STUDIES ON THE INCIDENCE OF ASYMPTOMATIC PLASMODIUM INFECTION AMONG APPARENTLY HEALTHY SUBJECTS IN ORPHANAGES IN KADUNA AND ZARIA, NIGERIA

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ABSTRACT
The incidence of asymptomatic Plasmodium falciparum infection among orphans between age groups, gender and blood groups was investigated. Standard microscopic methods were used to screen for malaria parasites in the blood specimens obtained from eighty-five (85) subjects in three orphanages in Kaduna and Zaria, Nigeria. An overall incidence of 14.1% was observed in this study. The age group 0-3 years had the highest overall incidence of 28.5% and lowest in the age group 16-19 years (0.0%). With respect to gender, a higher incidence was recorded among female subjects (17.50%) than males (11.11%). There was no significant difference in the age and sex of the subjects studied (p>0.5). There was no correlation between asymptomatic Plasmodium infection and the blood groups of subjects. To reduce morbidity and mortality rate among children in orphanages, there is a need for the use of chemoprophylaxis and insecticide- treated nets in orphanages.

Key words: Plasmodium falciparum, Orphanage, blood group, Age group.

INTRODUCTION
Malaria is a major public health problem in the world and particularly in developing countries and is an important cause of human morbidity and mortality (Lou et al., 2001). The prevalence of asymptomatic malaria parasitaemia in apparently healthy subjects living in endemic malarious areas has been of interest for many years (WHO, 2000). It is estimated that about 250 million people in Africa are carriers of malaria parasites. It is the most common cause of out-patient visits to health facilities and it is reported as one of the leading causes of death. Asymptomatic malaria parasitaemia is a condition in which a healthy individual has anumber of malaria parasites in the blood without showing any malaria symptom. Plasmodium falciparum is the dominant strain causing malaria with complications such as cerebral malaria (UNICEF, 2006). In Nigeria, malaria results in 25% infant and 30% childhood mortality (FMH, 2005). Infants and children living in endemic regions have the highest prevalence of asymptomatic parasitaemia in various age groups. Earlier reports showed that splenomegaly in younger age groups was indicative of a developing immunity and the absence of an enlarged spleen in older age groups represented established immunity (Yusuf et al., 2010). Njama-Meya et al. (2004) had reported that a risk of developing symptomatic malaria within 30 days was significantly higher in those with a positive routine smear than in those with a negative one. Against this background information, this study was carried out to assess the asymptomatic malaria parasitaemia among subjects in some orphanages in some parts of Kaduna State, Nigeria

MATERIALS AND METHODS

Study population
A total of 85 Subjects all aged between 0-19 years were randomly selected in 3 orphanages in Kaduna State, Nigeria: Zaria orphanage (16), Adoni orphanage, Kaduna (26), City of Refuge orphanage, (43). All subjects were interviewed using a structured questionnaire to obtain information about age, sex, blood group. Questions and answers were in Hausa and later translated into English Language. Informed consent was obtained from the guardian of all the participating subjects in the three orphanages.

Subjects with Asymptomatic malaria parasitaemia
Apparent health subjects (asymptomatic subjects ) in the orphanages were enrolled in this study if they met the following criteria: age 0–19 years; no history of treatment for malaria in the previous 2 weeks or fever in the previous 48 h..

Preparation of Giemsa stained Thin and Thick blood smears
Blood was collected by using sterile disposable lancets to prick disinfected thumbs of the children. Thick and thin blood films were made on clean – grease free slides. A slide was considered negative if no parasites were found after scanning 100 high power fields. Thick and thin smears of blood samples were made from the subjects under study. The smears were stained using 2% Giemsa solution for the thick film and 100% Leishman solution for the thin film for the identification and speciation of the parasite respectively.
Data analysis
The analysis was done using the Epi-info database package and SPSS (Statistical Package for SocialSciences) version 17.0. Differences in the prevalence of infection between age and gender groups were determined using the χ² tests from the contingency tables.

RESULTS
The type of Plasmodium spp identified in Giemsa stained smears was Plasmodium falciparum. Table 1 shows the incidence of subjects with asymptomatic Plasmodium infection among orphans by age. The incidences for this age group in the three orphanages were: 13.9% (City of refuge orphanage), 15.3% (Adonai orphanage) and 12.5% (Zaria orphanage).

Though Chi-square evaluation of asymptomatic Plasmodium infection among the age groups indicated that there was no statistically significant difference among the age groups at 95% confidence interval i.e. p >0.05 (χ² = 5.684, df = 4, p = 0.224, mean (x) = 2.00, Std Devia. = 1.206).

