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Preliminary Report on the Prevalence of Intestinal Parasites and Malaria among People Living with HIV/AIDS within Makurdi Metropolis, Benue State, Nigeria

O. T. Makwe[1*], V. U. Obisike[2], O. Amali[3] and G. N. Imandeh[3]

[1]Bioresources Development Center (National Biotechnology Development Agency), Abagana, Anambra State, Nigeria.
[2]Department of Animal and Environmental Biology, Abia State University, Uturu, Nigeria.
[3]Department of Zoology, Federal University of Agriculture, Makurdi, Benue State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Authors OTM, OA and GNI designed the study. Authors OTM and VUO performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors OTM, VUO and OA managed the analyses of the study. Authors OTM and VUO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

This research was conducted to determine the prevalence of intestinal parasites and malaria among people living with HIV/AIDS within Makurdi metropolis, Benue State, Nigeria. Four hundred (400) blood and stool samples of people living with HIV/AIDS were collected from 45 NAF Base Hospital and Bishop Murray Hospital, Makurdi and examined for intestinal parasites and malaria infections between the months of September and December 2014. Formal-ether concentration technique was used for the stool examination; the thick film was prepared for blood examinations. The most prevalent parasitic infections found was malaria (*Plasmodium falciparum*) (46.0%).This was followed by Taenasis (*Taenia solium*) (13.0%), Amoebasis (*Entamoeba histolytica*) (8.0%) and

**Corresponding author: E-mail: makwethomas2@gmail.com;*

hookworm disease (4.0%). The result shows that the age groups1– 10 and 11– 20 years had the highest prevalence of malaria and intestinal parasites (93.0%) each. While 51– 60 years had the least prevalence of malaria and intestinal parasites (50.0%). Chi-square analysis showed that there was significant differences in the distribution of intestinal parasite and malaria by age (χ^2 Cal= 120.835 df 6, p<0.05).Chi-square test also revealed that there was significant differences between the infections in male and female individuals (χ^2 Cal= 36.288df 60, P<0.05 and χ^2 Cal= 67.924df 60, P<0.05) respectively. The prevalence rate of intestinal parasite and malaria is high among people living with HIV/AIDS within Makurdi Metropolis.

Keywords: Malaria; intestinal parasite; HIV/AIDs; Makurdi.

1. INTRODUCTION

Helminthinfection is recognized as one of the important public health problems in tropical Africa. Intestinal helminths are among the commonest and most widespread of human infection. Man acquires intestinal helminths when in contact with the infective stage of the parasites. Infection can also be acquired through contaminated, unwashed fingers (Fecal-oral), eggs can be spread by flies and other animals, circulation of bank notes and by wind during dry condition [1].

Intestinal parasites are parasites that populate the gastro-intestinal tract in humans and other animals, they can live throughout the body, but most preferred the intestinal wall [2]. The major groups of parasites include protozoans (organisms having only one cell) and parasitic worms (helminth), of these, protozoans, including cryptosporidium, microsporidia, and isospora, are most common in HIV-infected persons. Each of these parasites can infect the digestive tract, and sometimes two or more can cause infection at the same time [3].

Children are particularly susceptible if they are not thoroughly cleaned after coming into contact with infected soil that is present in environments that they may frequently visit such as sandboxes and school playgrounds also People in developing countries are also at risk of intestinal and malaria parasites due to drinking water from sources that may be contaminated with parasites that colonize the gastrointestinal tract and the sleeping site.

2. METHODOLOGY

2.1 Study Population

Sample size: Sample size was determined using this formula:

$$S= X^2 NP (1-P) \div d^2 (N-1) + X^2P (1-P)$$

Where:

S = Sample size being sought
X^2 = table value for chi-square at 1 degree of freedom at the
desired alpha level (0.05 = 3.84: 01 =6.64)
N = Population size
P = the population proportion (usually 0.05 as this provides the maximum sample size).
d = degree of accuracy desired, expressed as a proportion (usually 0.05). (Rosie, 2006).

A total number of 400 samples were collected and analyzed. The Samples were collected from Bishop Murray Hospital Makurdi and 45 NAF Base Hospital Makurdi, these two Hospital run HIV clinical services weekly and also tend to have the highest number of HIV patients attending clinical service. A total number of 200 samples were collected from Bishop Murray Hospital Makurdi while 200 from 45 NAF Base Hospital Makurdi. Approval was gotten from the Hospital Management Board and informed consent was obtained from each of the participants and or their parents/ guardians in case of children prior to specimen collection.

2.2 Method of Sample Selection

Table of random numbers was used to randomly select participant for this investigation at the selected Hospitals in Makurdi metropolis.

