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Research Article

Prevalence of Intestinal Parasitic Infections among Schoolchildren of Kapan VDC, Kathmandu

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Abstract

The present study investigated the intestinal parasitic infections in schoolchildren of Kapan VDC, Kathmandu, Nepal. A total of 330 schoolchildren were included in this study. Stool samples collected in clean, dry, screw-capped plastic containers were examined by formal-ether sedimentation technique. A total of 134 samples (40.6%) were positive for some kind of intestinal parasites. The percentage of monoparasitism (67.9%) were higher than multiparasitism (32.1%). *Giardia lamblia* (17.8%) and *Trichuris trichiura* (3.6%) were the commonest protozoa and helminthes respectively. Girls were marginally more infected (41.4%) than boys (39.8%) ($p>0.05$). Children <5 years were more infected (80.0%) than 5-10 years (36.0%) ($p=0.001$). Prevalence of parasitic infection rate was higher in family size >5 (41.5%) than ≤5 (40.1%) ($p=0.82$). In ethnic wise distribution, incidence rate of parasites was higher in *Dalits* (71.4%) and the least in *Indo-Aryans* (33.1%) ($p<0.05$). Children drinking water from groundwater source had marginally lower prevalence rate (31.3%) than who used tap water (58.4%) ($p<0.001$). The higher infection rate (51.3%) was observed in children belonging to labour family and the least in the business family (33.3%) ($p=0.032$). The children who had taken anti-parasitic drug within past 6 months had lower prevalence rate (25%) than those who had not taken drugs (44.4%) ($p=0.005$).

Keywords: Intestinal parasites; schoolchildren; Kapan; Nepal.

Introduction

Intestinal parasitosis is one of the major causes of public health problems, resulting socioeconomic problems further in world particularly in developing countries. About twenty five percent of world population has been infected with one or more species of soil transmitted helminthes alone (WHO, 2002). Intestinal parasites are endemic in most tropical and subtropical countries, particularly in developing countries due to deficient life conditions with lack of adequate hygiene and sanitation, illiteracy, overcrowding and low construction level and are one of the major causes of diarrhoel diseases (Rai *et al.*, 2004).

Intestinal parasitic infections are common in Nepal (Rai and Gurung, 1986; Estevez *et al.*, 1983; Rai *et al.*, 2000). Polyparasitism is common in rural areas (Rai *et al.*, 2001). Intestinal worm infection alone ranks fourth in "top-ten-diseases" in Nepal (MoHP, 2007). Intestinal parasitosis has been associated with different morbidities, malnutrition, anemia and others particularly in children and pregnant women including mortality. This is attributed to low socio-

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economic, educational and poor hygienic conditions of the people (Rai *et al.*, 1998; Rai, 2005; Rai *et al.*, 2001). In this paper, we report the status of intestinal parasitosis among schoolchildren of Kapan VDC, Kathmandu.

Materials and Methods

Subjects and Sample Collections

Schoolchildren studying at private and public schools of Kapan VDC, 330 students (Boys: 161, Girls: 169) were included in this study. A questionnaire on age, sex, family size, ethnic group, predisposing factors etc was filled. Informed consent was obtained from both the teachers and students. Stool samples collected in clean and dry screw capped plastic containers were transported to Shi-Gan Health Foundation/National Institute of Tropical Medicine in Kathmandu and were fixed in equal volume of 10% formal saline for analysis.

Sample Analysis

Stool samples were examined for the parasitic eggs and cysts both microscopically and macroscopically. Microscopic examination was done after formal ether concentration technique. The wet mount prepared from deposit was examined under the microscope. The findings were recorded, stratified and analyzed using SPSS 12. Significant differences were calculated using the Chi-square test.

Results

Of the 330 schoolchildren included, 134 samples were found positive for parasites (40.6%). Altogether ten species of parasites were detected (Table-1). Among protozoans revealed *Giardia lamblia* (17.8%) was the most common along with *Entamoeba histolytica* (17.8%) followed by *Blastocystis hominis* (4.5%), *E. coli* (4.2%), *E. hartmanni* (2.4%) and *E. nana* (1.8%). Among helminthes *Trichuris trichiura* (3.6%) was most common followed by *Ascaris lumbricoides* (1.5%), hookworm (0.9%) and *Hymenolepis nana* (0.8%).

Table 1: Types and frequency of parasites detected in total 330 samples

Type of parasites	Total	%
Helminthes	21	**6.4%**
i) *T. trichiura*	12	3.6%
ii) *A. lumbricoides*	5	1.5%
iii) Hookworm	3	0.9%
iv) *H. nana*	1	0.3%
Protozoans	161	**48.8%**
i) *G. lamblia*	59	17.8%
ii) *E. histolytica*	59	17.8%
iii) *B. hominis*	15	4.5%
iv) *E. coli*	14	4.2%
v) *E. hartmanni*	8	2.4%
vi) *E. nana*	6	1.8%
Total Parasites	182	**100**

Boys had relatively higher prevalence compared with girls (p>0.05) (Table-2). The occurrence of parasitic infection was significantly higher in age group <5 years (p=0.001) (Table-3).

