Intestinal Parasitosis among School Going Children in Bhaktapur, Nepal

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ABSTRACT

Background: Intestinal parasites continue to be an important cause of public health problems in the world, particularly among children living in developing countries. The study was aimed to assess the load of intestinal parasites among school going children of Bhaktapur district of Nepal.

Methods: A total of 184 stool samples were collected from school children of Bhaktapur district between the age group 3-14 years. The stools collected were examined by direct microscopy and confirmed by concentration methods (formal ether sedimentation technique).

Results:

Prevalence of intestinal parasites among the children was found to be 42.9% (79/184). *Giardia lamblia* was the most predominant parasite, showing the incidence of 35.7%, followed by *Taenia* spp 22.6% and *Blastocystis hominis* 14.3%.

Conclusions: High parasitic infection in this study area may be due to lack of pure drinking water, lack of health education, unhygienic condition and presence of livestock near home, which is a major public health threat among school going children resulting serious illness.

Keywords: Parasites, Stool samples, microscopy, ether sedimentation technique

BACKGROUND

Intestinal parasitic infection is most prevalent throughout the world, particularly in developing nations. Approximately, 3.5 billion people are infected with parasitic infection and around 450 billion people are ill due to these infections [1, 2]. Nepal is a landlocked, impoverished and least developed country located in South Asia where 70% of public health problems are due to infectious disease [3, 4]. Intestinal parasitosis is one of the major causes of morbidity and mortality in Nepal [5].

The study conducted by Shrestha et al, 2013 in Bhaktapur district, Nepal in 2011 showed 27.67% prevalence while Chandrashekhar et al, 2005 showed prevalence of 21.3% of intestinal parasites in school-going children [6, 2]. High prevalence is attributed to poverty, lack of awareness, failure to practice proper hand washing after defecation, unsafe drinking water and use of improper toilets [7].

The common intestinal parasites reported from Nepalese children are *Giardia lamblia*, *Ascaris lumbricoides*, *Trichuris trichiura* and Hookworm. The agents spread faeco-orally through contaminated sources. Although people of all ages are infected with this organism, children

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are more often infected due to compromised sanitary habits [8, 9].

Thus, the present study was carried out to find the present situation of the parasitic infections among school going children of Bhaktapur district of Nepal.

METHODOLOGY

A total of 184 children from Bhaktapur district were taken as study population and fecal samples were collected during April – May, 2013. To collect stools, children were given sterile containers the day before sampling along with comprehensive instructions. A questionnaire on age, sex, and hygienic practices were used for analysis. Stools were collected and transported to the Laboratory of Kantipur College of Medical Science for further processing. Stool specimens were concentrated by formal–ether sedimentation technique. The concentrated stools were further processed by conventional iodine and saline wet mounting [10]. Data were entered into Microsoft excel and stratified according to sex using SPSS software (version 16.0). The Chi-square test was performed with a significance level of <0.05 for statistical analysis.

RESULTS

Stool samples from 184 students of age group between 2-17 years old were examined and overall rate of intestinal parasitosis were found to be 42.9% (**Table 1**). *Giardia lamblia* was found to be the most predominant parasite followed by *Taenia* spp, *Blastocystis hominis* and *Trichuris trichiura* (**Table 3**). The rate of parasitic infection in boys (45.3%) was slightly higher as compared to girls (40.4%). The maximum intestinal parasitic infection (43%) was found in age group between 6-10 years (**Fig 1**). Protozoan infestation rate was high (59.5%) as compared to helminthic (40.5%).

Nine species of parasites, five species of protozoa and four species of helminthes were detected. *Giardia lamblia* was the most predominant parasite (35.7%) amongst all

isolates. Among the helminths, *Taenia* sp. (22.6%), *Trichuris trichiura* (8.3%) and *Ascaris lumbricoides* (7.1%) accounted for the most prevalent ones. Similarly, of the protozoan parasites, *Giardia lamblia* (35.7%), *Blastocystis hominis* (14.3%), and *Cyclospora* (4.3%) were the most frequent organisms (**Table 3**). While 89.8% of the children had single parasitic infection, 10.1% had mixed parasitic infection (**Table 4**).

A higher rate of infection was seen among the school children who had live stocks reared at home (71%) and who drank untreated water (65.8%) (**Table 2**).

Table 1: Prevalence of intestinal parasites among boys and girls of school in Bhaktapur

Sex	Total No.	Positive No.	%	p-value
Boys (M)	95	43	45.3	>0.05
Girls (F)	89	36	40.4	
Total	184	79	42.9	

Fig 1: Prevalence of intestinal parasites among different age-groups.

