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Prevalence of *Plasmodia* and hepatitis B virus co-infection in blood donors at Bishop Murray Medical Centre, Makurdi, Benue State, Nigeria

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ABSTRACT

Objective: To evaluate the prevalence of co-infection of hepatitis B and *Plasmodia* among potential blood donors in Benue State, and Nigeria at large and offer suggestions and containment methods. **Methods:** Three hundred and thirty seven (337) potential blood donors, comprising 229(67.95%) Males and 108(32.05%) Females were screened for co-infection with hepatitis B virus (HBV) and *Plasmodia* between the months of July and December, 2009 using standard laboratory methods. **Results:** An overall co-infection rate of 137(40.67%) was observed among the donors. The month of December showed highest co-infection rates 59(17.51%). Highest rates of infection was observed in males at 129(38.30%) to 8(2.37%) in females. Statistical analysis showed significant difference in infection rates between males and females ($P<0.05$). The more youthful age groups 18-22, 23-27 and 28-32 had higher prevalence of infection at 11.90%, 13.05% and 6.53%, respectively. Irrespective of age group, males showed higher rates of infections than females in corresponding age groups. **Conclusions:** The high rates of co-infection imply that these infections are threats the health of citizens and should be adequately addressed by adoption of strategies to combat and control them. Further, blood should be rigorously screened before transfusion to safeguard the health of recipients.

1. Introduction

The twin infections of malaria and hepatitis B remain serious health issues in developing countries. Malaria fever is a life threatening infection, especially in Sub-Saharan Africa with approximately 350-500 million cases yearly, with 2-3 million annual deaths[1]. Malaria fever is caused by *Plasmodia*, transmitted through the bite of an infected female anopheles mosquito.

Hepatitis B infection (HBI) is caused by hepatitis B virus (HBV). HBI is as a result of exposure to blood or other body fluids containing HBV[2]. An estimated 350 million persons worldwide are chronic carriers[3,4], though adequate and accurate data is lacking on actual rates of infection[5]. 4 million clinical cases of HBI infection are recorded each year, with about 1 million deaths as a result of complications, including liver cancers[6,7].

2. Materials and methods

2.1. Ethical issues

Ethical clearance was obtained from the ethical committee of the center before the collection of samples commenced. No contact was made between the patients and the researchers. Samples used for the study were those collected from potential blood donors by designated hospital staff for laboratory analysis.

2.2. Study area

The study was carried out within a six month period; July to December, 2009, at a Tertiary Health Institution, the Bishop Murray Medical Centre in Makurdi, Benue State,

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Nigeria. Makurdi, the Benue state capital, according to Kogbe *et al*[8] is located on longitude 80 ° 31′ E and latitude 70 ° 45′ N. It is 90 metres above sea level. It has a tropical climate with distinct rainy and dry seasons; the wet season which runs from April to October, has well distributed rainfall with a monthly mean of 155.53 mm, an annual mean of 1 244.30 mm, and a peak in July/August and the dry season which runs from November to March with very little rainfall. Mean monthly relative humidity at 12.00 GMT range from 66%–68% in the rainy season and 15%–40% in the dry season, with an annual mean value of 60%. Mean daily temperature varies from 15.6 ℃ in December/January to 38 ℃ in February/March with an annual mean value of 27.5 ℃[9].

Thin and thick films were used for the examination of blood for *Plasmodia*[10-16]. Thick films were used for the determination of parasite densities and thin films for their identification[17]. One step HB surface antigen test strips were used for the diagnosis of HBV infection[10]. All tests were carried out according to standard procedures and practices[7,10].

3. Results

Table 1 shows that three hundred and thirty-seven (337) samples were examined; highest rates of infection with both *Plasmodia (mp)* and HBV (HBsAg) occurred in the month of December at 59(17.51%), while least infection occurred in September at 40(11.9%) respectively. Males had higher rates of infection compared to females with *Plasmodia* and HBV at 129(38.3%) to 8(2.37%) respectively. Males were more likely to be infected than females (P<0.05).

Table 2 shows the infection rates by age and gender. Age group 23 -27 years had the highest infection rates of 13.05%, followed by 18- 22 (11.90 %), then the 28-32 (6.53%). Least infection was observed in the 43-47 and 48-52 age groups, both with 0.60% prevalence.

