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Original Article

Prevalence and Intensity of Malaria among HIV Seropositive Patients in Nnewi, Anambra state.

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ABSTRACT

The prevalence and intensity of malaria parasite in HIV patients were determined. A total of 300 subjects comprising of 150 HIV seropositive subjects and 150 HIV seronegative control subjects were recruited for the study. The prevalence and intensity of malaria were determined from the blood samples collected from the subjects. The total prevalence and mean intensity of malaria in HIV seropositive subjects were 64.7% and $2.1x10^3$ parasites/μl and in control HIV seronegative subjects were 58.7% and $1.6x10^3$ parasites/μl. The age group of 18-30years recorded the highest prevalence and intensity of malaria parasites in both the HIV-seropositive and HIV seronegative subjects. The infection status of the male and female subjects showed no significant difference ($p>0.05$). Consideration of the socio-economic status of the dually infected patients in terms of parasitic prevalence showed significant result ($p<0.05$), where those with primary education had the highest prevalence. Prevalence and intensity by occupation yielded no significant result ($p>0.05$). There is high prevalence and intensity of malaria infection in HIV seropositive population. On a population basis, an increased prevalence of malaria and increased parasite intensity in HIV infected individuals could lead to increased malaria transmission affecting both HIV seropositive and seronegative individuals.

Key words: Malaria, Human Immunodeficiency Virus.

INTRODUCTION

Malaria and Human Immunodeficiency Virus (HIV) are among the two most important global health problems of our time. They are the two of the most important infectious diseases in the tropics and any interaction between the two diseases is expected to have far-reaching public health implications, in particular, in countries with constrained resources, co-infecting large numbers of people. Together, HIV/AIDS and malaria kill four million people each year, with additional four million new HIV infection and three hundred to five hundred million infections annually as well[1]. Transmission of both malaria and HIV can result from improper blood transfusion practices and unsafe injections.[2,3] In some settings, policies to minimize HIV transmission through transfusion exist but are not implemented. In area with improper blood transfusion practices, malaria may indirectly increase the risk of HIV transmission, as severe malaria-associated anaemia often leads to blood transfusion particularly in children. For example, in the Democratic Republic of Congo, malaria accounts for almost 90% of blood transfusions administered to children[4]. It is estimated that each year between 5,300 and 8,500 children in areas of stable malaria in Africa acquire HIV infection from blood transfusions given for severe malaria[5].

Co-infection of malaria and HIV is common where the two diseases co-exist in general population or in specific high groups. Given this extensive overlap with resulting high levels of co-infection, interactions between the two diseases have major implications for the treatment, care and prevention of both. For

pregnant women in areas of unstable malaria, the risk of developing severe malaria is 2-3 times higher than that of non-pregnant women living in the same area. In these areas, malaria may result in low birth weight infants, spontaneous abortion or neonatal death. In areas of stable malaria, most adult women have developed some immunity and the principle impact of malaria infection in these pregnant women is malaria-related anaemia which increases the risk of low birth weight infants[1]. Since HIV infection is associated with malaria, it is expected that prevalence of malaria will rise too with its attendant deleterious consequences[6]. In African, only between 8 and 25% of malaria infected patients visit hospital to seek medical treatment[7]. They are mainly those patients that experience febrile malaria attacks and severe malaria anaemia[8]. The remainder embark on self medication; eventually culminating to anti-malaria drug resistance due to inadequate dosage[9]. Some patients infected with HIV also, do not know their retroviral status, but apparently refuse to go for medical check-up. However, the delay leads to a steady immune depletion indicated by a steady decline in $CD4^+$ T-cells[10]. By the time the infection is detected, the immune system may have been compromised. Hence, the present study was designed to evaluate the prevalence and intensity of malaria in HIV seropositive subjects.

MATERIALS AND METHOD

Study Area: This study was conducted at the HIV Special Treatment Centre (STC) in Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, Anambra State, Nigeria. The Centre serves almost the South-eastern part of the Country.

Selection of Patients: The patients recruited into the study include HIV seropositive individuals attending the RVD clinic (Special Treatment Centre-STC) at the Nnamdi Azikiwe University Teaching Hospital, Nnewi (n=150) and HIV seronegative subjects (n=150) were also recruited for the study. Blood samples were collected from the 300 participants for HIV screening and confirmation and for detection and malaria parasite count. Informed consent was obtained from the patients studied before blood collection.

