The prevalence of malaria in Edo state Nigeria

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ABSTRACT: The study seeks to determine the prevalence of malaria in Edo state Nigeria. The study which was prospective and cross-sectional lasted one year. Children of school age were used for the study because they are most susceptible and easy to reach. Adults were also included in the study. Detection of malaria parasites was through thick blood film with Giemsa stain. The software package was (Gen Stat Release 8.1 2005). The t-test was determined with ANOVA and Duncan multiple range tests were used to determine the means. There was a predilection for infection for children less than ten years. Infection rate decreased with increasing age. Results showed that the months of June, July, September, and October had lower prevalence values than the other months of the year thus, showing an uneven seasonal transmission pattern (P < 0.05). The parasite was found to be ubiquitous in the state, thus, indicating even distribution of the parasites in the state. The need to provide adequate protection for children and also discourage the breeding of the insect vectors around human habitations was emphasized. The awareness of the negative effects on the economy through absenteeism from work, school attendance and money spent on anti malarial drugs were discussed as part of control measures.

Key words: Malaria; Vector abundance and disease; Susceptibility

INTRODUCTION

Human malaria is a disease of wide distribution in the tropics. It is caused by a protozoan organism called plasmodium. The arthropod intermediate hosts are certain species of Anopheles mosquito predominant among which are Anopheles gambiae, A funestus, A darlingi, A punctulatus (Nwankwo et al; 2002).

Human malaria is a protozoan disease of man and it constitutes the most important group of infections in tropical countries. It is a major cause of infant mortality and is the only insect- borne parasitic disease comparable in impact to the world major killer transmissible diseases (Curtis, 1996). It is estimated that 90% of death from malaria is recorded in African children under the age of five years (Curtis, 1996, Salako, 2007). It is a major cause of anemia in children (Ibrahim et al; 2001). Cerebral malaria is a major cause of death in patients with malaria especially in individuals not immuned (Stiles et al; 2008). It was estimated in 1960 that the annual number of malaria cases throughout the world was 140 million with 980,000 deaths (Bruce et al; 1967). Mosquito density is a major determinant of malaria transmission (Nbagwu et al; 2003).


The clinical manifestations of the disease, as well as the pathology which manifests as anemia, splenomegaly, hepatomegaly, renal failure, severe diarrhea, hyperpyrexia, still birth and central nervous system complications have been exhaustively discussed (Crawley, 2004,McGregor, 1985, and Sitprija, 1967). There is loss of effective working hours both in school and offices as a result of absenteeism due to malaria (Sitprija, 1967).

Here in Edo State, the information available on malaria is mainly from hospital based reports, which are usually from referred patients. Such reports cannot be used to determine the prevalence of the parasites in the state as this will not
give a good picture of infestation in the population. Despite the fact that some community studies in some parts of the state are known, the actual pattern of infection among the population through epidemiological studies of the community is not known for the greater part of the state. The need to have estimates of malaria infections in the state cannot be over emphasized. Thus, the paucity of information regarding the prevalence, distribution and pattern of infection necessitated this study.

MATERIALS AND METHODS

Study area

Edo State has a land area of approximately 19,794 sq kilometers and has a provisional population of 2,159848 from the 2004 census. The state lies roughly between longitudes 05° 0.4’ E and 06° 43’ E and latitudes 05° 44’ N and 07° 34’ N. The land area cuts across several ecological zones ranging from the coastal mangrove swamps (brackish water) in the south through rainforest vegetation in the middle to woodland savanna forest in the northern parts of the state. There is diversity in cultures and customs due to the presence of multiplicity of ethnic groups. The major ethnic groups include the Binis, Esans, Owan, Igaras and Etsakos, while the minority ethnic groups include Urhobos, Itsekiris, Ijaws, Igbankes and Yorubas. The occupation varies from fishing in the coastal areas to mixed crop farming in the middle and northern parts of the state. There are petty traders, business men and civil servants in all the areas that were studied.

Sampling technique

A week before sampling, visits were made to each local government area and letters were circulated to principals and headmasters of schools, community leaders, village heads and households. The headquarters of each local government area was chosen for the exercise. Participation in the exercise was purely voluntary. However there was plenty of persuasion to ensure adequate participation. The objective of the study was explained and emphasis was made on the aspects of the study that will benefit the community. This was designed to mobilize them and make them cooperate and also to get the approval of the community to carry out the study. Infection rate according to various age groups was determined. There was an interval of ten years between each age group. Child participants numbered one hundred (100), while the adult participants were twenty and this was repeated monthly in each local government area. A total of 25,920 participants were entered for the study. There was no sexual discrimination as regards participation in the study. Data were collected on monthly basis from January to December in each local government area.

Collection of samples

A slide was labeled on one end and the name, age and name of local government of origin of each participant was written on the labeled slide. A finger prick was made with a lancet after swabbing the thumb with 70% alcohol. Two to three drops of blood were spread on the slide and allowed to dry in air. The size of the spread was the size of a 10 kobo coin. This was the thick film as described by Giemsa (Dada and Omokhodion 2007). The thin film as described by Leishman (Giemsa, 1902) was not necessary for this type of study because many light infections will be missed as only a small quantity of blood is used.

