Annals of African Medicine
Vol. 5, No. 1; 2006: 42 – 45

High Prevalence of Asymptomatic Plasmodium Infection in a Suburb of Aba Town, Nigeria

[1]R. A. Eke, [2]L. N. Chigbu and [3]W. Nwachukwu

Departments of [1]Primary Health Care and, [2]Microbiology and Immunology, College of Medicine and Health Sciences, Abia State University and [3]Abia State University Teaching Hospital, Aba, Nigeria
Reprint requests to: Dr. Reginald A. Eke, Frank Agu Memorial Hospital, 21A Park Road, P. O. Box 3309, Aba, Nigeria. E-mail: demregi@yahoo.com

Abstract
Background: Malaria is endemic in many parts of the world. Various strategies have been planned to control malaria from time to time in many places. Whatever may be the strategy the prevalence of symptomatic and asymptomatic plasmodium parasitaemics has been of prime importance as useful parameter for its control. It is hoped that malaria control programme in Nigeria will benefit from prevalence of parasitaemic study such as this.
***Method*:** Ndiegoro flood disaster district was selected by stratified random sampling from 16 districts of ward 3 out of 12 wards in Aba South Local Government out of the 2 Local Governments of Aba Town. About three quarters of the houses were uninhabited as they were submerged at various depths of the selected district. The population who consented for the study was 257. Thick and thin blood films were studied by light microscopy for plasmodium parasitaemia.
Results: The prevalence of plasmodium parasitaemics in the 257 studied population was very high (45.1%). The asymptomatic parasitaemics were about three times as many as symptomatic parasitaemics (73.2% and 26.7% respectively). This difference is statistically significant ($p<.01$). The age group 0-4 years gave the least distribution of asymptomatic malaria parasitaemics of 2(2.9%) and a very high symptomatic parasitaemics of 16 (88.8%). The older age group of 40-59 has statistically significant difference ($p < 0.01$) in the distribution of asymptomatic parasitaemics of 51 (43.6%) in males as against 34 (24.3%) in females.
Conclusion: The high prevalence of parasitaemics but worse still in this study the high rate of asymptomatic parasitaemics which serve as reservoirs of infection can threaten any malaria control programme generally and in particular the present malaria control or Roll-Back malaria in Nigeria. This high rate should be considered in assessing and reorgansing the roll-back malaria in Nigeria or any malaria control programme generally.

Key words: Malaria, asymptomatic, control programme

Résumé
Fond*:* Le paludisme est endémique dans beaucoup de régions du monde. De diverses stratégies ont été projetées pour lutter contre le paludisme de temps en temps dans beaucoup de régions. Quelle que soit la stratégie, la prévalence du parasitémie symptomatique et asymptomatique de plasmodium a été d'importance primordiale en tant que paramètre utile pour sa commande. On l'espère que le programme de lutte contre le paludisme au Nigéria tirera bénéfice de la prédominance de l'étude parasitémique de ce type.
Méthode *:* Ndiegoro, une zone de désastre d'inondation, a été choisi par l'échantillonage aléatoirement stratifié à partir de 16 zones de division municipale 3 sur 12 divisions municipales du gouvernement municipal de Sud Aba. Il y a 2 gouvernements municipaux dans la ville d'Aba. Environ trois quarts des maisons étaient inhabités car ils ont été submergés à de diverses profondeurs de la zone choisie. La population qui a consenti pour l'étude était 257 personnes. Des frottis sanguins épais et minces ont été étudiés par photomicroscopie pour la parasitémie de plasmodium.
Résultats*:* La prévalence du parasitémie de plasmodium dans la population étudiée de 257 était très haute (45,1%). Le parasitémies asymptomatiques étaient environ trois fois autant que parasitémie symptomatique (73,2% et 26,7% respectivement). Cette différence est statistiquement significative ($p<.01$). La catégorie d'âge 0-4 ans a donné la moindre distribution de la parasitémie asymptomatique du paludisme de 2(2,9%) et d'une parasitémie symptomatique très haut de 16 (88,8%). La catégorie d'âge

supérieure de 40-59 a statistiquement la différence significative ($p < 0,01$) dans la distribution de la parasitémie asymptomatique de 51 (43,6%) dans les mâles par comparaison avec 34 (24,3%) dans les femelles.

***Conclusion**:* La forte présence de la parasitémie mais plus mauvais dans cette étude le taux élevé de parasitémie asymptomatique qui servent les réservoirs de l'infection peuvent menacer n'importe quel programme de lutte contre le paludisme généralement et en particulier la lutte actuelle contre le paludisme au Nigéria. Ce taux élevé devrait être considéré en évaluant et en reorganssant le programme roll-back paludisme au Nigéria ou n'importe quel programme de lutte contre le paludisme généralement.

