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Co-Infection of Human Immuno-Deficiency Virus (HIV) with Malaria in Gbalegi, Idanre and State Hospital, Akure, Ondo State, Nigeria

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Abstract

The study investigated the prevalence of HIV co-infection with malaria in Gbalegi area of Idanre local government and State Hospital Akure Ondo State Nigeria. A total of 150 blood samples were collected from individuals using lancet and heparinised capillary tubes. Thin and thick blood smears were used to identify different *Plasmodium* species for malarial infection while Abbot - determine and Stat-pak kits were used for HIV screening. Although the highest prevalence of malaria with HIV co-infection among the different occupation group in State Hospital Akure was found to be highest (36.8%) among civil servants than in others while there was no HIV co infection with malaria in people screened in Gbalegi. Reasons for the high prevalence of malaria and co-infection with HIV were discussed and it has shown that individuals with HIV infection are highly susceptible to malarial infection.

Keywords: Co-infection; Malaria; HIV; Prevalence; Immunochromatograhic kits

Introduction

Human primates in Sub-Saharan Africa and was transferred to humans during the late 19th or early 20th century. Two types of HIV infect humans: HIV-l and HIV-2. HIV-l is more virulent, is more easily transmitted and is the cause of the vast majority of HIV infections globally [1]. The pandemic strain of HIV-l is closely related to a virus found in the chimpanzees which lives in the forests of the Central African nations of Cameroon, Equatorial Guinea, Gabon, Republic of Congo (or Congo-Brazzaville), and Central African Republic [1,2].

The AIDS pandemic can also be seen as several epidemics of separate subtypes; the major factors in its spread are sexual transmission and vertical transmission from mother to child at birth and through breast milk [3]. Despite recent, improved access to antiretroviral treatment and care in many regions of the world, the AIDS pandemic claimed an estimated 2.1 million (range 1.9-2.4 million) lives in 2007 of which an estimated 330,000 were children under 15 years [4]. Globally, an estimated 33.2 million people lived with HIV in 2007, including 2.5 million children. AIDS is the ultimate clinical consequence of infection with HIV. HIV is a retrovirus that primarily infects vital organs of the human immune system such as CD4+ T cells (a subset of T cells), macrophages and dendritic cells. It directly and indirectly destroys CD4+ T cells [5]. Once HIV has killed so many CD4+ T cells that there are fewer than 200 of these cells per microliter (μL) of blood, cellular immunity is lost. Acute HIV infection progresses over time to clinical latent HIV infection and then to early symptomatic HIV infection and later to AIDS, which is identified either on the basis of the amount of CD4+ T cells remaining in the blood, and/or the presence of certain infections, as noted above [6]. Many factors affect the rate of progression. These include factors that influence the body's ability to defend against HIV such as the infected person's general immune function [7,8]. Older people have weaker immune systems, and therefore have a greater risk of rapid disease progression than younger people. Poor access to health care and the existence of coexisting infections such as tuberculosis also may predispose people to faster disease progression [8]. The infected person's genetic inheritance plays an important role and some people are resistant to certain strains of HIV. An example of this is people with the homozygousCCR5-832 variation are resistant to infection with certain strains of HIV [9]. HIV is genetically variable and exists as different strains, which cause different rates of clinical disease progression [10]. However, as research evidence emerged from sub Saharan Africa in the 1980s and 1990s it soon became clear that malaria is not a typical opportunistic infection In fact, the interaction between HIV and malaria has proved to be remarkably subtle, and it is only in the past few years that a clearer picture of this association has begun to emerge.

Malaria has being a major disease of mankind for thousands of years. It is caused by protozoan of the genus *Plasmodium* and is transmitted by female Anopheles mosquitoes. Four species of *Plasmodium* are known to cause malaria in humans; *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodiun ovale* and *Plasmodium malariae*. Other species of *Plasmodium* infect reptiles, birds and other mammals. Malaria has infected humans for over 50,000 years, and *Plasmodium* may have been a human pathogen for the entire history of the species [11]. Some new evidence suggests that the most virulent strain of human malaria may have originated in gorillas [12].

