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Research article

Intestinal parasites in Meche community in relation to their socio-economic status

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ABSTRACT

Background and Objectives: Intestinal parasites still establishes one of the important causes of public health problem in world, especially in developing countries like Nepal. The aim of the study is to determine the prevalence of intestinal parasites in Meche community of Jalthal Village Development Committee of Jhapa district in relation to their socio-economic status.

Material and Methods: Study was carried out during June to July 2017 in Meche community of Jalthal Village Development Committee of Jhapa district. A total of 150 human stool samples were randomly collected and examined using direct smear and concentration methods (sedimentation and flotation technique).

Results: Among total samples the prevalence of intestinal parasites in Meche community was 27.33%. Prevalence rate in females were higher 32.47% than in males 21.91%. There was no significant difference in the distribution of parasites between male and female (χ^2=1.6022, df=1, p value=0.2056). The prevalence of the parasites was maximum in the age group 21- 40 years (47.22%). Altogether 5 species of the intestinal parasites were detected. Among them *Ascaris lumbricoides* (19.33%) topped the list followed by *Taenia solium* (2.67%), Hookworm (2.67%), *Entamoeba coli* (2.67%) and *Trichuris trichiura* (2%).

Conclusion: The high prevalence of infection in community seems directly related to un-hygienic living condition, unsafe drinking water, unhygienic food, lack of health education, poor sanitary condition and low socio-economic status help to increase the burden of the infection in the community.

Key Words: Intestinal parasites, Infection, Meche people, socio-economic status

INTRODUCTION

Intestinal parasites are cosmopolitan in distribution. Intestinal parasitosis still establishes one of the important causes of public health problem in world, especially in developing countries like Nepal. Around 3.5 billion people globally are estimated to be affected by intestinal parasitosis and 450 million are sick as a result of these infections, the majority being children [1]. Intestinal parasitic disease is one of the global health burdens in many developing countries mainly due to fecal contamination of water, lack of adequate basic sanitation and environmental and socio-cultural factors enhancing parasitic transmission [2, 3]. More than one billion people are estimated to chronically infected

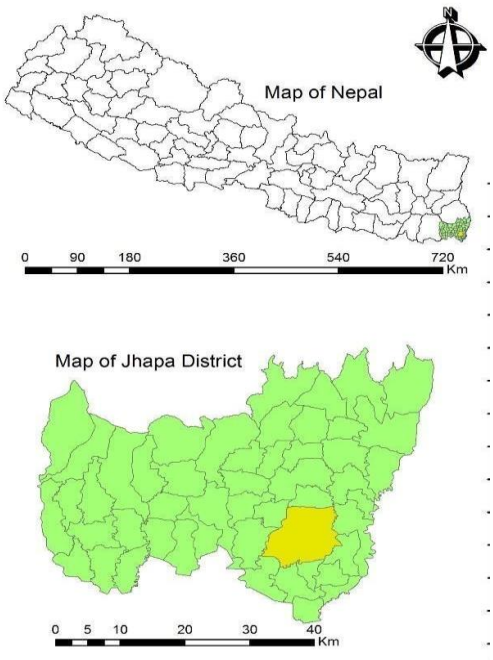
with intestinal helminthes[4]. Among the intestinal parasitic infections, ascariasis, hookworm infection and trichuriasisare reported as the most common infection in the world, being responsible for considerable morbidity and mortality. Besides of causing morbidity and mortality, intestinal parasitic infections have been associated with physical weakness and low educational performance of the poor segments of the populations and intimately linked with low economic status, poor personal and environmental hygiene, tropical climate and low altitude[5].

Nepal is small and impoverished country situated in the south Asia, with infectious disease, including intestinal parasitosis, with high prevalence rate[6]. Particularly in rural area of Nepal, open air defecations are common that enhance the parasites to invade into individual. In Nepal, over 70% morbidity and mortality rate concern with intestinal parasitic infection and is also reflected in "top ten disease of Nepal"[7]. *Ascaris* has remained as a leading human parasite in Nepal[8]. Diarrhea is caused by variety of etiological agents but of them intestinal parasitic infection alone contributes to a great extent in the cause of diarrhea and is one of the most common public health problems in Nepal[9].

It is reported that the prevalence of the intestinal parasites in Nepal varies considerably from one study to another study and reaches nearly 100% in some tropical areas.[10,11] In Nepal, children are more commonly infected than adults.[11,12] The intestinal helminth commonly reported from Nepalese children are *Ascaris lumbricoides,* hookworm and *Trichuris trichiura.*[13] The agents spread faeco-orally through contaminated sources.

