



***Research Paper***

**PREVALENCE OF INTESTINAL PARASITIC INFECTION AMONG  
DIFFERENT SEX AND AGE GROUPS OF PATIENTS ATTENDING BIRAT  
MEDICAL COLLEGE, BIRATNAGAR NEPAL**

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**Abstract**

Intestinal parasitic infections are important public health problems, especially in the developing countries of world. Their distribution is mainly associated with poor personal hygiene, environmental sanitation and limited access to clean water. Indeed, epidemiological information on the prevalence of various intestinal parasitic infections in different localities is a prerequisite to develop appropriate control measures. To evaluate the gender-wise and age-wise prevalence of intestinal parasitic infection among the patients visiting Birat Medical College Teaching hospital, Biratnagar, Nepal. A total of 2423 subject were enrolled which consisted of 1456 males and 967 females were recruited for this study with age ranging from 1 to more than 66 years. Stool specimens were collected and examined microscopically for the presence of eggs, cysts and trophozoites of intestinal parasites using direct saline smear and formol-ether concentration methods. 795 (32.8 %) subjects were found to be infected with different parasites. Prevalence rates of infection were 58.4% for *Ascaris lumbricoides*, 33.6% for *Entamoeba histolytica*, 6.2% *Giardia lamblia*, 0.75% *Taenia solium*, 0.6% *Ancylostoma duodenale*, 0.25% *Strongyloides stercoralis*, 0.12% *Hymenolepis nana* and 0.12% *Trichuris trichiura*. The patients were mostly infected with *Ascaris lumbricoides* and *Entamoeba histolytica*. Parasitic infection was much higher in male (53.84%) than female (46.2%), and the difference was statistically significant ( $\chi^2 = 2.241.75$ ;  $p = 0.692$ ). We recommend that enlightenment programmes should be mounted in schools and the community so as to inform people about the hazards of intestinal parasites, and employ appropriate preventive and control measures against these harmful parasites. The important finding from this study is the existence of high prevalence of *Ascaris lumbricoides*, and *E. histolytica*. Overall, parasitic infections were more prevalent in this region of Nepal.

Key words: Helminthes, Intestinal parasites, protozoa prevalence, Stool specimen.

## INTRODUCTION

Intestinal parasites inhabit gastro-intestinal tract in humans and other animals [1]. World Health Organization estimates that intestinal protozoa and helminthes affect over two billion people in biosphere [2]. Infections with these parasites are of great public health concern especially in underdeveloped and developing countries [3]. Certain aspects such as behavioral, biological, environmental, socioeconomic and health system factors govern parasitic infections. Local conditions like quality of domestic and village infrastructure, economic factors, employment, occupation and education influence the risk of infection, disease transmission and associated morbidity as well as mortality [4, 5]. Intestinal parasitic infections, commonly seen in developing countries, are responsible for malnutrition, susceptibility to other infections, anemia and several other acute complications such as intestinal obstruction, appendicitis and peritonitis. [6, 7]. Contamination of water and food sources with human wastes and insufficient hygiene in addition are main cause of fecal-oral transmitted intestinal infections [8, 9, and 10]. Annually, 16 million deaths occur due to parasitic diseases worldwide [11, 12]. Parasitic diseases, therefore, create morbidity and sometimes mortality too. Estimations of these parasitic diseases thus become a matter of necessity for the surveillance of public health-care delivery and people's welfare. [13] We, therefore, aim to study prevalence of intestinal parasitic infections among different sex and age-groups of patients in Eastern Nepal. In the present study, approximately 32.8 % subjects suffered from intestinal parasitic infection and infection caused by *Ascaris lumbricoides* was 58 % with the incidence of about 74 % single infection in locality. We, therefore, conclude that the intensity of parasitic infections need vital treatment strategies and policy.

## MATERIALS AND METHODS

This was a hospital-based retrospective study conducted at Birat Medical College and Teaching Hospital (BMCTH), Biratnagar, Nepal, in patients between January, 2014 to December, 2015 to determine prevalence of intestinal parasitic infection among various sex and age-groups.

