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Short Communication

A Five-Year Retrospective Investigation of the Prevalence of Intestinal Parasites at Mizan-Tepi University Teaching Hospital, Southwest Ethiopia

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Abstract

Background: Intestinal parasites are responsible for a significant amount of disease and mortality around the world. In developing nations, intestinal parasites are a severe public health issue. Intestinal parasite infections are one of the most common illnesses in the world. They're frequently linked to poor personal and environmental cleanliness, as well as low-quality drinking water. The aim of this study is to investigate the prevalence of intestinal parasites and their shifting trends during a five-year period at Mizan-Tepi University of Teaching Hospital (MTUTH).

Methods: A cross-sectional retrospective survey using the past five years' (2017 to 2021) clinical records obtained from MTUTH Mizan-Aman town Southern west Ethiopia. Patients with complete age, sex, and stool parasite examination (direct wet mount or concentration techniques) records on the parasitology registration book were included. Data were entered and analysed using a Microsoft Excel sheet. The parasite prevalence was calculated using frequency and percentages.

Results: Overall, 17,030 patient records of the past five years were reviewed from the registration books of parasitology laboratory departments at MTUTH and only 546 records were taken for this study. Of these 336 (61.50%) were female and the rest 210 (38.50%) were males. One hundred eighty-two (182) 33.33% of patients had one or more intestinal parasites over five years from 2017 to 2021. From total of 546 patients' records 17.77% in 2017, 18.89% in 2018, 23.44% in 2019, 19.96% in 2020 and 19.96% in 2021 had complete information.

Conclusion: Intestinal parasite prevalence was high among patients who visited the Mizan-Tepi University of Teaching Hospital during the five-year period. Helminthes and protozoan parasites prevalence was higher in the 15–45 years age category. In order to avoid intestinal parasite-related disease, strategies other than mass drug administration are required.

Introduction

Soil-transmitted helminth (STH) infections are the most common of the neglected tropical illnesses, affecting mostly low- and middle-income nations' underprivileged populations. Indeed, one or more of the most frequent STH species has infected over one billion individuals worldwide (1). Among the most prevalent parasitic worms are *Trichuris trichiura, Ascaris lumbricoides, and* hookworms such as *Necator americanus and Ancylostoma duodenale* (1, 2). Intestinal parasite infections, especially hookworms*, Ascaris lumbricoides, and Trichuris trichiura,* have infected nearly 24% (1.5 billion) of the world's population, according to a WHO estimate from 2020. IPs are most usually spread by contaminated food or drink, although they can also be transmitted through fecal-oral contact. Intestinal parasite protozoa and helminth infections are frequent all across the world, but especially so in poor nations (3). Geographic and socioeconomic considerations, as well as unforeseen events such as natural disasters, all contribute to the problem in developing countries. Furthermore, these countries primarily have tropics or subtropics climates with relatively humid areas, which, when combined with poverty, malnutrition, poor personal and community hygiene, high population density, lack of potable water, poor health status, and poor sanitary facilities, create ideal conditions for intestinal parasite growth, transmission, and exposure (4-6). Due to a lack of health, inadequate sanitation, poor hygiene practices, and poor health education, the problem of intestinal parasite infection in outpatients remains a critical public health concern because they are among the primary causes of sickness and death globally. According to current estimates, at least a quarter of the world's population is chronically infected with intestinal parasites, with the vast majority of those affected living in developing nations (7-9). Intestinal parasite infections are frequent in the tropics, causing severe public health issues in underdeveloped nations (9). Intestinal parasite infections are frequent in Ethiopia, as they are in many other underdeveloped countries, leading in malnutrition, anemia, and growth retardation, as well as increased susceptibility to other diseases (10, 11).

