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CLINICAL FEATURES OF MALARIA PARASITEAMIA AMONG CHILDREN IN PARTS OF THE NIGER DELTA AREA OF NIGERIA.

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ABSRACT

This study was carried out to investigate the prevalence of malaria parasitamiae and its clinical features in children aged 0-5 years in parts of Delta State of Nigeria. Blood samples were randomly collected from the thumb of each child using the finger prick method. A total of 600 blood samples (360 males and 240 females) were examined using the thick and thin smear method. The children were also examined clinically for related signs and symptoms. The result showed that a total of 485 (81.0%) children were positive and only *Plasmodium falciparum* and *Plasmodium malariae* were found among the positive cases. *Plasmodium falciparum* was significantly higher than *Plasmodium malariae* ($P<0.05$). Although males were more infected (82%) than females (79%) the difference was not statistical significant ($P>0.05$). The least prevalence of 55.6% was observed in 0-6 months age group. Common signs and symptoms observed among children include fever, cough, diarrhea, nausea and vomiting. Fever was the highest sign. The public health implications of these findings and the need to promote environmental sanitation are highlighted.

INTRODUCTION

Malaria is one the tropical diseases transmitted by mosquitoes. It involves the intra-cellular invasion of erythrocytes and liver cells by the causative agent which is a sporozoan of the genus plasmodium, transmissible by the female anopheline mosquitoes. The plasmodium is made up of four species which include *Plasmodium falciparum*, *Plasmodium vivax, Plasmodium ovale*, and *Plasmodium malariae* that infect man. Each of these produce different types of symptoms in man (1). For instance, *Plasmodium falciparum* causes malignant tertian malaria, *Plasmodium vivax* causes benign tertian malaria, *Plasmodium ovale* causes malaria similar in its periodicity to that caused by *Plasmodium malariae* which cause quartan malaria(2).

Malaria is characterized clinically by fever which is often periodic showing varying degrees of anaemia, spleenic enlargement and various syndromes resulting from the physiological and pathological involvement of certain organs including the brain, the liver and the kidneys(3). Almost all of the estimated over one million deaths from malaria each year worldwide is attributed to plasmodium falciparium around the world where endemicity of *P. falciparium* malaria

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is stable (4). Severe malaria is mainly a disease of children from the first few months of life to the age of 5 years. It is less common in older children and adults because of acquisition of partial immunity (3). In areas of higher endemicity, severe malaria occurs in both adults and children. Non-immune travelers and migrant workers are also vulnerable to severe malaria (5). The different types of malaria infection caused by plasmodium species, are dangerous and deadly because the schizonts remain in internal organs and rarely appear in peripheral blood causing more complications (6). Anaemia results from the destruction of red blood cells at the completion of each new erythrocytic cycle and its severity may be marked in acute plasmodium falciparium infection and may be associated with haemolysis and haemoglobinuria (3).

Anaemia is generally severe in infections due to attack of malaria parasites. The infection is caused when plasmodium attacks erythrocyte of and tends to concentrate in large numbers in visceral capillaries and multiplies very rapidly than. Malaria parasitaemia is a resultatnt effect of the existence of malaria parasites in the blood cells and the organs of man, which leads to the occurrences of various degrees and types of complications. The burden of disease malaria parasitaemia causes is considerable, amounting to 300-500 million clinical cases per year, 80% of which are in Africa. It is responsible for greater than one million deaths yearly. Virtually all due to *P. falciparium* and 90% of which are in Africa (7). The presence of parasitaemia in the blood cells of infected humans especially children under five years poses a great and insurable risk to the affected, the heard health status of the community and the population of the malaria endemic area at large. Thus, determining the prevalence of the occurrence of malaria parasitaemia and its morbidity indicators poses a fundamental challenge to all the stakeholders in the primary, secondary and tertiary health care delivery disciplines. As such this work aims at examining the existence of the condition or characteristic of the infection of malaria parasite and signs/symptomsamong children aged 0-5 years as this phenomenon is fraught with unpleasant health consequences.

The significance of this study derives from the potential of the findings to contribute to the body of knowledge on the understanding of malaria parasitaemia and its signs/symptoms. Findings on the clinical features of malaria parasitaemia in infants will help in the identification, diagnosis, prevention and control of the disease condition to reduce the prevalence and burden of malaria and its complications in our communities to the nearest minimal if not total eradication.

Materials and Methods

SAMPLING

This was done in Ika South Local Government Area in Delta State, Nigeria**.** The area lies between longitude $7^{0}29^{1} – 7^{0}\ 34^{1}$N and Latitude $8^{0}13^{0} – 8^{0}16^{1}$E. The vegetation is typically rain forest and there are distinct rainy and dry seasons with most of the rainfall (1700 – 2200mm) occurring between March and October.

Sampling

Six hundred children, both males and females between the ages of 0 and 5 years were randomly selected from the 25 villages for the study. Twenty Four individuals were selected from each of the villages. Both symptomatic and asymptomatic children were examined. The sex and ages of the children were recorded. Blood samples were collected from their thumb using sterile lancet to prepare thick and thin blood smear used in determining the plasmodium species present by observing themthrough the oil immersion of the microscope. Structured, pretested questionnaires were administered to mothers and heads of households of these children. In addition they were examined clinically by a physician to determine the clinical symptoms of malaria they present.