METHODS: HIV screening was by immunochromatography kit method (ACON Laboratories Inc. USA). The procedure was as described by the manufacturer. In brief, 25ul of serum samples was dispensed into the "specimen pad" of the test strip. 80ul of buffer was added. The reaction was allowed for 5 minutes, the appearance of distinct red lines at test region and control region of the kit suggest positive HIV test while one distinct red line in the region of the control suggest HIV sero negative test. The appearance of the distinct red line of the control region validates the result without which the kit is assumed to be non functional. Malaria screening as well as parasite count was done using the World Health Organization method - Parasite per microlitre of blood[11]. Other information such as age, sex, occupation and socioeconomic status were also collected from each subject; as well as the symptoms the HIV patients. Those who complained of symptoms like intense fever, severe headache, cough, internal body heat, night sweating, body rash, pains in the joints and other parts of the body, fatigue, loss of appetite, diarrhea and so on were termed symptomatic where as those who had no symptom though they are HIV positive patients were termed asymptomatic.

RESULT

A total of 300 patients made up of 150 HIV positive and 150 HIV negative (Control) were examined. The HIV positive patients recorded a malaria prevalence of 64.7% and a mean parasite load of $2.1x10^3$ parasites per microlitre of blood against the control group who recorded 58.7% and a mean parasite load of $1.6x10^3$ per microlitre respectively. The prevalence and parasite intensity according to sex showed that the HIV positive female subjects have higher prevalence (65.8%) and mean parasite load ($2.2x10^3/\mu l$) respectively than their HIV positive male counterpart. However, the prevalence and parasite intensity were similar between the control female group

and their control male counterpart, (p>0.05). (See Table 1). Considering the socio-economic status of the subjects and with respect to their literacy level, those who attained primary school education have the highest malaria prevalence but not intensity for both HIV positive and control subjects. (See Table 2). Meanwhile, prevalence and intensity by occupation gave no significant result (p>0.05) (See Table 3).

DISCUSSION

The present results revealed interactions between HIV and malaria in dually infected patients. Despite recent initiative by the Roll Back Malaria (RBM) to halve malaria burden by the year 2010, the malaria burden still persists at an alarming level [12]. In sub-Saharan Africa, the state of malaria is increasing due to additional burden as a result of HIV pandemic, which has assumed unimaginable proportion in the region. Elsewhere in Africa, studies have established association between HIV infection and increased susceptibility to malaria infection [13-15].

In this present study, a total malaria prevalence of 64.7% and a mean parasite intensity of $2.1x10^3/\mu l$ of blood recorded in HIV infected subjects are comparably higher than those of Control HIV negative subjects who recorded 58.7% and $1.6x10^3/\mu l$ respectively. This can be attributed to adverse impact that HIV has on malaria or vice versa. This is one angle through which association reported between HIV and malaria drives the prevalence of the latter forward. This agrees with the works of Amuta and Ikpa, in Markudi, [16] Uneke et al in Jos. [17]

The humoral and cell-mediated immunity to malaria parasite are reported to be developed in areas of stable malaria transmission [18]. This immunity can be altered in HIV infected persons and could influence the frequency and course of malaria infection. [19] [20] This may explain the high prevalence and intensity of malaria infection in HIV positive population. However, there may be need to further investigate other risk factors that may be associated with high prevalence of HIV and malaria interactions such as presence of opportunistic infection, nutritional status and viral load. On a population basis, an increased prevalence of malaria and increased parasite density in HIV infected individuals could lead to increased malaria transmission affecting both HIV positive and negative individuals [21].

The age group of 18-30 years has the highest prevalence and intensity of malaria in both HIV positive and control groups. This is in contrast to Uneke *et al,* [17] who recorded higher prevalence among the older age groups (51-60) of HIV sero-positive population. This high prevalence of malaria of the old age may be attributed the deteriorations of the immune cells at old age. Malaria is an important cause of adolescent hospital admissions in many sub-Saharan African Countries with stable malaria transmission. HIV infection increases malaria prevalence especially in the young age groups [22]. This may partly relate to reduce acquisition of acquired malaria immunity in young individual [23].

