Haematological Characteristics of Patients with Malaria Parasitaemia in selected Hospitals in Uli, Ihiala Local Government Area, Anambra State

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ABSTRACT

Haematological characteristics of patients, with malaria parasitaemia in selected hospitals in Uli were studied with the consent and assistance of hospital management. The study area was zoned into A, B, and C for convenience. Two hundred and fifty individuals were involved in the study within the ages of 0 - 44 years. 174(69.6%) of the population were infected. The age group of 0 – 14years had the highest malaria infection of 52.9% and adults > 45years (40.2%). In the ABO group infection, O blood group had the highest infection of 36% and AB group had the least of 3.2%. In the blood genotype infection, individuals with AA genotype had the infection rate of 52%, AS (16%) and SS (1.6%). It has been observed that the prevalence of malaria infection in man lies not only on age but also on one's haematological profile which include the blood group, the PCV and genotype. This calls for serious move for its prevention and control by individuals and Government.

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INTRODUCTION

In humans, malaria is known to be caused by four species of *Plasmodium* which include; *Plasmodium falciparum*, *Plasmodium malariae*, *Plasmodium ovale*, *Plasmodium vivax* and *Plasmodium knowlesi*. Among all these, *Plasmodium falciparum* is the most prevalent with about 80% infection and is responsible for 90% death from malaria infection (Trampuz *et al.*, 2003). Malaria has been one of the most prevalent of human infections in the Tropics. The severity and duration of its attack in endemic areas depend on many factors which include the nutritional status of the host, virulence of the infecting strain, immunity of the infected host, age, occupation and environmental factors (Orago *et al.*, 2001).

According to World Health Organization (WHO, 1996), malaria is one of the most prevalent human infections and over 40% of the world population live in malaria endemic areas. It has been found to cause cognitive impairments especially in children (Boivin, 2002) and severe brain damage (Idro, 2003). The relationship between plasmodium and red blood cells is of dual effects in which the parasite modifies the composition and antigenicity of the red blood cells (Eneanya, 1996). Epidemiological studies have shown

that red blood cells containing altered haemoglobin and lacking certain antigenic determinants at their surface confer resistance to malaria (Miller *et al.*, 2003). However, alteration of various haematological parameters has been observed in patients with malaria (Flemming, 2002). This study tends to explore some haematological characteristics of individuals infected by malaria in Uli community.

MATERIALS AND METHODS

Study Area

Uli is a rural community in Ihiala Local Government Area of Anambra State. It has 9 villages and lies between latitude 5° 58' – 5° 60' N and longitude 6° 47' – 6° 57' E.

Study Population and Blood Sample Collection

The population of study which involved 250 persons was drawn from patients who presented themselves for treatment at the hospitals; Victory medical centre, Ken Joe hospital, and Ezinne Maternity. They were classified among the ages of 0 - 44 years and > 45 which represented both children, students and adults.

With the assistance of the hospital management, venous blood was collected from the consented patients. This was done using dry sterile syringe and needle and dropped into EDTA bottles labelled for each patient. The uninfected patients were used as control.

Determination of Blood Characteristics

ABO blood group

This was determined using Anti sera kit containing Anti A, B and D reagents. There were white tiles, plastic stirrer. A drop of each patient blood was put on three different portions of the tile and anti-sera was dropped differently on the drops of blood. The content of each portion was thoroughly mixed with the stirrer, this was tilted side by side and agglutination was looked for after 2- 3 minutes. The blood groups A, B, AB, and O were identified based on the observed agglutination with the anti-sera.

Genotype determination

The test involve electrophoretic tank, white tile, cellulose acetate paper, buffer solution, distilled water. A drop of each patient's blood was placed on different portions of the tile, and a drop of the control(AS). Each drop blood was lysed with distilled water. Exactly 100ml of buffer solution was poured into the electrophoretic tank. The blood samples and control were applied on the cellulose acetate paper using applicator, this was placed in the electrophoretic tank and connected to power supply.

Packed cell volume estimation

Capillary tubes were dipped into EDTA bottles containing each patient's blood sample and were allowed to be three quarters full. The tubes were flamed and sealed, and placed in haematocrit centrifuge and spanned for 10 minutes. The packed cell volume was read from haematocrit reader. This was measured by the length of the column of the packed red cells divided by the length of the whole column of blood (cells and plasma), multiplied by 100%.

Blood examination

Each blood sample was mixed thoroughly and gently. A drop of each was placed on clean sterile glass slide and spread to make even thick smear. This was stained using field stain A and B accordingly. This was examined using oil immersion at x100 objective.

Identification of Malaria Parasite

This was based on morphological features of stained smears, the pink dots in red blood cells as Schaffner's dot in *P. vivax* and scanty Maurer's dot in *P. falciparum* (Olubunmi, 2013)

RESULTS

Two hundred and fifty people within the study area were screened for malaria parasitaemia, 174(69.6%) were positive. In the zone representation which is according to hospitals, A had 45(18.0%), zone B 84(33.6%) and zone C had 45(18.0%). Considering their sex in terms of level of infection, males were 98(39.2%) and females 76(30.4%) Table 1.

