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HIGH INCIDENCE OF CO-INFECTION WITH MALARIA AND TYPHOID IN FEBRILE HIV INFECTED AND AIDS PATIENTS IN EKPOMA, EDO STATE, NIGERIA

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ABSTRACT

This survey was designed to determine the prevalence of *Plasmodium falciparum* and *Salmonella* Typhi among febrile HIV/AIDS patients in Ekpoma. Malaria and typhoid risk factors in Ekpoma included occupation, poor health facilities and poor sanitation. Malaria and typhoid are highly prevalent among Ekpoma HIV/AIDS patients.

Key words: Malaria, Typhoid, HIV/AIDS, Ekpoma.

Despite efforts to clamp down the pandemic of Human Immunodeficiency Virus (HIV) infections and Acquired Immunodeficiency Syndrome (AIDS) in most developing countries, its impact is still alarming. Many infections including malaria and typhoid are known to complicate HIV/AIDS in sub-Saharan Africa. In recent times, malaria and HIV infection has drawn much research attention (5,8). Over 80% of malaria deaths in the world are known to occur in Africa, mostly in children under five years of age. Malaria and HIV frequently to result in co-infection and interactions between the two diseases may therefore have major implications for the treatment, care and prevention of both.

Typhoid fever is an acute systemic infection caused by the bacterium *Salmonella enterica* serovar Typhi. *Salmonella enterica* serovars Paratyphi A, B, and C cause the clinically similar condition, paratyphoid fever. Typhoid and Paratyphoid fevers are collectively referred to as enteric fevers. Typhoid is transmitted by the fecal-oral route via contaminated food and water and is therefore encountered mostly throughout the developing world because sanitary conditions are very poor and use of untreated water from streams and stagnant ponds are common. In the last decade, the emergence of resistance to the antibiotics used for treatment has led to large epidemics, and complicated the management of this disease (9). The true magnitude of typhoid is difficult to quantify because the clinical picture is often confused with many other febrile illnesses and most typhoid endemic areas in Africa lack facilities to confirm the diagnosis. A good surveillance system that accurately measures the incidence and causes of febrile illness in a region must be able to detect cases as close as possible to the population level and must be supported by modern laboratory diagnostic capacity (6).

In Ekpoma, measuring the incidence and prevalence of febrile illness in HIV/AIDS poses a major public health challenge because clinical diagnosis alone is usually unreliable (3) and diagnostic tests are often not available. Therefore, the incidence and relative prevalence of the etiologic agents of the febrile illness in Ekpoma HIV/AIDS patients remain unknown. Agents of febrile illness in Nigeria include: infectious mononucleosis (2), *Salmonella* Typhi (7), West Nile virus (4) and *Plasmodium falciparum* (11). We are not aware of any recent report of malaria and typhoid survey in HIV infected and AIDS patients in Ekpoma. This survey was therefore designed to determine the prevalence of *P. falciparum* and *S.* Typhi among febrile HIV infected and AIDS patients in Ekpoma with the ultimate goal of improving management of febrile illnesses among HIV/AIDS patients in this region.

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This one year survey was carried out in Search-Light Medical Diagnostic Center (SMDC) Ekpoma between May 1, 2003 and April 30, 2004. Ekpoma has few private clinics with no specialist or referral hospital. All referral cases are usually sent to Irrua Teaching Hospital located in a nearby community. The 560 febrile known HIV/AIDS (239 male and 321 female) patients enrolled in this survey were required by healthcare providers to test their blood for malaria and typhoid. Other patients with similar symptoms but without known HIV status were excluded. Ethical Research Committee of SMDC approved this survey and informed consent of patients were sought and obtained.

Five mils of venous blood were collected from each patient aseptically. Giemsa stained thick and thin blood films were examined for malaria parasites (11). Widal agglutination was performed with Croomatest Widal reagents (Linear Chemicals, Spain) using standard methods (7). A titer greater than 1/100 in a single serum specimen was taken to be indicative of typhoid fever because Ekpoma has a background antibody of less than 1/100 (1,9). With Fisher's exact test, there was statistically significant ($p<0.001$) association between malaria and typhoid infection (Table 1).

Out of 560 consenting known HIV/AIDS patients examined for the presence of *P. falciparum* and *S.* Typhi in their peripheral blood, 301 (53.8%) tested positive for *P. falciparum* alone, 73 (13.0%) were positive for *S.* Typhi alone and 117 (20.9%) were positive for both *P. falciparum* & *S.* Typhi. Out of the 239 consenting HIV/AIDS male patients examined, 184 (77.0%) samples were positive for *P. falciparum* and 106 (44.4%) were positive for *S.* Typhi. Out of 348 females examined, 292 (91.0%) were positive for *P. falciparum* and 142 (44.2%) were positive for *S.* Typhi. (Table 1). Males in the age group <10 years had the highest malaria prevalence 21(70.0%) while females of age group 31-40 had the highest malaria prevalence (56.8%). Males in the age group 41-50 years had the highest typhoid prevalence 2 (28.6%) while females of age group >50 relatively had the highest typhoid prevalence 1(50.0%).

