

Original Research Article**PREVALENCE OF MALARIA AND CO-INFECTION WITH HUMAN
IMMUNO-DEFICIENCY VIRUS (HIV) IN SELECTED AREAS OF
ONDO STATE, NIGERIA.****ABSTRACT**

The prevalence of malaria and its co-infection with Human Immunodeficiency Virus (HIV) was investigated in Owena, Idanre Local Government Area and State Hospital Akure, Ondo State, Nigeria. A total of 150 blood samples (Total number at, Owena = 88 and the State Hospital = 62) were collected and examined respectively for the presence of malaria using thick and thin blood smear; and also for the presence of Human Immunodeficiency Virus (HIV) using Abbott Determine kit and Stat Pak kit. The age and sex related prevalence of malaria infection in Owena shows that the overall prevalence was 54.5%. Malaria was found to be high among females (54.7%) than in males (54.2%). The age and sex prevalence of malaria infection in State Hospital shows that the overall prevalence was (54.8%). Malaria was found to be higher in females (56.8%) than in males (52.0%). Co-infection of malaria with HIV by sex in Owena shows that the infection was generally low (2.3%) but prevalence was higher in females (3.1%) than in males (0.0%). The sex distribution of malaria with HIV as co-infection in State Hospital shows that the infection was generally low (4.8%) but higher in females (5.4%) than in males (4.0%). The reasons for the high prevalence of malaria with HIV co-infection were discussed. This study suggested the need for more enlightenment campaign and public awareness of malaria and HIV infection. Key Words: Prevalence, Co-infection, Malaria and HIV,

INTRODUCTION

Malaria is a mosquito-borne disease caused by a eukaryotic protist of the genus *Plasmodium*. It is widespread in tropical and subtropical regions, including parts of the Americas (22 countries), Asia, and Africa (Grimwade *et al.*, 2003). Each year, there are more than 250 million cases of malaria, killing between one and three million people, the majority of whom are young children in Sub-Saharan Africa. Ninety percent of malaria-related deaths occur in Sub-Saharan Africa and may be associated with poverty (WHO, 2008). Five species of the *Plasmodium* parasite can infect humans: the most serious forms of the disease are caused by *Plasmodium falciparum*. Severe malaria is almost exclusively caused by *P. falciparum* infection, and usually arises 6–14 days after infection (Trampuz *et al.*, 2003). Malaria caused by *Plasmodium vivax*, *Plasmodium ovale* and *Plasmodium malariae* causes milder disease in humans that is not generally fatal. A fifth species, *Plasmodium knowlesi*, is a zoonosis that causes malaria in macaques but can also infect humans (Mens *et al.*, 2006). It is naturally transmitted by the bite of a female *Anopheles mosquito*. Malaria in humans develops via two phases: an exo-erythrocytic and an erythrocytic phase. The exo-erythrocytic phase involves infection of the hepatic system, or liver, whereas the erythrocytic phase involves infection of the erythrocytes, or red blood cells. (Bledsoe, 2005). Prevention of malaria is by avoiding outbreaks, being aware of peak exposure times and places and also, avoiding the outdoors or focusing preventive actions during peak hours may reduce risk, wearing appropriate clothing such as: long-sleeved shirts, long pants, boots, and hats, advising travelers to inspect themselves and their clothing for ticks during outdoor activity and at the end of the day, using bed nets to reduce discomfort caused by biting insects, using insecticides such as aerosol insecticides, vapourizing mats, and mosquito coils can help to clear rooms or areas of mosquitoes (Lon *et al.*, 2006).

HIV is the human immunodeficiency virus. It is the virus that can lead to acquired immune deficiency syndrome (AIDS). HIV is a positive-strand enveloped RNA virus within the family *retroviridae*. Although the disease has been studied intensely for the past two and a half decades, its origin now seems clear (Sepkowitz, 2001). HIV attacks the immune system; it primarily infects vital organs of the human immune system such as CD4⁺ T cells (a subset of cells), macrophages and dendritic cells. Once HIV has killed so many CD4⁺ T cells that there are fewer than 200 of these cells per micro liter (μL) of blood, cellular immunity is lost (Reeves *et al.*, 2002). HIV/AIDS and Malaria are two of the most important infectious diseases worldwide, accounting for almost 9% of the total burden of disease in sub-Saharan Africa (WHO, 2005). Cohort studies have shown that malaria infection causes an increase in plasma HIV viral load, even during asymptomatic parasitemia. HIV viral load returned to baseline eight weeks after acute malaria infection (Kublin *et al.*, 2005). It has also been demonstrated that CD4⁺ T lymphocytes decline temporarily during clinical malaria episodes in HIV-infected and HIV uninfected patients (Geertruyden *et al.*, 2006) and that repeated malaria infections are associated with a more rapid decline in CD4⁺ T lymphocytes over time (Mermin *et al.*, 2006), suggesting that malaria may lead to faster disease progression from HIV to AIDS, while early studies found no association between HIV and malaria disease severity in either adults or children (Chandramohan and Greenwood, 1998). Although co-infection with malaria and HIV does cause increased mortality, this is less of a problem than with HIV/tuberculosis co-infection, due to the two diseases usually attacking different age-ranges, with malaria being most common in the young and active tuberculosis most common in the old (Korenromp *et al.*, 2005). The objective of this study is to determine the prevalence of malaria and its co-infection with HIV among people in Owena Idanre-Local Government Area and State Hospital Akure, Ondo State.

