

Prevalence of intestinal parasitic infections among public school children in a rural village of Kathmandu Valley

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ABSTRACT

Intestinal parasitic infections (IPI) are one of the most prevalent infections in humans residing in developing countries and its burden is high among school aged children. This cross-sectional study was conducted to determine the prevalence of intestinal parasitic infection and types of intestinal parasites in rural public school children of Nepal. It included students from Nursery to Class X of a rural public school located in the northeast part of the Kathmandu Valley, Nepal. Among the 194 participating children, prevalence of intestinal parasitic infection was found as 23.7%; (28.2% for boys; 20.2% for girls). Amongst the infected children, single and mixed parasitic infection was detected in 43 (93.5%) and 3 (6.5%) children respectively. Among protozoan parasites, *Giardia lamblia* was the most common (58.6%) whereas *Hymenolepis nana* was the most common (21.7%) among the helminths. Statistically different prevalence of intestinal parasitic infection was observed among children aged above 10 years and children aged below 6 years as well as 6 to 10 years. Gender-wise, there was no statistical difference in prevalence of intestinal parasitic infection. This study suggests the need of health education program in schools along with regular screening of intestinal parasites and treatment for effective management of the intestinal parasites among school children in Nepal.

Keywords: Prevalence, Intestinal Parasitic Infection, School children, Nepal

INTRODUCTION

Intestinal parasitic infections (IPI) caused by intestinal helminths and protozoan parasites, are one of the most prevalent infections in humans residing in developing countries.¹ WHO has estimated about 3.5 billion people to be affected with these parasites worldwide, and 450 million people fall ill as a result of these infections, with the majority being children.² IPI is a major public health problem in Nepal.³⁻⁵ School-aged children are particularly susceptible to IPI, often carrying higher loads of parasites.⁶ The reported prevalence of intestinal parasites varies from place to place and time to time. A study conducted on the prevalence of intestinal parasites among school children in two rural villages of Chitwan district⁴ in 1999 has shown a prevalence of 44.0% whereas similar studies conducted at Pokhara³ in 2004 and Dharan⁷ in 2008 have shown the prevalence to be 21.3% and 22.5% respectively. Similar studies conducted on school going children at different places and period of time in Kathmandu valley have shown the prevalence ranging from 17.6% to 82%.⁸⁻¹² Most common intestinal parasites reported from school going children in Nepal are *Ascaris lumbricoides*, *Hymenolepis nana*, Hookworm, *Trichuris trichiura* and *Giardia lamblia*. These parasites are associated with diverse clinical manifestations such as malnutrition, iron deficiency anemia, malabsorption syndrome, intestinal obstruction,

and mental and physical growth retardation.⁷ This study was conducted to determine the prevalence of IPI and types of intestinal parasites in a rural public school children of Kathmandu valley.

MATERIALS AND METHODS

This cross-sectional study was conducted on September 9, 2012 at a rural public school located in the northeast part of the Kathmandu Valley, Nepal. Students from Nursery to Class X were included in the study. Consent was taken from the school authority prior to the commencement of the study. One day prior to the study, school children were distributed with a properly labeled clean, dry, screw capped plastic container and a plastic spatula. The method of stool collection was explained to the students from Class IV to Class X. Parents of students from Nursery to Class III, were given an information leaflet mentioning the purpose of the study and instruction on method of collection of stool sample. On the day of the study, a team of faculty and volunteer students from Patan Academy of Health Sciences (PAHS) went to the school with all the necessary equipments (e.g. microscopes, glass slides, reagents) to carry out this study. Demographic data collected during the study were verified from the school records.

Stool samples were examined for the presence of

parasites both macroscopically and microscopically. Direct microscopic examination was done by normal saline and Iodine wet mount. Students detected with intestinal parasites were treated with anti-protozoal and anti-helminthic drugs by an accompanying physician. The study was approved by the research committee of PAHS. Data entry and analysis were done in the Epi-Info V3.5.3 and SPSS V15.000 software respectively. Chi-square test was used to analyze the differences of proportions.