## SAMPLE COLLECTION AND PROCESSING

The inclusion criteria for patients were made as per the symptoms referable to GIT. The characteristic symptoms included abdominal pain, diarrhea, nausea or vomiting, gas or bloating, dysentery, stomach pain or tenderness, feeling tired, weight loss and passing worm in stool after proper instruction. Samples were collected, as per the recommendations and approval of the Institutional Ethical Committee, in cleaned wide-mouthed, screw-capped grease-free labeled universal containers and applicator sticks.

## EXAMINATION OF STOOL SAMPLES

Each of the specimens was examined macroscopically to check for its consistency and presence of blood or mucus and other abnormalities. Liquid specimens were examined within 30 mins after collection; semi formed stools within 60 mins to detect trophozoites. For microscopic examination, the specimens were processed using formol-ether concentration method and inspected under microscope for presence of intestinal parasites as previously described [14]. Briefly, about 1 g of faeces was emulsified in 4 ml formol saline and mixed. The mixture was sieved and 4ml of diethyl ether was added to filtrate and mixed. The mixture was centrifuged at 3,000 rpm for 1 min. The fecal debris was detached from side of the tube using an applicator and

supernatant was discarded. From the deposit, saline and iodine mounts were prepared and examined for attendance of parasites using 10X and 40X objectives [15, 16].

## DATA ANALYSIS

Collected stool samples were processed to check the existence of parasites and observations were recorded. After completion of the study, data were presented in the form of frequency and cross-tables. Chi-square test was employed to perceive the association of prevalence of parasites between males and females and the significance was tested in 95% confidence interval.

## RESULTS:

### MALES WERE DOMINANT SUFFERERS OF INTESTINAL PARASITIC INFECTION:

To assessing the prevalence of intestinal parasitic infection among different sex and age groups, a total of 2423 subjects were enrolled for investigation. Among the participants, males were more ( $n=1456$ ) compared to females ( $n=967$ ), suggesting that 60 % men and remaining 40 % women had intestinal discomfort. By contrast, we observed that 795 people had positive stool samples with demonstration of parasites. Around 32.8 % subjects, therefore, suffered from intestinal parasitic infection (2<sup>nd</sup> column; Table-1). Our findings, further, indicated that males were dominant ( $n=428$ ) equivalent to 53.8 % (3<sup>rd</sup> column, Table-1) than females.

**Table-1: Sex- and age-based prevalence of intestinal parasites in total numbers of patients**

Age-group (years)	Total no of stool samples examined = 2423		Positive stool sample (%) = 795 (32.8 %)		Significance Test
	Male	Female	Male	Female (%)	Chi-square = 2.241  P-value = 0.692
1-15	308	228	97 (12.2%)	78 (9.8)	
16-31	323	205	118 (14.9%)	94 (11.8)	
32-47	400	350	121 (15.2%)	101 (12.7)	
48-65	325	209	67 (8.5%)	65 (8.176)	
>66	100	75	25 (3.14%)	29 (3.64)	

*Ascaris lumbricoides* predominated the local infection in this region of Nepal.

There exist several parasites leading to intestinal infections. For example, the most common parasites leading to gastrointestinal infections include: *Entamoebahistolytica*, *Giardia lamblia*, *Ascaris lumbricoides*, *Ancylostomaduodenale*, *Taenia solium*, *Strongyloidesstercoralis*, *Hymenolepiis nana* and *Trichuristrichura*. We, therefore, ruled out the prevalence of infections caused by these parasites.

In our study, the infection caused by *Hymenolepiis nana* and *Trichuristrichura* was nearby nil. The infection caused by *Ascaris lumbricoides* was 464 i.e., 58 %. Among these, 255 males and 209 females were affected by the same parasite. The second most prevalent parasite was *Entamoebahistolytica* that had affected around 32.8 % people in this locality (Table-2).