HIV infected and AIDS patients in Nigeria are still faced with increasing health problems due to lack of adequate disease surveillance, poor health facilities, stigmatization occasioned by cultural and societal concept of the disease and socio-economic factors. The clinical presentation of malaria is known not to vary according to HIV status and can be difficult to distinguish from other causes of febrile illness in persons with HIV infection. Therefore, HIV infection may lower the specificity of a fever-based malaria case definition due to presence of febrile illnesses caused by a wide range of ordinary, virulent and opportunistic infection.

The observed 74.6% (single 53.8% and co-infection with typhoid 20.9% combined) prevalence of *P. falciparum* re-emphasizes the risk of malaria infection among HIV/AIDS patients living in malaria endemic areas (12). Again, 74.6% prevalence of *P. falciparum* among HIV/AIDS patients in Ekpoma (rural) is lower than 88.8% reported by Tatfeng *et al.*, (13) in Benin City (urban). Thus, urbanization continues to increase mosquito and malaria spread.

No blood banking services exist in Ekpoma. This may increase the tendency of transfusing infected blood and may also increase malaria, HIV and typhoid transmission through transfusion (14). Moreover, malaria associated anemia which may lead to blood transfusion, may also indirectly raise HIV/AIDS transmission in Ekpoma with no blood transfusion services. Immunological mechanisms which lead to the destruction of pre-erythrocytic stages of malaria parasite in the liver by cytotoxic T cells and related mechanisms can prevent the development of malaria infection (14). It has also been reported that malaria infection may have an adverse effect on

Table 1. Age and sex specific prevalence of infectious agents among 560 febrile HIV/AIDS patients examined.

Age (years)	Number Examined (M/F)	Number (%) positive for; (Male/Female)			
		Males (M)		Females (F)	
		P. falciparum n=184	*S.* Typhi n=106	*P. falciparum* n=292	*S.* Typhi n=142
<10	30 (23,7)	21 (70.0)	5 (16.7)	6 (20.0)	6 (20.0)
11-20	86 (37, 49)	35 (40.7)	12 (14.0)	48 (55.8)	23 (26.7)
21-30	252 (108,144)	88 (34.9)	55 (21.8)	133 (52.0)	100 (39.7)
31-40	183 (66, 117)	36 (19.7)	32 (17.5)	104 (56.8)	9 (4.9)
41-50	7 (4,3)	4 (57.1)	2 (28.6)	1 (14.3)	3 (42.9)
>50	2 (1,1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50.0)
Total	560 (239/321)	184 (77.0)	106 (44.4)	292 (91.0)	142 (44.2)

n= Total number of positive samples among the age groups.

HIV infection by stimulating T cell turnover, impairing T cell cytotoxic function and damaging the placenta in such a way as to facilitate transmission of HIV *in utero*. (5)

The 20.9% level of co-infection of malaria and typhoid observed in this study is higher than 10.1% reported by Mbuh *et al.*, (10) in Zaria, Kaduna State of Nigeria. This difference may be explained by the fact that Zaria is arid and the Zaria population is not HIV positive. Absence of pipe borne water and drinking of water from underground reservoir may explain the observed 33.9% (single 13.0% and co-infection with malaria 20.9% combined) prevalence of *S.* Typhi in Ekpoma. The observed 33.9% prevalence of *S.* Typhi is higher than 6.3% reported in Zaria (10). Though Mbuh *et al.*, (10) reported no correlation between the presence of malaria parasites and *S.* Typhi O and H antibody levels in malaria patients and in carriers of malaria parasites, we observed statistical significant association ($p<0.001$, $\alpha<0.05$) between single infections each with malaria and typhoid, among the HIV patients surveyed (Table 1).

The 12.3% who were negative for both *P. falciparum* & *S.* Typhi could be as a result of other underlying agents of febrile illnesses in Nigeria such as West Nile Virus (4) and infectious mononucleosis (2). Females were more exposed to malaria than males (Table 1). This is expected because most Ekpoma females are farmers and others are peti-traders who spend most of their times in farms and markets located in remote malaria endemic villages. We also noted high parasitaemia (70%) in Ekpoma children. This agrees with that reported by Tatfenge *et al.*, (13) in Benin city, (Table 1). We suggest HIV progression and other underlying medical conditions as probable reason for this observation.

This survey has shown that malaria and typhoid are highly prevalent among HIV/AIDS patients attending various clinics in Ekpoma and that they may contribute significantly to risk of HIV transmission through increased blood transfusion. Occupation, poor health facilities, poor sanitation (environmental and personal) and lack of prevention and control programmes of malaria and typhoid seem to be the major risk factors predisposing HIV/AIDS patients to malaria and typhoid infection in Ekpoma. Thorough grass root surveillance is therefore supreme for effective disease prevention. Though this study did not include blood and stool culture to confirm the positive Widal serological reactions, it may serve as baseline study which should encourage future investigations of this dimension to include typhoid confirmatory culture and sensitivity.

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RESUMO

Alta incidência de co-infecção de malária e febre tifóide em pacientes febris com HIV/AIDS em Ekpoma, Edo State, Nigéria

Esta pesquisa investigou a prevalência de *Plasmodium falciparum* e *Salmonella typhi* entre pacientes febris com HIV/AIDS em Ekpoma. Os fatores de risco para malária e febre tifóide incluem atividade profissional, baixas condições de saúde e saneamento deficiente. A prevalência de malária e febre tifóide entre os pacientes com HIV/AIDS em Ekpoma é elevada.

Palavras-chave: Malária, febre tifóide, HIV/AIDS, Ekpoma

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