Table 1. Incidence of asymptomatic Plasmodium falciparum Infection among apparently healthy children by age

<table>
<thead>
<tr>
<th>Age(yrs)</th>
<th>COR</th>
<th>AO</th>
<th>ZOC</th>
<th>Overall Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>13</td>
<td>4(30.7)</td>
<td>4</td>
<td>1 (25.9)</td>
</tr>
<tr>
<td>4-7</td>
<td>13</td>
<td>1(7.6)</td>
<td>11</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>8-11</td>
<td>7</td>
<td>1(14.2)</td>
<td>5</td>
<td>1(20.0)</td>
</tr>
<tr>
<td>12-15</td>
<td>8</td>
<td>0(0.0)</td>
<td>5</td>
<td>2(40.0)</td>
</tr>
<tr>
<td>16-19</td>
<td>2</td>
<td>1(0.0)</td>
<td>2</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>6 (13.9)</td>
<td>26</td>
<td>4 (15.3)</td>
</tr>
</tbody>
</table>

χ² = 5.684, df = 4, p = 0.224, mean (x) = 2.00, Std Devia. = 1.206

Key: COR = City of Refuge orphanage, AO = Adonai orphanage, ZOC = Zaria orphanage, NE = Number of Subjects Examined, No = Number of Subjects Positive

Table 2. Incidence of asymptomatic Plasmodium falciparum Infection among apparently healthy children by gender

<table>
<thead>
<tr>
<th>Age(yrs)</th>
<th>Male</th>
<th>Female</th>
<th>Overall Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>25</td>
<td>18</td>
<td>45 (11.11)</td>
</tr>
<tr>
<td>4-7</td>
<td>12</td>
<td>11</td>
<td>24 (10.5)</td>
</tr>
<tr>
<td>8-11</td>
<td>6</td>
<td>3</td>
<td>9 (18.18)</td>
</tr>
<tr>
<td>12-15</td>
<td>1</td>
<td>2</td>
<td>3 (50.0)</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>43</td>
<td>85 (14.11)</td>
</tr>
</tbody>
</table>

χ² = 0.713, df = 1, p = 0.398; mean (x) = 1.58, Std Devia. = 0.515

Key: COR = City of Refuge orphanage, AO = Adonai orphanage, ZOC = Zaria orphanage, NE = Number of Subjects Examined, No = Number of Subjects Positive

Table 3. Incidence of asymptomatic Plasmodium falciparum Infection among apparently healthy children by blood group

<table>
<thead>
<tr>
<th>Age(yrs)</th>
<th>O</th>
<th>A</th>
<th>B</th>
<th>AB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>24</td>
<td>12</td>
<td>8</td>
<td>1</td>
<td>43</td>
</tr>
<tr>
<td>4-7</td>
<td>17</td>
<td>12</td>
<td>2</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td>8-11</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>12-15</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>31</td>
<td>9</td>
<td>5</td>
<td>88</td>
</tr>
</tbody>
</table>

χ² = 4.833, df = 3, p = 0.184, mean = 3.00, SD =1.206

Key: COR = City of Refuge orphanage, AO = Adonai orphanage, ZOC = Zaria orphanage, NE = Number of Subjects Examined, No = Number of Subjects Positive
DISCUSSION

This study has shown the overall incidence of asymptomatic Plasmodium infection to be 14.1% (Table 1; p = 0.224) among subjects in some orphanages in Kaduna State. In Africa, asymptomatic P. falciparum infections are widespread (Rogier and Trape, 1995). The incidence of asymptomatic malaria parasitemia among children was higher in children less than five (<5) years of age when compared to children more than (>5) years in this study (Table 1). This is agreement with the work done by Ekeh and Tecilre (2008) in Abia South Local Government Area though a higher prevalence of asymptomatic (33.1%) Plasmodium infection was found among school children.

The finding that 14.1% of children were asymptomatic indicates that subjects in the selected orphanages seem to have acquired the ability to tolerate malaria parasites without having clinical symptoms. This may be due to the fact that individuals become immune to malaria due to age – function of the number of exposures. Children born to immune mothers are protected against the disease (malaria) during their first half year of life by maternal antibodies. As they grow older, after continued exposure from multiple malaria infections over time, they build up an acquired immunity and become relatively protected against disease.

In this study, females showed higher levels of asymptomatic Plasmodium infection than males (p = 0.398) though there was not statistical significance between the both infected males and females. However, females may be more exposed to mosquito bites than males as they engage in outdoor activities such as communal food preparation. This report agrees with the finding of Daboer et al. (2010) who reported a prevalence of 46.6% among females and 29.9% among males. Earlier reports by Olarenwaju and Johnson (2001); Adeleke (2007) showed that males were more infected than females.

In this study, group O subjects dominated the study population followed by A, B, and AB which is in consistent with previous reports that group O is the dominant blood group among Nigerians (Bakare et al., 2006; Enosolease and Bazuyue, 2008).

REFERENCES


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