

## Intestinal Helminthic Infections Among School Children in Kathmandu Valley

*Adhikari N<sup>a</sup>, Bomjan R<sup>a</sup>, Khatri DB<sup>a</sup>, Joshi DR<sup>a</sup>, Dhakal P<sup>b</sup> and Lekhak B<sup>c</sup>*

### Abstract

<b>Introduction</b>	Intestinal parasites, notably the helminthes are among the most common infections of school age children where they cause morbidity in developing countries. The morbidity caused by helminthes included nutritional deficiency, intestinal obstruction, prostrating anaemia, chronic dysentery, rectal prolapse; respiratory complications, poor weight gain, retarded growth and mental retardation.
<b>Objective</b>	This study was carried with the objective of determining the prevalence of intestinal helminthiasis among school children.
<b>Methods</b>	Three hundred and nine stool specimens were collected from the study subjects and examined by normal saline wet mount. Formalin ether sedimentation technique was performed for the concentration.
<b>Results</b>	Among 309 study subjects aged 5-14 years, the prevalence of helminthic infections was found nearly 34 percent. Such infection was found equally among males and female population. <i>Trichuris trichiura</i> was the most common parasite among the study subjects (nearly 55%), followed by <i>Ascaris lumbricoides</i> (26%), Hookworms (12%), <i>Hymenolepis nana</i> (5%) and <i>Strongyloides stercoralis</i> (2%). It was observed that the rate of helminthic infection among Dalits, Indo-Aryans and Tibeto-Burman doesn't differ significantly. Similar results were also found among dewormed and non-dewormed study subjects. However, it was observed that there was a significant difference in having helminthic infections with the gastrointestinal tract symptoms.
<b>Conclusion</b>	The findings of this study showed that intestinal helminthic infections remain highly endemic in the capital city due to the poor sanitary conditions and unplanned urbanization. This strongly indicates a need for a comprehensive program to combat intestinal helminthes associated morbidity and mortality in Nepal.
<b>Keywords</b>	School children, Kathmandu valley, Helminthic infections, <i>Trichuris trichiura</i>

### Introduction

Intestinal parasitic infection is one of the major health problems in develop countries. It has been estimated to affect some 3.5 billion people globally and 450 million are thought to be ill as a result of such infections, the majority being children<sup>1</sup>. In some tropical areas, the prevalence reaches nearly 100 percent<sup>2</sup>. It is a major socioeconomic problem in Nepal, though a hospital based study has shown a declining trend during a period of ten years. Intestinal parasites even in low or moderate number affect on

both nutritional and thereby on immune status of individuals leading to various morbidity and mortality. The reported prevalence of intestinal parasitosis in Nepal varies considerably with over 90 percent prevalence in some areas. Overall helminthic infections alone rank fourth in the top ten lists of diseases in Nepal. The intestinal parasitosis remains to be one of the major problems in bigger cities like Kathmandu as well because of the contamination of the drinking water and soil by feces<sup>3</sup>.

**Corresponding Author:** Nabaraj Adhikari, **E-mail:** adhikarinaba2004@yahoo.com, <sup>a</sup>National College, Lainchour, Kathmandu, Nepal. <sup>b</sup>Nepal Health Research Council, Ramshah Path, Kathmandu, Nepal. <sup>c</sup>Central Department of Microbiology, Tribhuvan University, Kirtipur, Kathmandu, Nepal.

## Methods

A cross-sectional descriptive study was conducted among school children studying at public school in the urban settings of Kathmandu valley, Nepal from June to November 2006. For the collection of sample, a clean, dry, screw capped and properly labeled plastic container was distributed to 309 school children [class 1-5, aged 5-14 years; boys:153 and girls:156]. A questionnaire on age, sex, family size, source of drinking water, gastrointestinal tract symptoms etc. was filled. Informed consent was obtained from teachers, parents and the students.

Faecal specimens were examined macro- and microscopically for the presence of parasites. Microscopic examination was done by formal-Ether concentration technique. The wet preparation prepared from the deposit was examined under the microscope for intestinal parasites. The findings were analyzed statistically using the Chi-square test.