MATERIAL AND METHODS

The study was conducted in JalthalVDC which lies in Jhapa district. Jhapa district is situated in terai region of eastern belt of Nepal. Jalthal is located in the southern part of the Jhapa district extending from Mahespur VDC in the east to Rajgadh VDC to the west with the location 26° 7'01.24" N and 87° 562' 7.62" E to 26° 3133.14' N and 88° 0257.37' E. The study population comprised of Meche people residing in the Jalthal VDC of Jhapadistrict which is least developed rural area. The total population of Meche in national context is 4,380, of which 4,076 reside in Jhapa district[14]. Jalthal VDC includes 9 wards in which 3, 4, 5,6,7,8 and 9 wards are inhabited by Meche people. Out of 13,363 population of Jalthal VDC, 10 and 11 are Meche people[15]. Mecheare mainly called Bodo, who mainly inhabit in Jalthal and Dhaijan VDCs of Jhapa [16]. The main occupation of the Meche people is agriculture and alcohol making by traditional method.



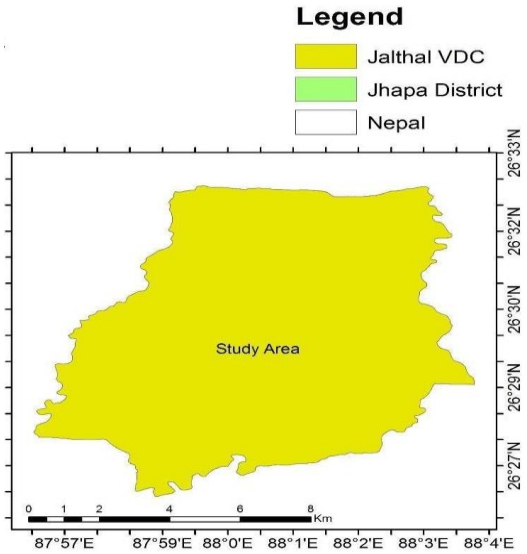


Figure 1: Map of study area.

Fecal sample collection and examination

Total sample size of the study was 150, which included the stool samples of Meche people of different age and sex. After proper instructions, vials were given to the people regarding collection of the stool sample, they were given sterile labeled vials and application sticks. A questionnaire pertaining Knowledge Attitude and Practice (KAP) and socioeconomic status of people was done at time of sample collection. The collected stool samples were preserved in potassium dichromate (2.5%) solution for further investigation of eggs, larva and adult of intestinal parasites. The microscopic examination was done by unstained preparation of stool smear, stained preparation of stool smear and concentration (Differential flotation technique and Sedimentation technique) methods. All the positive finding was noted. Eggs and cyst were measured by using ocular and stage micrometer. Association of intestinal parasites with age, sex, occupation, drinking water etc. were assessed by using "R", version 3.3.1 software packages.

RESULTS

Results of stool examination

Out of 150 sample examined, the general prevalence of the intestinal parasites was found to be 41 (27.33%) (Fig 2). Specific gastro intestinal parasites identified in the study were namely *Ascarislumbricoides* (19.33%), *Entamoeba coli* (2.67%), *Taeniasolium* (2.67%), Hookworm (2.67%) and *Trichuristrichiura* (2%) (Fig 3). Of total positive samples, protozoan parasite was observed in 9.75% cases (Fig 4) whereas helminth were observed in 97.56% cases (Fig 5). A total of 73 samples examined from male and 77 sample from female, 21.91% and 32.47% were found to be positive for male and female respectively(fig 6). There was not significant difference in the distribution of parasites between male and female (χ^2=1.6022, df=1, p-value= 0.2056). Single infection was seen in 92.68% cases whereas only 7.32% samples were detected to have double infection (Fig 7). Age wise distribution of parasites in study population was maximum (47.22%) in age groups 21-40 and minimum (20.51%) above 41 years old age group(Table 1).Parasitic infection among age group was found to be statistically significant (χ^2=5.999, df = 2, pvalue=0.0498).