It is endemic in most tropical and subtropical regions of the world. Of the four *Plasmodium* species that infect humans, *P. falciparum* is the most virulent and is responsible for the majority of morbidity and million infections and more than 1 million deaths each year, Center for Disease Control [13]. The majority of these deaths occur in young children in sub-Saharan Africa, where one in every five childhood deaths is due to malaria. Aside from young children, pregnant women are also heavily affected, with resultant effects on maternal health and birth outcomes. Years after the first Abuja declaration, Nigeria failed in the malaria burden in 2010 leading up to the MDG's deadline. Nigeria is still recording high prevalence of malaria. While recent data indicates the number of malaria infections per year is decreasing (247 million malaria cases in 2006) the number of deaths attributable to malaria remains unchanged. According to World Health Organization in [14], malaria is prevalent in over 100 countries and in recent years malaria

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has become more difficult to control and treat because malaria parasites have become resistance to drugs and mosquitoes that transmit the parasite have become resistant to insecticides. Families are the major context within which most health problems and illness occur and have a powerful influence on health. Most health belief and behavior are developed and maintained within the family. Community perceptions, beliefs and attitudes about malaria causation, symptoms identification, treatment of malaria and prevention influences effort to address malaria and are often overlooked in control efforts and this varies from community to community and among individual households. Considering these issues it can be an important step towards developing strategies aimed at controlling malaria. Understanding who already knows about malaria and malaria prevention, who has adopted malaria prevention and who is at risk of malaria infection is a necessary precursor to identifying and targeting vulnerable population. Health care provider can focus both on traditional physician-patient model and complement it with population based medicine for primary prevention of malaria.

The aim of this study is to determine the prevalence of HIV co-infection with malaria in Gbalegi Idanre Local Government and State Hospital, Akure, Ondo- State.

Materials and Methods

Study site and survey method

This study was carried out respectively from April to June 2011 in Gbalegi in Idanre and State Hospital Akure. Gbalegi is a small rural community in Idanre Local Government Area, Ondo State, Nigeria and comprising less than 2000 people. Most members of the town are farmers and few traders. A total of 63 (males and females respectively) were screened for malaria in Gbalegi. The inclusion criteria used were age, sex, occupation, knowledge of HIV.

Ethical concepts

Before the commencement of this work, a letter of introduction was collected from the Chief Medical Director of the State Hospital Akure to the officer in-charge of Haematology department and contact was made with officers in the Basic Health Center Gbalegi Idanre to explain the purpose of the project and through this means information was obtained on the status of infection, and socio-economic activities of the people using standard questionnaire.

Collection and preparation of blood samples for malaria test and HIV test

Blood samples were collected from people by the medical laboratory technologist for malaria and HIV screening. Heparinised capillary tubes were used to take the blood samples for malaria. Few drops of blood were placed on slides to make thin and thick smear to check for malaria parasites and also a drop was added on the malaria kit as a confirmatory test. A maximum of 25 blood samples were collected at each sampling periods. Thick and thin blood films were made on a clean grease free slide respectively. The films were allowed to air dry and stained with Giemsa stain previously diluted in 1:10 with distilled water. The stains were allowed to act for 30 minutes and air dried, after which the slides were screened under the microscope using xl00 objective lens to view for malaria parasites. The blood samples collected for HIV screening was analysed in-situ using Abbort determine and Stat-pak Rapid Diagnostic test kits.

HIV test procedure for abbott determine kit

The cassette was removed from the pouch and was labelled for easy identification. The cassette was placed horizontally on a bench; a drop of the patient's blood was placed on the cassette and buffer was added. The cassette that has the patient's blood was left for fifteen minutes to allow the test sample to move along the test channel. The result was read after fifteen minutes. The patient is positive if the test sample moves along the test channel to give two red lines or band at the control (one band stands for control). The absence of any band indicates invalid and also the presence of band without the control band indicates invalid. The major limitation of the kit is that it cannot detect the window period for HIV.

