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Research Article

Intestinal Parasite Infection among School Going Children in Kathmandu Valley

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Abstract

Background: Presence of easily available medication and treatment intestinal parasites still being a major contributing factor of children diarrhea.

Methods: A total of 445 stool samples were collected from different school of Kathmandu valley. The stool samples were examined for evidence of parasitic infections by direct microscopic examination and further confirmed by concentration methods, carried out by formal-ether sedimentation technique and floatation technique by using Sheather's sugar solution, for the coccidian parasites modified Ziehl-Neelsen (ZN) staining was performed.

Results: Prevalence of intestinal parasites was found to be 16.5 %. The highest prevalence was seen with *Giardia lamblia* 44 (58.7%) followed by Entamoeba histolytica 12 (16%), *H. nana* 9 (12%), *A. lumbricoides* 4 (5.3%) respectively. The highest prevalence (20.3%) of parasites was seen in age between 5-10 years (p=0.025). **Conclusions:** Despite the fact that periodic surveillance of school children for intestinal helminthiasis and public health activities of periodic deworming programme reduces intensity of intestinal worm infection among school children but there is significant infection caused by protozoans.

Keywords: Giardia lamblia; Stool parasite; Nepal; School going children

Introduction

Treatable and preventable parasitic infection is still being major public health problem in developing world like Nepal. Intestinal parasites are responsible for morbidity and mortality worldwide, especially in low-income countries and in people with other diseases [1]. It is estimated that some 3.5 billion people are affected, and that 450 million are ill as a result of these infections, the majority being children [2]. The high prevalence of these infections is closely correlated with poverty, poor environmental hygiene and impoverished health services [3-5], causes common infections of school age children in developing countries [6]. The public health importance of gastro-intestinal tract parasites is due to their high morbidity in school children and women during their child-bearing years. Children are the most affected due to the heavy infections they harbour and because of their vulnerability to nutritional deficiencies [7,8]. Three fact ors that separate the developing world from the developed world are access to safe drinking water, sanitation, and nutrition [9].

Efforts to control parasitic infections in developing countries typically focus on periodic anti-helminthic treatments targeted at specific risk groups, *e.g.*, schoolchildren. Nevertheless, reinfection in endemic areas is continuous [10]. The high prevalence of infection in children is attributed to the economic and social situation of the individuals which is the important cause of the prevalence of intestinal parasites [11]. Public health specialists are concerned that these infections impair children's growth and development [12]. The distribution and prevalence of various species of intestinal parasites also differs from region to region because of several environmental, social and geographical factors [13]. In Nepal, 50% of diarrhoeal diseases among children is due to parasites, diarrhoea being major killer of Nepalese children. The prevalence ranges from 32.6% to 72.4% among school children, provided majority of studies done in Kathmandu and rural hills [14].

Several studies has been conducted throughout the country, however it silent being major public concern. Still today, numerous studies showed variable out come with decreasing fashion of the parasitic infection therefore the study tries to explain the existing prevalence in the Kathmandu valley.

Material and Method

Survey area and period

The study was carried out in Public Health Research Laboratory, Maharajgunj, Kathmandu, Nepal, during January 2014 to July 2014. Stool samples were collected from different school of Kathmandu valley from aged under 15 years with or without having symptoms of diarrhea.

Sample collection, storage, transport, selection/rejection criteria

Stool samples from children were collected in a clean and sterile screw capped container and simultaneously data were collected and brought immediately to the laboratory. Upon arrival the stool samples were processed according to the standard laboratory methods. The sample was collected in a sterile screw capped container from the respective school children according to WHO guideline and was immediately transported to the laboratory by maintaining cold chain.

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Data collection methods

Samples were collected on the basis of simple random technique. Questionnaire after getting oral consent from care taker a short questionnaire was taken from both symptomatic and asymptomatic children.

Study variables

Age, sex, ethnicity, clinical symptoms, sanitation, socio-economic status e.t.c.,

Laboratory processing of samples

The stool samples were examined macroscopically for the presence of blood, mucus and adult or larvae of helminthic parasites. The color and consistency of the stool samples were also observed at the same time. Microscopic examination was the part of the study and carried out for the detection of oocyst, cyst, trophozoites, of protozoa and the detection of larva or eggs of helminthes. The detection was carried out at low power (10x) followed by high power (40x) of the microscopes, the suspected and possible parasite was observed under microscope by wet mount and iodine staining with special preference for C. cayetanensis. This preparation was done to examine the ova and cyst of the parasite. On the other hand, it was also helpful for the examination of red blood cells (RBC) and white blood cells (WBC) in faeces. The *C. cayetanensis* thus observed was confirmed by modified Zeihl Neelson staining.

Data analysis

Analytical statistics was used to analyze the data to show association between intestinal parasitic infection and predisposing factors by using chi-square test and other relevant statistical tools. Clinical data from each patient were collected by using a questionnaire and statistical analysis was performed with MS Excel and SPSS 11.5.

Results

A total of 455 samples were collected, of the total collected sample, 246 were male children and 199 were female children with male to female ratio of 1.2:1. Highest positive percentage of cases was found in female (18.6%) which was statistically not significant at 5% degree of freedom (Table 1).

Age distribution among total and positive cases

Of the total cases 455, the highest cases belong to age group 5-10 year and highest percentage positive cases were also in same age group (20.3%). The data was statistically significant.