MATERIALS AND METHOD

STUDY AREA

Idanre is a Local Government Area in Ondo State, Nigeria. Its head quarter is in Owena. Record from the Local Government office indicated that Owena has an area of 1,914 km² and a population of 129,024 at the 2006 census.

STUDY POPULATION AND SURVEY METHOD

This study was carried out from October to November 2013 in Owena, Idanre Local Government Area and State Hospital Akure, Ondo State. A total of 150 people of different age groups and sexes were screened for malaria and co-infection with HIV. In Owena and State hospital, 88 and 62 blood samples were examined respectively for the presence of malaria using thick and thin smear, and also for the presence of Human Immunodeficiency Virus (HIV) using Abbott Determine kit and Stat Pak kit. A standardized questionnaire was used to obtain information's from each person. Such information are those relating the infection rate with age, sex, and state of origin, place of residence.

COLLECTION AND DIAGNOSIS OF BLOOD SAMPLES

At each site, blood samples were collected according to medical standard by medical laboratory technologists from the Ondo State Hospital. Informed consent and ethical concept of each subject was obtained and their privacy of was assured by the medical personnel. Blood samples were analysed by adding a few drop of it on a clean grease free glass slide 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.

The blood smears were done according to (Warhaurst and Williams, 1996; Cheesebrough, 2000) and were analysed by making thin and thick smear to check for malaria parasites. A drop was also added on the malaria kit as a confirmatory test. Thin blood film allows easy

identification and characterization of malaria parasites while thick blood films is used to know the total number of malaria parasites present in the blood. Although, both methods were useful, but thin film was used for the identification of the malaria parasites.

METHOD FOR HIV SCREENING (ABBOTT AND STAT PAK KITS).

HIV antibody can be detected by two methods namely Abbott Determine HIV Kit, and Stat-Pak kits, which is the commonest method used. These kits were purchased from Metador pharmaceuticals in Akure, Ondo State, Nigeria. This method makes analysis faster, easy to carryout and requires less or no sophisticated equipments. The Stat-Pak kit is most efficient because it is used to confirm whether a patient is HIV-positive or HIV-negative while Abbott determine kit is used to determine the status of a patient and the patient is advised to check at the hospital after three months, this is because it cannot detect the window period of HIV.

Reactive samples: The patient is said to be reactive if there, are two pink/purple lines, one in the Test (T) area and one in the Control (C) area. The line in the Test (T) area may look different from the line in the Control (C) area. Intensities of the Test and Control Lines may vary. 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- 1 and/or HIV-2 antibodies have been detected in the specimen. The Test Result is interpreted as preliminary positive for HIV-1 and/or HIV-2 antibodies.

Invalid samples: The test is said to be invalid if no pink/purple line appear at the Control (C) area, whether or not a line appears in the Test (T) area. Any line that appears outside of the Control (C) Area or Test (T) Area is an invalid test. An invalid test cannot be interpreted.

RESULT

Table 1 shows the result of the total number of people by age and sex that were screened for malaria in Owena. There was no infection in female of the age groups 60-69 years old respectively. The overall prevalence pattern shows that there was an increase in malaria infection between age group (30-59) years from 36.7% to 72.7% and the overall *I*” prevalence in both male and female is 54.5%. The malaria disease was higher in females (54.7%). The highest occurrence (85.7%) of malaria infection in females was among the age groups 20-29years old while in males highest occurrence (100%) was among the age group 70-79 years old. The overall age and sex prevalence of infection revealed that there was no malaria infection among age group 50-79 years of age. Malaria infection was high in females (56.8%) than in males (52.0%). The highest prevalence of malaria in males was between the age group 30-39 years while in females, the highest prevalence was between age group 20-29. The total prevalence in males and females infected with malaria was 54.8%.