In the age related malaria parasitaemia, among the sexes in the various zones sampled, were as follows; in males 0 – 14years (14.8%), 15 – 29yrs (10.0%), 30 – 44yrs (7.6%) and >45yrs (6.8%). In females, the results were as follows; 0 – 14years (10.0%), 15 – 29yrs (8.4%), 30 – 44yrs (6.8%) and > 45yrs (5.2%) Table 2.

Table 3 shows the intensity of malaria infection and their corresponding mean packed cell volume (PCV) as follows; (+) 95(56.7%), (++) 68 (45.1%) and (+++) 11 (38.0%).

The blood groups of the studied population and level of malaria infection as shown in Table 4 were, blood group A (45)(18.0%), B (21)(8.4%), AB (8)(3.4%) and O (90)(36.0%). The genotype and malaria infection in the study area stood as follows; AA (130)(52.0%), AS (40)(16.0%), SS (4)(1.6%).

Table 1: Prevalence of malaria infection among the sampled population in relation to 3 location and sex.

Location/Zone	No. examined	No. infected	%Male	%Female
A	80	45(18.0%)	30(12.0%)	15(6.0%)
B	100	84(33.6%)	39(15.6%)	45(18.0%)
C	70	45(18.0%)	29(11.6%)	16(6.4%)
Total	250	174(69.6%)	98(39.2%)	76(30.4%)

Key to zone: Zone A = Victory Medical Centre; Zone B = Ken Joe Hospital; Zone C = Ezinne Maternity Home.

Table 2: The age related malaria parasitaemia among sexes in the zones/locations in the study area.

Zone No. infected	No. of males				No. of females			
	0-14yrs	15-29yrs	30-44yrs	45 & above	0-14yrs	15-29yrs	30-44yrs	45 & above
A 45(18.0)	12(4.8)	9(3.6)	3(1.2)	6(2.4)	5(2.0)	3(1.2)	4(1.6)	3(1.2)
B 84(33.6)	15(6.0)	9(3.6)	8(3.2)	7(2.8)	15(6.0)	13(5.2)	10(4.0)	7(2.8)
C 45(18.0)	10(4.0)	7(2.8)	8(3.2)	4(1.6)	5(2.0)	5(2.0)	3(1.2)	3(1.2)
Total 174(69.6)	37(14.8)	25(10.0)	19(7.6)	17(6.8)	25(10.0)	21(8.4)	17(6.8)	13(5.2)

Table 3: Malaria intensity and corresponding PCV volume (g/dl).

Malaria intensity	Frequency (F)	Mean Packed cell volume
+	95	56.7
++	68	45.1
+++	11	38.0
Total	174	139.8

Key to Malaria intensity: + = Low, ++ = moderately, +++ = severe.

Table 4: Blood groups of sampled population and malaria infection.

Blood group	No. Examined	No. Infected	% Infection
A	60	45	18.0
B	30	21	8.4
AB	10	8	3.2
O	150	100	40.0
Total	250	174	69.6

Table 5: The Genotype related malaria infection in the population.

Genotype	No. examined	Positive cases
AA	180	130(52%)
AS	65	40(16.0%)
SS	5	4(1.6%)
Total	250	174(69.6%)

DISCUSSION

The overall prevalence of malaria infection in the study area is 69.6% as shown in table 1. This is relatively low when compared with 100% infection by Eneanya (1996) in the work on severe falciparum malaria infection. The level of infection in the location can be attributed to the nature of the environment and the period of the study. In the sex related malaria infection, it was more in the males (39.2%) than in females (30.4%). In the age level of infection 0 – 14years group were higher in males as well as in females with 14.8% and 10.0% infection rates respectively. This confirms high level of malaria infection among children than in adults (Clair, 1997).

The intensity of malaria infection was related to packed cell volume (Table 3). Individuals with +++ infection had lower packed cell volume (38) when compared to those with just + (56.7) and ++ (45.1). High parasite intensity leads to anaemia and thus low packed cell volume (Trampuz, 2005) and this is common in children (Orago *et al*, 2001). Adults may have low packed cell volume which could be as a result of age related factors.

The ABO group infections varied as was observed in the study area. The highest infected blood group was O(40.0%) and the least AB(3.4%). This could in line with the report by Peter (2000), that some polymorphic human genes are involved in resistance of host to species of malaria infection. Moreso, the genotype of an individual's blood has influence in malaria infection. The result obtained showed that individuals with AA were more susceptible to malaria infection followed by AS and the least is SS (Table 4). The susceptibility the haemoglobin type could be based on its structure and nutrient content for the multiplication and

maturation of erythrocytic schizonts coupled with the rich oxygen content which is lacking in SS (Peters, 2000).

CONCLUSION

It has been observed that malaria infection has serious effect on blood characteristics which will affect the general wellbeing of an infected person. The complexity in its influence cannot be ruled out for this has resulted to debility and mortality mostly among infants and elderly. This however calls for serious move for its prevention and possible control by all sectors and adopting whatever measures that are spelled out by specialists in the area for its elimination.

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