Table 2: Possible Risk Factors

Variables	Frequency	%
Treatment of water		
Boiling	6	7.6
Filtration	21	26.6
Untreated	52	65.8
Live stocks present at home		
Positive parasitic infection	56	71
Negative parasitic infection	23	29

Table 3: Frequency of intestinal parasites

Types of Parasites	Total number	%
Protozoa	50	59.5
<i>Giardia lamblia</i>	30	35.7
<i>Blastocystis hominis</i>	12	14.3
<i>Cyclospora</i>	4	4.8
<i>E. histolytica</i>	3	3.6
<i>Balantidium coli</i>	1	1.2
Helminths	34	40.5
<i>Taenia spp</i>	19	22.6
<i>Trichuris trichiura</i>	7	8.3
<i>Ascaris lumbricoides</i>	6	7.1
<i>Hymenolepis nana</i>	2	2.4
Total	84	100

Table 4: Pattern of intestinal parasitic infections

Types of infection	Total no.	%
Single parasite	71	89.8
Protozoa	46	64.7
Helminths	25	35.2
Multiple parasites	8	10.1
Protozoa	4	0.5
Helminths	2	0.25
Protozoa+ Helminths	2	0.25
Total	79	100

Fig 2: Microscopy images of Intestinal parasites
A: *Ascaris lumbricoides*, B: *Hymenolepis nana*, C: *Giardia lamblia*, D: *Trichuris trichiura*, E: *Blastocystis hominis*, F: *Taenia spp*

DISCUSSION

Intestinal parasitosis is one of the major causes of death amongst people especially in school going children [11-13]. In the present study, the rate of intestinal parasitosis among school going children in Bhaktapur district was 42.9%. However, similar study carried out in Lalitpur district conducted by Tandukar et al, in 2013 [14], the prevalence of intestinal parasitosis in school going children of was only about 16.7%, suggesting that differences in time and place of the study, socioeconomic conditions, cultural practices, supply of drinking water and presence of live stocks at home can bring vast differences in the prevalence of parasitic infections.

Although intestinal parasitic infection is gender independent, higher infection rate in boys over girls was seen in the present study which was statistically insignificant ($P > 0.05$) [15, 16]. It might be related to personal hygiene. Nowadays, most of the children, especially boys, stay in hostel, where they are encouraged to improve their personal hygiene, most specifically hand washing with soap water before meal [7, 17].

Protozoan parasites were found more common (59.5%) than the helminthic parasites (40.5%) in the current study. It is attributed to periodic anti-helminthic drug administration program in the school children, which could possibly explain the lower prevalence of helminthic infections observed in our study.

Protozoans are dominating the helminthic parasites, which concords with the previous findings from Nepal [18, 19]. Among protozoan parasites, *Giardia lamblia* is the most common flagellate of the intestinal tract, causing Giardiasis in humans, which spreads faeco-orally through contaminated sources such as untreated drinking water. In our study, most frequently seen parasite was *Giardia lamblia* followed by *Taenia* spp and *Blastocystis hominis*. School-age children are particularly susceptible to parasitosis, often carrying higher burdens of parasites than adults [20]. This can be explained by the poor sanitary conditions and frequent exposure to the contaminated environment. In addition, they are more fascinated towards street food and drinks, which may be an important predisposing factor [7, 21].

High prevalence rate (43%) of intestinal parasitosis was found in children aged 6–10 years, the findings being similar to the observation of Rashid et al. [22]. It was also in agreement with the study done by Poudyal et al [23]. School aged children acquire infection may be due to their inadequate knowledge towards the personal hygiene and their involvement in different recreational activities in the polluted environment.

The rate of infection was higher (29.4%) in children using unboiled (direct tap) water for drinking purpose whereas lower rate (9.0%) was found in children using boiled water for drinking [Table 2]. This pattern of infection has also been reported by Wani et al. from India [14, 24]. The reason is that, boiling of water for drinking purposes kills the microorganisms and prevents transmission of infection. Thus, poor hygiene practices

associated with type of water may be probable risk factor for increased parasitic infection among children.

CONCLUSION

Intestinal parasitic infection is serious public health problem in Nepal. This study reveals that intestinal parasites are copious among school children of Bhaktapur district of Nepal. This situation highly suggest immediate need of control measures, including treatment of infected individuals, improvement of sanitation practices, and provision of safe drinking water. Furthermore, impoverishment, lack of awareness, failure to practice proper hand washing after defecation, unsafe drinking water are some of the risk factors associated with this study, as the reason of parasitic infections. Proper health education should be given to children and their parents concerning disease transmission, personal hygiene and safe drinking water, so that the infection rate can be controlled.

COMPETING INTERESTS

The authors declare that they have no competing interests concerning the work reported in this paper.

CONTRIBUTIONS

SS, SL, BRM participated in the sample collection. SS, SL, BRM carried out the different laboratory tests in the study. SS, SL, BRM performed the statistical analysis. SS and PT conceived the design of the study and guided to draft the manuscript. NA and UTS supervised the project. MP corrected the language of manuscript. All authors read and approved the final draft of the manuscript.

ETHICAL CONSIDERATION

This study was approved by Institutional Review Committee of Kantipur College of Medical Science, Kathmandu. Informed verbal agreement was taken from Patients. The intent of the study was to assess the load of

intestinal parasites among school going children of Bhaktapur district of Nepal.

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