The stock Giemsa was diluted 1:10 and the dry smear was flooded with Giemsa and allowed to stay 30 minutes. The slide was allowed to dry and a drop of oil immersion was placed on the film and examined in a x100 objective. One hundred microscope fields were examined to consider a slide positive or negative. Results were then subjected to statistical analysis.

The software package was (Gen Stat Release 8.1 2005). The t-test was determined with ANOVA, while the means were determined with Duncan multiple range test.

RESULTS

The overall prevalence rate of malaria in the state was found to be 4.5%.

Age group infection rate

Age group of 1-10 years recorded 15.0 % infection rate. This decreased steadily with increasing age. The infection rate
in the age group of 11-20 was 6.7% while the age group of 21-30 was 4.2%. The age group of 31-40 years recorded 3.3 % while the 41-50 yrs recorded 1.7 %. Age group of 51-60 and 61- 70 had a prevalence of 1.7 % each while infection rate of people above 70 years was also found to be 1.7% (Table 1). There was a significant difference in infection rates between the ages one to ten years and ages eleven years to seventy years and above seventy (p <0.05)

The monthly infection rate

The highest infection rate of 6.4 % was recorded in January and this was followed by 5.6 % in December. 5.0 % in August, 4.7 % in September, 4.6 % in March and April, 4.5 % in May while 4.4 % in October and 4.2 % in June and 3.8 and 3.3 were recorded respectively for July and November. The lowest prevalence rate of 2.5 % was recorded in the month of February (Table 2).There was a significant difference in infection rate between the dry months of the year and the wet season of the year (p < 0.05). The dry months recorded higher infection rates than the wet season.

The prevalence of malaria in the local government areas

Oredo LGA had the highest infection rate of 6.2 %. Orhionmwon LGA followed with 6.1 %. Igbeben LGA has a prevalence rate of 5.3 % and Ovia north east, Esan SW AND Uhunwhode LGAs recorded 5.0 %. Owan W, Esan NE and Egor had prevalence rates of 4.9 %, 4.8 % and 4.7 % respectively. The rest of the LGAs all recorded values below 4.5% which was the state average and 5.1 % prevalence rates respectively. However the local government areas with the least prevalence rate were Akoko – Edo and Etsako West (Table 3).

Statistically there was no difference in infection rate between Etsako west LGA (2.8 %) and Akoko Edo LGA 2.8 %, (P >
Table 3. The annual prevalence rate of malaria in the eighteen local government areas of Edo state Nigeria (2007/2008)

<table>
<thead>
<tr>
<th>S/N</th>
<th>LGAs</th>
<th>Sample size</th>
<th>No Positive</th>
<th>Prevalence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ESAN N.E</td>
<td>1440</td>
<td>69</td>
<td>4.8</td>
</tr>
<tr>
<td>2.</td>
<td>ESAN W.</td>
<td>1440</td>
<td>62</td>
<td>4.3</td>
</tr>
<tr>
<td>3.</td>
<td>ESAN C.</td>
<td>1440</td>
<td>54</td>
<td>3.8</td>
</tr>
<tr>
<td>4.</td>
<td>ESAN S.W</td>
<td>1440</td>
<td>72</td>
<td>5.0</td>
</tr>
<tr>
<td>5.</td>
<td>ETSako C.</td>
<td>1440</td>
<td>53</td>
<td>3.7</td>
</tr>
<tr>
<td>6.</td>
<td>IGUEBEN</td>
<td>1440</td>
<td>76</td>
<td>5.3</td>
</tr>
<tr>
<td>7.</td>
<td>AKOKO –EDO</td>
<td>1440</td>
<td>40</td>
<td>2.8</td>
</tr>
<tr>
<td>8.</td>
<td>ORHIOWHON</td>
<td>1440</td>
<td>88</td>
<td>6.1</td>
</tr>
<tr>
<td>9.</td>
<td>UHUNWHODE</td>
<td>1440</td>
<td>72</td>
<td>5.0</td>
</tr>
<tr>
<td>10.</td>
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</tr>
<tr>
<td>11.</td>
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<td>1440</td>
<td>60</td>
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<tr>
<td>12.</td>
<td>OWAN W.</td>
<td>1440</td>
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</tr>
<tr>
<td>13.</td>
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<td>1440</td>
<td>57</td>
<td>4.0</td>
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<tr>
<td>14.</td>
<td>OVIA NE</td>
<td>1440</td>
<td>72</td>
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<tr>
<td>15.</td>
<td>ETSako W.</td>
<td>1440</td>
<td>40</td>
<td>2.8</td>
</tr>
<tr>
<td>16.</td>
<td>OREDO</td>
<td>1440</td>
<td>89</td>
<td>6.2</td>
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<tr>
<td>17.</td>
<td>EGOR</td>
<td>1440</td>
<td>67</td>
<td>4.7</td>
</tr>
<tr>
<td>18.</td>
<td>IKPOBA OKHA</td>
<td>1440</td>
<td>60</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>25920</td>
<td>1162</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Source: Field Survey