Table 1
Monthly prevalence of *Plasmodium* and HBV co-infection by gender (*n*, %).

Month	No. examined	MP/HBI		
		Male		Total
July	48(14.24)	20(5.90)	2(0.60)	22(6.53)
August	60(17.80)	21(6.23)	1(0.30)	22(6.53)
September	40(11.90)	13(3.90)	2(0.60)	15(4.45)
October	62(18.40)	26(7.72)	0(0.00)	26(7.72)
November	68(20.20)	24(7.12)	0(0.00)	24(7.12)
December	59(17.51)	25(7.42)	3(0.90)	28(8.31)
Total	337(100.00)	129(38.30)	8(2.37)	137(40.65)

MP = Malaria parasite infection, HBI = Hepatitis B virus infection.

Table 2
Plasmodium & hepatitis B infection by age and gender (*n*, %).

Age (year)	No. examined	MP/HBI		
		Male	Female	Total
18-22	87(25.82)	38(11.30)	2(0.60)	40(11.90)
23-27	97(28.80)	43(12.8)	1(0.30)	44(13.05)
28-32	96(28.50)	22(6.53)	0(0.00)	22(6.53)
33-37	28(8.31)	14(4.15)	2(0.60)	16(4.75)
38-42	24(7.12)	10(7.97)	1(0.30)	11(3.26)
43-47	4(1.19)	0(0.00)	2(0.60)	2(0.60)
48-52	4(1.19)	2(0.60)	0(0.00)	2(0.60)
Total	337(100.00)	129(38.30)	8(2.37)	137(40.65)

MP = Malaria parasite infection, HBI = Hepatitis B virus infection.

4. Discussion

The high rates of infection observed in the results of this study agree with observations of Williams[18] that hepatitis B is endemic in parts of China and Africa. The high virulence of HBV is captured by Adoga *et al*[6] who state that HBV remains more infectious than HIV. Possibly some of those infected could even be chronic carriers[19], who may not even be aware of their status.

Results of this study suggest higher prevalence of infection in males than in females. Adoga *et al*[6] and koulentaki *et al*[14] in separate studies also reported higher prevalence of HBV infection in males than in females. No plausible reason could be found for this disparity. However this seems to be a global trend.

The high prevalence of co-infection within the more youthful age groups is again also consistent with the findings of Adoga *et al*[6] and Koulentaki *et al*[20]. One possible reason is that these age groups could engage in higher risk behaviour for contracting HBV, such as sexual activity, drugs abuse, tattooing or body piercing, lately an increasing trend in Nigeria.

The high rates of infection with *Plasmodia* observed could be attributed to the fact that malaria is already a looming endemic problem in Nigeria, including Benue State. The period of the survey July to October, coincided with the peak of the rainy season when mosquitoes are breeding due to the rains. Moreover Makurdi and its environs is a relatively water logged and poorly drained area, gutters and other drainages are also routinely clogged with wastes as a result of an inefficient public waste disposal system. All these provide good breeding sites for mosquitoes which help to fuel stable and continuous malaria transmission, even beyond the peak rainy season months of November and December.

The reasons advanced above for the individual prevalence of each infection could thus have contributed to the observed co infection rates. It is also possible that since both infections have periods of high activity in the liver, they may have synergistic effects on each other? Indeed infection

with one or the other pathogen could have led to a weakened immunity, thus creating the opportunity for infection with the other, as has been found for HIV/Malaria[21].

Education and re-education of the public remains one of the potent tools available for combating the twin diseases of malaria and hepatitis B.

Government owes it as a duty to the citizens to provide proper facilities to effectively screen blood and other body fluids before they are transfused, as non or inadequate screening of blood could lead to infection of persons with malarial, HBV or other deadly pathogens.

The provision and availability of vaccines against HBV is currently limited to infants and, mothers and children as a national policy. Government vaccination programme should be expanded to cover every citizen. Moreover strategies should be evolved that every eligible child is covered by the programme.

More aggressive strategies should be adopted in the fight against malaria such as extensive environmental insecticide spraying, de-clogging of water ways and drainages as well as widespread and effective distribution of Insecticide Treated Nets (ITNs) and other anti-malarials.

The fight against these and other infections should be relentless until like the fight against small pox and more recently, polio, it is won.

Conflict of interest statement

We declare that we no conflict of interest

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