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RESEARCH ARTICLE

MICROBIOLOGY

INTESTINAL PARASITIC INFESTATIONS IN HIV SERPOSITIVE CHILDREN.

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ABSTRACT

Objective: To study the prevalence of intestinal parasitic infestations in HIV seropositive children and to correlate these infestations with different immunological status and WHO clinical staging.

Methods: Three consecutive samples of each 60 HIV seropositive children in the age group of 18 months to 15 years admitted in KIMS, Hubli, Karnataka, over a period of one year from 1st November 2007 to 31st October 2008, were tested for intestinal parasites in the Microbiology department, KIMS, Hubli.

Results: The overall prevalence of intestinal parasitic infestation found in this study was 35% (21/60 cases). Of 21 cases, 17 were seen in patients with severe immune suppression. Most of the intestinal parasitic infestations were seen in patients with diarrhea (16/28) cases compared to patients without diarrhea (5/32) cases. The most frequently detected intestinal parasite in this study was Balantidium Coli, followed by Ascaris lumbricoides, Trichuris trichura, Cryptosporidia, Hymenolepiasis nana, Strongyloides stercoralis, Enterobius vermicularis. One case of multiple intestinal parasitic infestations was also noted in this study.

Conclusion: The present study highlights the magnitude of intestinal parasitic infestation HIV infected children. The prevalence was found to be significantly more in patients with diarrhea than without diarrhea. Most of the intestinal parasitic infestations were seen in severely immunosuppressed children. However, parasites were also observed in other immune suppression group. So intestinal parasitic infestation should be suspected in all HIV seropositive children particularly with diarrhea and severe immune suppression.

KEY WORDS

Immune suppression, CD4 count, intestinal parasite, diarrhea.

INTRODUCTION

Infection with the Human Immunodeficiency Virus is now a major public health problem for both developing and developed countries as it has dramatically increased the global burden of disease [1]. As on today approximately 40 million people live with HIV infection worldwide. This includes 2.5 million children with HIV infection and 0.7 million children are newly infected with HIV/AIDS every year [2]. Today, India has approximately 4.58 million people living with HIV infection -the second highest figure in the world after South Africa and also accounts for > 65% of south East Asia [3]. Intestinal parasitic infestation remains an important cause of morbidity and mortality in developing countries especially among pediatrics [4]. One of the major health problems among HIV seropositive children is superimposed infection due to defect in immunity [5]. Gastrointestinal involvement in HIV/AIDS is almost universal, and significant disease occurs in 50-90% of patients while diarrhea can be a presenting manifestation or life threatening complication in HIV patients [6].

Several species of protozoa have been associated with acute and chronic diarrhea in HIV disease. These include *Cryptosporidium parvum*, *Isospora belli*, *Microsporidia*, *Giardia intestinalis*, *Entamoeba histolytica*, *Cyclospora* species, *Blastocystis hominis*, and *Dientamoeba fragalis* [6]. Nematodes like *Strongyloides stercoralis* can also cause diarrhea and overwhelming infestation in patients with HIV/AIDS [7]. Other nematodes such as hookworm, *Ascaris lumbricoides*, *Opisthorchis viverrini* can also be seen in stool of HIV patients [8]. Severe Helminthic infestation, expressing either as more eggs in feces or infestations simultaneously by several helminths, correlated

positively with the load of HIV particles in plasma [9]. HIV infection has been studied extensively in adult age group but pediatric HIV infection is a relatively newer field and has not been extensively studied in Indian children.

There are only few published reports on the prevalence of intestinal parasitic infestation in HIV seropositive children. There is a difference in prevalence of these infestations in HIV children with different immune status and clinical staging and also morbidity caused by these differs. The Sentinel surveillance round of 2003, found high prevalence of HIV in many of the districts of northern Karnataka. As The Karnataka institute of medical science, Hubli is a referral centre for HIV in north Karnataka, many cases of pediatric HIV are referred here. Considering all these, the present study was undertaken at KIMS hospital Hubli, to know the prevalence of intestinal parasitic infestations in HIV seropositive children and to correlate these with different immunological status and WHO clinical staging.

