Original article

Intestinal Parasitic Infection among School children in Chitwan district of Nepal

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Abstract

Introduction: Parasitic infection occur in children of all ages living under poor sanitation, eating unhealthy food and drinking water. Study was conducted from Janury to June, 2012 at Saktikhor in Chitwan district of Nepal. The aim for this study was to determine prevalence rate of intestinal parasites among children (< or =18 aged) group.

Methods: 296 stool samples were collected in dry, clean and screw capped plastic container. Stool samples were preserved with 10% formalin, transported to Shi-Gan Health Research Laboratory then samples were examined microscopically by formal-ether sedimentation technique.

Results: Overall, Positive rate was 23.3% (69/296). There was no significance difference in two genders boys 21.8% and girls 24.8%, (p=0.39). Positive rate in Tibeto-Burman was highest 23.2% followed by Indo-Aryan 22.1% and Dalit 29.6%, (p=0.80). In drinking water, parasitic infection rate in well water was found higher 29.9% than tap water 21.9%, (p=0.263). Positive rate in no drug (anti-parasitic) user was found higher 32.1% than drug user 16.0%, (p=0.002). Age groups between 0-5 years Children was 26.9% highest in positive rate followed by 6-12 years 25.15% and 13-18 years 15.2%, (p=0.35). Altogether 10 species were identified. Taenia spp was most common found 21.0% followed by Entamoeba coli (17.0%), Giardia lamblia (17.0%), Endolimax nana (13.0%), Ascaris lumbricoides (11.0%) Entamoeba histolytica/ dispar (11.0%), Trichuris trichiura (4.0%), Hymenolepsis nana (3.0%), Blastocystis hominis (3.0%), and Hookworm (1.5%).

Conclusion : Children should focus on improvement of sanitation practice, periodic administration of anti-parasitic drug and safe drinking water.

Key words : Children, Chitawan, Intestinal Parasites, Nepal

Introduction

Intestinal parasitic infection is a serious public health problem throughout the world particularly in developing countries[1]. Intestinal parasitic infection is become a major health problem in many developing countries[2]. Approximately, 3.5 billion people infected by intestinal parasites and around 450 million children are ill due to these infections[3]. Moreover, it continues to be a major cause of morbidity and mortality rate in schoolchildren due to use of drinking water and poor personal hygiene[4]. A study conducted in two rural village of Chitwan district of Nepal showed a 44% prevalence of intestinal parasitosis in schoolchildren[5] whereas similar study was done from Lalitpur district of Nepal in 2011 showed a lower prevalence rate 16.7%[6].

Nepal is a small underdeveloped country located in South Asia with infectious diseases, including intestinal

parasitiosis being highly prevalent[7]. About 70% of health problems are due to infectious diseases and diarrheal disease alone is one of the major causes of morbidity and mortality in Nepal[8,9]. Nearly 200 million people were infected with *Giardia lamblia while Entamoeba histolytica* infects 10% of the world population[12]. More than one billion of the world's population including at least 400 million schoolchildren is chronically infected with *Ascaris lumbricoides, Trichuris trichiura and Ancyclostoma doudenale*[1]. Intestinal parasitic infections are most common in school going children and they tend to occur in high intensity in 3-12 year age group[10,11]. Protozoa and helminthes are spread faeco-orally through contaminated sources. Although, these organisms may infect people of all ages, children are often infected due to compromise in sanitary habits[12]. We reported the status of intestinal parasitosis among schoolchildren at Saktikhor area of Jutpani- 3 in Chitawan district of Nepal. The objective of this study was to determine the prevalence and risk factors of intestinal parasitosis among schoolchildren. The findings of this study might be help in strengthening the information available so far and encourage policy makers to design effective strategies to prevent intestinal parasitic infections in this study area.

Methods

Study Area

Study was conducted from Janury to June, 2012 at Saktikhor, Jutpani-3 in Chitwan district of Nepal. Nepal is land lock country of Southern Asia. Chitwan district is located southern part from capital city (Kathmandu). Saktikhor is located Village District Committee (VDC) of Jutpani -3, where covers an area nearly 376 km^2. Study was conducted between two governments and one boarding school up to 18 years schoolchildren.

