COMPARATIVE PREVALENCE OF DETECTABLE MALARIA PARASITES AMONG THE RURAL POPULATION OF IRUEKPEN, EDO STATE, NIGERIA

1Iyomon, P., 2,3Nwaopara, A.O., 3Nwaopara, O.S., 4Edebiri, O.E.

1Department of Physiology, Delta State, University, Abraka, Delta State, Nigeria; 2Department of Anatomy, University of Medical Sciences, Ondo, Ondo State, Nigeria; 3Innovative Science Research Foundation, Ekpoma, Edo State, Nigeria; 4Department of Physiology, University of Medical Sciences, Ondo, Ondo State, Nigeria.

Correspondence: patienceiyomon@gmail.com

ABSTRACT

Malaria has remained one of the most prevalent tropical diseases, with high morbidity and mortality rates, and with high economic and social impacts. This dry season study was conducted to assess the prevalence of malaria parasite among the rural population of Iruekpen, Ekpoma, Edo, Nigeria, and to evaluate the impact of free malaria intervention efforts of the government and non-governmental agencies. Their malaria status was determined using a kit produced by ‘Access Bio Incorporated’, Summerset NJ, USA. The data obtained was analyzed using the Statistical Package for Social Science (SPSS; version 20). Results showed that more females (48; 77.42%) than males (14; 22.58%), willfully presented themselves upon invitation for medical check-up at the Primary Health Center (PHC) and that most of them were 60 years and above (66.7%). Malaria was more prevalent among the females than the males; probably due to the differentials in their population size. Overall, the prevalence of malaria parasites was low (19.0%), suggesting a probable seasonal influence (dry season) and/or a reflection of the concerted efforts by concerned agencies; regarding the free distribution and use of treated mosquito nets. Nevertheless, a sustained effort is required particularly during the wet-season as it creates numerous breeding grounds for mosquitoes.

Key words: Ekpoma, Iruekpen, Interventions, Malaria, Mosquitoes, Prevalence

INTRODUCTION

Malaria is one of the world’s most important tropical parasitic diseases and kills more people than any other communicable disease except tuberculosis (Wenceslaus, 2000). Malaria remains one of the most pressing health problems in the world with an estimated 300-500 million cases annually of which 90 % occurs in Africa (Tarimo et al., 1998). The disease remains a major public health problem in Nigeria, where it is endemic especially in rural populations (Ito et al., 2014) and overcrowded slums with improper drainage and sanitation systems (Klinkenberg et al., 2005; Mbanefo et al., 2009).

Some studies have suggested that poor environmental sanitation and housing conditions, as well as lack of appropriate control measures, are significant risk factors for malaria parasite burden (Nkuo-Akenji et al., 2006). Environmental factors such as the presence of bushes and stagnant water around homes, rainfall, low altitude and high temperatures, favor the breeding of malaria vectors, as well as parasite reproduction within them (Messina et al., 2011), while increased urbanization tends to reduce the rate of Anopheles breeding (Onifada et al., 2007 ). Research coordinated by the World Health Organization (WHO) has found that sleeping under nets treated with insecticide can greatly reduce deaths from malaria, especially among children (Christine and Walter, 2007).

The problems associated with malaria treatment in Africa had substantially increased the rates of illness and death (Peter et al., 2000). It is estimated in Africa that malaria is responsible for over one million deaths of infants and young children each year (Angyo et al., 1996). In 2005, malaria was reported to have induced 25% infant and 30% childhood mortalities in Nigeria, and that more than
90% of the total population is at risk of malaria, while at least 50% of the population suffers from at least one episode of malaria each year (Federal Ministry of Health, 2005).

At high risk of malaria infection are individuals living in endemic areas, and people of low immunity; for instance, foreigners, pregnant women, children (Weir and Stewart 1997) and perhaps HIV/AIDS patients (Migot et al., 1996; Chandramohan and Greenwood 1998).

Considering the need to evaluate the concerted efforts of government and non-governmental agencies in checking the incidences of malaria within rural populations, especially the distribution of free treated mosquito nets to families, this study set out to assess the prevalence of malaria parasite among the rural population of Iruekpen, Ekpoma, Edo State, Nigeria, in order to enrich the working data base and encouraged information feed-back mechanisms for all agencies concerned.

