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Differences in Malaria Parasitaemia among Pregnant Women Visiting Antenatal Clinics of a Tertiary Health Facility in South Eastern Nigeria: Influence of Some Pregnancy-Related Factors

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Abstract: Malaria in pregnancy can result in maternal anaemia, abortion, premature delivery, still birth and low birth weight. Malaria parasitaemia among pregnant women visiting antenatal clinics of Federal Teaching Hospital, Abakaliki was carried out between May and October, 2014. One (1) ml of venous blood was collected from each woman and was processed and examined using standard parasitological techniques. Data collected were analysed using Chi squared test. Statistical significance was established at $p<0.05$. Sixty-one (15.25%) of the women were infected. Women within the age group of 20 to 24 years had the highest prevalence (17.86%) while those of ages 35 years and above had the lowest prevalence (10.53%). However, age was not statistically-associated with malaria infection ($p>0.05$). The primigravidae were the most infected (24.55%) gravidity group, with prevalence of infection decreasing with increasing gravidity. There was a significant difference in association between malaria infection and gravidity ($p<0.05$). Women in their first trimesters of pregnancy had the highest prevalence (21.77%) while those in their third trimesters had the lowest prevalence (9.64%). There was also a significant difference ($p<0.05$) in association between malaria infections and trimesters of pregnancy. Public health education and implementation of integrated malaria control and preventive measures were advocated.

Key words: Malaria · Pregnancy · Prevention · Factors · Nigeria

INTRODUCTION

Malaria is one of the important tropical parasitic diseases that despite being preventable and curable, remains very infectious and kills more than any other communicable disease. Five species of *Plasmodium-: P. falciparum, P. vivax, P. ovale, P. malariae* and *P. knowlesi* currently maintain the transmission of the infection within the human population. Malaria transmission is endemic in most tropical and sub-tropical countries where temperature and humidity are favourable for breeding of the anopheline mosquitoes and for growth and development of the parasite in the insect vector [1]. It has been reported that the development and multiplication of the parasite is retarded with a temperature fall below 20°C [2]. Many anthropogenic and environmental factors are responsible for propagating the transmission of malaria infections and diseases in many parts of the world. Karim *et al.* [3] has reported that many factors including resistance of malaria parasites to chemotherapy, resistance of the malaria vectors to insecticides, increase in rate of international travels from endemic zones to non-endemic zones by non-immune individuals, ecological and climatic changes encourage the spread of malaria infections and diseases. Nigeria is one of the African countries that are being ravaged by malaria. Malaria in Nigeria has been reported to be hyperendemic with intense transmission and remarkable stability [4].

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Pregnancy, infancy, old age and immunocompromisation inter alia can render an individual more susceptible to malaria infections. Malaria in pregnancy can result in maternal anaemia, abortion, premature delivery, stillbirth and low birth weight [5-8]. People living in regions with stable malaria transmission develop immunity with exposure to infective anopheline mosquito bites whereas there is little or no immunity in areas of unstable transmission. In high malaria transmission stable areas of the world, the associated health consequences of malaria infections in pregnancy are significant among the primigravidae [8]. Pregnant women with little or no previous immunity to malaria have been reported to have higher risk of developing severe malaria disease than non-pregnant ones inhabiting the same locality. Luxemburger *et al*. [9] and Samak [10] have reported that hormonal and immunological changes that occur during pregnancy predispose pregnant women more to malaria infections than other adults. Malaria in pregnancy has been reported to be still annually responsible for 400,000 cases of severe maternal anaemia, 10,000 maternal deaths and the death of 200,000 new born babies [11]. Despite the health risks associated with malaria in pregnancy, it has been reportedly estimated that up to 50 million women worldwide become pregnant per annum and it is paradoxical to report that more than 50% of them live in Africa [12].

This study was carried out to investigate malaria in pregnancy as it concerns pregnant women visiting a tertiary health facility in a hyper endemic and stable malaria transmission area, with respect to age, gravidity and trimester, for a possible contribution to the fight against malaria transmission.

MATERIALS AND METHODS

The Study Area: The study was carried out at the Antenatal Wards of the Federal Teaching Hospital, (Former Ebonyi State University Teaching Hospital and Federal Medical Centre), Abakaliki, Ebonyi State, Nigeria. Ebonyi State is located within the tropical rainforest region and it is characterised by two distinct seasons (wet and dry). The former commences from April and ends in October while the later starts from November to March. The state is approximately located within longitude $7°30^{1}$ and $8°30^{1}$E and latitude $5°40^{1}$ and $6°45^{1}$N [13].