Mots clés: Paludisme, asymptomatique, programme de lutte

Introduction

Malaria transmission depends on two primary factors. These are location of mosquito breeding sites, and clustering of human habitations where people serving as reservoirs of parasites for mosquito infection live.[1] Studies in Senegal and other malaria endemic areas in Africa and other parts of the world have shown high prevalence rate of asymptomatic plasmodium falciparum. [2] The high prevalence provides ready reservoirs of infection making control programme difficult to accomplish.

Previous successes in malaria control for example in India and Sri Lanka were primarily attributed to the effects of residual insecticide spraying which severely reduced anopheline population. [3] That coupled with treatment of asymptomatic malaria patients led to the reduction in number of asymptomatic malaria and thus the near elimination of the malaria parasite reservoir. Asymptomatic malaria parasite prevalence knowledge is of prime importance in the control of malaria. Nigeria is matching forward with the roll-back malaria control programme and the study of the degree of prevalence of symptomatic and asymptomatic parasitaemics will help in assessing the level of reservoir of infection. This will influence the necessary programme adjustment to achieve the desired goal.

Materials and Method

Aba town is made up of two Local Governments-Aba South and Aba North. Aba South, the chosen Local Government has 12 wards out of which ward 3 was chosen. Ward 3 has 16 districts from which one was chosen. The chosen one is at the centre of Ndiegoro flood disaster area. The district was chosen by stratified random selection. The district is in the suburban area of Aba Metropolis. It is an unplanned unsanitary area with almost everything it takes to foster mosquito breeding which include pockets of water, pot-holes, blocked drained and gutter, empty cans, bottles, and receptacles and water bearing plants. The inhabitants are mainly traders and of low income group. About three-quarters of the buildings were not habited as they were submerged at various depths in the flood. The district population was 308 and because of the small population size it was decided to consider the whole 308 for study.

The district population was sensitized. It insisted that those found to be parasitaemics whether symptomatic or not should be treated free of charge Despite the sensitization, 25 people refused to participate on religious reasons and 26 people declined for not seeing the importance of the study. Eventually 257 people were those studied.

It must be mentioned that the Local Government and the study population gave us their informed consent before we embarked on the study. In compliance with the agreement the study team had with the study population all those found to be parasitaemics were treated with complete doses of 300mg chloroquine base tablets. The children's dosage of chloroquine was adjusted according to their weight. Medication in all cases was taken before a study team member.

Thick and thin smears of blood samples were made from the subjects under study. The smears were taken to a laboratory attached to the district hospital, where they were stained using 2% Giemsa solution for the thick and 100% Leishman solution for the thin film for the identification and speciation of the parasite respectively. The ring forms of the merozoites were identified and counted in 100 filed using x 100 objective lens. The count was done per 200 leucocytes, assuming a leucocyte number of $600/mm^3$. Individuals who presented with malaria, fever, body pain or headache in addition to microscopy positivity were considered symptomatic.

Results

The number of subjects studied for the distribution of asymptomatic and symptomatic malaria parasitaemics was 257. The prevalence of asymptomatic and symptomatic parasitaemics by sex is shown in table 1. Out of 117 males examined, 51(43.6%) and 11 (9.4%) were asymptomatic and symptomatic parasitaemics respectively. Also of the 140 females studied, 34 (24.3%) and 20 (14.3%) were asymptomatic and symptomatic parastaemics respectively. A higher distribution of asymptomatic parasitaemics of 51 (43.6%) was noted among males as against females of 34(24.3%), showing a statistically significant difference ($p<0.01$) using chi-square test. However, a relatively higher distribution of symptomatic parasitaemics among the females of 20(14.3%) was observed as against 11(9.4%) for males.

The prevalence of asymptomatic and symptomatic malaria parasitaemics by age is shown in Table 2. The age brackets of 20-39 years and 40-59 years gave almost the same distribution of asymptomatic malaria parasitaemics; 28 (49.1%) and 12 (50%) respectively. The age group 0-4 years gave the least distribution of a symptomatic malaria parasite. A very high distribution of symptomatic malaria parasitaemics 16 (77.3%) was observed in the age group 0-4 years. The distribution of symptomatic malaria parasitaemics got reduced from the ages 15-60 years and above, with the age group 40-59 appearing the least, 1(4.2%). This data showed a statistically significant difference in the age distribution of asymptomatic malaria parasitaemics among the study group (P <0.10) using Chi - square test.

