Prevalence of intestinal parasitic infection in patients attending National Referral Hospital, Thimphu, from 2013 to 2015: A retrospective study

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ABSTRACT

Introduction: Infection with intestinal parasites continues to be a significant public health problem worldwide. There is no information on the prevalence of these intestinal parasites in patients visiting the National Referral Hospital, Thimphu, Bhutan. **Methods:** The study utilized information of stool data from 2013 to 2015 and was analyzed using SPSS 16.0. Wet and Iodine mount technique were used for identification. **Results:** The overall intestinal prevalence rate was 2.1%. Out of 5919 stool samples, *Giardia lamblia* has the highest rate of 0.93%, followed by *Entamoeba coli* 0.15%, *Trichomonahomonis* 0.19% *and Taeniaspp*. 0.17%.*Giardia lamblia infection* was 1.03% in males and 0.85% in females. The overall prevalence rate of parasitic infections was highest in >56 years age group with 2.83% in females and 2.0% in males. **Conclusions:** The overall prevalence of intestinal parasites is a concern in the country. Furthermore, this study provides insights to develop effective public health intervention for reducing parasitic infections in the country.

Keywords: Helminthes; Intestinal parasites; Prevalence; Protozoa.

INTRODUCTION

Parasitic infections are responsible for considerable morbidity and mortality throughout the world and often present with nonspecific signs and symptoms[1]. These parasites cause gastrointestinal infections and many other complicated diseases in children and high risk groups[2]. People living in developing countries are infected more with intestinal parasites. Consumption of less contaminated water, good sanitation practices and improved personal health and hygiene are the keys for the prevention and control of these parasites[3]. The main objective of this retrospective study was to investigate the prevalence of common intestinal parasites identified amongst patients who visited the Parasitology Section, Microbiology Unit, Department of Laboratory, Jigme Dorji Wangchuck National Referral Hospital (JDWNRH), Thimphu, Bhutan between 2013- 2015. The data will also contribute to the overall understanding of the prevalence patterns of *Ascaris lumbricoides*, *Taenia spp. Hookworm, Trichuris trichiura, Giardia lamblia, Trichomonas homonis, Entamoeba coli* and *Entamoeba histolytica.*

MATERIAL AND METHODS

5,919 patients with symptoms suggestive of parasitic infections coming to our hospital for whom stool examination for parasites was requested by physicians were included in the study. The samples were processed immediately upon collection using a standard saline wet mount procedure. Samples for which identification of parasites was difficult or uncertain were stained with an iodine solution to facilitate analysis. All the received stool samples during this period were included in this study as the study doesn't have inclusive and exclusive subjects. Data was collected from the laboratory records from laboratory information system (LIS) software of the year 2013, 2014, and 2015.

The laboratory information system (LIS) is computer software that processes, stores and manages clinical data about patients during a laboratory visit from all stages of medical processes and tests. The record included only demographic features like age and sex; and no patient identification were used.The parasites were identified as per the standard operating procedures and WHO manual of laboratory methods in medical parasitology[4,5]. Ethical clearance and approval was sought from REBH, Ministry of Health (REBH/Approval/2015/053) and the study was carried out from January 2016.The gathered data was carefully analyzed, and 5% of incomplete data points were discarded with SPSS software version 16.0.

RESULTS

A total of 5919 stool samples were analyzed within three years and all were included for this study. Out of 5919 stool samples, 1276 samples were from 2013, 2461 from 2014 and 2182 from 2015. The overall prevalence of intestinal parasitic infection was 2.1%. Parasites encountered in the helminthes group were *Ascaris lumbricoides* (0.14%), *Teania spp*(0.17%), *Trichuris trichiura* (0.05%) and *Ancylostoma duodenale* (*hookworms)*

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Table 1. Prevalence of intestinal parasites in three years (2013-2015)