The Study Population: The study was carried out on pregnant women attending Antenatal Clinics of the Federal Teaching Hospital, Abakaliki.

Ethical Considerations: The study was approved by the Federal Teaching Hospital, Abakaliki and all ethical precepts were dully followed and observed.

Laboratory Analysis: One ml of venous blood was collected from each woman and was processed and examined using standard parasitological techniques (microscopic identification of malaria parasite) as outlined by Cheesbrough [14].

Statistical Analysis: Chi squared test was used to evaluate differences in proportions. Statistical significance was established at $p<0.05$.

RESULTS

Pregnant women between the ages of 20 and 24 years old were infected most (17.86%) while those that were 35 years old or more had the least prevalence (10.53%). Age was not statistically associated with malaria infection ($X^2 = 2.18$, df = 3, $p>0.05$).

The gravidity-dependent prevalence of malaria among pregnant women visiting Antenatal Clinics of Federal Teaching Hospital, Abakaliki is as depicted in Table 2.

The highest prevalence of malaria infection (24.55%) was recorded among the primigravidae while the lowest prevalence of the infection (11.05%) was recorded among the multigravidae. The association between malaria infection and gravidity was statistically significant ($X^2 = 10.14$, df = 1, $p<0.05$).

Table 1: Age-dependent prevalence of malaria among pregnant women visiting Antenatal Clinics of Federal Teaching Hospital Abakaliki

Age group (years)	Number Examined	Number Infected	Prevalence (%)
20-24	168	30	17.86
25-29	105	16	15.24
30-34	70	9	12.86
≥35	57	6	10.53
Total	400	61	15.25

Table 2: Gravidity-dependent prevalence of malaria among pregnant women visiting Antenatal Clinics of Federal Teaching Hospital, Abakaliki

Gravidity	Number Examined	Number Infected	Prevalence (%)
Primigravidae	110	27	24.55
Secundigravidae	100	13	13.00
Multigravidae	190	21	11.05
Total	400	61	15.25

Table 3: Trimester-dependent prevalence of malaria among pregnant women visiting Antenatal Clinics of Federal Teaching Hospital, Abakaliki

Trimester	Number Examined	Number Infected	Prevalence (%)
First	124	27	21.77
Second	110	18	16.36
Third	166	16	9.64
Total	400	61	15.25

Women who were within their first trimesters had the highest prevalence (21.77%) while those in their third trimesters were least infected (9.64%). There was a significant difference in association between malaria infection and trimester of pregnancy ($X^2 = 8.37$, df = 2, $p<0.05$), (Table 3).

DISCUSSION

A total of 400 pregnant women of different ages, gravidities and trimesters who were visiting the Antenatal Clinics of Federal Teaching Hospital, Abakaliki participated in the study. Sixty-one (15.25%) of them were infected with malaria parasites. Lower incidence of 8.4% was reported in Ibadan, Nigeria [15] and slightly higher prevalence of 19.2% was recorded in Benin City, Nigeria [16]. However, high prevalence of 29.0% and 63.6% was reported, respectively [17, 18].

The differences recorded in the prevalence of the infections could be attributed to different prevailing ecological conditions that might be obtained in the different areas of study. Population densities and some anthropogenic factors could be responsible for the recorded variations in the prevalence of the infections. In densely populated societies, most of the anopheline mosquito vectors prefer to feed on humans while in sparsely populated areas, the mosquitoes switch over to zoophilic feeding behaviour [19]. Barbaric behaviours of some societies that do not encourage protective clothing expose people to infective bites of anopheline mosquitoes. Outdoor activities of people from diverse cultural backgrounds render people susceptible to the infective bites of exophagic and exophilic mosquitoes. The prevalence of the present study, 15.25% being lower than 29% reported by Nwonu *et al.* [17] in 2009 in the same Abakaliki could have resulted from increase in awareness and scale-up in the adoption of the malaria preventive and control measures over the years.

Younger women were infected more than the older ones, with prevalence of infection decreasing with advancement in age. This finding is in conformity with the findings of many researchers [16, 20-22].

