19.9	89	42.2
12-59 months	71	32.6	51	24.2	122	57.8
Total	**118**	**55.9**	**93**	**44.1**	**211**	**100.0**

Table 2: Prevalence of Malaria by Age and Sex Distribution of Study Population

Parameters	Prevalence of Malaria Parasitaemia					
Age(in months)	Infected		Not infected		Total	
	No.	%	No.	%	No.	%
<12 months	48	22.8	41	19.4	89	42.2
12-59 months	82	38.8	40	19.0	122	57.8
Total	**130**	**61.6**	**81**	**38.4**	**211**	**100.0**

Parameters	Prevalence of Malaria Parasitaemia					
Age(in months)	Infected		Not infected		Total	
	No.	%	No.	%	No.	%
<12 months	74	35.1	44	20.9	118	56.0
12-59 months	56	26.5	37	17.5	93	44.0
Total	**130**	**61.6**	**81**	**38.4**	**211**	**100.0**

Table 3: Prevalence of Malaria Parasitaemia by PCV Count and Percentage of Infection

PCV (%)	Infected		Not infected		Total	
	No.	%	No.	%	No.	%
< 20-24	45	21.3	10	4.7	55	26.0
25-29	34	16.1	23	10.9	57	27.0
≥ 30	51	24.2	48	22.8	99	47.0
Total	**130**	**61.6**	**81**	**38.4**	**211**	**100.0**

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