MATERIALS AND METHODS

This study was performed in a prospective hospital based study. Sixty HIV-infected children who were admitted in KIMS hospital, Hubli over a period of one year from 1st November 2007 to 31st October 2008 and who satisfied the inclusion criteria were included in this study. CD4 count/percentage was performed in all cases. All subjects were categorized by their immune status according to the revised classification of immune suppression in pediatric HIV (2006). All cases were studied with reference to history, physical examination, stool

examination and other necessary investigations in relevant cases. Three consecutive samples of stool of each patient were investigated for intestinal parasitic organism by as a wet saline mount and iodine preparation for the detection of larvae, ova and cysts (direct and concentrated specimen) in the department of Microbiology, KIMS, Hubli. The samples were subjected to modified acid-fast stain for the detection of coccidian infection. The intestinal parasitic infestation was correlated with different immunity status and with presence or absence of diarrhea.

During this study period, total of 60 HIV infected children admitted to KIMS hospital Hubli were included of whom 38 were male and 22 were female. The study population consisted of 47 patients with severe immunodeficiency, 4 patients with advanced immunodeficiency, 2 patients with mild immunodeficiency and 7 patients with no immunodeficiency. Among those cases 22 patients were in WHO clinical stage 3, 19 patients were in stage 4, 17 were in stage 2 and 4 in stage 1. Of 60 cases, 28 had diarrhea. Stool samples of all cases were examined for the presence of intestinal parasites by saline wet mount, iodine preparation as well as by modified acid fast stain.

RESULTS

Table 1
Prevalence of intestinal parasitic infestation in different immunity group

Immunodeficiency category	No of positive cases for parasites (n=21)
Severe	17
Advanced	0
Mild	1
No	3

Table 2
Prevalence of intestinal parasitic infestation in children with different WHO clinical staging

WHO clinical staging	No of positive cases for parasites (n=21)
Stage 1	0
Stage 2	5
Stage 3	10
Stage 4	6

Table 3
Prevalence of intestinal parasites in patients with diarrhea and without diarrhea

	No of positive cases for parasites
With diarrhea	16/28
Without diarrhea	5/32

Table 4

Prevalence of intestinal parasitic infestations in HIV-infected patients with diarrhea and without diarrhea

Immunological status	Infected cases/total cases(n=21)	
Categories	With diarrhea	Without diarrhea
Severe immunosuppression	13/21	4/26
Advanced immunosuppression	0/2	0/2
Mild immunosuppression	1/1	0/1
No immunosuppression	2/4	1/3

Table 5

Distribution of intestinal parasites in HIV seropositive children

Parasites	No of positive cases for parasites (%)
Balantidium coli	8 (13.33%)
Ascaris lumbricoides	4 (6.66%)
Cryptosporidium	2 (3.33%)
Tricuris .trichura	2 (3.33%)
H.nana	2 (3.33%)
Enterobius vermicularis	1 (1.66%)
Strongyloides stercoralis	1 (1.66%)
Multiple infestations	1 (1.66%)
Total	21 (35%)

Table 6

Intestinal parasites found in HIV seropositive children with different immune status (n=21)

Organism	Severe immunodeficiency	Advanced immunodeficiency	Mild immunodeficiency	No immunodeficiency	Total
B. coli	5	0	1	2	8
Cryptosporidium	2	0	0	0	2
A. lumbricoides	3	0	0	1	4
T. trichura	2	0	0	0	2
E. vermicularis	1	0	0	0	1
H. nana	2	0	0	0	2
S. stercoralis	1	0	0	0	1
Multiple parasites	1	0	0	0	1

Table 7
Prevalence of individual intestinal parasitic organism in patients with diarrhea and without diarrhea

Organism	With diarrhea	Without diarrhea	Total
B. coli	6	2	8
Cryptosporidium	1	1	2
A. lumbricoides	3	1	4
T. Trichura	1	1	2
E. vermicularis	1	0	1
H.nana	2	0	2
S. stercoralis	1	0	1
Multiple parasites	1	0	1

The prevalence of intestinal parasitic infestation found in this study was 35% (21/60). Highest number was found in group with severe immunodeficiency (17/21). The parasites were found in other immunity group also. More number of positive cases for parasites were found in patients with clinical stage 3 and 4. The prevalence of intestinal parasites was significantly higher in patients with diarrhea (16/28) than in those without diarrhea (5/32) (p value<0.05). Considering the type of organism, Balantidium Coli was seen in more number of cases (8/21) of which 5 cases were found in severe immunodeficiency group. Among those 8 cases, 5 were in diarrhea group and 3 in non-diarrhea group. *A.lumbricoides* was found in 4 cases of which 3 cases were in patients with diarrhea and 1 in patient without diarrhea. 3 cases of *A.lumbricoides* were found in patients with severe immune deficiency. *Cryptosporidium* was found in 2 cases, both of which were among severe immunodeficiency group. *T.trichura* was found in 2 cases and both of them were in severe immune deficiency group.