HIV test procedure for stat-pak kit

The Chembio HIV 1/2 STAT-PAK test device was removed from its pouch and placed on a flat surface and labelled accordingly with each patients name on different kit. The blood of the patient was placed on the well on the kit and at the same time, buffer was added. It was left for fifteen minutes before the result was given. For the nonreactive samples: One pink/purple line in the CONTROL (C) area, with no line in the TEST (T) area indicates nonreactive Test Result. A nonreactive Test Result means that HIV-l and HIV-2 antibodies were not detected in the specimen. The Test Result is interpreted as NEGATIVE for HIV-I and HIV-2 antibodies. Reactive samples: Two pink/purple lines, one in the TEST (T) area and one in the CONTROL (C) area indicate a reactive Test Result with visible lines in both TEST (T) and CONTROL (C) areas, regardless of intensity, is considered REACTIVE. A Reactive Test Result means that HIV-l and/or HIV-2 antibodies have been detected in the specimen. The Test Result is interpreted as preliminary POSITIVE for HIV-l and/orHIV-2 antibodies. Invalid samples: A pink/purple line should always appear on the CONTROL (C) area, whether or not a line appears in the TEST (T) area. If there is no distinct pink/purple line visible in the CONTROL (C) then the test is invalid .Any lines that appear outside of the Control (C) Area or Test (T) Area is an INVALID test. An INVALID test cannot be interpreted.

Results

Age and sex prevalence of malaria and co-infection with HIV in state hospital, Akure

A total of 87 individuals (37 males and 50 females) were screened for Malaria and co-infection with HIV. 37 males were screened, 7 were positive for malaria alone while 4 were had malaria and HIV. In females, a total of 50 people were screened; l1were positive for malaria alone while 4 had malaria with HIV. The overall prevalence for malaria was 20.7% and that of malaria and HIV co-infection was 10.3%. Overall prevalence was higher (22.0%) in females than in males (18.90/0) for malaria while malaria with co-infection with HIV was highest in males (10.8%) than in females (8.0%). Prevalence was high (37.5%) in males of age group 40 - 49 than in females (30.0%) for malaria while prevalence of malaria and co-infection with HIV was high (33.3%) in age group 30 - 39 compared to (25.5%) in females of the same age group. Other age and sex groups (60 - 69 and 70 - 79) were not infected (Table 1).

Occupational related prevalence of malarial and HIV infection in state hospital, Akure

A total of 87 individuals (38 males; 49 females) were screened in the State Hospital based on their occupational status. Prevalence was highest in females (14.3%) than in males (2.6%) and the overall prevalence was 9.2%. prevalence of female traders was higher (15.0%) than in male traders (10.0%) as shown in Table 2.

Knowledge of HIV in Gbalegi

The overall frequency of individuals knowledgeable about HIV based on occupational status was 73.0%. Male individuals (88.9%) had

Age Group (Yrs)	Males		Prevalence (%)			Females			Prevalence (%)		Total			Prevalence (%)	
	Number Screened M	Number Infected M/HIV	M	M/HIV		Number Screened M	Number Infected M/HIV		M	M/HIV	Number Screened M	Number Infected M/HIV		M	M/HIV
20-29	14	1	1	7.2	7.2	20	4	1	20.0	5.0	34	5	2	14.7	5.9
30-39	6	2	2	33.3	33.3	8	2	2	25.0	25.5	14	4	5	28	35.7
40-49	8	3	1	37.5	12.5	10	3	1	30.0	10.0	18	6	2	33.3	11.1
50-59	6	1	NI	16.7	0	8	2	NI	25.0	0	14	3	NI	21.4	0
60-69	1	NI	NI	0	0	3	NI	NI	0	0	4	NI	NI	0	0
70-79	2	NI	NI	0	0	1	NI	NI	0	0	3	NI	NI	0	0
Total	37	7	4	18.9	10.8	50	II	4	22.0	8.0	87	18	9	20.7	10.3

Note- M: Malaria; M/HIV: Malaria /Human immunodeficiency Virus; NI: No Infection.