Sample collection

Total 296 stool samples were collected from schoolchildren. The study population was divided into 3 age groups, i.e. upto 5 years, 6–12 years and 13–18 years. The data were collected from trained volunteers. A short questionnaire was designed which included

(a) demographic data: age, gender, ethnicity

(b) behavioral data: types of drinking water

(c) participant's present medical history: anti-parasitic drug taken before 6 months

Children were interviewed in their mother tongue. All the questionnaires were checked for accuracy and completeness. Informed written consent was taken from children, parents and teachers. After proper instructions were given to the children regarding collection of the stool sample, they were given labeled collection containers and application sticks. From each student, about 2-3 gm of fresh stool was collected in well neck, dry and clean container. Each of the samples were checked for its labeling and quantity. Stool samples were mixed with equal volume 10% formal-saline for preservation. Next morning, preserved samples were transported to Health Research Laboratory of Shi-Gan International College of Science and Technology (SICOST) at Narayangopal Chowk in Kathmandu, Nepal.

Microscopic examination

Formal-ether sedimentation technique:

3-4 ml stool samples were kept in test-tube and shaken well until 2-3 minutes then filtered using by cotton gauge. 3-4 ml of ether was added, shaken well vigorously for 5 minutes. 3-4 ml liquidly suspension stool samples were centrifuged 3000rpm for 15 minutes. Then four layers were appeared, sediment portion was tested by wet preparation with iodine solution. Cyst and trophozoite of parasites were detected by microscopically under 10x followed by 40x objectives.

Data analysis

Chi-Square test value was applied for statistical analysis of results using data analysis in Win- Pepi software programmed. P values < 0.05 were considered as statistically significant.

Ethics

IRC of SICOST was approved this research which is affiliated with Nepal Health Research Council (NHRC). Informed written consent was taken from the schools and parents of all the participating children.

Results

Out of 296 children, 69 positive parasites were detected. Overall, parasite positive rate was 23.3% (69/296) with no significant difference between boys 21.8% (32/147) and girls 24.8% (34/149) in genders as dipicted in table 1

Infection rate of intestinal parasites in girls were 24.8% (37/149) higher than boys 21.8% (32/147), (p=0.39) as shown in table 1

Table 1: Gender-wise distribution of children with intestinal parasites

Gender	Positive (n)	Total	%	P-value
Boys	32	147	21.8	0.39
Girls	37	149	24.8	
Total	69	96	23.3	

Parasitic infection rate between aged 0-5 years were highest 26.9% (17/63) followed by 6-12 years 25.3% (42/107) and 13-18 years 15.2% (10/66), (p=0.35) as shown in table 2

Table 2: Age wise distribution of children with intestinal parasites

Age (year)	Positive (n)	Total	%	P-value
0-5	17	63	26.9	0.35
6-12	42	107	25.3	
13-18	10	66	15.2	
Total	69	296	23.3	

In ethnic group, infection rate of intestinal parasites in Dalits were highest 29.6% (8/27) followed by Tibeto-Burman 23.2% (32/138) and Indo-Aryan 22.1% (29/131), (p=0.80) as shown in table 3

Table 3: Ethnicity -wise distribution of children with intestinal parasites

Ethnic group	Positive (n)	Total	%	p-value
Indo-Aryan	29	131	22.1	0.80
Tibeto-Burman	32	138	23.2	
Dalit	8	27	29.6	
Total	69	296	23.3.	