Chi square analysis was used as the test statistic to analyse data obtained.

Ethical Approval

Informed consent of all the subjects were obtained from their parents or care takers as the case may be while ethical clearance was given by the Central Hospital, Agbor, Delta State ethical committee and the review board of School of Health Technology, Federal University of Technology, Owerri.

RESULTS

The results of this study revealed that 485 (81.0%) out of 600 children examined had malaria parasite.Of the four plasmodium species that effect man, only *P. falciparium* and *P. Malaria* were detected in their blood. *P. falciparium* infections were significantly higher than P. malaria in children (table1). Children sampled were within the age bracket of 6 months to 5 years. Table 2 shows the detailed picture of malaria infections amongst various age groups. Malaria parasitaemia amongst children showed

significant variation in age groups ($p<0.05$). Of all the age groups, there was infection.

Apart from children below 0-6 months, which recorded the least infection rate of 55.6%, malaria parasitaemia in other age group ranged between 60% and 95%. Several signs and symptoms were associated with malaria infection in children.

As shown in table 3, these include fever, cough, vomiting, diarrhea, convulsion, lack of appetite, joint pains, shivering and headache. Generally, fever had the highest prevalence (33.3%) followed by fever and vomiting (19.6%) while headache had the least (0.6%).

However, only 2 children (0.4%) had parasitaemia with no symptoms. These children had come to the hospital for dressings of minor injuries.

Table 4 depicts the number and percentage of patients in the group seen in the Central Hospital in Ika Local Government Area during the study. These children presented with each of the common symptoms especially cough, fever, diarrhea and vomiting. These signs and symptoms are compared with the figures obtained from the patients in the group who had parasitaemia. Fever was the common presenting symptom in all children who came to the hospital. It was recorded in 197 (32.9%) patients, but of these only 133 (27.4%) had malaria parasitaemia. The latter represents 27.4% of the total number of children with parasitaemia. Thus, fever was common in the whole group as in those children with parasitaemia. The sex related prevalence of malaria in children is summarized in table 5 of the 600 patients examined, 360 and 240 were males and females respectively. Prevalence varies according to various age groups. Malaria parasitaemia was more in males (82%) than in females (79%). This variation was not statistically significant ($p>0.05$).

Table 6 shows the monthly malaria parasitaemia in the study area. There was monthly variation of malaria parasitaemia amongst the sampled children. Malaria parasitaemia had a gradual increase from April and peaked in June. Infection was significantly higher towards the end of the rainy season months of July and August.

Table 7 shows the parasite count in relation to age. The least parasite count was recorded amongst children less than one year of age. Thereafter, a gradual increase was noticed with increase in age reaching a peak in children 2 years and above.

Table 1: Frequency distribution of Plasmodium species encountered during the study.

No. of cases	*P. falciparium* No. %	P. malaria No. %
485	347 (71.5)	138 (28.5)

Table 2: Malaria parasitaemia amongst children (6months – 5 years) in Ika South Local Government Area of Delta State.

Age range (months)	No. Examined	No. Infected (%)
0-6	9	5 (55.6)
7-12	40	36 (90.0)
13-18	43	32 (74.40)
19-24	140	103 (73.6)
25-30	100	91 (91.0)
31-36	101	86 (85.1)
37-42	80	67 (83.8)
43-48	50	30 (60.0)
49-52	20	19 (95.0)
53-60	17	16 (94.1)
Total	**600**	**485 (80.26%)**

Table 3: Presentation of signs and symptoms correlation with malaria parasitaemia

Presenting Symptoms	Number of Patients	Percentage (%)*
Fever only	171	35.3
Fever and Vomiting	95	19.6
Cough only	30	6.2
Fever and Cough	23	4.7
Fever, Cough, Vomiting	13	2.7
Vomiting and Diarrhea	40	8.2
Lack of Appetite		
Convulsion	20	4.1
Shivering	29	6.0
Diarrhea	28	5.8
Pains in the Joints		
Fever and Headache	23	4.7
Headache only	8	1.6
Without	3	0.6
N=485	2	0.4

*Based on total number of infected persons.

Table 4: Prevalence of presenting symptoms in all 600 patients examined and in 485 patients with malaria parasitaemia.

Presenting symptoms	Total no examined	No with parasiaemia (%)
Fever	197 (32.9)	133 (27.4)
Cough	100 (16.7)	98 (20.2)
Diarrhea	68 (11.3)	64 (13.2)
Vomiting	152 (25.3)	110 (22.7)
Headache	83 (13.8)	80 (16.5)
Total	600	484

Table 5: Sex- related Malaria Parasitaemia in children

	MALES		**FEMALES**	
Age range (years)	No. Examined	No, infected (%)	No. Examined	No. infected (%)
0-1	50	35 (9.7)	50	36 (15)
2-3	210	180 (50.0)	150	125(12.1)
4-5	100	80 (22.2)	40	29 (12.1)
Total	360	295 (819%)	240	190 (39.2)%

Table 6: Monthly variation of malaria infection in the study area

Months	Positive smears	Negative smears	Total smears
Feb,	40	10	50
March,	51	16	67
April,	90	14	104
May,	82	15	97
June,	87	20	107
July,	80	21	101
Aug,	55	19	74
Total	**485**	**115**	**600**

Total 7: Parasite count in relation to age.