2.3 Collection of Fecal Samples

Each enrolled HIV/AIDS patient was asked to provide a fresh fecal sample in cleaned and dried sterile specimen bottles that were provided. The selected individuals were adequately instructed on how to get a little portion of their stool into the bottles using cardboard paper and applicator stick. Each participant was interviewed for sociodemographic variables.

2.4 Laboratory Procedure for Intestinal Parasite (Chesbrough (2006)

Each stool specimen was assessed for consistency. Then, it was examined by direct wet mount method using normal saline (0.85% NaCl solution) in order to prevent the loss of motile stage of parasites. Lugol's iodine was used to detect the cyst of intestinal parasites, also formal ether concentration techniques was used for the diagnosis. Faeces were emulsified by stirring 1g of stool suspension in 10ml of normal saline solution. The suspension was filtered into a centrifuge tube to remove large faecal particle before adding ether. The filtrate was centrifuged at 1,500 revolutions per minute for 3 minutes and the supernatant was discarded before keeping the tube in an upright position to allow water from the side to drain to the bottom. One to two (1-2) drops of sediment was transferred to a clean grease-free slide and then covered with a cover-slip and the preparation was examined microscopically using ×10 objective lens. The laboratory investigation was carried out at City Hospital Old G.R.A Makurdi. Diagnosis was based on the identification of helminth ova and protozoan cyst in the sample during microscopic examination. A person was considered to have a multiple infection if they were found to be positive for more than one species.

2.5 Data Analysis

Ch-square test was use to test the association between intestinal helminthes and malaria infection amongst HIV patients at P=0.05.

$$\frac{\sum(0-E)2}{E}$$

3. RESULTS

Table 1 Shows the Age distribution of intestinal and malaria parasites. The age group of 11-20 years has the highest infection of (93%), while 51-60 years has the least infection of (50%). Chi-square test reveal that there is significant difference in distribution of intestinal and Malaria Parasites by age (χ^2 Cal= 120.835df 6, P<0.05).

Table 2 Distribution of intestinal and malaria parasites in male living with HIV/AID within Makurdi Metropolis. The age group 11-20 years recorded the highest infection of (95%), while 60 years and above has the least infection of (40%). Chi-square test reveal there is significant difference in distribution of intestinal and Malaria parasites by sex and age (χ^2 Cal= 36.288df 6, P<0.05).

Table 3 Distribution of intestinal and malaria parasites in Female living with AIDS within Makurdi Metropolis. The age group <1-10 years has the highest infection of (91%) while 60 years and above has the least infection of (50%). Chi-square test reveal there is significant difference in distribution of intestinal and Malaria parasites by sex and age (χ^2 Cal= 63.308df 6, P<0.05

4. DISCUSSION

The result of this research work shows that the age groups 1-10 and 11-20years has the highest prevalence rate of infection (93%) of intestinal parasites and Malaria Parasites; this could be attributed to the fact that soil children play with contaminated soil. This agrees with Russel and Howson [4], who reported that the high-risk groups include young children, pregnant women, immune suppressed AIDS individuals, refugees, displaced persons and labourers entering endemic areas. age groups 1-10 and 11-20 years had the highest prevalence of *Entaoeba histolytica* at the rate of 19% while was the age group 11-20years had 18% prevalence of *Taenia solium* .Children are susceptible to intestinal parasites and can be attributed to dirty behavioral pertain among school age children. This study is in agreement with reports of Montresor et al. [5] who reported that children may also be particularly susceptible to the adverse effects of helminth infections due to their incomplete physical development and their greater immunological vulnerability. The study further agrees with Albonico et al. [6] who reported that children age 0-20 years habour heavy intestinal parasites and thus are a good study group; they are the group most responsible for contaminating the environment and transmitting these infections. This also agrees with Nwosu (1981), School children carry the heaviest burden of the associated morbidity, due to their dirty habits of playing or handling of infested soils, eating with soiled hands, unhygienic toilet practices, drinking and eating of contaminated water and food. Hookworm, the age group 11-20 years recorded (12%), the result of this study contrast with the work Albonico et al. [6] who reported that in sub-Saharan Africa alone, there are 41 million hookworm-infected school-age children.