Out of total samples, 450 samples belonged to private schools, 475 samples belonged to government schools and 467 samples belonged to community schools. The highest cases of 170 (35.8%) were found to be infected with entero-parasites in children of government school with prevalence of 12.2% (Table 2).

There were different types of water user among them highest parasite positive cases were found in the children who used tap water (21.8%) for drinking purpose (Table 3).

Among total 75 stool parasites positive cases, the commonest intestinal parasite found was *Giardia lamblia* 44 (58.7%) followed by *Entamoeba histolytica* 12 (16%), *H. nana* 9 (12%), *A. lumbricoides* 4 (5.3%) respectively was shown in (Table 4).

Table 1: Gender distribution among total and positive cases.

Gender	Total cases	Positive cases (%)	P value
Male	246 208	38 (15.4)	0.38
Female	199 162	37 (18.6)	
Total	455	75 (16.5)	

The chi-square statistic is 0.7769. The *p*-value is .378099. The result is *not* significant at $p < .05$.

Table 2: Age distribution among total and positive cases.

Age in years	Total cases	Total positive cases (%)	P value
>5	91 84	7 (7.6)	0.025
5-10	217 173	44 (20.3)	
10-15	147 123	24 (16.3)	
Total	455	75 (16.5)	

The chi-square statistic is 7.3792. The *p*-value is .024982. The result is significant at $p < .05$.

Table 3: Total and positive cases on the basis of source of water.

Source of water	Total cases	Positive cases (%)
Filter	101	19 (18.8)
Tap	197	43 (21.8)
Well	27	5 (18.5)
Jar	75	8 (10.7)
Boil	38	0
Pump	7	0

Table 4: Distribution of total stool parasites.

Stool parasites	Total positive cases (%)
G. lamblia	44 (58.7)
E. histolyitca	12 (16)
H. nana	9 (12)
A. lumbricoides	4 (5.3)
E. coli	3 (4)
C. parvum	1 (1.3)
T. trichiura	2 (2.6)
S. stercoralis	1 (1.3)
C. cayetanensis	3 (4)
Trichomonas Vaginalis	1 (1.3)

The study showed mixed infection between protozoa and protozoa (9.3%) and helminthes and protozoa (2.6%) (Table 5).

Of the total number of children for the study, only 117 were of having clinical symptoms of diarrhea followed by without having any symptoms 359. The highest intestinal parasites were seen children with clinical symptoms i.e., 22.2% than in patients without having symptoms i.e., 14.9% (Table 6).

Discussions

The intestinal parasites are among the most common infections of school age children in developing countries [15]. Despite the fact that the infection rate gradually decreasing but it is still major public health problem in country like ours. However, the easy accessible treatment and low cost medication are available; children from developing nation are still highly affected by parasitic infection.

Table 5: Distribution total stool parasites in mixed infection cases.

Mixed infection	Total positive cases (%)
Helminthes + Protozoan	2 (2.6)
Protozoan + Protozoa	7 (9.3)

Table 6: Distribution of cases and positive cases on the basis of clinical symptoms.

Clinical symptoms	Total cases	Positive cases	P value
Yes	117 91	26 (22.2)	0.07
No	328 279	49 (14.9)	

The chi-square statistic is 3.2644. The *p*-value is .0708. The result is *not* significant at $p < .05$.

Hence, the study tried to demonstrate the prevalence rate of parasitic infection in Kathmandu valley i.e., 75 (16.5%); which was lower than previous study done [16-18]. Though the male and female are equal chances to harbor the parasites but in developing countries, gender bias is major problem due to the reason infection rate seems to highest in female (18.6%) than male (15.4%) (p=0.38). This might be due to the reason; female children are less likely to take for medical treatment than the male children.

In this study, we found different type of parasites including both helminthes and protozoan. Trend of the study showed that helminth infection was on decreasing fashion than the protozoan. The higher prevalence of protozoa was found to be 14.06% in comparison to helminthes 2.4%; was in agreement with the previous findings [16-18]. In urbanized countries, protozoan parasites commonly cause gastrointestinal infections in contrast to helminthes [19]. Despite global success in the reduction of all cause and diarrhea-specific mortality in the past 30 years, diarrhea remains the second leading cause of death due to infections among children under five years of age worldwide [20]. These protozoan parasites can be transmitted orally by drinking contaminated water.

In this study, the most frequently seen protozoal parasite was *Giardia lamblia* with prevalence of 58.7% followed by that of *Entamoeba histolytica* 16%. In Nepal protozoal infections, amoebiasis and giardiasis are most frequently reported [21-23]. The water supply is really an important risk factor for protozoan infections several large outbreaks of Giardiasis have resulted from the contamination of municipal water supplies with human waste [24]. Cysts and oocysts not only remain infective for long periods in environment but are also resistant to the conventional treatment processes of water, representing a serious problem of public health [25-26]. Most of the children enrolled were age of 5-10 years among them significantly higher parasites positive cases were detected in same age group holding 20.3% (p=0.025). In this age most children are fascinated outdoor food and drinks. Highest mixed infection was also seen in protozoa and protozoa (9.3%), in addition of that parasites were in seen in both symptomatic and without having symptoms i.e., 14.9%.

Intestinal parasitic infection is still major public health concern though the study showed the decreasing trend. The study of parasitic infections in different populations is necessary to develop effective prevention and control strategies.

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