Parasitic infection rate in not drug user was higher 32.1% (42/131) than drug user 16.0% (27/165), (p=0.002) as shown in table 4

Table 4: Association of parasitic infection in relation to anti-parasitic drug intake in the past six months

Anti-parasitic drug	Positive (n)	Total	%	p-value
drug taken	27	165	16.0	0.002
No drug taken	42	131	32.1	
Total	69	296	23.3	

In drinking water, parasitic infection rate in well water was higher 29.2% (16/55) than tap water 21.9% (53/241), (p=0.263) as shown in table 5

Table 5: Relation between intestinal parasites with the source of drinking water

Drinking water	Positive (n)	Total	%	p-value
Tap	53	241	21.9	0.263
Well	16	55	29.2	
Total	69	296	23.3	

Infection rate in protozoa was higher 59.2% (41/69) than helminthes 40.0% (28/69). G. lamblia and E. coli are highest in common 17.0% (12/69) whereas least in E. histolytica 11.0% (8/69) in protozoa. Similarly, Taenia spp. is highest 21.0% (12/69) whereas least in Hookworm 1.5% (1/69) in helminthes as dipicted in figure 1

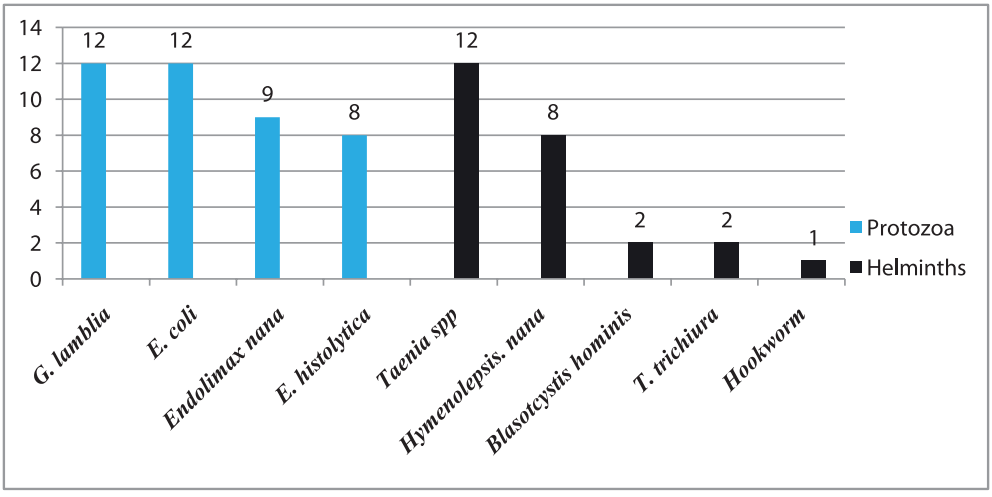

Figure 1: Types of intestinal parasites among children

Positive multi-parasites in rate was 4.2% (3/69). Multi parasites are identical 1.4% (1/69) in Protozoa, helminthes, and protozoan and helminthes as dipicted in table 6

Table 6: Relation between protozoa and helminthes in multi-parasites

Parasites	Positive (n)	Total	%
Protozoa	*E. coli* , *G. lamblia*	1	1.4
Helminths	*T. trichiura*, *A. lumbricoides*	1	1.4
Protozoa+Helminth	*H. nana* *E. coli*	1	1.4
Total		3	4.2

Discussion

The present study attempted to assist the prevalence of different parasitic infection in schoolchildren at Saktikhor in Chitwan, Nepal. Overall, prevalence rate of intestinal parasitism among schoolchildren was 23.3%. This was dissimilar to the finding in the northern part of the Kathmandu valley[13] and reports from [14,15]. High prevalence of intestinal parasitic infection is often occurred in low socio-economic condition, characterized by inadequate water supply and poor sanitary disposal of faeces[4].

In gender, Infection rate of parasites in girls were higher than boys. This finding was dissimilar to[13,14,16] and is similar to findings of[17,18] There is no significant difference between genders. It might be due to lack of health care and sanitation practice in girls than boys. Age groups between 0-5 years were highest rate than between 6-12 years and 13-18 years. It is dissimilar finding of [16] higher prevalence 71.0% among schoolchildren in the group aged 11-14 year. Children in this age move around over a wider territory, increasing the possibility of acquiring infection from contaminated environment. It may be due to between 0- 5 years child need more healthcare and sanitation.