## Results

The overall prevalence of helminthic infection was found to be 33.3 percent (105/309), in which 49.5 percent (153/309) were males and 50.5 percent (156/309) were females. The prevalence of parasitic infection among males and females was 34 percent

for each, as shown in table 1. Ethnically, the prevalence of helminthic infections among the *Dalits*, *Tibeto-Burmans* and *Indo--Aryans* were 35.2 percent (19/54), 35.1 percent (53/151) and 31.7 percent (33/104) respectively as shown in table 2. There was no statistically significant difference observed between males and females in having helminthic infection and similar observation was also found among *Dalit*, *Tibeto-Burman*, and *Indo-Aryans*.

Out of the 309 study subjects, 70.3 percent (217/309) were symptomatic and the rest 29.7 percent (92/309) were asymptomatic. Among the symptomatic cases, 41 percent (89/217) and among the non-symptomatic cases, 17.4 percent (1 /92) were infected with helminthes as shown in Table 3.

Of the total subjects, 76.7 percent (237/309) were dewormed and 23.3 percent (72/309) were non-dewormed. Among the dewormed cases, 34.1 percent (81/237) were infected with helminthes. Similarly, 33.3 percent (24/72) of non-dewormed cases were infected, as shown in table 4.

Among positive cases (105), the total helminthes detected were 122. Of these, *T. trichiura* was found to be the most predominant helminth; the result is shown in Figure 1.

**Table 1: Intestinal helminthic infection among study subjects (Age 5-14 years)**

Sex	Total (n)	+ve (n)	%
Male	153	52	33.9
Female	156	53	33.9
Total	309	105	33.9

The result was not found to be statistically significant at  $\alpha=0.05$  level.

**Table 2: Intestinal helminthic infection among different ethnic groups (Age 5-14 years)**

Ethnic groups	Total (n)	+ve (n)	%
<i>Dalits</i>	54	19	35.2
<i>Indo-Aryans</i>	104	33	31.7
<i>Tibeto-Burmans</i>	151	53	35.1
Total	309	105	33.9

The result was not found to be statistically significant at  $\alpha=0.05$  level.

**Table 3: Intestinal helminthic infection among study subjects based on gastrointestinal symptoms**

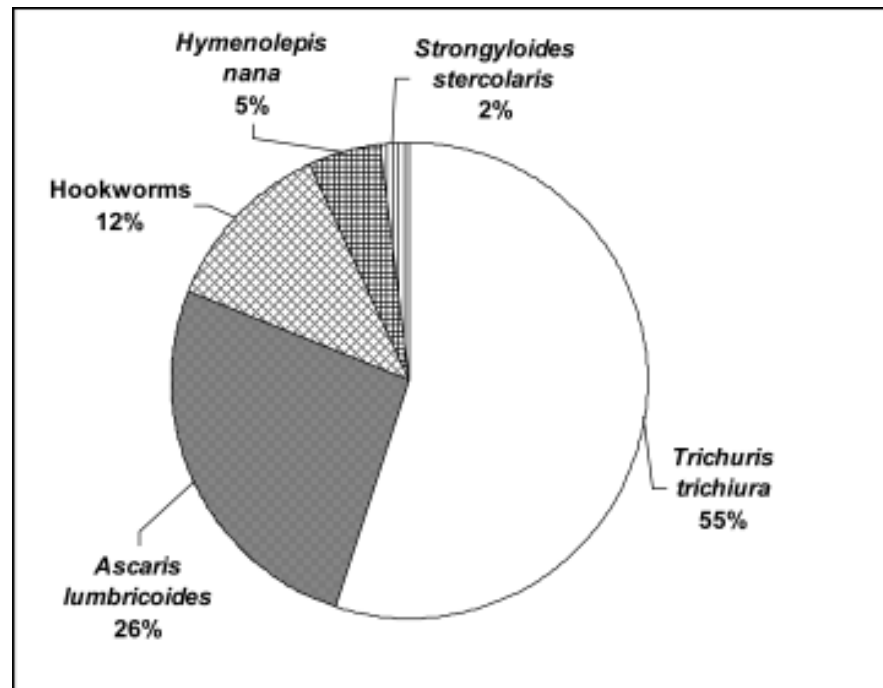
Gastrointestinal symptoms (GIT)	Total (n)	+ve (n)	%
No GIT symptoms	92	16	17.4
GIT symptoms	217	89	41.0
<b>Total</b>	<b>309</b>	<b>105</b>	<b>33.9</b>

The result was found to be statistically significant at  $\alpha=0.05$  level.