Parasites	2013		2014		2015		Overall prevalence	
	n	%	n	%	n	%	n	%
Helminths								
Ascarislumbricoides	2	0.16	4	0.16	2	0.09	8	0.14
Taenia spp.	0		7	0.28	3	0.14	10	0.17
Hookworm	1	0.08	0		1	0.05	2	0.03
Trichuristrichiura	0		1	0.04	2	0.09	3	0.05
Intestinal protozoa								
Giardia lamblia	25	1.96	20	0.81	10	0.46	55	0.93
Trichomonashomonis	1	0.08	10	0.41	0		11	0.19
Entamoeba coli	4	0.31	5	0.20	3	0.14	12	0.15
Entamoebahistolytica	1	0.08	4	0.16	3	0.14	8	0.14
Total samples	1276		2461		2182		5919	

Table 2. Proportions of parasites detected based on age groups

Parasites	0-10	11-21	22-32	33-55	>56
Helminths					
Ascaris lumbricoides	3(0.16)	1(0.13)	1(0.06)	1(0.08)	2(0.33)
Taenia spp.	1(0.05)	2(0.26)	1(0.06)	2(0.16)	4(0.67)
Hookworm	-	1(0.13)	-	-	1(0.16)
Trichuris trichiura	1(0.05)	-	2(0.13)	-	-
Intestinal protozoa					
Giardia lamblia	20(1.06)	4(0.52)	16(1.08)	8(0.65)	7(1.17)
Trichomonas homonis	5(0.26)	1(0.13)	3(0.20)	2(0.16)	-
Entamoeba coli	4(0.21)	1(0.13)	6(0.40)	1(0.08)	-
Entamoeba histolytica	2(0.10)	1(0.13)	2(0.13)	-	3(0.50)
Total sample	1875	759	1478	1213	594

(0.03%). Parasites identified in the intestinal protozoa group were *Giardia lamblia* (0.93%), *Trichomonas hominis* (0.19%), *Entamoeba histolytica* (0.14%) and *Entamoeba coli* (0.20%).

Amongst them, *Giardia lamblia* was the predominant intestinal parasite with a prevalence rate of 1.96% in 2013, 0.8% in 2014 and 0.46% in 2015 as presented in Table 1. *Entamoeba coli* was found to be the second most prevalent with an overall prevalence rate of 0.20%. The least prevalent parasite was *Ancylostoma duodenale* (Hook worms) with a 0.03% overall prevalence rate.

The prevalence of helminthes and protozoan infections was stratified by age groups. The groups were stratified as 0-10 years, 11-21 years, 22-32 years, 32-55 years and >56 years. The overall prevalence of general intestinal parasites encountered was highest among >56 years age group followed by 22-32 years age group. The lowest prevalence was seen in 33-55 years age group as shown in Table 2. The prevalence rate of intestinal protozoa was higher than that of intestinal helminthes in all age groups.

Prevalence of intestinal infections was slightly higher in females than males. The dominant intestinal parasite was *Giardia lamblia* (4.48%) for both genders. The second most prevalent was *Taenia spp.* (1.2%) followed by En*tamoeba histolytica* (0.86%). The prevalence of protozoan infection (p-value=0.668) was higher than helminthes infections in both genders (p-value=0.044). The least infected intestinal parasites for both genders were *Ancylostoma duodenale* (hookworms) and *Trichuris trichiura* infections.

Table 3. Distribution pattern of infection by gender

Parasites	Male	Female	Total	p-value
Helminths				
Ascaris lumbricoides	5(0.19)	3(0.08)	8	0.668
Taenia spp.	4(0.15)	6(0.17)	10	
Hookworm	1(0.03)	1(0.02)	2	
Trichuris trichiura	2(0.07)	1(0.02)	3	
Intestinal protozoa				
Giardia lamblia	26(1.03)	29(0.85)	55	0.044
Trichomonas homonis	4(0.15)	7(0.20)	11	
Entamoeba coli	3(0.11)	9(0.26)	12	
Entamoeba histolytica	7(0.27)	1(0.02)	8	
Total sample	2510	3409		

DISCUSSION

Low economic standards, poor sanitation and ignorance of simple health promotion practices favor the wide distribution of intestinal parasites globally. In this retrospective study, eight intestinal parasites were identified which is relatively low compared to studies conducted elsewhere in the world[6]. The reasons for low prevalence could be extensive deworming programmes in the schools. Tablet Albendazole is commonly used to treat soil transmitted helminthes in schools in Bhutan. All individuals receiving Iron supplementation will be given a single dose of Albendazole. It is known that globally, in terms of the disease burden in school age populations in developing countries, intestinal helminthes infections rank first among the causes of all communicable and non-communicable diseases[7].