In this study, infection rate in not drug user is higher than taking drug user past six month. It is similar finding of taking anti-parasitic in six month had significantly lower prevalence rate as have been reported previously[18,19]. It is clearly indicate the importance of periodic administration of anti-parasitic drug used children is effective. Positive rate of infection in drinking well water was higher than tap water. It is similar finding of [7,20,21]. It may be due to proper management system and municipality responsibility in the source of tap water rather than source of well water. In races, rate of Infection in *Dalits* were highest followed by *Tibeto-Burman and Indo-Aryan*. This finding is similar to[7] reported a higher positive rate among *Dalits* compared with others in rural hilly community. Dalits in Nepal have a relatively low literacy rate, unhygienic habits, and low socio-economic status[22] and there is no significance difference between them. It may be relatively low literacy rates, unhygienic habits and low socio-econimic status of *Dalits* and may be cultural effect in *Tibeto- Burman and Ino-Aryan*. In this study, infection rate of protozoan was higher than helminthes. This is dissimilar to result of helminthes dominating protozoan parasite of[5,23,24].

It might be some of the protozoan cyst resistant chlorination of drinking water. It may be due to the difference in the life cycle of the two types of parasites. Protozoan parasites are found in the faeces immediately after the infection while considerably long time is taken to appear the eggs of helminthes parasites in feces after de-worming. In this study rate of infection *Taenia* spp. was highest among helminthes. It is dissimilar to finding of[16,19]. *G. lamblia* is the most prevalent parasitic cause of diarrhea in the developed country and this infection is very common in developing countries[25]. G. *lamblia* was highest in protozoa. This may be due to Cyst of G. lamblia is resistant to normal level of Chlorination of drinking water. A. lumbricoides can infect over billion, T. trichiura can infect 795 million[25]. *T. trichiura and A. lumbricoides* were appeared commonly. This may be due to the difficulty of complete removal of this parasite with single dose of anti-helminthic drug, particularly in those with heavy infection. *E. histolytica* and E. coli were most common occurred in this study. This study is dissimilar to prevalence of E. histolytica was higher in schoolchildren than adult population[26]. Source of drinking water is highly contaminated with fecal matter in Jutpani-3 village of Saktikhor due to improper management.

Conclusion

Intestinal parasitic infection is an important public health problem in Nepal. Study reveals that intestinal parasites are high rate among schoolchildren in Chitwan district of Nepal. Hence, positive rate of infection had reported from data presentation based on ethnicity, age, sex, drug intake and drinking water. Illiteracy, lack of awareness, no intake anti-parasitic drug, and unsafe drinking water are highlighted by this study as causes of parasitic infections. Appropriate health education should be given to children and their parents concerning disease transmission, personal hygiene, safe drinking water as well as periodic administration of anti-parasitic drug.

Conflict of interests: None declared.

Reference

1. World Health Organization. Control of Tropical Diseases WHO, Geneva; 1998.
2. World Health Organization. Prevention and control of Intestinal parasitic infections. World Health Organization Technical report. 1998a; 749-783.
3. World Health Organizarion. World Health Report. Conquering Suffering Enriching Humanity, Geneva; 2000.
4. Al-Agha R and Teodorescu I. Intestinal parasites infections and anaemia in primary schools children in G29 Gonernorates Palestine. Roum- Arch-Microbiol- Immunol. 2000; 59(1-2): 131–143.
5. Sherchand JB, Larsson S, Shrestha MP. Intestinal parasites in children and adults with and without abdominal discomfort from the Kathmandu area of Nepal. Trop J Gastroenterol. 1996; 17: 15–22.
6. Tandulkar S and Shamshul A. Intestinal parasitosis in school children of Lalitpur District of Nepal. BMC J Res Notes. 2011; 1:1.
7. Rai SK, Hirai K, Abe A. Intestinal parasitosis among school children in a rural hilly area of the Dhading district, Nepal. Nepal Med Coll J. 2002; 4: 54-58.
8. Agwa NA. Incidence of intestinal helminthiasis in schoolchildren in Aba urban city, Abia state, Nigeria. Environ Hlth and Human Dev Int J. 2001; 1: 47–51.
9. Meremikwu MM, Antia-Obong OE, Asindi AA, Ejezie GC. Prevalence and intensity of intestinal helminthiasis in Pre-School children of peasant farmers in Calabar, Nigeria. Nigerian J Med. 1995; 2: 40–44.
10. Albonico M, Crompton DWT, Savioli L. Control strategies for human intestinal helminth infections. Adv Parasitol. 1999; 42: 276–341.