Table-2: Gender wise prevalence of parasitic infection

Sex	Total n	Positive n	%	p-value
Boys	161	64	39.8	0.823
Girls	169	70	41.4	
Total	330	134	40.6	

Table-3: Age wise distribution of parasitic infection

Age	Total n	Positive n	%	p-value
< 5 years	20	16	80.0	0.001
5-10 years	222	80	36.0	
> 10 years	88	38	43.2	
Total	330	134	40.6	

Among different ethnic groups, the highest percentage (71.4%) of positive cases were in *Dalits* whereas 45.8% in *Tibeto-Burmans* and 33.1% in *Indo-Aryans* (p<0.05) (Fig. 1).

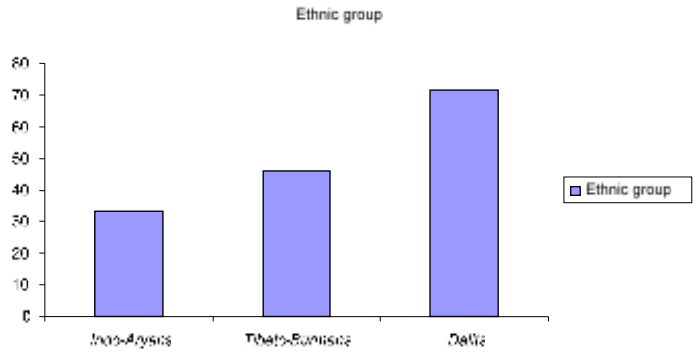

Fig. 1: Prevalence of intestinal parasitosis according to ethnic group

The prevalence was found slightly lower among the children of family size <5 (p>0.05). The highest prevalence rate of parasitic infection was in children from parents with labour as occupation (51.3%) (Table-4).

The higher prevalence was found in those consuming tap water (58.4%) than those taking ground water (31.3%) (Table-5). The difference between the source of water and occurrence of the parasitic infection was statistically significant (p<0.001). Statistically, there was significant difference between type of water used and the occurrence of parasitic infection (p<0.001) (Table-6). The prevalence of parasitic infection was found low in the people who have hand washing habit (46.1%) than people not washing their hands frequently (30.1%). Statistically there was significant

difference between hand washing habit and occurrence of the parasitic infection (p=0.003) (Table-7). Higher prevalence of parasitic infection was found among children studying at public school (52%) than in private school (28.3%). The difference between type of school and the occurrence of parasites was statistically significant (p<0.001) (Table-8).

Table-4: Prevalence of parasites according to occupation of parents

Occupation	Total n	Positive n	%	p-value
Service	125	43	34.4	
Business	39	13	33.3	
Labour	119	61	51.3	0.032
Others	47	17	36.2	
Total	330	134	40.6	

Table-5: Prevalence of parasites according to source of water

Source of water	Total n	Positive n	%	p-value
Tap water	113	66	58.4	
Groundwater	217	68	31.3	<0.001
Total	330	134	40.6	

Table-6: Prevalence of parasites according to treatment of water

Treatment	Total n	Positive n	%	p-value
Treated	199	105	52.8	
Untreated	131	29	22.1	<0.001
Total	330	134	40.6	

Table-7: Prevalence of parasites according to hand washing habit

Hand washing	Total n	Positive n	%	p-value
No	217	100	46.1	
Yes	113	34	30.1	0.003
Total	330	134	40.6	

Table-8: Prevalence of parasites according to type of school

School	Total n	Positive n	%	p-value
Public	171	89	52	
Private	159	45	28.3	<0.001
Total	330	134	40.6	

There was significant difference in occurrence of the parasitic infection (p=0.013) which reveals that presence of abdominal symptoms is associated with parasitic infection (Table-9). Statistically, there was significant difference between use of anti-helminthic drug and occurrence of the parasitic infection (p=0.005) (Fig-2).