**Table 4: Intestinal helminthic infection based on deworming**

Status	Total	(n)	+ve (n)	%
Dewormed	237		81	34.1
Non dewormed	72		24	33.3
Total	309		105	33.9

The result was not found to be statistically significant at  $\alpha=0.05$  level.

**Figure 1: Helminthes detected among study subjects**

## Discussion

In this study, one third of the public school children were infected with some kinds of intestinal helminthes. Elsewhere in the world, the prevalence of helminthic infection ranges from 16.9 percent to as high as 77.0 percent<sup>5-8</sup>. Our findings were in agreement with the findings of Rai *et al*<sup>7</sup>, who reported the annual incidence rate of helminthiasis as 18 to 36.6 percent. Though the annual incidence decreased every successive calendar year in both adults and children, the prevalence is still higher in the cities and this may be attributed to the influx of parasites infected people from rural areas and unplanned organization resulting into poor sanitary system<sup>3</sup>. Similarly, our finding was lower than the findings of Oyewole *et al*<sup>9</sup>. These variable results in the prevalence were reflection of the local endemicity, sanitary standard, environmental conditions, timing and seasonal differences in the design of the survey work and personal hygiene<sup>6</sup>.

Infection rates were similar between boys and girls indicating and equal opportunity for acquiring helminthic infection. Ishiyama *et al*<sup>10</sup> reported similar findings among school children living in the identical conditions. Equal positive rates between sexes have also been reported by Rai *et al*<sup>7</sup>. However, Rajeshwori *et al*<sup>11</sup> and Kightliner *et al*<sup>12</sup> reported higher prevalence in females and males respectively.

About 41.0 percent of the study subjects with gastrointestinal symptoms had some kind of helminthic infections and the prevalence was about 17.4 percent in asymptomatic subjects and these difference was statistically significant. Our result was in agreement with the findings of Sherchand *et al*<sup>13</sup> in Nepal, who reported the highest prevalence of parasitic infections among the children and adults with abdominal discomforts. Similar results have also

been reported by Adhikari *et al*<sup>14</sup> among the HIV seropositive subjects in Nepal.

Ethnically, the prevalence of helminthic infections was higher among the *Dalits* and *Tibeto-Burmans* in comparison to *Indo-Aryans*. Similar results have been reported by Rai *et al*<sup>15</sup> and Rai *et al*<sup>16</sup> in Nepal. However, conflicting results have been reported by many other investigators in Nepal<sup>4,10,15,16</sup>.

The prevalence of helminthic infections among the dewormed subjects was not significantly higher in comparison to non dewormed subjects. However, Oyewole *et al*<sup>9</sup> in Nigeria reported the significant decrease in prevalence of helminthiasis after deworming among school children. In Nepal, cheaper curex Albendazole was widely used for deworming which was not so efficient<sup>17</sup>. However, the effectiveness of different antihelminthic drugs has not been assessed in this study.

Among helminthic infections, *T. trichiura* topped the list. Our findings were in agreement with the findings of other investigators in Nepal<sup>2,4,15,18</sup>. However, most studies in Nepal showed *A. lumbricoides* as the most common helminth. This appeared due to the difficulty in the complete removal of the parasite with a single dose of antihelminthic drug, particularly in those with heavy infection<sup>4</sup>. Oyewole *et al*<sup>9</sup> also reported the lower reduction rate of *T. trichiura* after the administration of anti helminthic therapy in comparison to *Ascaris* and hook worms.

## Conclusion

The findings of this study showed that helminthic infections remains highly endemic in the capital city due to the poor sanitary conditions and unplanned urbanizations. These findings strongly indicates a need for a comprehensive program to combat intestinal helminths associated morbidity and mortality in Nepal. Additionally, our findings also indicate the need of effective deworming program to minimize the helminthic infections among children (age 5 to 14 years) in Nepal.

## Acknowledgements

We wish to extend our sincere thanks to national college for letting us the use of laboratory facilities needed in accomplishing this study. Similarly, we would like to thank Ms. Urmila Adhikari and the teachers of Shram Rastriya Secondary School for their co-operation during the collection of samples.