**Table-2. Prevalence of intestinal parasitic infection by several parasites in males and females**

<u>Parasites</u>	<u>Male (%)</u>	<u>Female (%)</u>	<u>Total (%)</u>
<i>Ascaris lumbricoides</i>	255	209	464 (58.4)
<i>Entamoebahistolytica</i>	135	132	267 (33.6)
<i>Giardia lamblia</i>	33	16	49 (6.2)
<i>Taenia solium</i>	4	2	6 (0.75)
<i>Ancylostomaduodenale</i>	2	3	5 (0.6)
<i>Strongyloides stercoralis</i>	1	1	2 (0.25)
<i>Hymenolepis nana</i>	-	1	1 (0.12)
<i>Trichuristrichura</i>	1	-	1 (0.12)

**Table-3. Test of significance on prevalence of intestinal parasitic infection between males and females**

<u>Parasites</u>	<u>Male (%)</u>	<u>Female (%)</u>	<u>Test of Significance</u>
<i>Ascaris lumbricoides</i>	255	209	Chi-square = 4.947 P-value = 0.176
<i>Entamoebahistolytica</i>	135	132	
<i>Giardia lamblia</i>	33	16	
<i>Ancylostomaduodenale and Others</i>	8	7	

The significance test was employed to check whether there exist significance difference in prevalence of intestinal parasites between males and females by types of parasites. However, the results showed that there was no significance difference ( $p > 0.05$ ).

#### **SINGLE PARASITIC INFECTION WAS PREDOMINANT AMONG THE INFECTIOUS SUBJECTS:**

Gastrointestinal infection may be caused by one or more parasites simultaneously. We, therefore, assessed the pattern of infection whether it was single, double or triple. We found the frequency of infection caused by a single parasite was highest about 74 % ( $n=722$  out of 795 positive subjects), while the double infection remained only 9 % and, interestingly, the occurrence of triple infection was adjacently nil in our study.

**Table-4. Prevalence of intestinal parasites among positive stool samples**

<u>Pattern of infection</u>	<u>Infected cases</u> <u>Total samples = 2423</u> <u>Total positive = 795</u>	<u>Infected cases (%)</u> <u>Total positive</u>
Single infection	722	90.8
Double infection	73	9.2
Triple infection	Nil	nil