Results of questionnaire survey analysis

Meche people were interviewed on the basis of the parasitic infection, knowledge of the transmission, control and prevention of the parasites. According to the occupation, prevalence of infection was found to be maximum (32.59%) among students, minimum among the drivers (20%) whereas business man and teacher did not show any infection (Fig 8). There was not significant

difference according to occupation ($\chi 2=4.2039$, df=5, p-value=0.519). The prevalence was found higher (30.77%) among the people who had livestock and domestic animals while 15.15% was found in peoples who didn't have livestock and domestic animals (Fig 9). No significant difference was observed among infected people on the basis of livestock and domestic animal owner ship ($\chi^2=2.4235$,df=1, pvalue=0.12). It was found that most of the people who believed in traditional method (Dhami, Jhakri) were found to be highly infected (42.31%) and those consulting with doctors showed minimum infection (12%) (Fig 10). There was no significant difference in the prevalence of intestinal parasites on the basis of treatment method ($\chi^2=5.895$, df=2, p-value=0.0525). The parasitic infection was found to be maximum (42.86%) in those who used soil and water as cleaning agent to clean hands and minimum (21.50%) in those people who used soap and water as cleaning agent (Fig 11). There seems significant difference in the prevalence of the intestinal parasites according to the different agent for cleaning hands ($\chi^2=6.445$, df=2, pvalue=0.0399). Out of 150 people, 70% were unaware and 30% were aware about the infection of the parasites. The infection was found higher (30.48%) among unaware and lower (20%) among aware people (Table 7). Statistically, distribution of parasites between aware and unaware people was not found significant ($\chi^2=1.253$, df=1, p-value= 0.263). Among 134 non-vegetarian, 28.36% were infected whereas 18.75% showed infections among 16 vegetarian (Table 8). The distribution of the parasite between vegetarian and non-vegetarian was not significant ($\chi^2=0.269$, df=1, p-value=0.604). The prevalence rate was higher (85.37%) among those people who directly drink water without treatment and lower (14%) in those who drink water after filtration while respondent drinking boiled water didn't have any infections. Significant difference was seen in the distribution of intestinal parasites on the basis of water treatment method ($\chi^2=14.392$, df=2, p-value=0.00075).

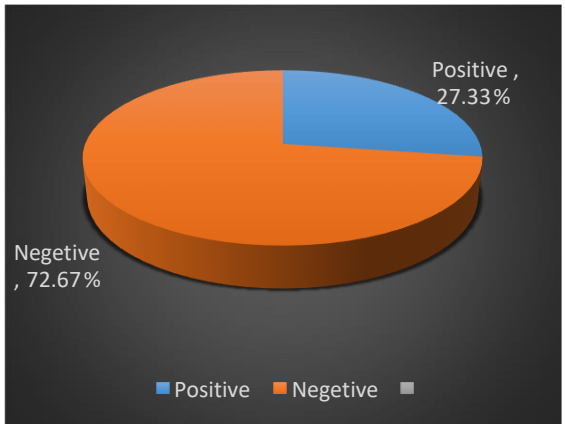


Figure 2:General prevalence of intestinal parasites

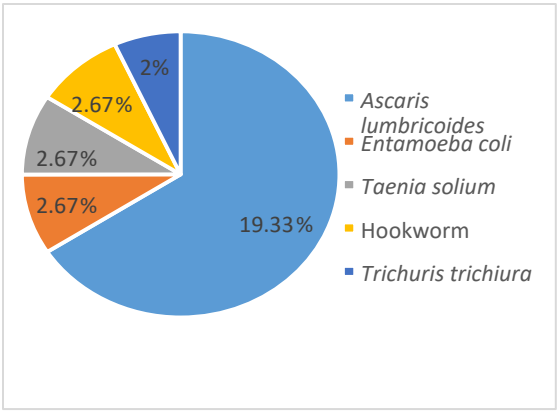


Figure 3: Prevalence specific intestinal parasites

Table 1: Age group-wise Prevalence of Intestinal Parasites

S.N.	Age	Total no. of samples	+ve cases	+ve %
1.	1-20	45	16	35.56
2.	21-40	36	17	47.22
3.	< 41	39	8	20.51
	Total	150	41	27.33