Other reasons could be either free medical services provided in the country, less populated area, improved sanitation and good awareness on the importance of hygiene. In this study, the highest prevalent parasite was *Giardia lamblia* with a prevalence rate of 0.93% and the lowest was hookworm with 0.03% (Table 1) which is 10 times lower than the study conducted in Kumasi, Ghana[8]. The reason for higher prevalence of *Giardia lamblia* in the study is not known exactly and further studies are required. Highest rate of intestinal parasitic infections was noted among the >56 years age group followed by 22-32 years age group. (Table 2) This also necessitates further studies to evaluate underlying reasons for this age group distribution of intestinal parasitic infections. A study conducted among rural southern Indians revealed that *Giardia* and *Cryptosporidium* infections were mostly encoutered in children below 15 years than in adults[9] whereas this study shows that *Giardia lamblia* infections was encountered in all the age groups (Table 2).

Regarding the sex distribution of the intestinal parasites, intestinal parasites had infected females slightly more than males as observed in Table 3. The deviation of the parasites towards female may be associated with occupation of individuals and personal hygiene. The parasitic infestation among males was lower than in females but the difference was not significant which is similar to a study conducted in the eastern region of the Nepal[10].

In this study, prevalence rate was low which may be due to better awareness about personal hygiene and sanitation practices, as suggested in a study conducted in northern India[11]. Clean and safe water supply in the municipal area is an important factor because outbreak of Giardiasis mainly results from the contamination of water supplies with human waste[12]. The present study found that *Giardia lamblia* was the most prevalent infestation and thus, further investigations and studies are required to look into the association of these infestations and the quality of drinking water. There was sharp decreasing trend for *Giardia lamblia* and a fluctuating trend for rest of the intestinal parasites through the course of the three years (2013–2015).

LIMITATIONS

Data which had incomplete details of the patients were not included in the study and this might have led to the underestimation of the overall and individual parasite prevalence rates. Not all the patients who were included in the study brought viable stool samples, and no sample-randomization techniques were employed. Patients who received de-worming treatments and other treatments are not excluded from the study.

The simple wet and iodine mound techniques used for collecting and processing stool samples may lead to the lack of detection of certain parasites. Other concentration techniques, such as formalin-acetate concentration would need to be used if useful data on the relative intensity of infections are needed.

CONCLUSIONS

Taken together, the study shows that intestinal protozoan, *Giardia lamblia* was the most prevalent parasite identified among all age

groups and both genders. Among the helminthes, the predominant one was *Taenia spp.* followed by *Ascaris lumbricoides*.

The overall prevalence of parasitic infection is alarming and requires public health interventions. Proper education on the importance of good health and hygiene practices is of paramount importance. The prevalence of parasitic infection in the whole country needs further studies since this study covers only the urban area and vulnerable rural areas needs to be assessed. In future, more research has to be conducted using comprehensive diagnostic techniques to determine the intensity and relative parasite loads of the study population and not only the prevalence of infection.

ACKNOWLEDGEMENTS

The authors would like to acknowledge all staff at the Microbiology unit at JDWNRH, the hospital administration, Ministry of Health and REBH for their support and contributions.

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AUTHORS CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

KN: Concept, design, data collection and analysis, manuscript writing and review.

AM: Concept, design, data collection and analysis, manuscript review.

ND: Data collection and analysis, manuscript review.

LDD: Data collection and analysis, manuscript review.

Authors agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

None

GRANT SUPPORT AND FINANCIAL DISCLOSURE

None