

Malaria and Hookworm Co-Infection among Pregnant and Non-Pregnant Women in a Semi-Urban Area in Anambra State, Nigeria

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Abstract: Malaria and helminth infections are widespread in the tropics particularly in Sub-Saharan Africa where their co-infections are common. Recent studies suggest that helminth infections may increase susceptibility to malaria infection particularly during pregnancy-induced immunosuppression. A cross-sectional study to assess the prevalence of malaria and hookworm co-infection was carried out in a sample of 100 pregnant and 100 non-pregnant women attending the General Hospital, Enugwu-Ukwu a semi-urban community in Anambra State, Nigeria. Result showed an overall co-infection rate of 13% and 6% respectively for pregnant and non-pregnant women. The infection rate among the pregnant women was 81% for malaria and 17% for hookworm while the rate among non-pregnant women was 52% and 9% for malaria and hookworm respectively. A packed cell volume (PCV) value below 30% was observed among 83% and 66% of the pregnant and non-pregnant women respectively. The study suggests an association between malaria, hookworm and anaemia.

Key word: Missing

INTRODUCTION

The World Health Organization estimates that up to 24 million women may become pregnant each year in sub-Saharan Africa [1]. This high rate is often related to an increase in susceptibility to infections because pregnancy is a time of high hormone activity which may exert immune-suppressive effects on child bearing women [2]. Plasmodium infection is a very common occurrence in Africa and several studies have reported the relationship between malaria during pregnancy and low birth weight, anaemia, splenomegaly and congenital transmission [3-5]. An extensive geographic overlap exists between *P. falciparum* and the major helminth infections in Africa [6]. Women with intestinal helminth infection were 4.8 times more likely to have malaria infection [7]. Studies suggest that coinfection with *P. falciparum* and hookworm has additive impact on haemoglobin thus a helminth-induced increase in susceptibility to *P.falciparum* could have important consequences for pregnancy outcome and responses to *P. falciparum* infection in infancy [6,8].

In Nigeria, although plasmodium infection is generally more prevalent, the occurrence of intestinal helminth is also high with iron deficiency anaemia. The concomitant occurrence of plasmodium and intestinal helminth infections in pregnant women is largely unreported hence the need for this study.

MATERIALS AND METHODS

A cross-sectional study was carried out to assess the prevalence of malaria and hookworm co-infection among pregnant women attending antenatal clinic and non-pregnant women also seen at the General Hospital Enugwu-Ukwu, a semi-urban area a few kilometers from Awka the Anambra State capital in Southeastern Nigeria. The area has inadequate waste disposal facility and portable water supply. Their staple foods include rice, cassava, yam and maize. A total of 100 pregnant women and 100 non-pregnant women who were attended to at the hospital were recruited for the study. The women are Nigerians representing the major ethnic group living in the

area. The women indicated that they had not taken antibiotics within the past one month. Permission to carry out the study was obtained from the Hospital Management while informed consent was sought from the women. Blood sample was obtained from the finger of each subject to make thin and thick films and stained with Giemsa's stain for the identification of malaria parasites using the method described by Cheesbrough [7]. Stool samples produced by the subjects were also processed respectively using normal saline and iodine preparation as well as saturated sodium chloride floatation technique for identification of intestinal parasites [1]. Personal data relating to parity and packed cell volume (PCV) were obtained from their records. All the samples collected were processed and examined microscopically at the Nnamdi Azikiwe Teaching Hospital at Nnewi, Anambra State. The data obtained was analysed statistically using percentages and Chi-square test based on age and parity to which the subjects were divided.

RESULTS

Of the 100 pregnant women examined, 81% were infected with malaria parasite (*P. falciparum*), 17% were infected with hookworm and 13% were infected with both parasites. Among the 100 non-pregnant women examined, 52% had malaria parasites, 9% had hookworm while 6% had both malaria parasites and hookworm

The highest prevalence of 86.6% and 73.3% were observed in the 15-20 years age group among pregnant and non-pregnant women respectively. The lowest rate of 59.0% was observed in the 31-35 years age group among those pregnant while the 36-40 years age group had the lowest rate of 44.5% among non-pregnant women. Age specific prevalence for hookworm infection showed the highest rate of 33.3% in the 15-20 year age group among pregnant women while the lowest rate of 0% was observed in the 31-35 year age group among the non-pregnant women. A Chi-square analysis show that the differences observed were significant among the pregnant women for malaria infection according to parity and age group respectively ($P < 0.05$) but were not significant for the non-pregnant ones. The PCV values obtained from their records showed that 83% of the pregnant women had PCV less than 30% while 66% of the non-pregnant had similar values.

Table 1: Overall co-infection of Plasmodium and hookworm in pregnant and non-pregnant women

Status	No. examined	No. co-infected
Pregnant	100	13(13%)
Non-pregnant	100	6(6%)
Total	200	19(9.5%)

Table 2: Prevalence of Plasmodium and hookworm infections according to Parity among pregnant women

Parity	No. with No. Examined	No. with	
		Plasmodium	Hookworm
Primigravidae	45	41(91.1%)	9(20%)
Gravidae two	37	32(86%)	5(13.5%)
Multigravidae	18	8(44.4%)	3(16.6%)
Total	100	81(81%)	17(17%)

DISCUSSION

The findings of our study suggest that women in this area are more susceptible to malaria and hookworm infections in the first pregnancy. This observation is similar to that made in Ghana reported by Nelly *et al.* [10] and in Nigeria by Mokuolu *et al.* [11]. The report from Nigeria stated 17% prevalence for malaria in peripheral blood and 14% in cord blood of 1875 parturient women. According to them, the main impacts of pregnancy outcome were twofold increase in rate of maternal anaemia and higher prevalence of low birth weight. Low PCV values observed among majority of the subjects in our study indicate anaemic status that is associated with low birth weight babies. In a study by Mockenhaupt and Kohn [12] pregnant women with plasmodium and hookworm co-infection had lower haemoglobin levels than those that suffered from either malaria or hookworm infection. Plasmodium and hookworm co-infection anaemia in pregnancy may also be aggravated by low nutritional status of subjects whose staple foods are mainly carbohydrates that are poor sources of folate and iron. The subjects in our study were anaemic, infected with either plasmodium or hookworm or both and nutritionally deficient which could have serious consequences on pregnancy outcome.

CONCLUSION

This study illustrates high prevalence of malaria and hookworm infection among pregnant women living in the study area. Younger age and first pregnancy appear to be greater determinants of risk of malaria and hookworm

infection. We suggest the following strategies for control, intermittent prophylaxis (antimalarials, antihelminths and folates), use of insecticide treated nets and promotion of better environmental conditions, balanced and adequate nutrition.

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