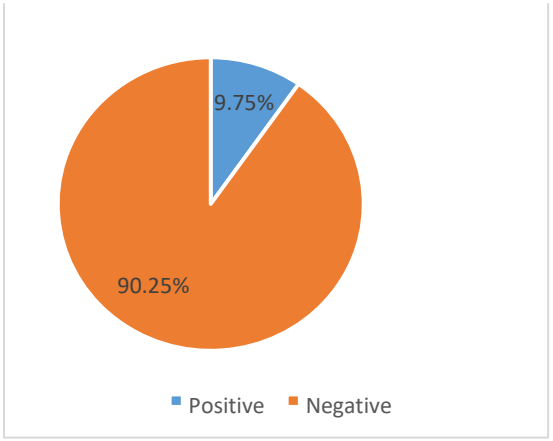


Figure 4: Distribution of protozoan parasite

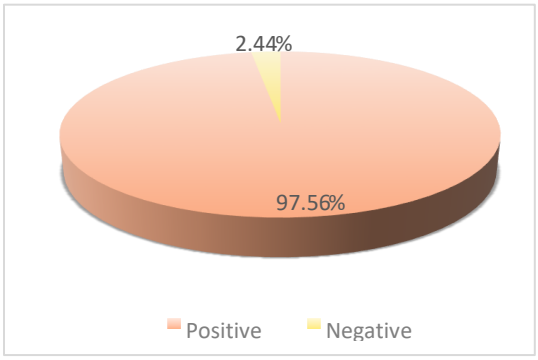


Figure 5: Distribution of helminth parasites

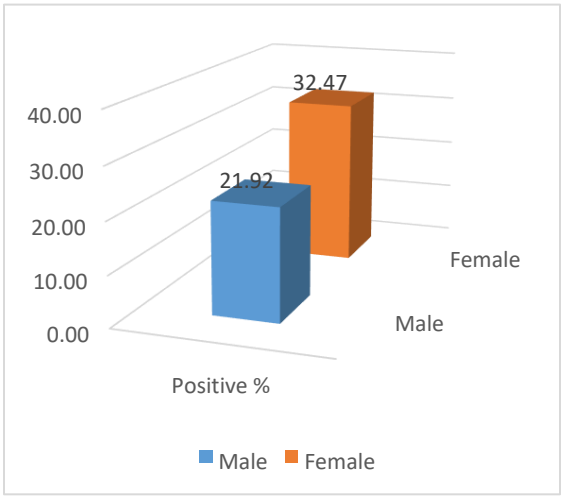


Figure 6: Sex-wise Prevalence of Intestinal Parasites

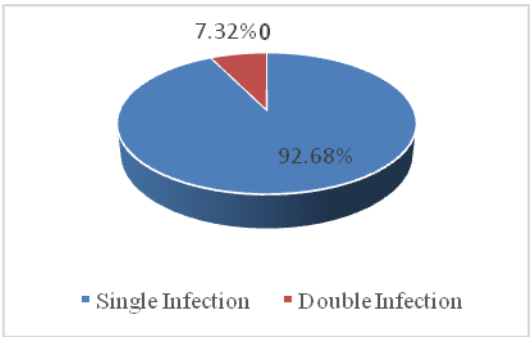


Figure 7: Overall concurrency of intestinal parasites

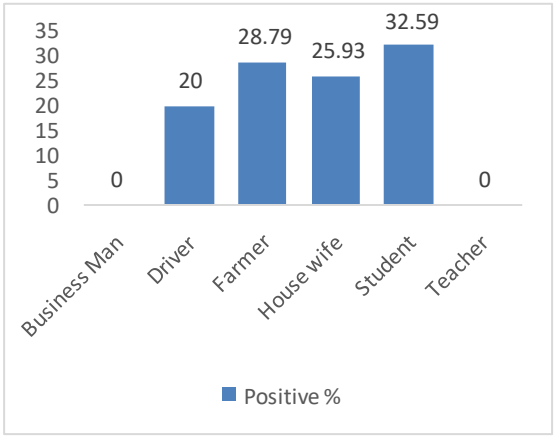


Figure 8: Occupation wise prevalence of intestinal parasites

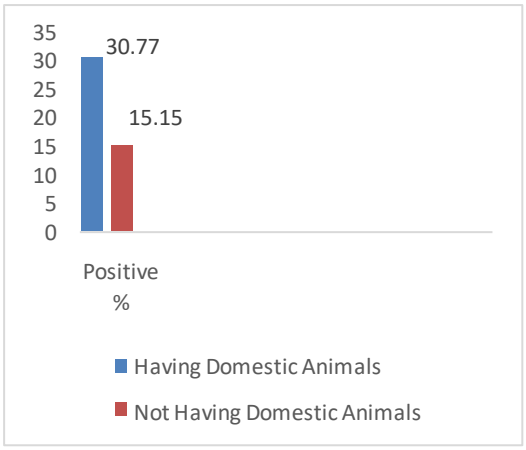


Figure 9: Livestock and Domestic Animals Ownership-wise Prevalence of Intestinal Parasites

