

Research Article

Intestinal parasites in the slum-dwelling population in Naya Bazar, Kaski, Nepal

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ABSTRACT

Background and Objectives: Gastrointestinal infection is a major cause of diarrhea, anemia, malnutrition and responsible for reducing physical and mental development especially in children. This study aimed to investigate the prevalence of the intestinal pathogens in the slum-dwelling population in Kaski, Nepal.

Material and Methods: A cross-sectional study was conducted in August-September 2012 in slum-dwelling community. Overall 166 human faecal samples were collected and examined using formal ether sedimentation method.

Results: The prevalence of gastrointestinal infections in slum-dwelling population was found to be 24.1%. The magnitude of infection was higher (26.9%) among females compared to males. The difference was not statistically significant ($P > 0.05$). The prevalence of infection was higher (37.0%, $P > 0.05$) in Dalit group. Children (≤ 10 years) had higher rate of infection than older people. 22% subjects had single and 2.4% had multiple infections. In the overall population, 12.7% had *G. lamblia* followed by 5.4% *Ascaris lumbricoides*, 4.8% *Hymenolepis nana* and 3.6% *Trichuris trichuria*.

Conclusion: Gastrointestinal infections were common in the slum-dwelling populations. Lack of health education and safe drinking water contributed higher infection rate in the community. Increased exposure time to the contaminated water and gender disparity had influenced the rate of infection. Due to the semi-urban area with absence of moist soil, protozoan infection was prevalent than helminth infections.

Key words: Slum community, Gastro-intestinal parasites, Nepal

INTRODUCTION

Majority of gastrointestinal infections in human are caused by intestinal parasites including helminths and protozoa [1,2].

Infections caused by gastrointestinal parasites are responsible for diarrhea, anemia, and malnutrition which impact physical and mental wellbeing of human [3,4]. It has been estimated that approximately five

million people in developing countries died each year from 750 million diarrheal episodes [5,6]. The infection can be fatal for children, pregnant women and immune-compromised individual [7].

Diarrheal disease caused by gastrointestinal parasites is one of the major public health problems around the world with an average distribution rate of 50% in developed world, and almost 95% in developing countries [8]. The higher infection rate in developing countries including Nepal is contributed by the warm and moist climate that suites parasites for being infectious including helminths [9,10]. In addition, socio-economic conditions and social behavior of individual in respect to access to primary health, education, improve sanitation and safe drinking water is important contributor of gastrointestinal infections [10-12].

Slum-dwelling people live in extreme poverty and disadvantaged socio-economic conditions of landlessness. Thus, they are incapable of accessing essential health care, education and safe drinking water. They depend on traditional healers known as Dhami and Jhakri who perform ancient rite of protection, blessing and healing and use native plants to combat diseases [13].

Gastrointestinal infection is one of the top ten infectious diseases in Nepal [7]. The rate of intestinal infections can be up to 100% in isolated communities. There had been large numbers of studies conducted regarding distribution of helminths infections in different communities in Nepal [2, 7, 14]. However, only handful of studies to date looked at the distribution of overall gastrointestinal infections in slum community of Nepal. In this study, we aimed to find out

the distribution of the gastrointestinal infection in the slum-dwelling population in Naya bazaar, Kaski.

MATERIAL AND METHODS

The study was conducted in the slum-dwelling population of Nayabazar, Kaski, located in 28°12' 54.10" N and 83°59' 31.12" E; 200 Km West from the capital of Nepal. The location of the study area can be seen in Figure 1. A cross-sectional parasitological survey was conducted in August-September 2012. The study sample consisted of 166 individuals from slum community.

Labelled sterile sample collecting vials and plastic scoops were handed to individuals with clear sampling instruction after consent to obtain faecal sample was signed by the individual. The vials containing faecal samples were collected early next morning. The faecal samples were mixed with 2.5% potassium dichromate ($K_2Cr_2O_7$) solution to preserve the gastrointestinal parasites. Samples were transported to the laboratory of Family Planning Association Kaski, Nepal in ice and processed within 2-4 hr. Laboratory analyses of faecal samples were carried out by formal ether sedimentation technique.

All the results from microscopy and questioners were recorded into a Microsoft Excel spreadsheet. A Chi-square test for test of independence was applied to determine the significant association between distribution of intestinal parasites within gender, age groups, castes and education. Chi-square test was also performed to determine the significant difference between parasites among the study populations. *P* value <0.05 was considered as statistically significant.

RESULTS

The distribution of gastrointestinal infections in slum-dwelling population was found to be 24.1%. The infection rate was found to be higher 26.9% in female population when compared with male population 19.4% (Table1). The study showed that the gastrointestinal infection rate was higher 29.5% among illiterate population than literate population.