11. Savioli L, Bundy DAP, Tomkins A. Intestinal parasitic infections a soluble public health problem. Trans R Soc J Trop Med Hyg. 1992; 86: 353–354.

12. Salako AA. Effects of portable water availability on intestinal parasitism among rural school children with sewage disposal facilities in the Mjidum and Owutu sub- urban community of Lagos state. Nigeria J Med pract. 2001; 39: 3–4.

13. Ishiyama S, Rai SK, Ono K. Study of enter-pathogens and its predisposing factors in suburban public school children in Kathmandu, Nepal. Nepal Med Coll J. 2001; 35-39.

14. Rai SK, Gurung CK. Intestinal parasitic infection in high school children of Birgunj City. J Inst Med (Nepal) 1986; 8: 33-38.

15. Rai SK, Matsumura T, Ono K. Intestinal parasitosis in an unknown disease outbreak hit rural hilly area in western Nepal. Nepal Med Coll J. 2001; 3 : 69-73.

16. Sharma BK, Rai SK, Rai DR, Choudhary DR. Prevalence of intestinal parasitic infestation in school children in the northeastern part of Kathmandu Valley, Nepal. Southeast Asian J Trop Med Pub Hlth. 2004; 35: 501–505.

17. Kightlinger LK, Seed JR, Kightlinger MB. Epidemiology of Ascris lumbricoides, Trichuris Trichiura and Hookworm in Children in the Ramonafana rainforest, Madagascar. J Parasitol. 1995; 81: 159-169.

18. Rajeswari B, Sinniah B, Hussein H. Socio-economic factors associated with intestinal parasites among children living in Gombak, Malayasia. Asia Pacific J Pub Hlth. 1994; 7: 21-25.

19. Thapa Magar D, Rai SK, Lekhak B, Rai KR. Study of parasitic infection among children of Sukumbasi Basti in Kathmandu valley. Nepal Med Coll J. 2011; 13(1): 7–10.

20. Adhikari RK, Rai SK, Pokheral BM, Khadka JB. Bacterial study of drinking water of the kathmadu valley. J Inest Med (Nepal) 1986; 14: 39-42.

21. Wani SA, Ahmad F, Zargar SA, Ahmad Z, Ahmad P, Tak H. Prevalence of intestinal parasites and associated risk factors among schoolchildren in Srinagar City, Kashmir, India. J Parasitol. 2007; 93(6): 1541–1543.

22. National Planning Commisison (NPC). His Majesty's Government, Nepal. National Dalit strategy report. Part I: situation analysis of Dalit in Nepal. A report prepared by Action-aid Nepal, CARE Nepal and Save the children US; 2002.

23. Nepal M, Palfy BA. Study of the prevalence intestinal parasites in the Mahankal Panchyat, and their relation with hemoglobin levels. J Inst Med (Nepal) 1980; 175-182.

24. Estevez EG, Levine JA, Warren J. Intestinal parasites in a remote village in Nepal. J Clin Microbiol. 1983; 17:160–161.

25. Rashidul H. Human intestinal parasites. J Hlth Nutr. 2007; 25(4): 387-391.

26. Okpala I. A survey of the incidence of intestinal parasites among Government Workers in Lagos, Nigeria. West Afri Med J. 1961; 10: 148-157.