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Seroprevalence of Malaria and Hepatitis B (HBsAg) with Associated Risk Factors among Pregnant Women Attending Antenatal Clinic in General Hospital Minna, North-Central Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors ICJO, IKO and AJ designed the study. Authors SCH and CM wrote the protocol and performed the statistical analysis. Authors AM and LAA managed the patients, while author LAA wrote the first draft of the manuscript. All authors read and approved the final manuscript.

Research Article

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ABSTRACT

Aims: This study determines the antibody levels of Malaria and Hepatitis B and associated risk factors among pregnant women attending anti-natal Clinic at General Hospital Minna.
Study Design: The subjects were pregnant women who attended ante-natal clinic. Sample sizes were determined from the number of pregnant women that attended antenatal Clinic.
Place and Duration of Study: Samples were collected from the ante-natal Clinic of General Hospital Minna between July to November 2011.
Methodology: Samples were assayed for malaria and hepatitis B (HBsAg) by commercial enzyme-linked immunosorbent assay kits. Time and age of pregnancy were noted.
Results: Out of the 269 pregnant women screened 216(80.30%) were positive for malaria, 22(8.18%) for hepatitis B and 21(7.81%) were co-infection of malaria and hepatitis B and 10 were negative. while non-pregnant women had 51(51.00%), 8(8.00%) and 6(6.00%) for

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malaria, hepatitis B and co-infection of both out of 100 screened. There was a significant difference between pregnant and non-pregnant women both in malaria and hepatitis B at $p<0.05$. History of blood transfusion, Alcohol consumption and Use of contraceptives were significantly associated with hepatitis B and co-infection of both hepatitis B and malaria at $p<0.05$. Only history of blood transfusion was associated with malaria infection though not significant.
Conclusion: High prevalence of antibodies to malaria and hepatitis B is a matter of great concern considering the effect of these diseases on the foetus. Adequate measures need to be taken to treat and provide prophylactic measures.

Keywords: Hepatitis; malaria; antigen; alcohol; contraceptives.

1. INTRODUCTION

Malaria is both a modern and ancient plague. Over 2000 million people, 41% of world's population still remain exposed to this disease. Three hundred to five hundred million cases occurs each year worldwide affecting 90 countries or territories. Around 1.5 to 2.7 million deaths occurs each year due to malaria. The pathological changes due to malaria and the physiological changes associated with pregnancy have a synergistic effect on the course of each other [1]. Pregnancy exacerbates malaria through a nonspecific hormone-dependant depression of the immune system; protective antiplasmodial activity is suppressed at pregnancy [2]. Hepatitis B virus (HBV) is one of the most important infectious agents causing acute and chronic morbidity worldwide. It is estimated that between 350 and 400 million people are chronic HBsAg carriers [3], with mortality generally associated with complications of cirrhosis, hepatocellular carcinoma, and, rarely, fulminant liver failure during acute infection [4,5]. Co endemic *falciparum* malaria and acute hepatitis B occur through much of Africa. Both diseases represent key threats to public health.

This report examines the seroprevalence and association of infection with hepatitis B and malaria among pregnant and non-pregnant women and the impact of some associated risk factors on both infections.

2. METHODS

2.1 Study Site

The study was carried out at General Hospital Minna, North Central Nigeria. Minna, the capital of Niger State, Nigeria, is located within longitude 6º33'E and latitude 9º37' N, covering a land area of 88km^2 with a population of 1.2 million. Minna has a tropical climate with mean annual temperature, relative humidity, and rainfall of 30.20º, 61.00% and 1334.00 cm, respectively. The climate presents two distinct seasons: a rainy season (April–October) and dry season (November–March).

2.2 Study Design

The study was conducted from July to November 2011. The subjects were pregnant women who attended ante-natal clinic at the General Hospital Minna. Sample sizes were determined from the number of pregnant women that attended antenatal care during the period of study.

The non-pregnant women served as control to help compare malaria and Hepatitis B prevalence in pregnancy only.

2.3 Sample Collections

Blood samples were obtained from 259 pregnant and 64 non pregnant women using sterile syringes. The blood samples were transferred into EDTA bottles further analysis. Factors such as history of blood transfusion, alcohol consumption and use of contraceptives of the study population were recorded.