The literate population had 20.9% infection rate (Table 1). Similarly, the infection rate of gastrointestinal parasites was found higher (37.0%) among Dalit group. The infection rate was almost similar among non specified group of people and people belongs to Gurung/Magar group. However, the study population belongs to Shrestha group had the lowest (12.5%) infection rate. The similar rate of infection was found in the people that were aware of gastrointestinal parasites and

Table 1: Distribution of gastrointestinal parasites in slum-dwelling population

Variables		No of Observed Samples	No of Positive Samples	Distribution (%)	P value
Gender	Male	62	12	19.4	0.27
	Female	104	28	26.9	
Caste	Brahmin/Chettri	54	10	18.5	0.40
	Gurung/Magar	50	12	24.0	
	Shrestha	8	1	12.5	
	Dalit	27	10	37.0	
	Others	27	7	25.9	
Education	Literate	105	22	20.9	0.21
	Illiterate	61	18	29.5	
Awareness	Aware	67	16	23.8	0.95
	Unaware	99	24	24.2	

Table 2: Frequency of gastrointestinal parasites in slum-dwelling population

Type		No of Positive samples	Frequency rate	P value
Parasites	<i>Giardia lamblia</i>	21	12.7	0.03
	<i>Ascaris lumbricoides</i>	9	5.4	
	<i>Hymenolepis nana</i>	8	4.8	
	<i>Trichuris trichuria</i>	6	3.6	
Infection Pattern	Single	36	21.7	0.05
	Multiple	4	2.4	

their mode of transmission and that were unaware (Table 1). All the results however, found to be statistical not significant ($P > 0.05$).

The distribution of gastrointestinal parasites was found to be higher (40.7%) in the aged group ≤ 10 years and lower (6.7%) in the population of age between 31-41 years

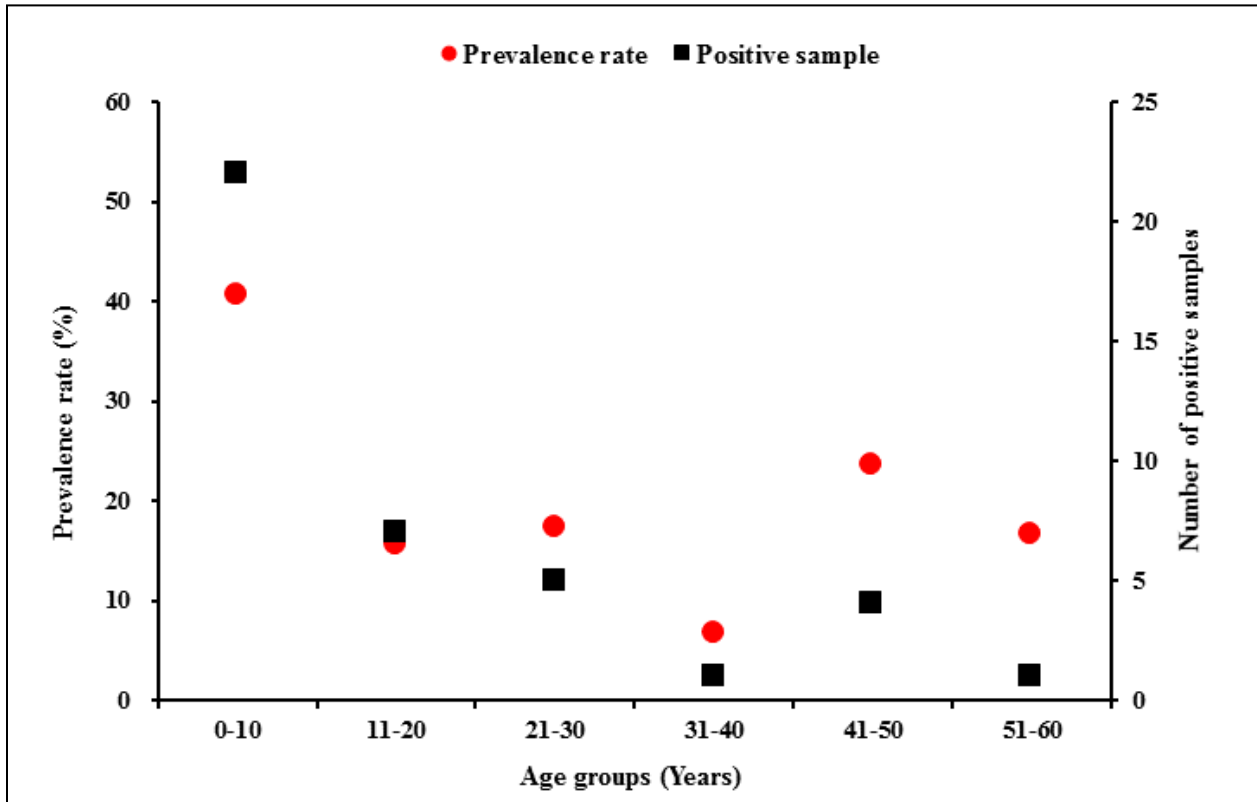
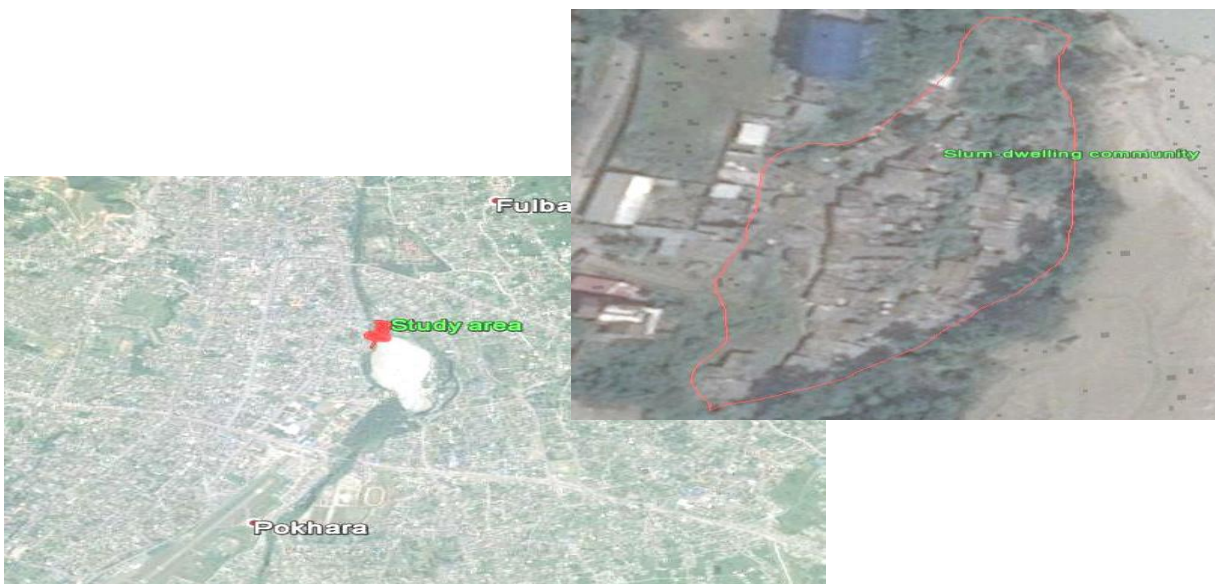


