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Status of Intestinal Parasitic Infections in a Tertiary Care Center

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ABSTRACT

Background: Intestinal parasitic infections (IPIs) are diseases of serious public health concern in low- and middle-income countries, including Nepal. Such infections can cause growth retardation and increased susceptibility to other parasitic infections. Hence, this study aims to assess the prevalence of IPIs among the patients attending a tertiary care hospital in central Nepal.

Methods: Clinical and laboratory records of patients, whose stool samples were collected and transported to the Department of Clinical Microbiology, KIST Medical College and Teaching Hospital, during 2 years (January 2019 and December 2020) were examined for parasitological findings, by conventional microscopy using normal saline and iodine preparation.

Results: Out of 3,146 patients included in the study, 411 (13.1%) patients (median age[IQR]: 27[12-45]) were infected with the intestinal parasites. Patients of different age groups, such as 20-30 years (16.1%), 10-20 years (14.1%), and 30-40 years (13.3%) were mostly infected. Infection was more common in females (221/1572, 14.1%) than males (190/1574, 12.1%). There were 373 (90.8%) cases of IPIs due to *Entamoeba histolytica,* 34 (8.3%) cases due to *Giardia lamblia*, and 4 (0.9%) cases due to helminths. The prevalence of IPI in the first and second years was 14.5% (260/1794) and 11.2% (151/1352), respectively. IPIs were more common in summer (n=87, 12.8%) and spring(n=81, 10.8%).

Conclusions: Present study showed a declined prevalence of helminth infection. However, a higher rate of protozoan infection indicated the water source contamination with fecal matters and therefore urgencies for awareness among the public about hygienic practices.

Keywords: Hospital visiting patients; intestinal parasitic infections; Nepal

INTRODUCTION

Intestinal parasitic infections (IPIs) has been a major public health problem in developing countries, including Nepal.[1] As of 2020, WHO estimates more than 1.5 billion people to be infected globally with IPIs, primarily from sub-Saharan Africa, China, and East Asia.[2] Several factors such as poor socio-economic conditions, high population density, and unhygienic lifestyle attribute to IPIs.[3]

The infected individual is often predisposed to malnutrition (due to increased nutrient loss, iron deficiency), wasting, stunted linear growth, and decreased cognitive development.[4] The synergism between IPIs and malnutrition is responsible for the increased tendency of other microbial infections as well as higher mortality among children in developing countries.[5]

Though several field-based cross-sectional studies portraying the prevalence of IPIs in school-aged children

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have been reported from Nepal, this hospital-based study presents the actual scenario of parasitic infestation in patients visiting a tertiary care hospital in central Nepal.

METHODS

A hospital-based retrospective study was conducted in the Department of Clinical Microbiology of Kist Medical College and Teaching Hospital (KISTMCTH), Gwarko, Lalitpur. The study was approved by the Institutional Review Committee (Reference number: 20787952) of KISTMCTH. Patients with gastrointestinal symptoms attending in Outpatient department and Inpatient department of the hospital from January 2019 to December 2020 were traced and analyzed for parasitological findings.

Using a wooden scoop, 5-10 grams of stool samples were collected from the patients in wide-mouthed, clean, dry, screw-capped, leak-proof plastic containers. Each container was labeled carefully and transported to the Department of Clinical Microbiology for analysis. Macroscopic examination of the stool specimens for the color, consistency, and presence of mucous, blood, adult worms, or any other abnormalities was done. Additionally, the microscopic examination was performed by conventional microscopy using direct normal saline and iodine wet mounts of the specimens. Direct saline wet mounts with approximately 2mg of stool specimens were prepared in a drop of normal saline (0.9%) to observe pus cells, ova, cyst, and trophozoites of parasites. Iodine wet mount preparations using approximately 2mg of stool specimens were prepared in 5 times diluted Lugol's iodine. Both preparations were covered with coverslips and examined under the low power field(400×)of the microscope.[6]

Data analysis was performed using the Statistical Package for the Social Sciences software version 17.0. Patients' demographics and prevalence of IPIs based on age, gender, season and year were calculated and presented in tables accordingly.

RESULTS

Out of 3,146 patients investigated for parasitological findings, 411 patients were infected with intestinal parasites. The overall prevalence of IPIs among the patients was 13.1% (411/3146). .

The patients with IPIs had a median age (IQR) of 27 years (12-45). Among them,221 (14.1%) werefemalesand 190 (12.1%) were males. Among the infected patients, there were 91 (16.1%) patients of age group 20-30 years, 41 (14.1%) of 10-20 years, 58 (13.3%) of 30-40 years, 44 (13.2%) of 40-50 years, 49 (12.1%) of ≥ 60 years, 95(11.5%) of <10 years, and 33 (11.4%) of 50-60 years (Table1).Concerning the seasons, there were 164 (15.8%) incidences of IPIs in the summer season, 87 (12.8%) in the spring season, 79 (11.6%) in the autumn season, and 81 (10.8%) in the winter season (Table 1).

Table 1. Incidence of intestinal parasitic infection based upon age, gender, and season.