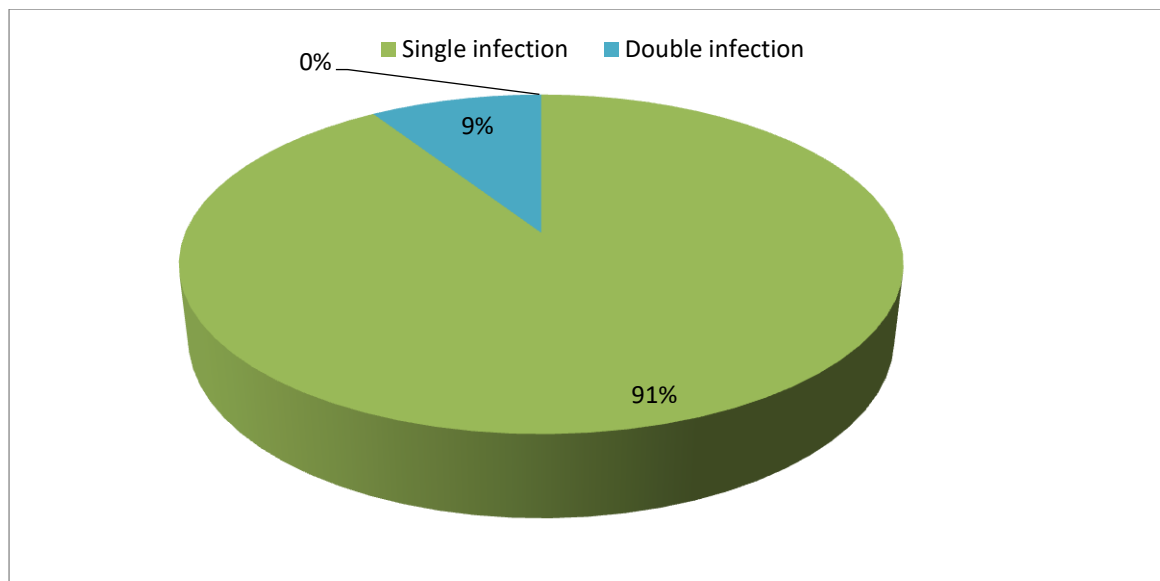


Figure 1. The burden of infection

## DISCUSSION:

In the present study, a total of 2423 subjects had participated and we assessed prevalence of intestinal parasitic infection with the domains of sex and various age groups. The contribution from males was more ( $n=1456$ , 60%) compared to females ( $n=967$ , 40%). In comparative study, we observed that 795 people had positive stool samples demonstrating the parasites. Around 32.8 % subjects, therefore, suffered from intestinal parasitic infection. We applied chi-square test to determine the level of significance between two genders. Though there were higher males suffering from parasitic infection, our result showed no significant difference in between males and females ( $p=0.692$ ). In the study carried out by Jonathan *et al.*, [17], their result showed approximately 60 % parasitic infection in total enrolled subjects. Our findings, from a total of 2423 participants, presented around 32.8 %. The result in the present study, therefore, somewhat differs from the study conducted by Jonathan *et al.*, [17].

It has been evident that certain parasites (such as *Entamoeba histolytica*, *Giardia lamblia*, *Ascaris lumbricoides*, *Ancylostomaduodenale*, *Taenia solium*, *Strongyloides stercoralis*, *Hymenolepis nana* and *Trichuris trichura*) are regular infecting species in many regions of the world [3, 18- 20]. *A. lumbricoides* is the commonest encountered intestinal parasite for humans [17-23]. More than 1.4 billion people were infected with *A. lumbricoides* that remarkably represents 2.5% of the world population. Its ubiquitous distribution, high number of eggs produced per parasite, durability of eggs under a variety of environmental conditions, poor socioeconomic conditions facilitate its spread of infection and thus account for the prevalence. Estimates of daily *Ascaris* female egg production were in the range of 200,000 eggs [21], and contact with infective eggs was by the faecal-oral route. In addition, transmission was enhanced by the fact that individuals can be asymptotically infected and continue to shed eggs for years.

Present finding highlights that there were several parasites leading to intestinal infections and the most common parasites causing gastrointestinal infections include: *A. lumbricoides*, *E. histolytica*, *G. lamblia*, *T. solium*, *A. duodenale*, *S. stercoralis*, *H. nana* and *T. trichura*. By contrast, infection caused by *Hymenolepis nana* was nearby nil.

The significance test was carried out to check the level of significance difference in prevalence of intestinal parasites between males and females by various types of parasites. However, the results showed no significance difference ( $p>0.05$ ).

As the occurrence of gastrointestinal infection may be caused by one or more parasites simultaneously, we assessed pattern of infection whether it was single, double or triple. We found the frequency of infection caused by single parasite was highest about 74 % ( $n=722$  out of 795 positive subjects), the double infection remained only 9 % and, interestingly, the incidence of triple infection was nil in our study.

Our observation reflects the fact that 32.8 % prevalence of intestinal parasites was lower compared to reports from other similar studies, 72.9% in Gondar, Azezo [22], 83% in Jimma [23]. On the other hand, the prevalence in this region of Nepal was higher than the study conducted by Babile (27.2%) [24] in Ethiopia. It is plausible that such variations in prevalence might be due to differences in climatic conditions, environmental sanitation, economic and educational status of parents and study subjects along with the previous control efforts.

#### CONCLUSION:

Infection with these intestinal parasites will continue to remain in the locality because of the relative unawareness. Regular and sustained enlightenment programmes in school and communities are required to control this scourge. Particularly, schools should adopt the World Health Organization recommended baseline surveys in order to determination of the prevalence. Moreover, the intensity of parasitic infections, thereby facilitate treatment strategies [25]. Present study showed that intestinal parasites were prevalent in varying magnitude among different age groups of patients. The proportions of infection were higher for helminthes compared to protozoa. *A. lumbricoides* among the helminthes and *E. histolytica* among protozoans were predominant. Thus, prompt preventive measures should be taken for the eradication of high infestation, rate which should include public health education, safe water supply, improve sanitation and personal hygiene practices.

#### CONFLICT OF INTEREST

Authors declare no conflict of interest.

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