

Intestinal Parasitic Infections among School Children.

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ABSTRACT

Introduction: Intestinal parasitic infections are endemic worldwide and constitute a major public health problem and considered as ‘cancers of developing countries. Nepal is small improvised country where 70.0% of morbidity and mortality are associated with infectious diseases. Giardiasis, ascariasis, amoebiasis, ancylostomiasis and taeniasis are common intestinal parasitic infections in Nepal. Thus, in this paper we report the prevalence of intestinal parasitic infection among school going children of Eastern part of Nepal.

Methods: A total of 300 stool samples were collected from school children of Eastern part of Nepal in random basis. An informed consent was taken from both students and school teachers. The samples were examined for the presence of parasites both macroscopically and microscopically. Standard parasitological examination methods were followed.

Results: Out of total 300 school going children included in the study, 195 were male and 105 were female. A total of 97 (29.1%) were positive for one or more parasites. Out of total parasites detected, 35 (36.1%) were protozoan, 39 (40.2%) were helminthes and 23 (23.7%) were mixed type. *Giardia intestinalis* 30 (30.9%) and Hookworm 18 (18.6%) were the commonest protozoan and helminthes respectively. The other parasites detected were *A. lumbricoides* 15 (15.5%), *H. nana* 6 (6.2%) and *Entamoebahistolytica* 5 (5.2%). Multiple parasitism was detected in 23 (23.7%) children.

Conclusions: The incidence of intestinal parasite infection was 29%. The commonest infestation was Helminthe. Regular deworming program in association to other preventive measures may help reduce the prevalence.

Keywords: prevalence; intestinal parasites; school children; specimen.

INTRODUCTION

Intestinal parasitosis, a major public health problem in developing countries is aggravated by hot and humid climate, poverty, malnutrition, high population density, and poor health¹.

Intestinal parasitic infections are endemic worldwide and constitute a major public health problem. It is responsible for causing significant morbidity and mortality all over the world particularly in developing

countries. Thus, it is considered as ‘cancers of developing countries².

The World Health Organization estimates that over 270 million pre-school children and over 600 million of school children are living in areas where the parasites are intensively transmitted and are in need of treatment and preventive interventions. At least 750 million episodes of diarrhoea occur per year in developing countries that results in five million deaths^{3,4}.

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In Nepal, giardiasis, ascariasis, amoebiasis, ancylostomiasis and taeniasis are common intestinal parasitic infection^{5,6}. Parasitic infection usually categorized as a disease of poverty.

Thus, in this paper we report the prevalence of intestinal parasitic infection among school going children of Eastern part of Nepal which may be fruitful to formulate strategies for the prevalence and control of intestinal parasitosis among school children of Nepal .

METHODS

The study was carried out from June 2012 to January 2013 at NAIHS, Kathmandu. The samples were collected from school children of Eastern part of Nepal in random basis. Ethical approval was obtained from Nepalese Army Institute of Health sciences Institutional Research/Review Committee (NAIHS-IRC). An informed consent was taken from both students and school teachers. A total of 300 students were enrolled in the study. They were provided with clean, dry, screw capped and properly labeled plastic container for the collection of the stool sample. Fecal samples were examined for the presence of parasites both macroscopically and microscopically. The samples were examined by standard parasitological examination which included wet mount (Saline mount and Iodine preparation method) and by formal-ether concentration method⁷. They were observed under low and high power fields of microscope. Macroscopic examination of stool was done for presence of mucus, blood or any parasites. The findings were stratified against age, sex and ethnic and were analyzed by applying statistical tools.

RESULTS

A total of 300 stool samples were collected in a clean, dry screw capped plastic container. The specimens were examined by wet mount (Saline mount and Iodine preparation method) and by formal-ether concentration method. Out of total 300 school going children included in the study, 195 were male and 105 were female. 97 (29.1%) were positive for one or more parasites (Table 1). The prevalence of parasitic infection was significantly higher among Male children 74 (37.9.%) than Female children 23 (21.9%) (P<0.05)(Table 2).significantly highest infection rate was observed in the children aged between 5 - 10 years