Variables	Total patients (n=3,146)	Patients infected					
		Total		Protozoan		Helminth	
		n	%	n	%	n	%
Age (median [IQR])	27 years [8-46]					27 years [12-45]	
Age group (years)							
< 10	826	95	11.5	95	11.5	0	0
10-20	290	41	14.1	41	14.1	0	0
20-30	566	91	16.1	90	15.9	1	0.2
30-40	436	58	13.3	57	13.1	1	0.2
40-50	334	44	13.2	43	12.9	1	0.3
50-60	289	33	11.4	33	11.4	0	0
≥ 60	405	49	12.1	48	11.9	1	0.2
Gender							
Male	1,574	190	12.1	190	12.1	0	0
Female	1,572	221	14.1	217	13.8	4	0.3
Season							
Summer	1,037	164	15.8	164	15.8	0	0
Spring	680	87	12.8	86	12.6	1	0.2
Autumn	680	79	11.6	78	11.5	1	0.1
Winter	749	81	10.8	79	10.5	2	0.3

Out of 411 infected patients, there were 407 (99.1%) incidencesof protozoan infection and 4 (0.9%)of helminth infection (Table 2). There were 373 (90.8%) cases of IPIs due to *E. histolytica*, 34 (8.3%) due to *G. lamblia*, 2 (0.5%) due to *Ascaris lumbricoides*, and 1 (0.2%) due to *Ancylostoma duodenale*and *Strongyloides stercoralis* each (Fig 1). Helminth infection due to *A. lumbricoides* (0.9%, 2/221), *A. duodenale*(0.5%, 1/221), and *S. stercoralis* (0.5%, 1/221) were observed only in infected female patients (Table 2).

Table 2. Frequency of intestinal parasites on yearly basis.

Parasites	Year				Total
	2019 (n=1,794)		2020 (n=1,352)		
	Male	Female	Male	Female	
Protozoa (n=407)					
Entamoeba histolytica	108	125	61	79	373
Giardia lamblia	14	9	7	4	34
Helminths (n=4)					
Ascaris lumbricoides	0	2	0	0	2
Hookworm	0	1	0	0	1
Strongyloides stercoralis	0	1	0	0	1
Total	122	138	68	83	411

DISCUSSION

The findings of the current study documented an overall prevalence of intestinal parasites in 13.1% among the patients. The prevalence rate of the current study concords with the findings reported from other southeastern countries, including China (14.9%)[7] and India (13.3%).[8] However, prevalence seems much lower than studies conducted in other parts of Nepal, including Biratnagar (15.17%),[9] Dang (21.4%),[10] and in different countries like Sudan (64.4%)[11], Yemen (58.7%)[12], Iraq (22.0%)[13], and Brazil (57.8%).[14] The remarkably lower prevalence of IPIs in our study could be due to the differences in the method employed for stool examination, improved economical status, and level of awareness about IPIs amongst the dwellers. Additionally, the governmental policies of general improvement in health services, sanitary conditions, and deworming programs could be other reasons for the low prevalence of IPIs.[15]

The higher incidence of IPIs in females (14.1%) as compared to males (12.1%) in this study was similar to the findings of Li et al.[7] Increased incidence of IPIs in females could be due to differences in occupational exposure, low literacy rate, and poor hygienic and sanitation practices in different communities.[9] The patients of the age group 20-30 years (16.1%) were mostly affected by intestinal parasites followed by those of <10 years (11.5%). This finding is juxtaposed to the study done by Khanal et al.,[10] who reported the highest IPIs rate in the age group of < 10 years, followed by 20-30 years. The higher infection rates in adults in this study could be attributed to the close contact of individuals to the fecal contaminated environment while farming without using shoes/slippers or due to improper hygiene or unhealthy habit of eating junk foods.[16]

The prevalence of IPIs in the duration of two years, from January 2019 to December 2020, was declined from the first year (14.5%) to the successive year (11.2%). Such a declining trends in the prevalence of IPIs in the successive years was in agreement with the trend reported by Kunwaret al.[17]In this study, the prevalence of IPIs was highest in the summer season (15.8%) and lowest in the winter season (10.8%). The occurrence of IPIs due to protozoa(12.9%) was more common than the helminths (0.1%), which is in agreement with the previous findings from Nepal.[18] The high prevalence of *E. histolytica* (90.8%) followed by *G. lamblia* (8.3%) in this study is consistent with findings of various studies from Nepal and several other parts of the world.[19,20] Contrary to our findings, a study by Chandrashekhar et al.[21]reported a higher prevalence of *G. lamblia* (13.2%) and a low prevalence of *E. histolytica* (1.7%). Nonetheless, such a surge in the prevalence of protozoan indicates a high level of contamination of food and water source by human feces,which could have occurred due to the proximity of broken drainage pipes left unattended that eventually contaminated the drinking water and other water bodies.[22,23]

Regarding the nematodes infection, the current study revealed a low prevalence for *A. lumbricoides*, *A. duodenale*, and *S. stercoralis*. This finding was lower than several other studies reported from Nepal,[21] and other parts of the world, including Ethiopia (11.3%)[24] and China (0.5%).7 The significant decrease in the prevalence of helminth infection in this study could be due to commendable use of sanitary latrines, improvements in iron status, and deworming programs.[3,7] The periodic campaign of anti-helminthic drug, especially albendazole administration, governed by the ministry of health to the school-aged children could explain the lower prevalence of helminthic infections seen in this study.[25-27] Some of the limitations of this study include the examination of stool specimens by saline/iodine wet mount technique, which may affect the accuracy of the parasite/egg count. In addition, this technique may fail to detect some parasites that need concentration techniques for identification.

CONCLUSIONS

The low prevalence of IPIs due to helminth as observed in this study indicates the improvement in living conditions and hygiene of people besides the combined efforts of the healthcare authorities in the district. However, the higher dissemination of protozoa strongly calls for the

provision of safe drinking water, both at the household and community levels.

Conflict of interest

None.

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