RESULTS

Out of 296 enrolled students, only 194 (65.5%) school children chose to participate in this study. The overall prevalence of intestinal parasites was found to be 23.7% (either protozoa, helminths or mixed). Among all infected children (n=46), single parasitic infection was detected in 43 (93.5%) children, while 3 (6.5%) children had mixed infection. The prevalence of protozoal infection and helminthic infestation including the mixed infection were found to be 18.5% and 6.1% respectively.

Six different species of parasites; 2 protozoan and 4 helminthic species were detected. Among protozoan parasites, *Giardia lamblia* was the most common (58.6%) followed by *Entamoebahistolytica/dispar* (19.6%). Among helminths, *Hymenolepis nana* was the most common (21.7%). Only one Hookworm, *Trichuristrichiura* and *Ascarislumbricoides* was detected. Mixed infections of *Hymenolepis nana* with protozoan parasite (*Giardia lamblia*) were detected in two children and with helminth (*Ascarislumbricoides*) were detected in one child (Table-1).

Table-1: Prevalence and distribution of intestinal parasites

Intestinal parasites	Number (n)	Prevalence %	Positive %
Protozoa (single infection)	34	17.5	73.9
<i>Giardia lamblia</i>	25	12.9	54.3
<i>Entamoeba histolytica/dispar</i>	9	4.6	19.6
Helminths (single infection)	9	4.6	19.6
<i>Hymenolepis nana</i>	7	3.6	15.2
Hookworm	1	0.5	2.2
<i>Trichuristrichiura</i>	1	0.5	2.2
Mixed infections	3	1.5	6.5
<i>Giardia lamblia</i> and <i>Hymenolepis nana</i>	2	1.0	4.3
<i>Ascaris lumbricoides</i> and <i>Hymenolepis nana</i>	1	0.5	2.2
Total (N)	46	194	46
Total (%)	—	23.7	100

Note: Total may not add to 100% due to rounding.

The prevalence of IPI among boys was 28.2% which was higher compared to that of girls (20.2%), but this

difference was not statistically significant (p value = 0.191) (Table-2).

Table-2: Prevalence of IPI by gender

Gender	Total (N)	Positive (n)	Positive (%)	p-value
Male	85	24	28.2	0.191 (>0.05)
Female	109	22	20.2	
Total	194	46	23.7	

IPI was highest among children aged less than 6 years (37.5%) followed by children aged 6-10 years (31.6%) and children aged more than 10 years (16.8%). The prevalence of intestinal parasite was found to be statistically different among the age groups. Further, Post Hoc (pair wise) comparison of prevalence of intestinal parasites in different age groups showed statistically different prevalence among children aged less than 6 years and greater than 10 years as well as among children aged 6-10 years and greater than 10 years. However, prevalence of intestinal parasites among children aged less than 6 years and 6-10 years was not found to be statistically significant (Table-3).

Table-3: Prevalence of IPI by age group and pair wise comparison between different age group

Age group	Total (n)	Positive (n)	Positive (%)	p-value	Age group	p-value
< 6	24	9	37.5	0.024 (<0.05)	< 6 vs. 6 – 10	0.615
6 – 10	57	18	31.6		6 – 10 vs. > 10	0.032*
> 10	113	19	16.8		< 6 vs. > 10	0.047*
Total	194	46				

*This shows that the two proportions are significantly different. (p<0.05)

IPI was highest among children studying below primary level (42.3%) followed by primary (38.4%) and above primary (16.7%). The prevalence of intestinal parasites was found to be statistically different among the different grades. Further, Post Hoc (pair wise) comparison of prevalence of intestinal parasites in different grades showed statistically different prevalence among children in below primary and above primary level. On contrary, prevalence of intestinal parasites among children in below primary and primary level as well as between primary and above primary level was not found to be statistically significant (Table-4).

Table-4: Prevalence of IPI by grades and pair wise comparison of different grades

Grade	Total (n)	Positive (n)	Positive (%)	p-value	Grade	p-value
Below Primary	26	11	42.3	0.019 (< 0.05)	Below primary vs. Primary	0.131
Primary	72	19	38.4		Primary vs. Above Primary	0.125
Above Primary	96	16	16.7		Below Primary vs. Above Primary	0.005*
Total	194	46				

Note: Below primary = Nursery, KG; Primary = Grade 1-5, Above Primary = Grade 6 and above.