Table 3 shows the sex related prevalence of co-infection of malaria with HIV in Owena-Idanre Market Centre. Overall prevalence of co-infection of malaria with HIV was observed to be 4.5%. Co-infection of malaria with HIV was found to be 6.3% and it was only in females. The sex related distribution of co-infection of malaria with HIV in the State Hospital is shown in Table 4. Overall prevalence of co-infection was 4.8% and the prevalence was higher in females (5.4%) than in males (4.0%).

Table 1: Age and Sex prevalence of Malaria infection in Owena-Idanre Market

Centre

	Males		Females		Total	
Age Group (Years)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)
20-29	9	3 (33.3)	14	12 (85.7)	23	15 (65.2)
30-39	5	3 (60.0)	25	8 (32.0)	30	11 (36.7)
40-49	3	2 (66.7)	13	8 (61.5)	16	10 (62.5)
50-59	5	3 (60.0)	6	5 (83.3)	11	8 (72.7)
60-69	-	- (0.0)	3	- (0.0)	3	- (0.0)
70-79	2	2 (100.0)	3	2 (66.7)	5	4 (80.0)
TOTAL	24	13 (54.2)	64	35 (54.7)	88	48 (54.5)

Table 2: Age and Sex prevalence of Malaria infection in State Hospital, Aklure

	Males		Females		Total	
Age Group Infected (Years)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)
20-29	11	6 (54.5)	13	10 (76.9)	24	16 (66.7)
30-39	9	6 (66.7)	13	9 (69.2)	22	15 (68.2)
40-49	3	1 (33.3)	6	2 (33.3)	9	3 (33.3)
50-59	1	- (0.0)	3	- (0.0)	4	- (0.0)
60-69	-	- (0.0)	1	- (0.0)	1	- (0.0)
70-79	1	- (0.0)	1	- (0.0)	2	- (0.0)
TOTAL	25	13 (52.0)	37	21 (56.8)	62	34 (54.5)

Table 3: Co-infection of Malaria with HIV by Sex in Owena-Idanre Market Centre

Males			Females		Total	
Age Group (Years)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)
Malaria	24	13 (52.0)	64	35 (54.7)	88	48 (54.5)
Malaria & HIV	24	- (0.0)	64	4 (6.3)	88	4 (4.5)

Table 4: Sex Distribution of Malaria with HIV Co-infection in State Hospital, Aklure

Males			Females		Total	
Age Group (Years)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)	Number Examined	Number Infected & Infection Rate (%)
Malaria	25	13 (52.0)	37	21 (56.8)	62	34 (54.8)
Malaria & HIV	25	1 (4.0)	37	2 (5.4)	62	3 (4.8)

DISCUSSION

The result from the work shows that there was a high prevalence of malaria in Owena-Idanre, Ondo State Nigeria. This finding may be due to the high exposure of the people to uncut bushes around their homes, dirty gutters, ponds, flood, drainages, erosion and empty cans which can serve as a breeding ground for mosquitoes. Also, Insecticide Treated Mosquito Nets, screened windows or doors were not available in some houses in the study areas. This create an easy access for humans to be infected the malaria parasite through the bite of the *Anopheles* mosquito. This observation is in agreement with Snow *et al.*, (2005) who while working on the global distribution of clinical episodes of *Plasmodium falciparum* malaria reported that malaria is a worldwide disease and that mosquito breeds in dirty environment. In addition, the observed prevalence could due to drug resistant malaria parasite because the study area is rural and most of the people cannot afford hospital bills such that they resort to self-medication such as herbal concoctions and decoctions as well as inadequate use of orthodox malaria drugs. This is in agreement with Onifade *et al.*, (2007)

The females were observed to have a higher prevalence of malaria (56.8%) than the males (52.0%). This may probably be due to the clothing apparels of the females which are inform of short skirts, dark coloured shirts, so wearing light colours or white clothing might help prevent being bitten by mosquito. This observation is in line with Hay *et at.*, (2004) while studying the global distribution and population at risk of malaria reported that females are at higher risk of malaria infection compared to males.

Findings from this study revealed a low prevalence of HIV infection in the study area this could probably be due to the campaign strategies mounted by Ondo State Government to sensitize and increase the awareness of the people to the knowledge and transmission HIV infection. This observation is in agreement with Joint United Nations program on

HIV/AIDS who stated that the knowledge of HIV status is the gateway to combating AIDS (UNAIDS, 2010). Research has shown that the prevalence of malaria and HIV has become a pandemic case in our world especially in developing countries such as Nigeria. The problem of HIV infection has generated a lot of concern. Based on these findings, it is suggested that multiplicity of control strategies should be incorporated with that which is presently embarked upon by the State Government. This will prevent the spread of the infection and will bring about a long lasting solution to eliminate this dreadful disease. In addition effective assessment of the status of HIV infection and its co-infection with malaria especially in the rural areas should be carried out.

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