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Prevalence of Intestinal Parasitic Infection among Rural Area School Children of Lokhim VDC, Nepal

Abstract

Background: In the developing world, intestinal parasitic infection plays a significant role in high morbidity and mortality among the general population. In a developing country like Nepal, burden of parasitic infection appears in all ages mainly due to factors like lack of education, low socio-economic status, poor sanitation, consumption of unhealthy food and water. The burden and impact is even higher in school going children of rural community. Thus, the present study was planned to investigate the prevalence of intestinal parasitic infection among the rural community school going children of Lokhim Village Development Committee (VDC) situated in Solukhumbu district, Nepal.

Method: A cross sectional study was conducted from February to July 2016 on 359 students attending Janata Secondary School, Lokhim VDC. The detection of parasite in stool samples was done by conventional microscopy using normal saline and Iodine wet mount method.

Result: The overall intestinal parasitic prevalence was found to be 30.92% (111/359). Highest prevalence rate was seen with *Giardia lamblia* 13% (n=50) followed by *Entamoeba histolytica* 6.68% (n=24), *Hymenolepis nana* 2.79% (n=10), hookworm 2.5% (n=9), *Ascaris lumbricoides* 2.30% (n=8), *Trichuris trichiura* 0.84% (n=3) and *Enterobious vermicularis* 0.28% (n=1). The prevalence of parasites was found to be higher in female children than in the male children, and highest prevalence was found in age group of 6 to 10 years, but the difference was statistically insignificant (p value > 0.05) in both categories.

Conclusion: Prevalence of intestinal parasitic infection among school children in the study area is high. In order to bring a positive change in the current status of parasitic prevalence, the need for effective long term strategies, health policies, health awareness education program, regular screening and distribution of antiprotozoals besides the deworming program are indicated.

Keywords: School children; Intestinal parasite; Lokhim VDC; Solukhumbu; *Giardia lamblia*

Research Article

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Introduction

In today's world of modern medicine era, parasitic infections still exist as a major burden to human health. Evidences have shown that infections have been closely associated with humans for over 10,000 years [1]. Protozoa and helminthes are the major parasites that infect human. These parasites are not only well known for their global distribution but are also regarded as one of the important causes of life threatening diseases. The parasitic diseases are responsible for causing a significant amount of morbidity and mortality, most of which are located in the tropical and subtropical regions [2]. The overall parasitic infection rate is higher in developing countries especially in the endemic regions; however, with regard to developed countries the prevalence of intestinal protozoan parasites is higher than that of intestinal helminthes [3].

The protozoan parasites that are most commonly associated with gastrointestinal diseases are *Giardia intestinalis, Entamoeba histolytica, Cyclospora cayetanenensis*, and *Cryptosporidium* species [4]. Among the soil transmitted helminthes, *Ascaris lumbricoides*, hookworm and *Trichuris trichiura* are the most prevalent ones, and are known to infect an estimated one-sixth of the world population. Sub-Saharan African children are known to be the biggest victims of the protozoan and helminthes, followed by Asian, Latin American, and the Caribbean children [5]. The World Health Organization (WHO) estimates that intestinal nematode worms are currently endemic in 130 countries in the world [6], the helminthes that have been commonly found are generally of soil-borne type like roundworm (*Ascaris lumbricoides*), whipworm (*Trichuris trichiura*) and hookworms (*Ancylostoma duodenale* and *Necator americanus*). A global study conducted by the WHO in 2008 found that 2600 million people were not using improved sanitation facilities. Among them, 1100 million were defecating in the open leading to high level of environmental contamination and exposure to the risk of parasitic and other microbial infection. In South- East Asia and Europe, the percentage of people using improved sanitation facilities was 40% and 96% respectively [7].

A survey conducted in various districts of Central and Mid-Western development Region of Nepal indicated that 65% of children were infected with hookworm, followed by 21% with roundworm and 19% with whipworm [8]. According to the annual report, published in 2010/2011 by Ministry of Health (MOH), Nepal, intestinal worm infection ranks fourth accounting for morbidity among "top-ten-diseases". Most of the Nepal's population lives in rural areas, depending upon farming for survival. 25% are under poverty rate and they have little or no access to primary health care, lack safe drinking water, lack proper sanitation and other basic services [9]. Government of Nepal is distributing antihelminthic drug (under de-worming program) free of cost. However, intestinal parasitic infection still has a high prevalence as shown by researches conducted in various districts of Nepal [10-13].