Intestinal parasites are among the most common human parasites, and they have a substantial economical and health impact on people living in resource-poor regions all over the world (12, 13). For a variety of causes, the micro-geographical distribution of these illnesses can differ significantly from one location to the next (14, 15). Because the parasites cause a wide range of non-specific signs and symptoms, it might be difficult to select an appropriate diagnostic test or empirical treatment if one is not immediately accessible. The majority of the available information on these diseases comes from field research involving a large number of people who have no intention of seeking medical help and who may not display any visible signs or symptoms of infection (16). Infections with (IP) are frequently mistaken for infections with other pathogens such as viruses, fungi, and bacteria, making a clinical diagnosis and diagnostic procedure selection problematic. IPIs and poly parasitism harm people's health, mostly hurting their physical and mental development, resulting in malnutrition, anemia, stunting, cognitive impairment, worse educational attainment, and productivity interference (17-19). Protozoan parasites and soil-transmitted helminths are currently the most common intestinal parasites, causing major morbidity and mortality (20). According to various studies, the high occurrence of intestinal parasites is mostly due to a lack of personal and environmental hygiene, a lack of safe water supply, human behaviours, poverty, ignorance of health promotion approaches, and inadequate health facilities (21). Intestinal parasites are transmitted through infected objects such as food, drink,

dirt, and even a person's finger (22, 23). Although there are multiple routes for intestinal parasites to be transmitted, several studies have shown that hand-to-mouth transmission is a more common cause of parasitic infection (24-26).

This study mainly focuses on investigating the prevalence of intestinal parasites and their shifting trends over the past five-years which could help to take further interventional measures in the study area.

Materials and Methods

Study design, period, and area

A retrospective cross-sectional study was conducted using secondary data registered from 2017-2021 on the prevalence of intestinal parasites and their trends at Mizan-Tepi University Teaching Hospital found in Mizan-Aman town, which had a total population of 34,080 people in 2007, according to the Ethiopian state statistical agency, with 18,138 men and 15,942 women. Southwest Ethiopia. The hospital has been established in 1932 E.C and is located 584 km Southwest to Addis Ababa, the capital city of the country.

Study participants and Data collection

All intestinal parasite suspected patients who visited Mizan-Tepi University Teaching Hospital and who provided stool samples for laboratory examination and those patients who were microscopically diagnosed with intestinal parasites at Mizan-Tepi University Teaching Hospital during the past five years were the source and study population respectively. Patients with stool examination result in the laboratory record were considered as study subjects.

A systematic random sampling technique was employed to collect the secondary data from the Mizan-Tepi University of Teaching Hospital laboratory register book. A sample was taken of all the findings from the first week of each month. The sampling frame included only laboratory records of patients who met the inclusion criteria and whose samples were examined microscopically in the Mizan-Tepi University of Teaching Hospital parasitology Laboratory. Manual scrutiny of the reports to verify completeness was carryout. All necessary information of patients' such as sex, age, and stool microscopy outcome were extracted using a checklist table.

Sample size

All of the 546 patients' records of stool examination result registered from 2017 to 2021 in the laboratory logbook that fulfilled the inclusion criteria were taken for analysis.

Inclusion criteria and Exclusion criteria

All data records within the period from 2017 to 2021 with complete information of patients' such as sex, age, year/months, and stool examination outcome were considered in the document whereas patients' record with incomplete information was not included.

Data analysis

Data was entered and analysed using Microsoft office excels worksheet 2016. The parasite prevalence was calculated using frequency and percentages. Finally, the data were summarized and presented in the form of figures and tables. Patients' data recorded/registered with complete information were included in the analysis and P-value of < 0.05 considered statistically significant.

Parasitological diagnostic methods

Direct wet mount, Lugol's iodine (0.5%) for staining of cyst stage of some parasites, and concentration techniques were the main parasitological diagnostic methods used in the teaching hospital where this study was conducted.

Data collection tool

Secondary data collection checklist was prepared and used to collect the data from registration books.

Data quality control measures

To ensure the quality of data, the prepared checklist with specified variables was filled with great attention to avoid any redundancy of the study subjects. Completeness of the data was asserted through periodic checks of the filled data. Finally, data were analysed by implementing appropriate statistical analysis following proper entry and cleaning.

Results

A total of 17,030 patient records for the past five years were reviewed from the registration books of parasitology laboratory departments at MTUTH and only 546 patients' records were taken for this study even though the total sample size was 582. Thirty-six patient records were incomplete information so, not included.