(67.0%), followed by 11-15 years (15.0%) (P<0.05) (Table 3).Ethnically, prevalence of intestinal parasitic infection was found to be highest in *Dalit* 24(40.0%) followed by *Aadibasi-Janjati* 29(32.2%) and *Brahman-Chhetri* 44 (27.5%) (Table 4).Altogether 5 species (2 protozoan and 3 helminthes) of intestinal parasites were detected. Out of total parasites detected, 35 (36.1%) were protozoan, 39 (40.2%) were helminthes and 23(23.7%) were mixed type. *Giardia intestinalis* 30 (30.9%) and Hookworm 18 (18.6%) were the commonest protozoan and helminthes respectively. The other parasites detected were *A. lumbricoides* 15(15.5%), *H. nana* 6 (6.2%) and *Entamoebahistolytica* 5(5.2%) (Table 5). Multiple parasitism was detected in 23(23.7%) children (Table 6).

Table 1.Prevalence of intestinal parasitic infection in students

Number of students	Result	Percentage
97	Positive	29.1
203	Negative	60.9
Total		100

Table 2.Gender wise prevalence of intestinal parasitic infection

Gender	Total (n)	Positive (n)	Percentage	P-value
Male children	195	74	37.9	0.005
Female children	105	23	21.9	
Total	300	97	29.1	

Table 3.Prevalence based on age group

Age group	Total n	Positive n	Percentage	P-value
5 -10 yrs	100	67	67.0	00.00
11-15 yrs	200	30	30.0	

Table 4.Prevalence of intestinal parasitic infection based on Ethnic group

Ethnic group	Total n	Positive n	Percentage	P- value
<i>Brahman-Chhetri</i>	160	44	27.5	0.112
<i>Aadibasi-Janjati</i>	90	29	32.2	
<i>Dalit</i>	50	24	40.0	
Total	300	97	29.1	

Table 5.Frequency of intestinal parasite detected

Types of parasite	Total Positive n	Percentage
Protozoa	35	36.1
<i>G. lamblia</i>	30	30.9
<i>E. histolytica</i>	5	5.2
Helminthes	39	40.2
Hookworm	18	18.6
<i>A. lumbricoides</i>	15	15.5
<i>H. nana</i>	6	6.2
Mixed (Both Protozoa and Helminths)	23	23.7
Total parasites	97	29.1

Table 6.Pattern of parasitic infections among patients

Types of infection	Total positive n	Percentage
Single parasite	74	76.3
Protozoa	35	36.1
Helminthes	39	40.2
Multiple parasite	23	23.7
Protozoans	6	6.1
Helminthes	12	12.5
Protozoa + Helminthes	5	5.1
Total n	97	100.0

DISCUSSION

In the six month study period (June 2012 to Jan 2013), nearly one third 97 (29.1%) samples were positive for one or more parasites. This finding was in agreement with the recent studies conducted among school going children in dandeldhura district (31.1%) (Tiwari *et al*, 2013)⁴, Nepal. The finding of this study was also in agreement with a study conducted in school going children of rural community in India (30.4%) (Aher *et al* 2011)⁵. However, Similar type of study conducted in Baglung district and Kathmandu district showed slightly lower prevalence (21.1% in baglung and 17.6% in Kathmandu) (Shrestha *et al*, 2011 and Khana *et al*, 2011)^{6,8} and slightly higher prevalence (40.0%) was observed by Bhandari *et al*, 2011³ and (51.9%) Sherchand *et al* in 2010⁹. The remarkably differences in prevalence might be due to the place and time differences of the study and use of concentration technique for the detection of parasites which might have increased the parasitic detection rate.

In this study in gender wise basis, intestinal parasitic infection rate was found higher among male (37.9%)

than female (21.9%). The findings was in agreement with some previous reports (Khana *et al*, 2011; Olivera *et al*, 2003; Rai *et al*, 2004)^{8,10,11} and in contrast with the previous similar type of studies (Gyawali *et al*, 2009; Ishiyama *et al*, 2003; Rai *et al*, 2003, 2007; Shaky *et al*, 2009; Uga *et al*, 2004)^{1,12,13,14}. Although studies in Nepal and elsewhere in worlds have reported parasitic infection being gender independent, higher prevalence among boys than girls in the study population might be due to occupation and behavioral factors. Generally increased mobility of the male or their more active and wandering nature increases the risk of infection.