MATERIAL AND METHOD

Study area: This study was carried out at Iruekpen - a village in Ekpoma, the administrative headquarters of Esan West Local Government Area of Edo State, Nigeria, and the host town of the State-owned University – Ambrose Alli University, Ekpoma, Edo State, Ekpoma, Edo State, Nigeria.

Study population: This study was conducted among rural dwellers of Iruekpen, who presented at the Primary Health Center (PHC) following publicized invitation for free medical examination and treatment. At the end of the period in focus, 62 adults (14 males and 48) females responded to the invitation. Their age and other relevant parameters were documented while promptly attending to them.

Ethical Consideration: Consent was obtained from the Department of Nursing Science, Ambrose Alli University, Ekpoma, Edo State, and the Health Department of Esan West Local Government Headquarters, Ekpoma, Edo State, Nigeria.

Data Collection: The mean age and standard deviation of the study population was calculated using the statistical package for social science (SPSS) version 20. Their ages were categorized into these age-ranges: <20, 20-29, 30-39, 40-49, 50-59, and 60 and above.

Determination of Malaria status: The malaria status of the study population was determined using the ‘Care Start’ malaria test kit by Access Bio Incorporated, 65 Clyde Road, Suite A, Summerset NJ, 08873, USA (www.accessbio.net). The test kit results were tabulated as positive and negative for malaria respectively.

RESULT

Table 1 shows the sex distribution of the study population in relation to their age range. Most of the study population were females (n=48; 77.42%) as compared to the males (14; 22.58%), and most of them (male and female) were within the age range of 60 and above (10 Males; 16.13% and 31 females).

Table 1: Age distribution of the study population in relation with sex

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Male (%)</th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>20 - 29</td>
<td>0 (0.00)</td>
<td>1 (1.61)</td>
</tr>
<tr>
<td>30 - 39</td>
<td>0 (0.00)</td>
<td>3 (4.84)</td>
</tr>
<tr>
<td>40 - 49</td>
<td>2 (3.23)</td>
<td>7 (11.29)</td>
</tr>
<tr>
<td>50 - 59</td>
<td>2 (3.23)</td>
<td>6 (9.68)</td>
</tr>
</tbody>
</table>
| 60 and above | 10 (16.13) | 31 (50.00) | Total 14 (22.58) 48(77.42)

Table 2 shows the mean age distribution of the study population. Comparatively, the males were much older (56.43±6.49) than the females (54.25±9.33) that willfully presented for medical check-up.
The prevalence of detectable malaria parasite among the population under study in relation with sex. Among the 62 patients, 3 (4.84%) and 11 (17.74%) of the males tested positive and negative to malaria respectively, while 7 (11.29) and 41 (66.13) of the females tested positive and negative to malaria respectively.

**DISCUSSION**

This study revealed a low malaria parasite prevalence of 16.13% among the population under study, compared to 30.2% at Nnewi, Nigeria (Okocha et al. 2005), 39.5% reported among patients attending General Hospital Gboko, Benue State, Nigeria, (Houmsou et al., 2010), 51.5% reported among blood donors in Abakaliki in Nigeria (Epidi et al. 2008), 58.4% reported at Enugu (Nwagha et al., 2009), 59.9% reported among pregnant women in eastern Nigeria (Ogbodo et al., 2009) and 76.9% reported among pregnant women attending antenatal clinics in Gboko General Hospital, Benue state, Nigeria (Houmsou et al., 2010). However the observed prevalence at Irukpenu, Edo State, Nigeria, is higher than the 7.7% reported among blood donors in Lagos, Southwest, Nigeria, by Chimere et al. (2009) and almost same with the 17% among students at the University of Ibadan, Oyo State, Nigeria, by Anumudu et al. (2006).

The season of this study (dry season) may account for the observed low prevalence and this assertion is supported by the reports from a study conducted at Abuja by Yahaya (2014), stating that the amount of rainfall positively correlates with malaria cases and the peak of rainfall is in August, while the peak of malaria is in June. Similarly, the outcome of a study conducted at Ibadan by Onwuemele (2014), indicated that seasonal variations play significant roles in malaria infection in Nigeria, while showing also that malaria infections prevalence differs in some geographical zones. This association with the differences in geographical zone is evident in the high prevalence rate of 67.5% reported in Port Harcourt by Kennedy and Ibinabo (2015) and the 80.40% and 74. 40%, reported in Aba and Umuahia respectively (Kalu et. al., 2012), compared to the low prevalence (17.5%) observed in Abuja (Nmadu et al., 2015). Studies have also shown that seasonal variation is associated with the rate of infections and differences in the types of malaria parasite (Ghulam et al., 2004).