Parasitic infection, which is a common problem of people of backward society, has a greater effect on children, hindering their health, growth, education and overall development. It is hence relevant to find out the prevalence of infection and take the necessary step to reduce parasitic burden on children, who are still in the developing phase of life. Therefore, the present study will help to determine the prevalence rate of intestinal parasite in rural community school children of Lokhim VDC, where such kind of study had never been conducted before.

Materials and Methods

Study area

This descriptive, cross sectional study was conducted from 15th February to 14th July 2016 at "Janata Secondary School" in Lokhim VDC, located on the Eastern Development region of Nepal. Lokhim VDC is the most remote VDC which lies in the east at the border of Khotang district. This is an under developed VDC with people having low socio-economic status, lack of health education and insufficient government facilities.

Study subjects

Students of Grade I to Grade X were included in the study. Written consents were taken from the principal and guardians. Students willing to participate were properly instructed for stool sample collection procedure. A labeled plastic container with lid was provided to each participant by the class teacher under our direct observation and sample was submitted to us by the next morning.

Stool collection and examination

A total of 359 fresh stool samples were collected from participants. Each student was advised to bring 2-3 gm of fresh stool, collected in clean, dry and leak proof plastic container. The samples were processed and examined inside the temporary laboratory established at Janata Secondary School. The slide was prepared by using Normal saline and Lugol's Iodine. Examination of the wet mount was done by conventional light microscopy. Smear was first observed under low power (10X) then under high power (40X) for examination of ova, cysts and larvae.

Ethical clearance

This study was approved by Nepal Health Research Council (NHRC), Kathmandu, Nepal.

Statistical analysis

Data were entered in SPSS version 16.0 software. Statistical analysis was done by using X^2 test**.** The 'P value' of <0.05 was taken as significant.

Results

The present study included a total of 359 students (185 boys and 174 girls). The age range of study subject was 4-16 year. Overall intestinal parasitic prevalence was found to be 30.92% (Table 1). Of 111 positive cases, protozoan parasites were found in 66.66% while helminthcs parasites in 33.33%. Among them 14.8% were found to have mixed infection (more than one parasitic co-infection). The prevalence of protozoan and helminthcs infection was 20.61% and 10.3% respectively. The protozoa: helminthic ratio approximated to 2:1.

Giardia lamblia was found to be the most prevalent parasite 13.92%(n=50) followed by *Entamoeba histolytica* 6.68%(n=24), *Hymenolepis nana* 2.79%(n=10), hook worm 2.5%(n=9), *Ascaris lumbricoides* 2.23%(n=8), *Trichuris trichiura* 0.84%(n=3) and *Enterobious vermicularis* 0.28% (n=1). The mixed infection was found 4.2% (n=15) (Figure 1).

The prevalence of parasites in female students (33.90%) was higher than in male students (27.56%), P value >0.05 (Table 2).The prevalence was found to be highest in the age group of 6 to 10 years (33.82%) in comparison the two other age groups (Table 2 & 3). The differences, however were statistically insignificant (P value >0.05).

Table 1: Prevalence and distribution of intestinal parasites.

S.No	Intestinal parasites	Frequency	Prevalence %	Positive %
I	Protozoa	74	20.61	66.66
ii	Helminthcs	37	10.3	33.33
iii	Mixed Infection	15	4.2	14.8
Total		111	30.92	

Table 2: Gender wise distribution of intestinal parasite among school children.

Gender	Total Case	Negative	Frequency	Prevalence %	X^2 Test (P -Value)
Male	185	134	51	27.56	
Female	174	115	59	33.9	0.19
Total	359	249	111	30.92	

Table 3: Age wise distribution of different intestinal parasites and pair wise comparison between different age groups.

Age Range	Age Groups	Total	Frequency	Prevalence %	P-Value
< 6 years	< 6 vs. 6-10	39	9	23.07	0.14
6-10 years	6-10 vs. > 10	136	46	33.82	0.27
>10 years	< 6 vs. >10	184	56	30.43	0.21