0.05). However, there was a significant difference between these two local government areas and the rest of the other local government areas (P < 0.05). The infection rate between the other local government areas was not significant (P < 0.05)

DISCUSSION

The 4.5 % prevalence rate in the state is very low when compared with the results of similar study by other workers in various parts of Nigeria. For instance Bruce-Chat reported 90 % infection rate, while Ukpai and Ajaku reported 80.25% (Bruce et al; 1967 and Ukpai and Ajaku, 1998). The infection rates were found to vary according to geographical locations and the endemicity of the disease. A situation known as premonition, which is a condition in which there is parasitaemia in the absence of disease and sometimes individuals carry the parasites in their blood without disease manifestation (Leishman, 1901).

The pattern of infection in the various age groups demonstrated clearly that although all age groups were susceptible, the ages ranging from one to ten years showed much higher infection rates. Infection decreased with increasing age. Differences in habits could be advanced for the differences in the prevalence values of the various age groups. Again the absence of acquired immunity in the younger age group of one to ten years could be advanced as additional factor to explain the high vulnerability and higher infection rate which was observed among the teenage group. The resistance to malaria which was observed in the older age groups can be explained on the basis of acquired immunity which resulted from repeated clinical and sub clinical infections in earlier life (Salako, 1981). Another explanation is the physiological difference between children and adults. This is termed age resistance. This is a result of changing physiological pattern from youth to adulthood. It involves the antibody forming mechanism, the endocrine balance and mucus production in the alimentary tract (Bruce-Chat, 1995).

The pattern of infection between January and December indicated that infection was relative higher in the months between November and March. The months of relative high prevalence rates happened to coincide with the dry season. The high incidence of malaria infection in the dry season stressed the contribution of little collections of water to the epidemiological picture of malaria disease. There is no doubt, that relative high humidity coupled with flooding would constitute favorable conditions for the proliferation and dissemination of the arthropod vectors and therefore increases malaria transmission (Nbagwu et al; 2003, WHO, 1964). However, the opposite was the case as the rainy season showed lower infection values. This observation can be explained by the fact that torrential rains, as are observed in the rainy season tend to wash away all the surface water that would have formed excellent microhabitat for the breeding of arthropod vectors. Most arthropod vectors prefer small pockets of water for their breeding. These microhabitats are found in tree holes, empty cans, abandoned containers like motor tires and small collections of water in bushy
surroundings and blocked drains (Nbagwu et al; 2003, Julius et al; 1961).

The pattern of infection in the local government areas did not show any significant difference and thus, indicated that all the local government areas were equally exposed to infection. However there were one or two local government areas that showed very low values. This may be a result of some technical sampling error or a topographical advantage that reduced contact between man and the arthropod vectors. The northern parts of the state constituted the wood land savanna of the state. In Akoko-Edo local government area, there are rocky hills and this could be a factor which may account for the lower infection rate in the locality. This observation stressed the inhibitor effects of high altitude on malaria (Nnoruka and Anukam, 2002).

Malaria disease is still very much with us despite the low values recorded in this study. We should therefore not relent in our efforts to keeping malaria infection very low as it is a major cause of morbidity and mortality in infants below the age of five years and also it has been found to have a negative effect on our economy through absenteeism from work and money spent on antimalaria drugs. Malaria disease has been found to be related to the factors of water and mosquito bites, it follows therefore that the disease can be effectively controlled if water is kept out of the reach of mosquitoes. This relationship has shown that environmental conditions constitute a major factor in the epidemiology of malaria disease (Nwankwo; 2002). Clean environments without litters containing water must be maintained as they tend to discourage the breeding of the arthropod intermediate hosts. Bushy, dirty and waterlogged environments must be discouraged as they provide a favorable microhabitats for the breeding of the arthropod vectors. Individuals are encouraged to spray insecticides in their houses regularly to kill mosquitoes and other haematophagous flies. The use of insecticide treated mosquito nets will go a long way to prevent mosquito bites and the transmission of the parasites. All sources of stagnant water around homes must be removed. There is need to have well ventilated houses with nets on the windows to prevent entry of blood sucking flies. Individuals who have occupations that expose them to contacts with the arthropod intermediate hosts should wear protective clothing to avoid insect bites. It is our responsibility to protect ourselves from malaria infection since the disease is preventable.

CONCLUSION:

The study clearly showed that children in the age range of one and ten years are the most susceptible to the disease and has also showed the pattern of distribution of the disease in the state which included the seasonal, geographical and the demographic factors. The study could be a source of information that could guide government in prioritizing the available resources to the appropriate individuals and locations in the state that are in most need of them.

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