## References

1. WHO. World Health Report- Conquering Suffering Enriching Humanity. Geneva: WHO, 2000.
2. Uga S, Rai SK, Lizhi H, Machfudz and Dachlan YP. Reinfection by soil transmitted helminthes in Sumbawa Island, Indonesia six or seven months after albendazole therapy. *Jpn. J. Environ. Entomol. Zool.* 2004; 15(4): 157-68.
3. Rai SK. Parasitic Diseases in Nepal. In. Asian Parasitology Vol. 1: Food-borne Helminthiasis in Asia; Editor-in-chief: Yano A. Editors: Arizono N, Chai J-Y, Nawa Y, Takahashi Y. *Federation of Asian Parasitologists, Japan* 2005: 305-18.
4. Sharma BK, Rai SK, Rai DR, Choudhury DR. Prevalence of intestinal parasitic infestations in school children in the Northeastern part of Kathmandu Valley, Nepal. *Southeast Asian J Trop Med Public Health* 2004; 35: 501-5.
5. Malla B, Sherchand JB, Ghimire P, BC Rajendra Kumar and Gauchan P. Prevalence of intestinal parasitosis infection in malnutrition among children in rural community of Sarlahi, Nepal. *JNepal. Health Res Council* 2004; 2: 55-7.
6. Chiazioe JU, Kelvin OE, Patrick GO, Nelson CA, Emmanuel A. Soil-transmitted helminth infection in school children in South-Eastern Nigeria: The public health implication. *The internet journal of third world medicine* 2007; 1.
7. Rai SK, Kubo T, Nakanishi M, Sumi K, Shibita H, Matsuoka A, Shrestha HG. Status of soil-transmitted helminthic infection in Nepal. *J Japanese Assoc Infect Dis* 1994; 68: 625-30.
8. Tadesse G. The prevalence of intestinal helminthic infections and associated risk factors among school children in Babile town, Eastern Ethiopia. *Ethiop. J. Health Dev.* 2005; 19(2): 140-7.
9. Oyewole M, Oyibo WA, Sanyaolu A, Faweya T, Monye P, Ukpong Metal. Helminthic reduction with albendazole among school children in riverine communities of Nigeria. *Journal of Rural and Tropical Public Health* 2007; 6:-6-10.
10. Ishiyama S; Rai SK, Ono K *et al.* Study of enteropathogens and its predisposing factors in sub-urban public school children in Kathmandu, Nepal. *Nepal Med Col J'200 1; 3: 5-9.*
11. Rajeswari B, Sinniah B and Hussein H. . Socio-economic factors associated with intestinal parasites among children living in Gombak, Malaysia: *Asia Pacific J Public Health* 1994; : 7: 21-5.
12. Kightlinger LK, Seed JR and Kightlinger MB. Epidemiology of *Ascaris lumbricoides*, *Trichuris*

- trichiura* and hookworm in children in the Ramonafana and rainforest, Madagascar. *J Parasitol* 1995; 81:159-69.
13. Sherchand JB, Larsson S and Shrestha MP. Intestinal parasites in children and adults with and without abdominal-discomfort from the Kathmandu area of Nepal. *Trop Gastroenterol* 1996; 17:15-22.
  14. Adhikari N, Rai SK, Singh A, Dahal Sand Ghimire G. Intestinal parasitic infections among HIV seropositive and high risk group subjects for HIV infection in Nepal. *Nepal Med Col J* 2006; 8: 166-70.
  15. Rai DR, Rai SK, Sharma BK, Ghimire F and Bhatta DR. Factors associated with intestinal parasitic infection among school children in a rural area of Kathmandu Valley, Nepal. *Nepal Med College J* 2005; 7: 43-6.
  16. Rai SK, Hirai K, Abe A, Ishiyama S, Rai G, Ono K *et al*. Intestinal parasitoses among school children in a rural hilly area of Dhading District, Nepal. *Nepal Med College J* 2002; 4: 54-8.
  17. Albinico M, Mthema P, Montresor A, Khakurel B, Reggi V, Pandey S *et al*. Comparative study of the quality and efficacy of originator and generic albendazole for mass treatment of soil-transmitted nematode infections in Nepal. *Trans R Soc Trop Med Hyg*. 2006; 101(5): 454-60.
  18. Uga S, Rai SK, Kimura K, Rai G, Kimura D, Wakasugi M *et al*. Parasites detected from diarrheal stool samples collected in Kathmandu, Nepal. *Southeast Asian J Trop Med Public Health* 2004; 35:19-23.