Age (Years)	Number (%) of patients	Parasite count /PHF	Grading*
>1	30(6.2%)	1-3	(+)
1+	35 (7.2%)	4-7	(++)
2+	154(29.9%)	>12	Numerous
3+	132(27.2%)	8-12	(+++)
4+	83 (17.1%)	4-7	(++)
5	60 (12.4%)	1-3	(+)

***Grading of count**

1-3 parasite count/PHF = (+)
4-7 Parasite count /PHF = (++)
8-12 Parasite count/PHF = (+++)
>12 Parasite count/ PHF = Numerous

DISCUSSION

In Nigeria, malaria is hyper endemic with stable transmission and a mortality rate of about 10% in children aged less than 5 years (8). Malaria parasiteamia in children aged 6 months to 5 years varies from one area to another. In the present study, malaria parasite was detected in 485 out of 600 children sampled. This gives a prevalence of 81.0%. This value is higher than the observations of Umunede and Emuma (9) in parts of of Abavo areas of Delta State. The high prevalence observed in the work also is higher than the report of Okaro (10) who noted a prevalence of 58.3% of the 400 children aged 0-5 years in Warri metropolis in Delta State. The high malaria parasitaemie observed in this study suggests that the arthropod vectors also breed in the area as noted by Eneaya (11). Malaria exists where infective anopheline vectors breed in water and where human carriers of the sexual forms of the parasite are available to these mosquitoes.

Similar results were documented in parts of Enugu State (11) where *P. falciparium* were encountered with *P. malariae.* It has been observed that in Africa *P. falciparium* is the dominant species (1;10). In the present study, it was observed that the association between plasmodium infections and age was statistically signicant. Low malaria parasiteemia of plasmodium infection in infants less than 6 months aged group was observed. Evidence abound from other researchers that probably this could be due to persisting maternally derived antibodies that are present in each child's serum from the time of birth (3;12). More so, low concentration of paraminobenzo acid in breast milk consumed during the first month of life and the presence of fetal hemoglobin (HBF) have also been thought to prevent the growth of *P.Falciparium* parasite and to protect the infant from malaria infection and illness (13). This could explain the low malaria parasitaemia observed amongst infants below 6 months of age.

On the other hand, the markedly increased level of parasitaemia in the 2-3 years age group could be attributed to the gradual loss of these maternally derived antibodies. This result agrees with earlier reports (14;15) that these observations could be attributed to the pattern of persisting antibodies as well as the development of acquired immunity. The pattern of parasite count recorded in this work also resembles that of the age related prevalence.

Children under one year of age had the least parasite count. While there was a gradual increase with increase in age and reaching a peak in children 2 years and above. It is also possible that this observation could be linked to the issue of immunity of infants to malaria infections immediately after birth (15). Parasitaemia in relation to sex of children sampled showed that although more male than females were infected, it was not statistically significant. Observations made on the seasonal variation of malaria parasitaemia on children showed a gradual increase from April and peaked in June. Indeed more cases were recorded towards the end of the raining season months of July, August and September. In Nigeria, malaria is hyper endemic with stable transmission and a mortality rate of about 10% in children age less than 5 years. As has been documented (1;2;9;12) a greater number of malaria cases are seen during the raining season months.This is in conformity with the present study. This could be related to the high abundance of the mosquito vector during the raining season months.

Malaria causes a great deal of morbidity in early childhood in many parts of the tropics and subtropics where the disease is endemic (1). Malaria in children is also associated with several signs and symptoms such as fever, vomiting, cough, diarrhea, convulsion, lack appitite, headache among others. These were found in the present study. Fever was the common presenting symptom in all children who came to the hospital. Malaria is a common cause of febrile illness in children in tropics including Nigeria similar to the report of Chukwuocha *et al* (16) in parts of the Imo River Basin of Nigeria. In the present study, out of 600 children seen in the hospital, 197 had fever. Of these only 133 (27.4%) had parasitaemia when these children were examined, other common causes for their febrile illness were found, these were obits media, sickle cell crises, meningitis, typhoid fever, measles and bronchopneumonia. Malaria parasitaemie was found in 68 patients without fever and eight of these were brought to the hospital for minor injuries only. Other complication of malaria in children such as anaemia, loss of appetite, convulsion, diarrhea etc was also observed during this study.

Some striking disparities were observed amongst the various locations in the study. These disparities could be attributed to both locations and age of the children.

As noted by Chuklwuocha *et al*(2) the promotion of better environmental conditions such as better town planning and good housing with appropriate, and well maintained drainage system, proper waste disposal management, proper nutrition and drastic change in our socio-cultural behaviour are necessary for reduction in morbidity and mortality caused by plasmodium infection. Consequently, public health education campaign is required to change the unhealthy socio-cultural practices which highly predisposes to malaria infections.

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