Based on the age of patients, the highest prevalence of intestinal parasitosis was found among children aged 5 - 10 years 67 (67.0%), followed by 11-15 years 30 (15.0%). The highest rate of prevalence among children was in agreement with the previous reports (Khana *et al*, 2011; Rai *et al*, 1995, 2004; Shaky *et al*, 2009)^{1,8,15}. The higher prevalence among children might be due to lack of proper care of children by their parents, unhygienic behavior, lack of public health awareness and lack of sanitation. On the other hand, previous studies (Nuchprayoon *et al*, 2002; Rai *et al*, 2007; Shaky *et al*, 2006)^{16,1,17} reported high prevalence rate among adults and elderly patients too.

Ethnically, prevalence of intestinal parasitic infection was found to be highest in Dalit 24(40.0%) followed by Aadibasi-Janjati 29(32.2%) and Brahman-Chhetri 44 (27.5%). It was consistent with the previous studies (Ishiyama *et al*, 2003; Rai *et al*, 2005; Rai *et al*, 2002)^{13,18,19}. However, higher positive rate among Aadibasi-Janjati and Brahman-Chhetri have also been reported (Adhikari *et al*, 2006; Rai *et al*, 2003, 2008; Sharma *et al*, 2004)^{18,19,20}. This could be due to low literacy rate, lack of health awareness, poor hygienic condition, area of study etc.

Altogether 5 species (2 protozoan and 3 helminthes) of intestinal parasites were detected. Out of total parasites detected, 39 (40.2%) were helminthes, 35 (36.1%) were protozoan. Multiple parasitism was detected in 23(23.7%) children. This finding was in agreement with the various previous findings from Nepal and elsewhere (Ishiyama *et al*, 2001; Sharma *et al*, 2004)^{21,22}. However, other studies (Rai *et al*, 2002, 2007; Shaky *et al*, 2006; Sherchand *et al*, 1996)^{23,1,24} among general population have found higher prevalence of protozoan infections.

This might be due to the differences in the life-cycle

of these two types of parasites. Helminthic parasites are common from soil where as protozoan parasites are found in the faces and gets contaminated through faeco-oral route only.

In the present study, among the various parasites detected, the most common was *G. lamblia* (30.9%) and *Enatmoebahistoltytica* (5.2%) the protozoan parasite. This finding was in agreement with previous reports (Ihaboet *al*, 2011; Raiet *al*)^{25,19}.,However it was in contrast with other similar studies in Nepal and else where (Raiet *al*, 1995; Ugaet *al*, 2004)^{15,18}.High prevalence of *G. lamblia* might be due to consumption of raw fecal contaminated water because of drinking raw water, water sources may be in contact with pig farming, animal farming and poor sewerage system.

Similarly, among the helminthes, hookworm (18.6%) was the commonest parasite in the study group, followed by *A. lumbricoides* (15.5%) and *H. nana* (6.2%) High prevalence of hookworm among the helminthes was in agreement with the previous reports (Raiet *al*, 1995; Raiet *al*, 2008)^{19,20}.However, this finding was in contrast to most other findings reported earlier in which *A. lumbricoides* topped the list (Raiet *al*, 1995; Shakyaet *al*, 2012)^{19,1}. High prevalence of hookworm might be due to open defecation that may cause the contamination of soil with hookworm larva and then farming in the field with bare foot. Low prevalence of *A.lumbricoides* might be due to intake of anti-helminthic drugs as well as public awareness about parasitic infections.

The prevalence of monoparasitism was higher (76.3%) than multiparastism (23.7%) in the study population. This finding was in agreement with the previous reports (Ugaet *al*, 2004; Magaret *al*, 2011)^{15,26}.But higher percentage of multiparasitism has also been reported by Ishiyamaet *al* (2001)¹³. The higher rate of monoparasitism with *G. lamblia* might be due to the consumption of raw fecal contaminated water.

CONCLUSIONS

The incidence of intestinal parasitosis is as high as 29%. The prevalence of parasitic infection was significantly higher among boys (37.9%) than girls (21.9%). Highest infection rate was observed in the children aged between 5 - 10 years (67.0%). The commonest parasites detected were helminthes (40.2%). Regular deworming program in association to other preventive measures may help reduce the prevalence.

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