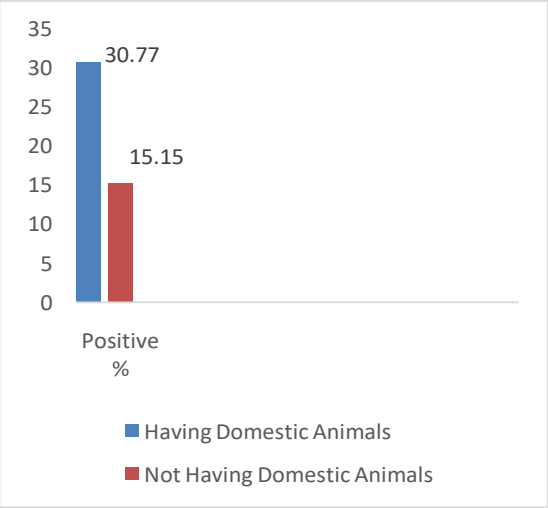


Figure 10: Treatment Method-wise Prevalence of Intestinal Parasites

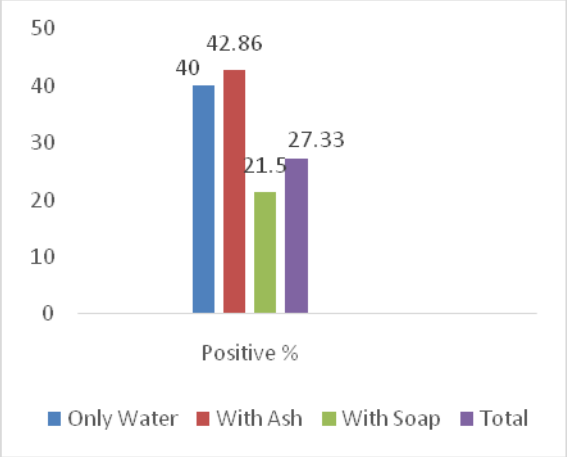


Figure 11: Hand washing wise Prevalence of Intestinal Parasites

Table 2: Knowledge towards intestinal parasites among Meche people

Sex	Respondent	Aware		Unaware	
		No.	%	No.	%
Male	73	22	9.1	51	27.45
Female	77	23	30.4	54	33.33
Total	150	45	20	105	30.48

Table 3: Prevalence of Intestinal Parasites on the basis of Food habit

Sex	Vegetarian		Non-vegetarian	
	No.	Infected (%)	No.	Infected (%)
Male	12	25.0	61	21.31
Female	4	0	73	34.25
Total	16	18.75	134	28.36

DISCUSSION

Intestinal parasites are present throughout the world in various degree of prevalence and are the major health problems in areas where there is overcrowding, poor environmental sanitation and personal hygiene practice especially in developing countries [17]. The overall prevalence of intestinal parasites in the present study was found to be 27.33% which is slightly similar to the results which have also recorded the same prevalence with minor differences [18-26]. In contrast, some studies reported higher prevalence than present study [7, 27-35]. These differences might be due to the place and time differences of the study, health, awareness, education and living standard of people.

The present study recorded higher prevalence as compared with the study of different authors [9, 36-42]. The high prevalence of the intestinal parasites may be attributed to the lack of health education, hand washing behavior, farming profession and non-vegetarian food habit. Most of the vegetable farmer use human excreta as manure which might be the potential source of the infection since farmers go to the farm to tender vegetables.

Among the Meche people the most prevalent intestinal parasite recorded was *Ascaris lumbricoides*(19.33%) which is similar to the works which also reported *Ascaris*

lumbricoides as most predominant parasites[10, 22, 26-27, 36, 39, 43-49]. This may be due to the water contamination with helminth eggs in the locality, inadequate agent for washing hand after defecation and low economy of poor farmers who usually work bare foot in farm.