Table 1: Prevalence and intensity of malaria according to sex

	HIV POSITIVE			HIV NEGATIVE (CONTROL)		
Sex	number examined	% positive	mean malaria load ($x10^3/\mu l$)	Number Examined	% positive	mean malaria load ($x10^3/\mu l$)
Male	45	28(62.2)	1.9	77	44(57.1)	1.4
Female	105	69(65.7)	2.2	73	44(60.3)	1.2
Total	150	97(64.7)		150	88(58.7)	

Table 2: Prevalence and intensity of malaria with respect to the socio-economic status (Quantified by literacy level).

	HIV POSITIVE			HIV NEGATIVE (CONTROL)		
Status	number Examined	% positive	mean malaria load ($x10^3/\mu l$)	Number Examined	% positive	mean malaria load ($x10^3/\mu l$)
Primary	41	28(68.3)	1.9	44	32(72.2)	2.4
Secondary	82	53(64.6)	2.0	77	48(62.3)	1.2
Tertiary	27	16(59.3)	2.8	29	8(27.6)	1.9
Total	150	97(64.7)		150	88(58.7)	

Prevalence: significant ($p<0.05$), Intensity: not significant ($p>0.05$)

Table 3: Prevalence and intensity by occupation.

	HIV POSITIVE			HIV NEGATIVE (CONTROL)		
Occupation	number Examined	% positive	mean malaria load ($x10^3/\mu l$)	Number Examined	% positive	mean malaria load ($x10^3/\mu l$)
Student	15	9(64.3)	2.7	25	18(72.0)	1.2
Traders	85	56(65.9)	1.7	64	41(64.0)	1.4
Civil Servants	20	12(60.0)	2.3	29	10(34.0)	1.5
Others	30	20(66.7)	2.9	32	19(59.4)	1.2
Total	150	97(64.7)		150	88(58.7)	

Prevalence and Intensity: not significant ($p>0.05$)
Note:Others include: housewives, labourers, cyclists, applicants, hairdressers, conductors, masons and drivers.

This may explain why there is higher prevalence and intensity of malaria in the younger age groups. However, malaria tends to affect mainly children and pregnant women, especially in rural areas, whereas HIV is more common among sexually active adults in urban centers [24]. According to the Centre for Disease Control and Prevention (CDC), HIV infection is the leading cause of death in Africa, especially in women [10]. HIV infected women remain susceptible to the effects of malaria whether or not they are pregnant. In sub-Saharan Africa, the highest overlap between malaria and HIV infections occur in females [22]. HIV and malaria are responsible for much of the disease burden affecting females who suffer disproportionately from these combined infections relative to others [22].This may attribute to higher prevalence and intensity recorded in HIV sero-positive women, although, there was no significant difference between the infection status of male and female patients studied.

Further stratification of the patients according to their socio-economic status gave a significant result ($p<0.05$), which means that, there may be a relationship between HIV/malaria co-infection and socio-economic status of the patients. The highest prevalence of malaria infection was found in those who had primary education. This group of people may have been placed in the least salary scale in their occupational setting, having low educational background; thus belonging to lower socio-economic class. According to WHO [1], malaria and HIV are both diseases of poverty as well as cause of poverty and they share determinants of vulnerability to

infection. Many of the circumstances that give rise to such vulnerability are present in sub-Saharan Africa. Given the wide geographical overlap in occurrence and the resulting co-infection, the interaction between the two diseases clearly has major public health implications. These diseases are part of the poverty trap in Africa. People get sick because they are poor and they get poorer because they are sick. The people in lower socio-economic class spend greater part of their income in healthcare services, transportation as well as feeding (which may not be adequate). The cost may be too much to bear due to lack of fund. The health condition may get worse until they can no longer work. Soon the entire family is malnourished as a result of illness. Hence, there is serious loss to the economy. World Health Organization reported that the overall consequences of malaria on the lives of Africans translate into an annual loss of as much as 1.3% points of growth as compared with countries without malaria. Malaria and HIV contributed immensely to Nigerians impoverished state and will no doubt continue to keep Nigerians poor.[25] Prevalence and intensity by occupation had no significant result ($p>0.05$).

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