

## A small-scale survey on the status of intestinal parasite infections in rural villages in Nepal

Tai-Soon YONG<sup>1)\*</sup>, Seobo SIM<sup>1)</sup>, Jongweon LEE<sup>1)</sup>, Heechoul OHRR<sup>2)</sup>,  
Myung-Ho KIM<sup>3)</sup>, and Hyunsoo KIM<sup>4)</sup>

*Department of Parasitology and Institute of Tropical Medicine<sup>1)</sup>, Preventive Medicine<sup>2)</sup>,  
Yonsei University College of Medicine, Seoul 120-752, Korea, School of Health Science<sup>3)</sup>,  
Bharatpur, Nepal and Boran Pharmaceuticals<sup>4)</sup>, Seoul 121-010, Korea*

**Abstract:** The status of intestinal parasite infections was investigated in two rural villages (Chitrasar, Jerona) in Chitwan District, Nepal in 1999. Stool examination was performed with a total of 300 specimens from schoolchildren by formalin-ether sedimentation technique. The prevalence rate of intestinal parasite infections in the surveyed areas was 44.0%. The prevalence rate in Jerona was slightly higher than that in Chitrasar. The prevalence rate of intestinal parasite infections in female was slightly higher than that in male without statistically significant difference. *Entamoeba coli* was the most commonly found protozoan parasite (21.0%) followed by *Giardia lamblia* (13.7%) and others (5.3%). Hookworm was the most prevalent intestinal helminth (13.0%) followed by *Trichuris trichiura* (3.0%) and others (5.0%). Forty-three specimens (14.3%) showed mixed infections. It is necessary to implement large-scale treatment with anthelmintics, health education and sanitary improvement for intestinal parasite control in the surveyed areas.

**Key words:** Nepal, intestinal parasites, formalin-ether sedimentation technique

Nepal is a Himalayan kingdom located between China and India. The climate varies from cool summers and severe winters in the north to subtropical summers and mild winters in the south. Over 85% of 21.9 million population are engaged in agriculture and the life expectancy at birth is 54 years. Population growth rate is 2.6%, and literacy rate is 28% of a total population. Agricultural products are rice, millet, corn, wheat, sugar cane and root crops etc. Live stock and live stock products are cattle, buffalo, goat, milk and meat etc. (Bacon et al., 1997; Rai et al., 1998).

Like other developing countries, intestinal

parasite infections are major health problems in Nepal. Epidemiological surveys on the intestinal parasite infections are important in this country because they reflect sanitary conditions of the community and produce basic data for the control of parasitosis in the future.

Bharatpur is a city located in western part of Chitwan District and about 146 km southwest of Kathmandu, the capital of Nepal. Chitrasar and Jerona are villages in agricultural area in Chitwan District located about 12 km east and southeast of Bharatpur, respectively (Fig. 1). A total of 300 stool specimens was collected from elementary schoolchildren in November, 1999. The stools were examined by microscopy following formalin-ether sedimentation technique.

The prevalence rate of intestinal parasite

• Received 9 August 2000, accepted after revision 18 September 2000.

\*Corresponding author (e-mail: tsyong212@yumc.yonsei.ac.kr)

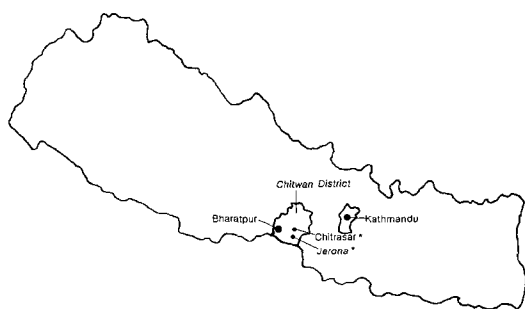
infections of schoolchildren in Jerona and Chitrasar were 48.8% and 37.9%, respectively (Table 1). The prevalence rate was slightly higher in females (46.3%) than that in males (42.1%) without statistically significant difference. Slightly higher prevalence rates of intestinal parasite infections in females have been reported in Nepal previously (Rai et al., 1994; Rai et al., 1998).

The cyst positive rate of intestinal protozoa infections were 21.0%, 13.7%, 3.7%, 2.3% and 0.3% for *Entamoeba coli*, *Giardia lamblia*, *Entamoeba histolytica/Entamoeba dispar*, *Endolimax nana* and *Iodamoeba buetchilii*, respectively (Table 2). The egg positive rate of helminth infections were 13.0%, 3.0%, 1.7%, 1.7% and 1.3% for hookworm, *Trichuris trichiura*, *Ascaris lumbricoides*, *Hymenolepis nana* and *Fasciola hepatica*, respectively. Three pinworm egg positive cases were found out of 300 examines (1%) on stool examination, suggesting high prevalence of pinworm infections in schoolchildren. The prevalence rate of each intestinal parasite infection in Jerona was higher than that in Chitrasar except *G. lamblia* (Table 2). *F.*

*hepatica* eggs were detected without confirmation of true infection. No other trematode eggs were found on stool examinations. Interestingly, the prevalence rate of protozoan parasite infections was relatively higher than that of helminth infections in this survey, suggesting problems in their drinking water.