Table 1. Age distribution of intestinal and Malarial parasites among people living with HIV/AIDS within Makurdi metropolis

Parasite	<1- 10 n=54 A(%)	11-20 n=75 A(%)	21-30 n=74 A(%)	31-40 n=77 A(%)	41-50 n=54 A(%)	51-60 n=50 A(%)	60^ n=16 A(%)	Total N=400 A(%)	χ^2 cal	P. value
Malarial	11(20)	20(26)	53(72)	41(53)	32(59)	21(42)	7(44)	185(46)	61.892	0.00
Hookworm	4(7)	7(12)	2(3)	2(3)	1(1)	0(0)	0(0)	16(4)	7.12	0.129
Fasciola spp	3(6)	2(3)	0(0)	0(0)	0(0)	0(0)	0(0)	5(1)	0.200	0.655
Taenia solium	4(7)	13(18)	4(5)	17(22)	8(11)	3(6)	1(6)	50(13)	28.96	0.00
Taenia seginata	3(6)	5(7)	4(5)	1(1)	3(4)	0(0)	1(6)	17(4)	4.529	0.476
Entamoeba histolytica	10(19)	11(15)	3(4)	3(4)	3(4)	0(0)	0(0)	30(8)	11.333	0.023
Hymenolepsis nana	3(6)	5(7)	0(0)	2(3)	0(0)	0(0)	0(0)	10(3)	1.400	0.497
Giardia lamblia	3(6)	2(3)	0(0)	0(0)	1(1)	0(0)	0(0)	6(2)	1.000	0.607
Ascaris lumbricoides	1(2)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(0.3)	0.001	0.00
Schistosoma mansoni	4(7)	4(5)	0(0)	1(1)	0(0)	0(0)	0(0)	9(2)	2.000	0.368
Strongyloide stercoralis	4(7)	1(1)	0(0)	0(0)	0(0)	0(0)	0(0)	5(1)	1.800	0.180
Total %	50(93)	70(93)	67(91)	68(88)	48(89)	24(48)	9(56)	334(84)	120.835	

A is the number infected

χ^2 Cal= 120.835 df 6, P<0.05.There is significant difference in distribution of intestinal and Malaria parasites by age

Table 2. The distribution of intestinal and Malarial parasites among HIV/AIDS male individuals within Makurdi metropolis

Parasite	<1- 10 n=32 A(%)	11-20 n=43 A(%)	21-30 n=40 A(%)	31-40 n=34 A(%)	41-50 n=41 A(%)	51-60 n=19 A(%)	60^ n=5 A(%)	Total N=400 A(%)	χ^2 cal	P. value
Malarial	11(34)	15(35)	18(5)	17(50)	24(59)	10(53)	2(40)	97(24)	21.278	0.002
Hookworm	4(13)	4(9)	1(3)	1(1)	1(2)	0(0)	0(0)	11(3)	4.909	0.297
Fasciola spp	2(6)	1(2)	0(0)	0(0)	0(0)	0(0)	0(0)	3(1)	0.333	0.564
Taenia solium	2(6)	7(16)	3(8)	9(27)	6(15)	3(16)	0(0)	30(8)	7.600	0.180
Taenia seginata	3(9)	4(9)	2(5)	0(0)	2(5)	0(0)	0(0)	11(3)	1.000	0.801
Entamoeba histolytica	1(3)	3(7)	2(5)	1(3)	2(5)	0(0)	0(0)	9(2)	1.556	0.817
Hymenolepsis nana	1(3)	2(5)	0(0)	1(3)	0(0)	0(0)	0(0)	4(1)	0.500	0.779
Giardia lamblia	1(3)	0(0)	0(0)	0(0)	0(0)	1(5)	0(0)	2(1)	0.000	1.000
Ascaris lumbricoides	1(3)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(1)	0.001	0.087
Schistosoma mansoni	2(6)	4(10)	0(0)	0(0)	0(0)	0(0)	0(0)	6(2)	0.667	0.414
Strongyloide stercoralis	1(3)	1(2)	0(0)	0(0)	0(0)	0(0)	0(0)	2(1)	0.000	1.000
Total %	29(91)	41(95)	26(65)	29(85)	35(85)	15(79)	2(40)	176(44)	36.288	

χ^2 Cal= 36.288 df60, P<0.05.There is significant difference in distribution of intestinal and Malaria parasites by sex and age

Table 3. The distribution of intestinal and malarial parasites among HIV/AIDS female individuals within Makurdi Metropolis