2.4 Serological Examination

Malaria parasite detection were detected using the *in vitro* diagnostic kit (malaria pf/pv/antigen card test) manufactured by lab-care diagnostic PUT ltd, while Hepatitis B surface antigen (HBsAg) were detected using the *in vitro* diagnostic kit manufactured by Guangzhou Wonder Biotech. Co, ltd, USA.

2.5 Ethics Statement

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 declaration of Helsinki.

2.6 Statistical Analysis

All data were analysed using SPSS version 10.1 for windows. Descriptive statistics were computed for all relevant data. Chi square analysis was used to compare proportions within and among groups, for statistical significance.

3. RESULTS

Malaria and Hepatitis B surface antigens were detected in both pregnant and non-pregnant women. Out of the 259 pregnant women screened 216(83.40%) were positive for *Plasmodium falciparum*, 22(8.50%) for hepatitis B and 21(8.12%) were co-infection of malaria and hepatitis B, while non-pregnant women had 51(79.69%), 8(12.50%) and 6(9.38%) for malaria, hepatitis B and co-infection of both respectively out of 64 screened (Table 1). There was no significant difference between pregnant and non-pregnant women both in malaria and hepatitis B at $p>0.05$. Out of 48 pregnant women with history of blood transfusion 29(60.42%), 10(20.83%), and 9(18.75%) were positive for *Plasmodium falciparum*, hepatitis B and co-infection of both, while for those without history of blood transfusion 187(88.63%), 12(5.69%) and 12(5.69%) were positive for malaria, hepatitis B and co-infection of both respectively out of 211 screened. For alcohol consumption 12(54.55%) were positive for malaria, 5(22.73%) for hepatitis B and 5(22.73%) for malaria and hepatitis B co-infection out of 22, while for those who don't consume alcohol 204(86.08%) were positive for malaria, 17(7.17%) for hepatitis B and 16(6.75%) for malaria and hepatitis B co-infection respectively out of 237. Out of 68 pregnant women that used contraceptives (54.41%) were positive for malaria, 5(23.53%) for hepatitis B and 15(22.06%) for malaria and hepatitis B co-infection, while for those who did not use contraceptives 179(93.72%) were positive for malaria, 6(3.14%) for hepatitis B and 6(3.14%) for malaria and hepatitis B co-infection respectively out of 191 (Table 2). These factors were

significantly associated with hepatitis B and co-infection of both hepatitis B and malaria at p<0.05 but has no effect on malaria transmission.

Table 1. Seroprevalence of malaria and hepatitis b surface antigen (hbsag) among pregnant women attending antenatal clinic in general hospital minna, north-central Nigeria

Population	No. Examined	Malaria (*P. falciparum*) No. +ve* (%)**	Hepatitis B No. +ve (%)	Malaria (*P. falciparum*) and HepatitisNo. +ve (%)
Pregnant women	259	216(83.40%)	22(8.50%)	21(8.12%)
Non pregnant women	64	51(79.69%)	8(12.50%)	6(9.38%)
Total	323	267(82.66%)	30(9.29%)	27(8.36%)

**+ve – Positive; * Percentages in parenthesis*

Table 2. Some risk factors associated with pregnant women attending antenatal clinic in General Hospital Minna, North-Central Nigeria

Risk factor	Response	No. examined	Malaria (*P. falciparum*) No. +ve* (%)**	Hepatitis B No. +ve (%)	Malaria (*P. falciparum*) and Hepatitis No. +ve (%)
History of Blood transfusion	Yes	48	29(60.42%)	10(20.83%)	9(18.75%)
	No	211	187(88.63%)	12(5.69%)	12(5.69%)
Alcohol consumption	Yes	22	-	5(22.73%)	5(22.73%)
	No	237	-	17(7.17%)	16(6.75%)
Use of contraceptives	Yes	68	-	16(23.53%)	15(22.06%)
	No	191	-	6(3.14%)	6(3.14%)