The present study revealed more prevalence of the helminths than protozoan parasites. The findings of this study matched with finding which reported helminth parasites as more prevalent than protozoan parasites from Banglore, India[18], Sunsari, Nepal [43], Sarlahi, Nepal [46] and Southern Ehiopia[50]. Other helminthes recorded in present study are Hookworm (2.67%), *Taenia solium* (2.67%) and *Trichuris trichiura* (2%). These parasites were also reported from Greek [40] and Abia state, South [51]. This study presents that single infection was found to be maximum (92.68%) than double (7.32%) parasitic infection. Similar finding was reported [39, 44, 52]. This might be indication of the condition of insanitary environment, poor living condition, lack of health education associated with poverty, lack of clean water and personal hygiene.

Entamoeba coli was the protozoan parasites recorded in this study which contribute to 2.67% of total infection, is generally non-pathogenic but sometimes it causes diarrhea and its prevalence could be due to faecal contamination of drinking water which in turn shows poor sanitary practices. Present study is in agreement to the work done from school children of Central Region of Thailand [2], Kathmandu[53] and South Chennai, India [54].

Gender-wise parasitic infection rate was found slightly more common in females (32.47%) than in males (21.91%) which agrees with the findings [35, 48]. Slightly higher prevalence of parasites in female than in males was reported from, children in Pokhara, elsewhere in Nepal, Chitwan, Nepal[55], Kanti children Hospital Kathmandu [56], Bhusenyi district, Western, Uganda [57] and African urban slum in Nigeria and North-west, Saudi Arabia[58]. The risk factors for high prevalence of parasites among females include lower educational status, their involvement in child care as well as other household works [52] and consuming raw vegetables.

Based on the age of the people included in study, the infection was found higher in the middle age group 21-40 (47.22%) and lowest among the elder people (20.51%) which is slightly similar to the report.[51] The people showing higher prevalence are those involved in farming and house hold activities. On the other hand people of (1-20) years showed high prevalence (35.56%) compared to elderly people. This age group include school children who are generally highly infected as a result of age and lack acquired immunity [59, 60]. The present study is different from the reports of studies done among the school going children which showed high prevalence among the school going children under 15 years of age [38,41,61]. The finding of the present study showed the higher prevalence (28.36%) among the non-vegetarian and lower among vegetarian (18.75%) which is supported by the study of which reported higher prevalence of parasites among non-vegetarian [21,38,62,63]. This might be due to consuming infected raw and improperly cooked meat [21]. However the study showed high prevalence among the vegetarian patient of cataract surgery at the eye camps in the rural hilly areas of Nepal [64].

In the present study, the infection was found higher (42.86%) among those people who use soil and water as hand cleaning agent which seems similar to the resultwhere higher prevalence among those using soil/ mud and water as hand cleaning agent was reported[12,22,65]. This study reflects that the highest percentage (85.37%) of positive cases of parasitic infection was found in those who used direct tube well water without any treatment which is supported by the finding [65]. This study highlights that prevalence was found maximum (30.77%) in the people having livestock and domestic mainly pig, duck, cow, goat, hens, which is supported by the results [21,22] who also reported high prevalence in people having livestock and domestic animals. This might be due to the insufficient sanitary conditions, lack of personal hygiene and having nearby livestock and domestic animals.

Most of the respondent (70%) in this study are unaware about the intestinal parasitic infection among them 30% were infected by the intestinal parasitic infection whereas of 30% aware people, 20% were infected. Most of the people of the Meche community do not have any knowledge of means and modes of the parasitic disease transmission. This finding matched with the results [22,38,63]. The present study revealed that most of the people who believe in traditional method such as Dhami, Jhakri, were highly infected (42.31%) and people consulting doctors show lower prevalence (12%) of the parasitic infection which is supported by the results [21,63]. It is due to the lack of knowledge, attitude, cultural and behavioral variations.

CONCLUSION

Overall, the Meche people of the Jalthal VDC of Jhapa district are infected with various kinds of gastrointestinal parasites .Among helminth, *Ascarislumbricoides*wasmost domionant as compared to others whereas only one protozoan parasite i.e. *Entamoeba coli,* was detected in this study. The prevalence of intestinal parasites was slightly higher in student. Female revealed higher infections as compared to male. Similarly, unaware respondents are more infected than aware. The people who used soil and water as hand cleaning agent, who drink direct tube well water and who believed in traditional method of treatment showed high infections. It can be concluded that the high prevalence of intestinal parasitic infection in current study is due to the lack of health education program, poverty, lack of awareness, poor environmental sanitation, habit of consuming raw and uncooked food, drinking unsafe water and negligence of school aged students towards their personal hygiene.

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