Fig: 1 Age wise distribution of gastrointestinal parasites in slum dwelling population

Figure 2: Map showing slum-dwelling community in the study area



(Figure 2). The difference between the infection rates among the different age group was found to be statistical significant ($P < 0.05$). The study population had single and multiple infections. In which 21.7% populations had single infection and 2.4% had multiple (Table 2). Among the gastrointestinal parasites, *Giardia lamblia* was the most dominant parasites found in the study population. Among the studied populations 12.7% had *G. lamblia* followed by 5.4% *Ascaris lumbricoides*, 4.8% *Hymenolepis nana* and 3.6% *Trichuris trichuria* (Table 2). The distribution of gastrointestinal parasites in the study population was found to be statistical significant ($P < 0.05$).

DISCUSSION

Intestinal parasites are cosmopolitan in distribution and can cause serious health complication in immune compromised people. Poverty, poor drinking water quality, poor sanitation, lack of health education and traditional healing approach can contribute higher infection in a community [14,15]. Very few of the study population had proper health education and awareness towards the gastrointestinal parasites as well as their mode of transmission. Our result indicated that the population without health education and awareness had higher rate of gastrointestinal infection when compare with those had adequate education.

The infection rate was higher in female populations. This can be associated by their role in the community. Females are cheaper than male to hire for agriculture labor. In addition, gender inequality is still present in the developing countries including the study population [14, 16]. The female populations had been involved in housework such as dish washing and laundering which significantly increases their exposure time to

contaminated water [10, 17]. Therefore, gastrointestinal infection rate can be increased significantly.

Age is a risk factor for the distribution of gastrointestinal parasitic infection. The result indicated that, the distribution rate of gastrointestinal parasites was higher in age group ≤ 10 years. This could be due to the fact that as the child grows younger the exposure to different risk factors for intestinal parasite increases. In contrast, older aged peoples are comparatively more knowledgeable and aware about the transmission of parasites than the young aged children.

Our study indicated that *G. lamblia*, *A. lumbricoides*, *H. nana* and *T. trichiura* are common parasites in slum dwelling population. However, *G. lamblia* occurred more frequently than the other helminth parasites. This could be the fact that, transmission dynamics of *Giardia lamblia* transmits directly through contaminated food and indirectly through arthropods. This could be the fact of high incidence of *G. lamblia* in the area of poverty [6,18]. In addition, helminth infections are known to occur more frequently in rural areas than in urban or semi-urban areas due to the lack of sandy and soil environment essential to complete their life cycles successfully or remain infectious for long period of time [19].

CONCLUSION

Gastrointestinal infections were common in the slum-dwelling population. Lack of health education and safe drinking water contributed the higher infection rate in the community. Increased exposure time to the contaminated water and gender disparity had influenced the rate of infection. Due to the semi-urban area with absence of moist soil,

helminthes infection was less common than protozoan infection. More children were infected with gastrointestinal parasites due to the possible high risk of exposure to parasites than younger people who had adequate health education and less time to expose themselves to parasites.

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AUTHOR'S CONTRIBUTION

IT- field and laboratory work, manuscript preparation, data analysis; **PG-** Experiment design, data analysis and manuscript editing; **JRS-** experiment design, manuscript editing and laboratory supervision.

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CONFLICT OF INTEREST: There is no conflict of interest

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