Of the 269 women recruited 79 (29.36%) were in their 1st trimester while 100 (37.17%) and 90 (33.46%) were in their 2nd and 3rd trimester, respectively. 63(79.25%) of Pregnant women in their 1st trimester tested positive while 80(80.00%) and 73 (81.11%) in their 2nd and 3rd trimester respectively tested positive for Malaria. Although Malaria prevalence was higher among Pregnant women in their 3rd trimester, there was no significant difference (P>0.05) in Malaria prevalence rate among the trimesters. While 5(7.93%) tested positive for Hepatitis B alone in the 1st trimester, 8(8.00%) and 9(10.00%) tested positive in the 2nd and 3rd trimester, respectively. Although there was no significant difference in Hepatitis B infection in the 1st and 2nd trimester (P>0.05), 5(7.93%) and 7(7.00%) tested positive in the 1st and 2nd trimester respectively, there was no significant difference (P>0.05) between them and 9 (10.00%) tested positive in the 3rd trimester showing some significant difference (p > 0.05) (Table 3).

Table 3. χ^2 analysis of the Prevalence (%) of malaria and hepatitis B among pregnant women, in relation to pregnancy trimester, in general hospital Minna

Pregnancy trimester	No. examined	Malaria No. +ve (%)	Hepatitis B No. +ve (%)	Malaria/Hepatitis B Co-infection No. +ve (%)
1st	79	63 (79.75)[a*]	5 (7.93)[a]	5 (7.93)[a]
2nd	100	80 (80.00)[a]	8 (8.00)[a]	7 (7.00)[a]
3rd	90	73 (81.11)[a]	9 (10.00)[b]	9 (10.00)[b]
Aggregate	269	216 (80.30)[a]	22 (8.18)[a]	21 (7.81)[a]

** Values followed by same superscript alphabets in a column are not significantly different at P= 0.05.*

4. DISCUSSION

The high prevalence of malaria recorded in both pregnant and non-pregnant women is an indication that malaria is still a serious problem in Minna North Central Nigeria. Though, this study is an indication of the level of antibody implies life time exposure to malaria, it is still very high. Pregnancy has been identified to increase the risk and vulnerability of malaria infection, this finding is consistent with the reports of Ekejinde et al. [6] and Houmson et al. [7] in different parts of Nigeria.

For hepatitis B a high prevalence was observed. The HBSAG Seroprevalence rate of above 8% for pregnant and non-pregnant women classified Minna as a highly endemic area according to Hodges et al. [8] that HBV Seroprevalence of 7% in adult population in a given location classified such location as a highly endemic area. Co-infection of both malaria and hepatitis B also showed a high prevalence.

We tried to relate some risk factors mainly associated with hepatitis B from other studies to both malaria and hepatitis B in the study. We observed that history of blood transfusion, alcohol consumption and use of contraceptives has no effect on malaria transmission, but has a significant effect on hepatitis B infections and in women with both malaria and hepatitis B infections. The observation agrees with the reports of Mbaawuga et al. [9] and Lokoba et al. [10] that found one or more of these factors associated with hepatitis B only. These factors were included for malaria to take care of women that had co-infection with hepatitis B.

Various workers have reported high seroprevalence of Malaria in different trimesters of pregnancy. This study recorded the highest seroprevalence rate in the 3rd trimester followed by the 2nd trimester and least was recorded among subjects in their 1st trimester of pregnancy; this findings correlate with the work of Idowu et al. [11] who recorded a high seroprevalence in third trimester and least in second trimester, but does not correlate with the work of Brabin [12] who reported higher prevalence in the second trimester of pregnancy while Allesandro and Langerock [13] identified higher risk of Malaria in the first trimester of pregnancy. For Hepatitis B, a high seroprevalence rate was observed, irrespective of time of pregnancy which was reported by Hodges et al. [8].

The findings nonetheless point to the possibility of an interaction between these diseases that may increase the risk of morbidity and mortality for the many millions of people other than pregnant women exposed to endemic risk of both infections. The mechanism of this apparent increase in susceptibility is not known. Perhaps chronic hepatitis B carriers are less efficient at limiting parasite multiplication. There was no suggestion that hepatitis B carriers were older or more likely to come from malaria endemic areas, which might imply a failure to develop specific protective immunity. Understanding this relationship may help redefine strategies intended to diminish disease and death caused by malaria.

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CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests.

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