*This shows that the two proportions are significantly different ($p < 0.05$)

DISCUSSION

In this study, nearly one fourth (23.71%) of the rural public school children were found to be harboring one or more intestinal parasites. This was close to the findings of different studies conducted in school going children of Nepal.^{3,7,13} Yet, lower prevalence of intestinal parasites has been reported from studies done in school children of urban cities of Nepal.^{9,14} On the other hand, prevalence of intestinal parasites up to 82% has been reported from a study done among school children in Lalitpur district of Nepal.¹²

The prevalence of protozoal infection was found to be higher than that of the helminths in this study. This finding is in accordance with the results of similar studies conducted in school children of Nepal,^{7,14} and elsewhere.¹⁵ On the contrary, higher prevalence of helminths has been reported in other studies from Nepal.^{8,9,11} Among the protozoan parasites, *Giardia lamblia* was the most common intestinal parasite followed by *Entamoeba histolytica*. Likewise, *Giardia lamblia* was reported as the commonest protozoan parasite in school going children in other studies conducted in Nepal^{7,14} and elsewhere.¹⁵

Among the helminths, *Hymenolepis nana* was the most common intestinal parasite. This is in contrast with the finding of other studies conducted on school going children of Nepal.^{7,9,11,13,14} Various studies have found *Ascaris lumbricoides*^{7,14,16} and *Trichuris trichiura*^{9,11,13} as the commonest intestinal helminth in school children of Nepal. Low prevalence of helminths in this study can be attributed to the nationwide bi-annual integrated deworming as well as Vitamin A supplementation programme¹⁷ and implementation of mass drug administration in which single dose of albendazole is given.¹⁸ But, single dose of albendazole is not sufficient to clear *Hymenolepis nana* infestation¹⁹ as well as protozoal infections. These findings point out the need for regular screening of intestinal parasites among school children for effective management of these infections.

Prevalence of intestinal parasites was found slightly higher among boys but the difference was not statistically

significant. Similar findings have been reported by various studies conducted in Nepal^{11,13} and elsewhere.¹⁵ However, other study has shown significantly lower prevalence of parasitic infection in girls attributing it to their good hygiene compared to boys.⁹ On the contrary, various studies have reported higher prevalence of intestinal parasites among girls.^{14,20}

Age wise prevalence of IPI was found to be highest among children of age below 6 years followed by children of age ranging from 6-10 years, which were significantly higher than that of children of aged 10 years and above. Further, pair wise comparison revealed statistically significant lower prevalence of IPI among children above 10 years than children aged less than 6 years and 6-10 years. The decrease in prevalence of IPI with the increase in age of children have been reported in other studies as well, in which they have attributed this finding to rise of awareness regarding hygienic practices^{9,14} and environmental sanitation.¹⁴ On the contrary, higher prevalence of IPI among children aged 10-14 years have been reported by different studies done in Nepal attributing it to lack of parental control regarding dietary habits¹³ and increased outdoor activities.¹¹

Grade wise prevalence of IPI was found to be highest among children of below primary level, followed by children of primary level and children of beyond primary level. However, pair wise comparison revealed significantly different prevalence of IPI between children of below primary level and children of above primary level only. On contrary, a study found higher intestinal parasitic prevalence among lower secondary students than primary and secondary students.¹³

In conclusion, the prevalence of intestinal parasites was found to be 23.7%. No significant difference in prevalence of intestinal parasites between boys and girls were observed. However, significant difference in prevalence of parasitic infection was found between students aged less than 10 years and more than 10 years as well as among students of below primary and above primary.

Although the existing mass deworming programs of Government of Nepal is found to be effective in clearing helminths like *Ascaris lumbricoides* and Hookworm, it is not effective to reduce helminths like *Hymenolepis nana* and protozoan parasites. Therefore, this study emphasizes the need of targeted health education programs for students, teachers and parents along with regular screening and specific treatment for effective management of the intestinal parasites among school children in Nepal.

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