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THE PREVALENCE OF MALARIA AND TYPHOID FEVER INFECTION IN DIOBU AREAS OF PORT-HERCOURT L.G.A OF RIVERS STATE, NIGERIA

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ABSTRACT

The prevalence of malaria and typhoid fever infections among people living in Diobu areas of Port Hercourt L.G.A of Rivers state, Nigeria, were investigated among volunteer subjects aged 1 – 80 years. Microscopic examination and WIDAL test methods were used for dictation of malaria parasites and the specific antibodies in serum produced in response to exposure to *Salmonella typhi* organisms respectively. Examination of blood film smears showed that out of 289 samples, 222 were positive for malaria parasites. Serological examination showed that out of the 297 tested, 254 were positive for typhoid fever. Although the prevalence of infection was found to be higher in females than in males (in the age-groups 1 – 10 and 21 – 50 years), the differences were not statistically significant ($p > 0.05$). Also age bracket 21 – 50 years had higher incidence of both malaria and typhoid infections than that of 51 – 80 years age group. Preventive measures should be intensified and target the age-groups 1 – 10 and 21 – 50 years who are more vulnerable to the infection.

Keywords: Malaria, Typhoid, Infection, Males, Females, Age-Groups

INTRODUCTION

Malaria, an endemic disease in the tropical and subtropical regions of the world is said to occur at the rate of about 12 – 33 million cases annually **[1]**. More recent statistics put it at about 515 million cases with 3 million deaths annually, majority of who are children in the sub-saharan Africa **[2, 3]**. Female mosquitoes of the anopheles genus are the

parasite's primary host and transmission vectors. When bitten by an infected vector, it takes about two or more weeks for symptoms to begin. On the other hand, typhoid fever is caused by a bacterium. Although both are often present with mimicking symptoms (particularly in the early stages of typhoid), the Plasmodium parasite and the bacterium – *Salmonella typhi* are quite distinct organisms and show clear differences in their mode and mechanism of transmission, treatment and prevention.

The present study focuses on the prevalence of malaria and typhoid fever in a Local Government Area in Rivers state, Nigeria. The infection rate will be determined as well as the relationship between the prevalence of infection, and gender among subjects aged 1 – 90 years. Such information, no doubt, finds usefulness in strategic planning for prevention and control of infections.

METHODS

Reagents and Chemicals

Widal antigen Kit was a product of Fortress Diagnosis Limited unit 2C Antrim, Northern Ireland, United Kingdom, BT4I.IQS.www.fortressdiagnostic.com; while Leishman's powder was purchased from Qualigens Fine Chemicals, a division of Glaxo India Limited. Other reagents prepared were 8% sodium hydroxide (solution 1), and 27.2% potassium dihydrogen sulphate (solution 2). Solution 3 was a mixture of 23.7ml of solution1 and 50ml of solution 2, out of which 20mls was made-up to 1000mls with distilled water and adjusted to pH 6.8.

Sampling

A total of 586 volunteer subjects participated in the study. Subjects were admitted into the study based on their informed consent and willingness to participate. Admission into the study lasted for a period of three months - from February to May, 2007. The malaria parasite tests served as part of the routine examinations carried out on out-patient clinics on patients who sought medical attention for various ailments.

Preparation of Blood Samples

Five milliliters of venous blood was drawn by venopuncture from the subjects. Two milliliters of each sample was placed into EDTA-anti-coagulated specimen bottles and mixed gently. The remaining 3mls was allowed to clot and then centrifuged at 1500rpm to obtain the serum which was stored at 20°C.

Malaria Parasites Test

The malaria parasites were isolated from the blood using the thin and think film preparations **[4]**. The thin smears served to describe the blood cells, while the thick

smears were used for detecting the malaria parasites.

A drop of anti-coagulated blood was placed at one end of a greased free slide, spread with cover-slip, allowed to air-dry and fixed with methanol (for one minute to prevent cell lysis when in contact with washing buffered water). Sample was stained with leishman's stain for 1 - 2 minutes and finally washed before microscopic examination using X 100 objective with oil immersion lens. On the other hand, the thick film smear was not fixed in methanol so as to enable cell lysis and parasite release before staining. Microscopic observation of the thin film showed red blood cells; while diagnosis of malaria infection was based on the microscopic dictation of plasmodium species on the stained thick blood films. Due to the presence of artifacts, at least two parasites were seen before a slide was considered positive. Care was taken to differentiate malaria parasites from the artifacts.