Table 1: Sex and prevalence of asymptomatic and symptomatic malaria parasitaemia

Parasitaemia	M (%) n = 117	F (%) n = 140	Total (%) n = 257
Asymptomatic	51 (43.6)	34 (24.3)	85 (33.1)
Symptomatic	11 (9.4)	20 (14.3)	31 (12.1)
Total	62 (52)	54 (38.6)	116 (45.1)

Table 2: Age and prevalence of asymptomatic and symptomatic malaria parasitaemia among 257 individuals

Age (years)	No. studied	Asymptomatic parasitaemia (%)	Symptomatic parasitaemia (%)	Total No. infected (%)
0 – 4	70	2 (2.9)	16 (77.3)	18 (23.7)
5 – 14	64	25 (39.1)	9 (26.4)	34 (53.1)
15 – 19	30	13 (43.5)	2 (13.3)	15 (50.0)
20 – 39	57	28 (49.1)	2 (6.6)	30 (52.6)
40 – 59	24	12 (50.0)	1 (4.2)	13 (54.2)
≥60	12	5 (41.7)	1 (8.3)	6 (50.0)

Discussion

In this study 33.1% of the 257 of the population studied had asymptomatic malaria. That high rate of asymptomatic parasitaemics was almost three folds as much as those with symptomatic infection. This high rate is in line with the findings of other workers in other malaria endemic area.[2] The asymptomatic malaria had higher rate of prevalence in males than in females. The difference is statistically significant ($p<0.01$). The sex difference in the rate may find explanation that the males have more exposure to mosquito biting than the females who at various times in the day may be busy in the warm kitchens of the family. The males may be resting outside being exposed to the mosquito bites. Further work needs to be done to try get to the root of the sex different rate.

All age groups should be exposed to plasmodium species and the result in this and other reports 4 confirms this. Although symptomatic malaria is significantly most prevalent in younger age group under 5 years the prevalence of asymptomatic infection is higher in age groups above 5 years. These facts taken together indicate that individuals become immune to malaria as a function of age – function of the number of exposures. Data at table 2 showed a statistically significant difference in the age distribution of asymptomatic malaria parasitaemics among study groups.

In Africa, asymptomatic *P. falciparum* infections are common place and widespread. [5-8] Detection of plasmodium infection by light microscopy is found to be less sensitive than by polymerase chain reaction (PCR). [4] It therefore means that many parasite counts in this study must have been below the microscopic threshold and so many negative cases could have been positive if PCR was the laboratory study method. The implication here is that the rate of parasitaemia in the group studied was definitely very high.

There are many more asymptomatic parasitaemics than symptomatic parasitaemics. The asymptomatic parasitaemics are healthy carriers of malaria parasites and serve as reservoir of infection. The symptomatic people can be treated during their clinical manifestation but the asymptomatics remain unnoticed to pose a public health danger to the population as long as there is high mosquito vector density to transmit the parasites.

Parasitaemics and in particular asymptomatics are a big threat or challenge to any malaria control programme. For effectiveness, the malaria control programme currently going on in Nigeria and indeed any control programme elsewhere need to take healthy malaria parasite carriers or asymptomatic malaria parasitaemics as reservoirs of infection as serious threat to the success of the programme. The problems it poses needs to be seriously addressed simultaneously with other control strategies.

Symptomatic malaria victims can be forced to seek for treatment and from our study findings these are in the minority. That means that the majority of people are public health threat who will continue

to be reservoirs of infection and yet have no compulsion to seek for medical treatment. Therefore in any malaria control programme the designers may contemplate including treating the entire population or all the population parasitaemics so as to achieve their desired goal.

References

1. Carter R, Mandis KN, Roberts D. Spatial targeting of interventions against malaria. Bull WHO 2000; 78:1401-1411
2. Bottins E, Guanziroll A, Trape JF, Rogier C, Konate L, Druihe P. Malaria even more chronic in nature than previously thought; evidence for subclinical parasitaemia detectable by the polymerase chain reaction. Trans Roy Soc Trop Med Hyg 1996; 90:15-19
3. Vinetz JM, Gilman RH. Asymptomatic plasmodium parasitaemia and the ecology of malaria transmission. Am J Trop Med Hyg 2000; 66: 639-640
4. Alves FP, Durlacher R, Menezes MJ, et al. High prevalence of asymptomatic *Plasmodium vivax* and *Plasmodium falciparum* infections in native Amazonian populations. Am J trop Med Hyg 2002; 66:641-648
5. Trape Jf, Rogier C, Konate L, et al. The Dielmo project: a longitudinal study of natural malaria infection and the mechanisms of protective immunity in a community living in a holoedemic area of Senegal. Am J Trop Med Hyg 1994; 51: 123-137
6. Bloland PB, Boriga DA, Ruebush TK, et al. Longitudinal cohort study of the epidemiology of malaria infections in an area of intent malaria transmission II: descriptive epidemiology of malaria infection and disease among children. Am J Trop Med Hyg 1999; 60: 641-648
7. Rogier C, Trape JF. Study of premonition development in holo and mesoendamic malaria areas in Dielmo and Ndiop (Senegal): preliminary results, 1990-1994. Med Trop (Mars) 1995; 55:71-76
8. Smith T, Charlwood JD, Kihanda J, et al. Absence of seasonal variation in malaria parasitaemia in an area of intense seasonal transmission. Acta Trop 1993; 54: 54-72