Table 1: Age and sex prevalence of malaria and co-infection with HIV in State Hospital, Akure.

Occupation	Male		Prevalence (%)	Females		Prevalence (%)	Total		Prevalence (%)
	Number Screened	Number infected		Number Screened	Number Infected		Number Screened	Number Infected	
Traders	10	-	1	20	3	15	30		13.3
Students								1	
Civil	7	-	-	8	1	12.5	15	3	6.7
Servants	14	-	-	18	3	16.7	32	8	9.4
Total	38	1	2.6	49	7	14.3	87	16	9.2

Table 2: Occupational related prevalence of malarial infection in state hospital Akure.

high frequency than females (66.7%). Civil servants (100%) and students (100%) had more knowledge about HIV than other occupational status (Table 3).

Discussion

This findings suggest that HIV infection is associated with malaria in this study area. Malaria and HIV are two of the most common infections in sub-Saharan Africa and, to a lesser extent in other developing countries. 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. The increased risk of clinical malaria in HIV positive subjects could increase the burden on clinical services in areas where HIV is prevalent as observed in this study. The high rate of malaria infection in could be attributed to water lodge around resident houses, poor drainage system, bushes around houses, which are good breeding grounds for mosquitoes. Inadequate preventive and control measures might have also contributed to high rate of malaria infection in these areas. Drug resistant malaria parasite could also contribute to high infection rate since most of the patients in these areas cannot afford hospital bills thereby resorting to inadequate medication. This finding agrees with Onifade et al. [15].

The high prevalence of malaria with co-infection with HIV observed in males of age groups 40-49 years old compared to females of same age groups; this could probably be that males are more careless, sexually promiscuous than females. There was low rate of malaria and HIV co-infection in males and females among age group 20-29 in State Hospital Akure probably due to their knowledge on acquiring HIV and the mode of malaria transmission. Civil servants and students were more knowledgeable about Human Immunodeficiency Virus (HIV) compared to other occupational status observed. This could probably be due to the fact that they are literates and well informed about the HIV syndrome.

Conclusion and Recommendation

Conclusively, the prevalence of' HIV is now becoming pandemic in our world most especially developing countries such as Nigeria. Its problem has generated a lot of concern and how to eradicate or reduce the spread of the virus. The issue of malaria /HIV co-infection has now become a major challenge for medical practitioners in the world at large and this is becoming a public health concern most especially in communities of little or no awareness. It is therefore required that more awareness to educate people especially the rural communities should be intensified through sex education, more awareness campaign and Compulsory Screening for HIV. Further, HIV testing should be conducted in malaria patients as an evaluation for febrile illness in malaria and HIV endemic areas. Thus this very high rate of malaria co-infection in symptomatic HIV subjects calls for public health concern. Bearing in mind that the study was carried out in malaria endemic area with stable transmission throughout the year. The implication is that they may be exposed to such level of risk of susceptibility throughout

Occupation	Male			Female					Total
	Number Screened	Number of individuals Aware	Frequency (%)	Number of Individuals Aware	Frequency (%)	Number screened	Number of Individuals Aware	Frequency (%)	
Traders	6	6	100	33	19	57.6	39	25	64.1
Civil	-	-	-	3	3	100	3	3	100
Students	2	2	100	1	1	100	3	3	100
Farmers	10	8	80.0	8	7	87.5	18	15	83.3
Total	18	16	80.9	45	30	66.7	63	46	73.0

Table 3: Knowledge of screened individuals on human immunodeficiency virus based on occupation in Gbalegi.

the year. Therefore, irrespective of site or location in a malaria endemic area, the problem of HIV and malaria infections calls for concern as both could lead to high mortality rate. Due to high mortality rates associated with malaria infection in an endemic area, it may be necessary that routine malaria screening be adopted as part of the management policy to check the co-infection.

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