Parasite	<1- 10 n=32 A(%)	11-20 n=43 A(%)	21-30 n=40 A(%)	31-40 n=34 A(%)	41-50 n=41 A(%)	51-60 n=19 A(%)	60^ n=5 A(%)	Total N=400 A(%)	χ^2 cal	P. value
Malarial	5(23)	10(31)	20(59)	26(61)	15(46)	5(31)	2(33)	88(22)	39.711	0.000
Hookworm	1(5)	2(6)	1(3)	1(2)	0(0)	0(0)	0(0)	5(1)	0.600	0.896
Fasciola spp	1(5)	1(3)	0(0)	0(0)	0(0)	0(0)	0(0)	2(1)	0.000	1.000
Taenia solium	1(5)	3(9)	2(6)	8(19)	2(6)	3(19)	1(17)	20(5)	12.200	0.058
Taenia seginata	1(5)	1(3)	2(6)	1(2)	1(3)	0(0)	0(0)	6(2)	0.667	0.955
Entamoeba histolytica	6(27)	5(16)	1(3)	2(5)	1(3)	0(0)	0(0)	15(4)	7.333	0.119
Hymenolepsis nana	2(9)	3(9)	0(0)	1(2)	0(0)	0(0)	0(0)	6(2)	1.000	0.607
Giardia lamblia	1(5)	2(6)	0(0)	0(0)	1(3)	0(0)	0(0)	4(1)	0.500	0.779
Ascaris lumbricoides	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0.001	0.087
Schistosoma mansoni	1(5)	1(3)	0(0)	1(2)	0(0)	0(0)	0(0)	3(1)	0.000	1.000
Strongyloide stercoralis	1(5)	1(3)	0(0)	1(2)	0(0)	0(0)	0(0)	3(1)	0.000	1.000
Total %	20(91)	29(90)	26(65)	41(95)	20(49)	8(50)	3(50)	147(37)	63.308	

χ^2 Cal= 63.308 df 60, P<0.05.There is significant difference in distribution of haemoparasite and intestinal parasites by sex and age

The result shows a progressive decrease in the prevalence of Malaria Parasites among the younger age groups with (20%) and (26%) within the age group <1-10 years and 11-20 years, while the older age group 21-30 years and 41-50 years continuously increase progressively with (59%) and (72%); the result of this study contrast with the work of Russel and Howson, [4] who reported that the high-risk groups include young children, pregnant women, non-immune travelers, refugees, displaced persons and labourers entering endemic areas. The overall result shows that the prevalence rate of intestinal parasite infection is generally high among the school age children with Hookworm (7%) and *Entamoeba histolytica* (19%), This result agrees with World Health Organization (1996), children in the age groups 5-9 and 10- 14 years are more exposed to helminth infection since they usually play with soil and eat food without washing hands, as well as vegetables and fruits.

The male within the age group<1-10 years have the highest infection (13%) of Hookworm and the least is recorded among the age group 31-40 years with (1%), the age group <1-10 years recorded (1%) infection of *Ascaris lumbricoides* while the remaining age groups has the same infection rate of (0%). This result contradict the work of Martin et al. (1984) which show incidence of *Ascaris lumbricoides* (58%), *Trichuris trichura* (whip worm) (52%) and hookworm 52%. Malaria Parasites, the highest infection is recorded among the age group 41-50 years with (59%) , while the least infection is recorded among the age group with <1-10 years (34%). This tremendous prevalence among the older age groups in Malaria Parasites distribution could be attributed with the fact that most male stay outdoor in the night, thereby exposing them to mosquito bite. This result contradict the works of Krogstad, [7] who reported that Malaria is a major public health problem with an estimated two million children worldwide dying of Malaria Parasites yearly, primarily because of Malaria Parasites and its complications.

The *Schistosoma mansoni,* recorded (6%) for age group <1-10years while the remaining age groups has the same infection rate of (0%), this result contradict the work of Kaba et al. [8] who revealed the overall prevalence of *Schistosoma mansoni* (81.6%) and (81.3%) among males and females in Uganda. In summary sex is not factor in parasitic distribution among male HIV/AIDS individuals. The affirmed parasite, Hookworm, *Fasciola spp, Taenia seginata, Hymenolepsis nana, Giardia lamblia, Ascaris lumbricoides, Schistosoma mansoni* and *Strongyloides stercoralis* do not show a significant difference in

the distribution of parasitic infection among people living with HIV/AIDS. This work agrees with WHO [3], reported that several environmental and socio-economic factors have been identified to be responsible for the continued persistence of intestinal parasites in children and people living with HIV/AIDS; some of these include poor sanitary conditions, unhygienic practices, absence of portable water, poor housing and poverty.

5. CONCLUSION

Conclusively, the prevalence of intestinal and Malaria Parasites infection among the HIV/AIDS individual was high and there by posing danger or threats now and in near feature. This study has revealed that HIV/AIDS individuals are prone to higher prevalence of intestinal and malaria parasite. People living with HIV/AIDS are threatened by several diseases caused by different kinds of pathogens.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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