However, age was not statistically associated with malaria infection ($p>0.05$). This finding disagrees with that of Agomo and Oyibo [21], who reported a significant association between the ages of the women and the malaria parasite infections. The decrease in malaria infection with advancement in age recorded in this study could be attributed to the acquisition of higher immunity to the parasitic infection by the older pregnant women due to higher exposure over the years to the infective mosquito bites, as opposed to the shorter exposure periods that were supposed to have taken place within the younger ones.

The prevalence of malaria parasite infections was highest among the primigravidae and lowest among the multigravidae. There was a gradual decline in prevalence of infections with advancement in gravidity. The association between malaria infection and gravidity was statistically significant ($p<0.05$). This finding is similar to the findings of many studies [18, 20 & 22]. The decline in prevalence of infections with advancement in gravidities could also be attributed to exposures to infective mosquito bites. Some scholars have suggested some physiological and immunological explanations for the differences in malaria infections across gravidities. Duffy and Fried [23] and Okoko *et al*. [24] asserted that the early onset of efficient antibody response in multigravidae and the delayed production of antibodies in primigravidae seem to account for the gravidity-dependent differences in malaria infection prevalence during pregnancy.

The prevalence of malaria parasite infections varied across the different levels of trimester, with women within the first trimester having the highest level of infections while those in the third trimester had the lowest infections. Prevalence of infections progressively declined with gestation age and a significant difference ($p<0.05$) in association between malaria infections and trimesters of pregnancy was observed. This recorded observation is in line with many researches [22, 25 & 26] but disagrees with Wogu and Obasohan [16], who recorded the lowest prevalence in the first trimesters of pregnancy and the highest in the third trimesters. The observed highest prevalence of malaria infections among women within the first trimesters of pregnancies could be attributed to the non-usage of intermittent preventive therapy in pregnancy with sulphadoxine pyrimethamine (IPTp-SP), an efficient intervention against malaria transmission in pregnancy. The use of IPTp-SP is prohibited within the first trimester of pregnancy due to its potential teratogenic effect during the first trimester, a vital period for organogenesis and general formation of the foetus.

CONCLUSIONS

Malaria infections in pregnancy have been found to be statistically-associated with most of the considered pregnancy-related factors including ages, gravidities and trimesters. The severity of health challenges that malaria in pregnancy imposes on maternal, foetal and subsequently on infant health cannot be over emphasized. Serious adoption into the health system of integrated malaria prevention and control measures including proper and adequate use of insecticide-treated bednets (ITNs) and intermittent preventive therapy in pregnancy with sulphadoxine pyrimethamine (IPTp-SP) is advocated for effective and efficient control of malaria in pregnancy.