Table 9: Prevalence of parasites according to presence of associated symptoms

Symptoms	Total n	Positive n	%	p-value
Absence	183	63	34.4	
Presence	147	71	48.3	0.013
Total	330	134	40.6	

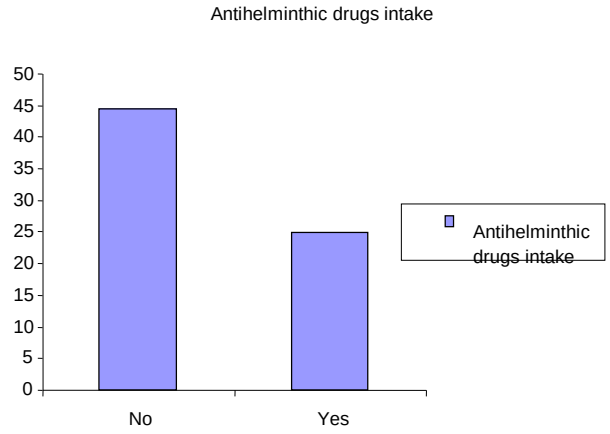

Fig. 2: Prevalence of intestinal parasitosis in relation to antihelminthic drugs taken

Discussion

The prevalence of parasitic infections was found 40.6%. The finding was in harmony with other previous results (Oda *et al*., 2002; Yong *et al*., 2000). Ishiyama *et al.* (2001), Rai *et al*., (2002) and Rai *et al.* (2005) have reported higher positive rates among school children. The prevalence rate found was higher than rates reported by Ishiyama *et al.* (2003) and Easow *et al.* (2005). Such variations may be due to over dispersion of parasites, socio-economic conditions of study areas and the detection method used.

The percentage of monoparasitism was higher than multiparasitism in this study which was in agreement with other studies (Yong *et al.*, 2000; Ishiyama *et al*., 2003; Uga *et al*., 2004). Low prevalence of mixed parasitic infection might be due to increasing awareness about health and hygiene among the people.

Protozoans were dominant over helminthes. Contamination of land with faecal matter used as manure, open defaecation, lack of public awareness and use of contaminated drinking water are possible factors resulting in higher rate of protozoal infection. Overall 9 species of intestinal parasites were detected, 4 helminthes and 5 protozoans. *G. lamblia* (17.8%) and *E. histolytica* (17.8 %) were the most common protozoans detected whereas *T. trichiura* (3.6%) was the most common helminthes detected. Infection with *E. histolytica* is common in developing countries; mainly affecting people with low socioeconomic conditions and poor personal hygiene (Braga *et al*., 1998). Detection of

intestinal parasites such as *G. lamblia* and *E. histolytica* infecting the children implies the fact that children are exposed to faecally contaminated surroundings. Practicing good hygiene (e.g. washing hands thoroughly with soap and water) and avoiding use of contaminated water and food are the important preventive measure of common intestinal infections.

T. trichiura has been reported as most common parasite in previous studies from Nepal (Ishiyama *et al*., 2001; Uga *et al*., 2004; Rai *et al*., 2005a; Sharma *et al*., 2004). In this study also *T. trichiura* is most common helminthes but the prevalence is less than reported previously. It could be due to ineffective deworming with single dose of anti helminthic drug. The higher prevalence of *T. trichiura* in comparison to other helminthes is because of its special mode of attachment to intestinal mucosa, longer life span of parasites and its refractory reaction to most antihelminthic drugs then remains in intestine causing chronic infection.

The overall positive rate is nearly similar in both boys and girls. This result implies that there is equal chance of infection for all, which might be due to over dispersion of parasites and poor sanitary conditions in the community (Rai *et al*., 2005). Ishiyama *et al.* (2001) also reported the equal positive rates between sexes in Western Nepal.

The infection rate was found highest among children under age of five. Prevalence of parasite might be associated with their unhygienic habits and also due to difference between the study populations.

Higher positive rates in *Dalits* have been reported earlier (Rai *et al*., 2002; Rai *et al*., 2005; Shrestha *et al.*, 2001). In this study also *Dalits* have seen to have highest prevalence of parasites. This may be due to small sampling size and low socioeconomic status, poverty, illiteracy, lack of awareness of *Dalits*, as compared to other castes. The significantly higher rate has been reported in children of parents involved in farming or working as labors as their family members are more prone to get infection through the soil, contaminated with parasites. Hygienic practice like proper hand washing and drinking safe water as well as good sanitation can reduce the transmission of helminth infections. The type of drinking water (treated vs. untreated) was also found significantly associated with parasitic infections (Ishiyama *et al.*, 2001; Oda and Sherchand, 2002). In this study the parasitic infection is more than double in children drinking untreated water. It may be due to direct drinking of contaminated water as water sources of Kathmandu Valley are heavily contaminated.

In present study, the parasitic infection was significantly higher in public school than in private school. Different studies had also reported the high prevalence of parasitic infection in public school (Rai *et al.*, 1986; Ishiyama *et al.*, 2001; Rai *et al.*, 2005; Sharma *et al.*, 2004). This difference was due to poor sanitary environment, unhygienic condition, drinking contaminated water, immunity level of children and low socioeconomic level of the family (Rai *et al*., 2000; Rai *et al*., 1998).

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