Furthermore, the increased preventive measures adopted by the Federal Government of Nigeria including the free distribution of long lasting treated mosquito nets as well as the use of other insecticides, may explain the observed low prevalence. Indeed, the Nigerian government recently distributed free mosquito treated nets to Nigerian citizens and this is in tandem with the World Health Organization’s recommendation that people living in malaria

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**Table 2:** Mean age of the study population in relation with sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Mean Age ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>56.43±6.49</td>
</tr>
<tr>
<td>Female</td>
<td>54.25±9.33</td>
</tr>
</tbody>
</table>

SD = Standard Deviation

**Table 3:** Prevalence of malaria parasite in relation with sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Positive (%)</th>
<th>Negative (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3(4.84)</td>
<td>11(17.74)</td>
<td>14(22.58)</td>
</tr>
<tr>
<td>Female</td>
<td>7(11.29)</td>
<td>41(66.13)</td>
<td>48(77.41)</td>
</tr>
<tr>
<td>Total</td>
<td>10(16.13)</td>
<td>51(83.87)</td>
<td>62(100.00)</td>
</tr>
</tbody>
</table>
endemic areas should sleep under long lasting insecticidal treated nets to reduce the risk of malaria especially during pregnancy (WHO, 2016). Ogbedo et al. (2009) had earlier recommended that insecticide treated nets, intermittent preventive treatment, integrated vector control, and nutritional support, as well as enhanced health education, be applied to the prevention of malaria. In fact, a study at Bassa in plateau state brought to light the effectiveness of long lasting insecticide treated nets as being a tool for malaria prevention, since it does not only prevent mosquito bites, but also kills mosquito thereby reducing mosquito density; with subsequent reduction in the incidence of malaria (Zuwaira et al., 2015).

It is also important to acknowledge that malaria epidemics are common in mostly rural, less privileged population without effective alert systems in tropical Africa, especially Nigeria (Ito et al., 2014). It has also been postulated that though the levels of transmission in urban areas may be lower than in contiguous rural areas, high population densities and possible lower immunity (due to lack of repeated infections with multiple strains of malaria parasites) may result in more disease impact in urban settings (Klinkenberg et al., 2005). Other factors like overcrowded human population, availability of breeding places for malaria vectors, relative humidity and increase population without increase services that inhibit the breeding vector of malaria may increase the prevalence rate in urban areas (Fonterille and Simard 2004, Fondjo et al., 1992).

In this study, detectable malaria parasite was higher in females than in male which is in line with work done at Owerri and in Okigwe Imo State (Okpai and Ajoku, 2001) and in Awka, Anambra State (Mbanugo and Ejime 2000). However, the finding is in contrast to the findings of a study at Udi, Enugu State (Ezeanya, 1998) and in Lagos, Lagos state (Nebe et al., 2002).

On the other hand, the higher population of the females in the study population may also account for the observed higher prevalence among the female. The availability of the females for check-up in a rural Primary Health Center, can be linked with household practices in typical Nigerian populations, whereby house wives stay back home to take care of their children and do most of the house chores, while their male counterparts leave the house for work so as to earn a living.

Nevertheless, there are ongoing discussions on the influence of the male and female genes on the prevalence of malaria; though patterns of exposure often coincide with gender norms and behavior as men have a greater occupational risk of contracting malaria if they work in mines, fields or forests, at peak biting times, or migrate to areas of high endemicity for work (Reuben, 1993). Women who get up before dawn to perform household chores may also be exposed to mosquitoes and consequently to malaria infection (Vlassoff and Manderson, 1998). In other societies, the activities of men and women during peak biting times may result in equal risks of infection (Tin-Oo et al., 2001)

Conclusion

Detectable malaria prevalence in Iruikpen was comparably low during the period of study. However, it is recommended that the distribution of treated mosquito nets be sustained, while also sustaining awareness campaigns in rural communities on the need for routine bush clearing around residential areas and the importance of effective drainage channels.

ACKNOWLEDGEMENT

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World health organization (WHO). Insecticide-treated net to reduce the risk of malaria in pregnant women. WHO 2016.


**AUTHOR'S CONTRIBUTIONS**

All authors (Iyomon, P., Nwaopara, A.O., Nwaopara, O. S. and Edebiri, O.E.) contributed to the completion of this research work and were actively involved in the presentation of this manuscript.