Several previous studies showed that *A. lumbricoides* was the most common helminth in Nepal (Rai et al., 1994; Rai et al., 1997; Rai et al., 1998). Other studies showed that hookworm was the most common helminth in Nepal (Navitsky et al., 1983; Estevez et al., 1998), as same as in this study. Different surveyed areas would be the reason for the difference. Hookworm infection is recognized as an important contributor to iron-deficiency anemia in populations with poor diets (Stolfus et al., 1997; Albonico et al., 1998). Hookworm infects humans through penetration of the skin. The residents have no footwear or wear thong-type sandals, so hookworms easily penetrate the skin, especially in sandy conditions. Hookworm infection rate was reported higher in the monsoon season (June-September) than in the remaining dry months of the year in Nepal (Navitsky et al., 1998). Forty-three specimens (14.3%) showed mixed infections from 2 to 4 parasite species (Table 3). The rate of mixed parasite infections in Nepal has been reported as high as 87.5% (Estevez et al., 1983).

High prevalence rate of intestinal parasite infections is associated with intake of contaminated water, open defecation habit, poor hygiene and poor sanitary conditions etc. Relatively simple personal protections, such as personal hygiene, appropriate water management (boiling), use of latrines and



**Fig. 1.** Two surveyed areas(\*) in Chitwan District, Nepal.

**Table 1.** Prevalence rate of intestinal parasite infections in two villages in Chitwan District, Nepal in 1999

Sex	No. of positive/No. of examined (%) in each village		
	Jerona	Chitrasar	Total
Male	38/83 (45.8)	31/81 (38.3)	69/164 (42.1)
Female	44/85 (51.8)	19/51 (37.3)	63/136 (46.3)
Total	82/168 (48.8)	50/132 (37.9)	132/300 (44.0)

**Table 2.** Egg or cyst positive rate of intestinal parasites in two villages in Chitwan District, Nepal in 1999

Parasites	No. of positive (%) in each village		
	Jerona	Chitrasar	Total
<i>Entamoeba histolytica/Entamoeba dispar</i>	7 (4.2)	4 (3.0)	11 (3.7)
<i>Entamoeba coli</i>	42 (25.0)	21 (15.9)	63 (21.0)
<i>Endolimax nana</i>	7 (4.2)	0 (0)	7 (2.3)
<i>Iodamoeba butschlii</i>	1 (0.6)	0 (0)	1 (0.3)
<i>Giardia lamblia</i>	14 (8.3)	27 (20.5)	41 (13.7)
<i>Ascaris lumbricoides</i>	4 (2.4)	1 (0.8)	5 (1.7)
<i>Trichuris trichiura</i>	6 (3.6)	3 (2.3)	9 (3.0)
Hookworm	35 (20.8)	4 (3.0)	39 (13.0)
<i>Fasciola hepatica</i>	4 (2.4)	0 (0)	4 (1.3)
<i>Hymenolepis nana</i>	4 (2.4)	1 (0.8)	5 (1.7)

**Table 3.** The rate of mixed parasite infections in two villages in Chitwan District, Nepal

Species	No. of positive (%) in each village		
	Jerona	Chitrasar	Total
Two	27 (16.1)	6 (4.5)	33 (11.0)
Three	7 (4.2)	1 (0.8)	8 (2.7)
Four	1 (0.6)	1 (0.8)	2 (0.7)
Total	35 (20.8)	8 (6.1)	43 (14.3)

improvement in footwear contribute to prevent parasite infections. School-based anthelmintic chemotherapy is also a cost-effective approach for controlling intestinal helminth infections (Albonico et al., 1999).

In conclusion, high prevalence rate of intestinal parasite infections were found in two rural villages in Nepal, and it is necessary to implement large-scale treatment with anthelmintics, health education and sanitary improvement for intestinal parasite control in the areas.

### REFERENCES

Albonico M, Stoltzfus RJ, Savioli L, Chwaya HM, d'Harcourt E, Tielsch JM (1999) A controlled evaluation of two school-based anthelmintic chemotherapy regimens on intensity of intestinal helminth infections. *Int J Epidemiol* **28**: 591-596.

Albonico M, Stoltzfus RJ, Savioli L, et al. (1998) Epidemiological evidence for a differential effect of hookworm species, *Ancylostoma duodenale* or *Necator americanus*, on iron status of children. *Int J Epidemiol* **27**: 530-537.

Bacon P, Bednarz SW, Battenfield BP, et al. (1997) Microsoft Encarta97 World Atlas: Nepal/Information/Facts and Figures.

Estevez EG, Levine JA, Warren J (1983) Intestinal parasites in a remote village in Nepal. *J Clin Microbiol* **17**: 160-161.

Navitsky RC, Dreyfuss ML, Shrestha J, Khatri SK, Stoltzfus RJ, Albonico M. (1998) *Ancylostoma duodenale* is responsible for hookworm infections among pregnant women in the rural plains of Nepal. *J Parasitol* **84**: 647-651.

Rai SK, Hirai K, Ohno Y, Matsumura T (1997) Village health and sanitary profile from eastern hilly region, Nepal. *Kobe J Med Sci* **43**(3-4): 121-133.

Rai SK, Kubo T, Nakanishi M, et al. (1994) Status of soil-transmitted helminthic infection in Nepal. *J Jpn Assoc Infect Dis* **68**: 625-630.

Rai SK, Nakanishi M, Upadhyay MP, et al. (1998) Effect of intestinal helminth infection on some nutritional parameters among rural villagers in Nepal. *Kobe J Med Sci* **44**: 91-98.

Stoltzfus RJ, Chwaya HM, Tielsch JM, Schulze KJ, Albonico M, Savioli L (1997) Epidemiology of iron deficiency anemia in Zanzibari schoolchildren: the importance of hookworms. *Am J Clin Nutr* **65**: 153-159.