E.vermicularis and *S.stercoralis* were found in one case each and both were in patients with severe immune deficiency. *H. nana* was found in two patients with severe immunodeficiency with diarrhea. In non-diarrhea group, organisms found were, two *B. coli*, one each of *A. lumbricoides*, *T.trichura* and *Cryptosporidium*. Multiple infestations were found in one patient with severe immunodeficiency with diarrhea. The multiple infestations included *A.lumbricoides*, *T.trichura* and *H.nan*.

DISCUSSION

The distribution of patients according to immunity status in present study was 47 (78.34%) with severe immune suppression, 4 (6.66%) with advanced immune suppression, 2 (3.34%) with mild immune suppression and 7 (11.66%) with no immune suppression. In a similar study by Viroj Wiwanitkit, 25 (41.66%) patients were with severe immune suppression [9].

In the present study, diarrhea was found in 28 out of 60 cases (46.66%). In a study by Javid Sadraei, Moshahid A. Rizvi and U.K.Baveja the rate of diarrhea was 38% and diarrhea was most strongly associated with low CD4⁺ cell count. In this study also diarrhea is most strongly associated with low CD4⁺ [10]. The distribution of parasites in different immunity group in the present study shows highest prevalence in severe immunodeficiency group (17/60) which is similar to Viroj Wiwanitkit study (17/60). The prevalence of intestinal parasitic infestation among those with diarrhea is significantly high in this study (16/28) (p value <0.05) which is similar to Viroj Wiwanitkit study (20/28). In a study by Lindo JF et al. intestinal parasites were detected more frequently among the persons who did not have diarrhea than among those who did (18.2% versus 58.5%) [11]. In a study by Dwivedi KK, et al. the prevalence in diarrhea group was 76.6% compared to 23.4% in non-diarrheal cases. Considering the type of organism, *Balantidium coli* was found in more number of cases in this study followed by *A.lumbricoides*, *T. trichura*, *C. parvum* (13.33%, 6.66% and 3.33%). In a study by Viroj Wiwanitkit, hookworm and *A. lumbricoides* were seen in high prevalence (13.33% and 13.33) followed by *S.stercoralis* (3.33%), *Cryptosporidium* (3.33%), and *Microsporidium* (1.67%). Vaishali R. Wabale et.al in their study found high prevalence of *A.lumbricoides* (20%), followed by *A.duodenale* (5.7%), *E.histolytica* (5.7%) and *Cryptosporidium* (5.7%). *S. stercoralis* was found in (2.9%) [12]. In a study conducted by Lindo JF et al. the highest prevalence was that of *T.trichura* (21.2%) followed by hookworm (17.3%), *S.stercoralis* (7.7%), *E.histolytica* (5.8%). This study also found that pathogenic intestinal parasites were diagnosed more frequently among persons who did not have diarrhea than among those who did.

In a study by Dwivedi KK, et al *Cryptosporidium* and *A.lumbricoides* were identified more frequently. In present study the prevalence of *Balantidium coli* was more in patients with diarrhea (6 cases), followed by *A.lumbricoides* (3 cases), *H.nana* (2 cases) and one each of cryptosporidium *E.vermicularis*, *S.stercoralis*. In a similar study by Javid Sadrei, Moshahid A.Rizvi and U.K.Baveja *Cryptosporidium* infection was, at 56.5%, the highest and statistically significant compared with other parasites. In a study by Dwivedi KK, et al. the highest prevalence in patients with diarrhea was *Cryptosporidium* (63.9%). This infection was significantly higher in cases with diarrhea when compared to cases without diarrhea (p<0.01). In this study high prevalence of *Balantidium coli* is seen which is similar to other study by Vaishali R Wabale, et al where the common protozoal cysts seen were *Balantidium coli* (6.08%) followed by *Giardia lamblia* and *Entamoeba histolytica*. In non-diarrhea group, organisms detected were *B.coli* in two cases, one each of *A.lumbricoides*, *T.trichura*, and *Cryptosporidium*. In a similar study by Viroj Wivanitkit, *A.lumbricoides* was the most common detected organism. Multiple infestations were also noted in our study in one patient with severe immune suppression and with diarrhea. In other similar study like, Dwivedi KK et al. Gatachew Hailemariam, multiple infestations were noted in patients with severe immune suppression.

CONCLUSION

Parasitic infestations are very common in pediatric HIV patients; so one has to do stool microscopy in all confirmed HIV cases and treat appropriately to prevent morbidity associated with intestinal parasitic infestations.

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