REFERENCES

1. Ichhpujani, R.L. and R. Bhatia, 2005. Medical Parasitology, 3rded. Jaypee Brothers Medical Publishers, New Delhi, India, pp: 1-10.
2. Mpanga, V., A. Maluwa, U. Kafulafula, M. Pindani and K. Buttemeier, 2014. Comprehension of risk factors of malaria during pregnancy among pregnant women attending antenatal care in Malawi. Open Journal of Nursing, 4: 896-905.
3. Karim, A., A. Akram, S. Shaikh, W. Khalil, A.A. Sial and Z. Karim, 2013. Complications and preventive measures of malaria infection during pregnancy.Wyno Academic Journal of Biological Sciences, 1(5): 24-29.
4. Ofovwe, E.G. and C.O. Eregic, 2001. Manifestation of severe falciparum malaria in children aged 6 months to 5 years in Benin City, Nigeria. The Resident Doctor, 5: 16-20.
5. Greenwood, B.M., A.M. Greenwood, R.W. Snow, P. Bypass, S. Bennet and A.B. Hatib-Njie, 1989. The effects of malaria chemoprophylaxis given by traditional birth attendants on the course and outcome of pregnancy. Transactions of the Royal Society of Tropical Medicine and Hygiene, 83: 589-594.
6. Shulman, C. and E. Dorman, 2003. Clinical features of malaria in pregnancy. In: Warrel, D.A. and Gilles, H.M. editors. Essential Malariology.Fourth edition. Arnold, London, pp: 219-235.
7. Wort, U.U., I. Hastings, T.K. Mutabingwa and B. Brabin, 2006. The impact of endemic and epidemic malaria on the risk of still birth in two areas of Tanzania with different malaria transmission patterns.Malaria Journal, 5: 89.
8. World Health Organisation, 2015. Guidelines for the Treatment of Malaria.Third edition.
9. Luxemburger, C., F. Ricci, F. Nosten, D. Raimond, S. Bathet and N.J. White 1997. The epidemiology of severe malaria in an area of low transmission in Thailand. Transactions of Royal Society of Tropical Medicine and Hygiene, 91: 256-262.
10. Samak, A.C., 2004. Malaria in pregnancy: an overview. McGill Journal of Medicine, 8: 66-71.
11. Menendez, C., 2015. Intermittent preventive therapy, a key tool to prevent and control malaria in pregnancy. Malaria in Pregnancy: Intermittent Preventive Treatment Fact sheet.
12. World Health Organisation, 2011. World Malaria Report: Global Malaria Programme.
13. Ogbodo, E.N., 2013. Assessment and management strategies for the receding watersheds of Ebonyi State, Southeast Nigeria.Journal of Environment and Earth Sciences, 3(3): 18-26.
14. Cheesbrough, M., 2010. District Laboratory Practice in Tropical Countries. Part 2. Second Edition update. Cambridge University Press, Cambridge.
15. Falade, C.O., O. Olayemi, H.O. Dada- Adegbola, C.O. Aimakhu, O.G. Ademowo and L.A. Salako, 2008. Prevalence of malaria at booking among antenatal clients in a secondary health care facility in Ibadan, Nigeria. African Journal of Reproductive Health, 12(2): 141-152.
16. Wogu, M.D. and H.O. Obasohan, 2014. Malaria Parasitaemia and anaemia among pregnant women attending a secondary health care facility in Benin City, Southern Nigeria. American-Eurasian Journal of Scientific Research, 9(4): 76-81.
17. Nwonu, E.U., P.C. Ibekwe, J.I. Ugwu, H.C. Obarezi and O.C. Nwagbara, 2009. Prevalence of malaria parasitaemia and malaria-related anaemia among pregnant women in Abakaliki, Southeast Nigeria. Nigeria Journal of Clinical Practice, 12(2): 182-186.
18. Akinboro, R.A., O. Ojurongbe, A.A. Akindele, O.A. Adefioye, O.S. Bolaji, O. Olaniran and O.A. Adeyeba, 2010. Plasmodium falciparumparasitaemia in pregnancy in relation to maternal anaemia. African Journal of Clinical and Experimental Microbiology, 11(3): 164:169.
19. Service, M.W. and H. Townson, 2003. The Anopheles vector. In: Essential Malariology 4th ed.. Eds., Warrel, D.A. and H.M. Gilles. Arnold, London, pp: 59-84.

20. Zhou, A., R. Megnekou, R. Leke, J. Fogako, D.W. Metenou and R.F.G. Leke, 2002. Prevalence of Plasmodium falciparum infection in pregnant Cameroonian women.American Journal of Tropical Medicine and Hygiene, 67(6): 566-570.
21. Agomo, C.O. and W.A. Oyibo, 2013. Factors associated with risk of malaria infection among pregnant women in Lagos, Nigeria. Infectious Diseases of Poverty, 2:19-26.
22. Nduka, F.O., A. Egbu, F.C. Okafor and V.O. Nwaugo, 2006. Prevalence of malaria parasites and anaemia in pregnant and non-pregnant women in Aba and Okigwe Towns of Southeast Nigeria. Animal Research International, 3(3): 508-512.
23. Duffy, P.E. and M. Fried, 1999. Malaria during pregnancy, parasites, antibodies and chondroitin sulphate A. Biochemical Society Transactions, 27(4): 478-482.
24. Okoko, B.J., G. Enwereand M.O.C. Ota, 2003. The epidemiology and consequences of maternal malaria: a review of immunological basis. Acta Tropica, 7: 193-205.
25. Nair, L.S. and A.S. Nair, 1993. Effect of malaria infection on pregnancy. Indian Journal of Malariology, 12: 29-37.
26. Anosike, J.C., B.E.B. Nwoke, A.J. Njoku, C.N. Ukaga and O.C. Onyekwere, 2004. A study on the prevalence of malaria in pregnant women visiting antenatal clinic in Federal Medical Centre, Owerri.In The Proceeding of the 28th annual conference of the Nigerian Society for Parasitology, September 22nd – 25th, 2004, held at Imo State University, Owerri.