WIDAL Test

In vitro detection and qualitative estimation of specific antibodies present in serum was carried out by rapid slide titration method using the Widal antigen Kit - a commercial antigen suspension for somatic (O) and flagellated (H) antigens. Test was based on the fact that antibodies in serum produced in response to exposure to salmonella organism will agglutinate bacterial suspension containing homologous antigens **[4]**. For the rapid slide titration method, the Widal antigen Kit and other reagents were brought to room temperature before use. All tiles used were kept clean and free of water before use. The procedure was carried out according to the manufacturers' specification. The mixing of one drop each of serum and antigen type was done using separate wooden applicator stick to avoid transfer of reagents from one circle to the other. Agglutination was observed macroscopically, followed by a quantitative estimation of the titre of the appropriate antibody among the reactions that showed visible agglutination. Microscopically, the reaction was considered significant at titre >1 ; 80 (1 in 80). Absence of significant reaction was an indication of non-detectable antibody in patient's serum. The specific organism responsible was determined by observing the H agglutination. Agglutination titre of 1: 3320 was considered positive for typhoid fever. Results were calculated using the statistical function of Microsoft excel computer package.

RESULTS

The present study has investigated the prevalence of malaria and typhoid infection in Diobu areas of Port Harcourt L.G.A of Rivers

state between the months of February to May, which coincide with the rainy season. A total of 289 volunteer subjects participated in the tests for malaria parasites as against 297 who were screened for typhoid fever. The subjects were grouped into 9 age-group categories – from 1 – 10 years to 81 – 90 years age-groups.

Out of 150 male subjects, 118 (79%) tested positive for malaria parasites. Results from the various male age-groups, (1 – 10 to 51 – 60 years) showed that percentage infection was between 71 – 89% **(Table 1)**; whereas for the female groups, 75% of them had positive test with a rate of 67 – 90% for the above mentioned age- groups, **(Table 2)**.

For the typhoid test, out of 150 male subjects, 127 (85%) were positive. The percentage infection was 48% for age-group 1 – 10 years; whereas age-groups 11 – 20 to 51 – 60 years had between 83 – 90% positive cases. Percentage of infection was 100% for the last two age-groups, 61 – 70 and 71 – 80 years (males and females). The few subjects in the elderly groups (a total of six) all tested positive, **(Table 3)**.

From 139 female subjects, 127 (91%) were positive for *S. typhi*. The rate of infection determined for the various age-groups (for age-groups 1 - 10 to 51 – 60 years), was between 80 – 100% **(Table 4)**.

Table 1: The Prevalence of Malaria Infection among Male Age-Groups

Age-Groups Affected (Years)	Number of Subjects	Number Infected Percentage	Percentage (%)
1-10	**29**	**25**	**86.2**
11-20	**7**	**5**	**71.4**
21-30	**39**	**31**	**79.5**
31-40	**39**	**28**	**71.8**
41-50	**22**	**17**	**77.3**
51-60	**9**	**8**	**89.0**
61-70	**4**	**3**	**82.5**
71-80	**1**	**1**	**100.0**
Total	**150**	**118**	**78.67**

Table 2: The Prevalence of Malaria Infection among Female Age-Groups

Age-Groups (Years)	Number of Subjects	Number Infected Affected	Percentage (%)
1-10	19	17	89.5
11-20	19	10	52.6
21-30	41	32	71.1
31-40	37	27	72.9
41-50	16	14	87.5
51-60	3	2	66.7
61-70	3	2	66.7
71-80	1	0	0
Total	139	104	74.8

Table 3: Positive WIDALTest Determined Among Male Age-Groups

Age-Groups Affected (Years)	Number of Subjects	Number Infected Percentage	Percentage (%)
1-10	31	15	48.4
11-20	9	8	88.9
21-30	38	39	89.5
31-40	42	37	88.1
41-50	24	20	83.3
51-60	8	7	87.5
61-70	5	5	100
71-80	1	1	100
Total	150	127	84.67