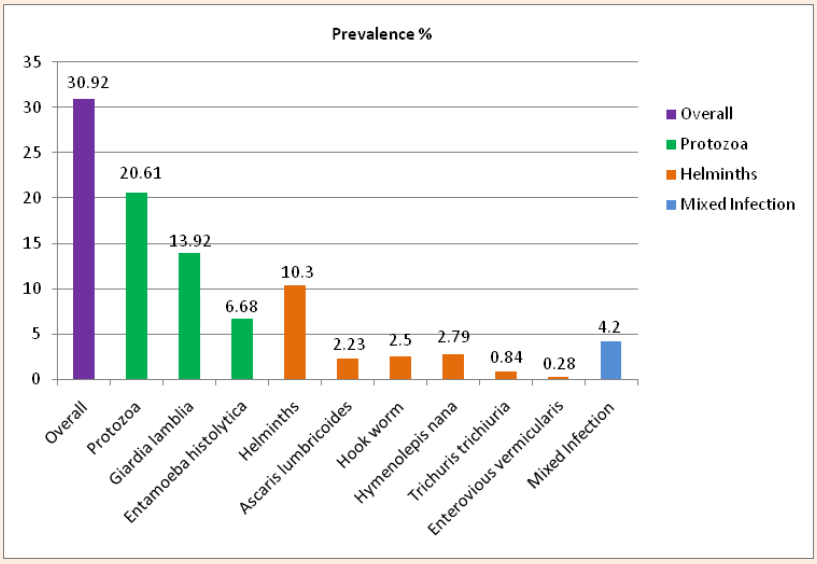

Figure 1: Prevalence percentage of intestinal parasites.

Discussion

In the present study, the overall prevalence of intestinal parasitic infection among school children was found to be 30.92% (n=111). This finding is comparable to the findings observed in various parts of Nepal, like 31.13% in Dadeldhura [11], 23.3% in Chitwan [10] and 43.3% in a sukumbasi basti (a slum area occupied by homeless people) of Kathmandu valley [14]. Such kind of high prevalence might be due to major factors like, low socioeconomic status, lack of education, lack of proper health facility etc.

Giardia lamblia was the most commonly detected parasite in our study with the highest prevalence rate of 13%, which is higher than that of Baglung district 5.76% [15], Dadeldhura district 7.47% [11] and a remote village in western Nepal named Dhungar 11.1% [16]. This rate is also higher than that of other countries such as Palestine 4.1% [17] and Thailand 1.7% [18]. The prevalence, however, is lower than that of Pakistan 28.9% [19]. This high prevalence may be due to consumption of untreated drinking water and also due to poor hygiene habits, improper hand washing and lack of awareness.

The second and the third most prevalent parasites in this study were *E. histolytica* 6.68% and *H. nana* 2.79% respectively. The prevalence of *E. histolytica* in our study was found to be lower than that in Baglung 9.23% [15], Kathmandu valley 20.7% [14], Chitwan 11.1% [10], Biratnagar hospital 44.86% [20]. The prevalence is higher than that in countries like India 3.9% [21] and Thailand 0.3% [18]. *H nana* prevalence in our study is found to be higher than that in Bhaktapur 0.81% [22], lower than that in Dadeldhura 46.56% [11] and Biratnagar 3.34% [20]. This difference also could mainly be due to environmental factors and living conditions.

On the basis of gender, the parasitic prevalence rate in female children was higher than that in male children. The difference, however, was statistically insignificant. This finding is similar to the finding of study conducted in Chitwan 24.8% female and 21.8% male [10] respectively and is also similar to Malaysian female 66.3% male 58.5% [23]. The relatively higher prevalence in females might be mainly due to the general trend in this orthodox society where females do more household and soil related works than males.

Owing to the facts that like majority of the Nepalese villages, people of Lokhim VDC also have low socio economic status, lack of education, unhygienic drinking water, lack of health awareness, less access to government health services and programs, high parasitic prevalence in such people is evident. In order to control helminthic infection, although Nepal Government has been conducting deworming program every six months in this VDC, but despite this, high prevalence of helminthes exists. This may be due to difficulty in complete removable of helminthes by single dose therapy [10] or due to other factors like consumption of untreated drinking water from natural source, spending much of their time in fields and soil related works, using bare hands to prepare and eat food, using hand and water to clean anal area after defecation and improper hand washing.

Due to various constraints, better test conditions like sophisticated microscope, concentration methods, and triple sample examination, were not possible in our laboratory set up. The sensitivity of the test would have been even better had these conditions been possible. A larger scale study with more sensitive methods should be conducted in order to prove the present result statistically.

Conclusion

In spite of government effort, the intestinal parasitic prevalence rate among school going children in Lokhim VDC is still high. Both protozoan parasites and helminthes have been found to inflict the children. Thus, in addition to the long term policies and deworming programs the government should also immediately implement strategies like health awareness program, regular screening and distribution of anti-protozoan drugs.

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