Table 4: Positive WIDALTest Determined Among Female Age-Group

Age-Groups Affected (Years)	Number of Subjects	Number Infected	Percentage (%)
1-10	15	12	80.0
11-20	15	12	80.0
21-30	43	40	93.0
31-40	37	36	97.3
41-50	20	18	90.0
51-60	5	5	100.0
61-70	3	3	100.0
71-80	1	1	100.0
Total	139	127	91.37

DISCUSSION

The present work has determined the prevalence of malaria and typhoid fever infection in some Local Government areas of Rivers state. Infection rates of malaria were determined to be 79% and 75% for males and females respectively. Malaria infection seemed to have affected more males than females, although there was no significant difference between the means of incidence of infection for both sexes, ($p > 0.05$). However the reverse was the case for age-groups 1 – 10 and 21 – 50 years – more females than males were infected.

The age bracket 21 – 50 years incidentally represents the period most women decide to have their babies. A number of physiological factors possibly account, in part, for the observed tendencies in the prevalence of disease among age-groups and sexes. One such factor could be attributed to the stress of pregnancy. The physiological stress of pregnancy could affect the immune response and consequently precipitate other sicknesses including malaria. Two, factors such as blood-loss during child birth and menstrual cycle, could diminish the number of red cells and cause anaemia among those in marginal nutritional status. It then follows that malaria parasites, which require the red blood cells to complete their erythrocytic cycle, could by so doing trigger the on-set of anaemia in susceptible individuals, worsening disease prognosis. Parasite-occupied red cells rupture prematurely to release the merozoites thereby destroying the red cells and hastening the manifestation of anaemia. Finally, the effect of the presence of toxicants in the environment (and consequently in the food-stuff of many populations) is an area that needs more investigation. Some of these toxicants are known to be capable of deactivating some important enzymes in metabolism, (among which are those in the part-way of haem biosynthesis), causing anaemia **[5]**.

Although malaria is commonly associated with poverty, it is also known to be a cause of poverty and a major hindrance to economic development **[6]**. This is in line with the report of Madukosiri and Bawo **[7]**. These authors estimated that more than one half (approximated to represent 103 million people) of the Nigerian population could be at risk of malaria infection (with an infection frequency of 1 – 12 times a year), implying that Nigeria spends large sum of her financial resources combating malaria. These resources, they opined, could be directed to a more productive sector of the economy capable of enhancing economic growth and

improving the standard of living for the masses.

Literature had also reported that children who frequently suffered from malaria exhibited, apart from wide- spread anaemia, abnormal posturing – indicating a sign of brain damage **[8]**. Malaria was then implicated in cognitive impairment in children. This neurological impairment might be linked to cerebral malaria which the children are more vulnerable to. The present study indicates that the girl child, who is more vulnerable to malaria infection, is more likely to be at higher risk of such complication.

Typhoid fever affected more (95%) of the female subjects than the male (85%) counterparts; although the difference was not statistically significant ($p > 0.05$). Again, as with the pattern of malaria, the number of girls (between the ages of 1 – 10 years) who had positive typhoid test was about double that of their male counterparts. Here also the rate of infection stayed-up during the reproductive years. On the other hand, the apparently high percentage of infection in the aged groups (71 – 80 years, both sexes), was attributed to low sample size, which in turn was the outcome of low level clinic attendance. Either of these factors was deemed to represent low infection rate or the result of increased acquired immunity through previous exposures to infection.

CONCLUSION

In summary, the present study has determined high incidence of malaria and typhoid infections in a sample population in Diobu Port Hercourt L.G.A. of Rivers state. For both infections, age and gender distribution were implicated but the differences were not statistically significant ($p > 0.05$). Age groups which were more prone to infection were girls 1 – 10 years and women 21 – 50 years. The older age-group, 71 – 80 years was least affected by infections.

The present work is in consonance with an earlier one **[7]** which showed that malaria infection was on the increase in spite of measures already put in place to curb the infection. This simply means that more effort is required, not only on the part of the government, but from all and sundry if this endemic disease should be put in the past. Issues to be highlighted during any meaningful intervention include the use of prophylaxis - particularly for girls and women of reproductive age, and the elimination of mosquitoes and their breeding places. All measures already put in place to combat infection should be intensified. Also awareness through the media should be

biffed-up and run consistently until malaria infection is drastically reduced.

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