Of the total patient records considered above 336 (61.50%) were female and the rest 210 (38.50%) were males. One hundred eighty-two (33.33%) of patients had one or more intestinal parasites over five years from 2017 to 2021. From total of 546 patients records 17.77% in 2017, 18.89% in 2018, 23.44% in 2019, 19.96% in 2020 and 19.96% in 2021 had complete information (age, sex and stool examinations result). A higher number of (230) patient records of females were in the age group of 15 – 44 years while the least number of female patient (16) participants were in the age category of > 45 years. The majority (342) of patients were aged between 15-44 years (Table 1).

Table 1: Sex and Age distribution of patients examined for intestinal parasites in Mizan-Tepi University of Teaching Hospital from 2017 – 2021, Southwest, Ethiopia

Sex of patient	***Age of the patient***				
	0-4	**5-14**	**15-44**	**>45**	**Total**
Male	34(6.23%)	38(6.96%)	112(20.51%)	26(4.76)	210(38.46%)
Female	45(8.24%)	45(8.24%)	230(42.13%)	16(2.93%)	336(61.54%)
Total	79(14.47%)	83(15.20%)	342(62.64%)	42(7.69%)	546(100%)

From a total of 182 positive patients were found to be positive for at least one intestinal parasite making the overall positivity rate of 33.33% (182/546). Intestinal protozoa were found in 14.10% (77/546), and intestinal helminths were found in 19.23% (105/546). Prevalence with *Ascaris lumbricoides* was found to be the commonest helminthic parasite, while *Giardia lamblia* contributed the most of the protozoan parasite and *Strongyloides Stercoralis* was the least prevalent parasite identified in the study. The rate of intestinal helminths within the five years showed that A. lumbricoides, Schistosoma mansoni, and T. trichuria were the three-parasite species that had a higher rate of prevalence in the study area compared to other parasites. Strongyloides stercoralis was found to be the least in terms of prevalence (Table 2).

The overall rate of intestinal protozoan prevalence was (14.10%) *G. lamblia* had a higher rate (32.42%) than *E. histolytica/dispar* (23.38%) among protozoans throughout the study year except in 2021 when both had equal prevalence (7.79%) (Fig. 1).

The distribution of all intestinal parasites concerning sex within the five years of the study period. *G. lamblia* had recorded to have a high prevalence in both sexes (16.54%) and (15.93%) for females and males respectively compared to other parasites. *Ascaris lumbricoides*, *Schistosoma mansoni,* and *Trichuris trichuria* take the second, third, and fourth-ranking based on their prevalence in both sexes. *S. Stercoralis* was the least prevalent parasite identified in the study compared to other parasites. All helminths and protozoan were the least prevalent in males than females. Except for

Taenia species and *S. Stercoralis*. Generally, the overall prevalence of the intestinal parasite in males was 77 (42.31%) and in females 105 (57.69%) higher in females than males (Fig. 2).

Table 2: Rate of helminths and protozoan parasites in the Mizan-Tepi University of Teaching Hospital from 2017 to 2021, Southwest Ethiopia

Parasite	*2017*		*2018*		*2019*		*2020*		*2021*		*Total over-rate*	
	No	%	No	%	No	%	No	%	No	%	No	%
Hookworm	2	1.10	3	1.65	1	0.55	1	0.55	2	1.10	9	4.95
A. lumbricoides	6	3.30	8	4.40	7	3.85	7	3.85	5	2.75	33	18.13
E. vermicularis	2	1.10	1	0.55	1	0.55	2	1.10	0	0	6	3.30
T. trichiuria	3	1.65	2	1.10	3	1.65	3	1.65	9	4.95	20	11.10
S. mansoni	4	2.20	8	4.40	6	3.30	4	2.20	2	1.10	24	13.19
Taenia species	1	0.55	0	0.00	3	1.65	1	0.55	2	1.10	7	3.85
S. Stercoralis	0	0.00	1	0.55	0	0.00	0	0.00	0	0.00	1	0.55
H. nana	1	0.55	1	0.55	1	0.55	2	1.10	0	0.00	5	2.75
E.histolytica/dispar	3	1.65	3	1.65	4	2.20	2	1.10	6	3.30	18	9.89
G. lamblia	16	8.79	12	6.53	18	9.89	7	3.85	6	3.30	59	32.42
Total	38	20.88	40	21.98	45	24.73	29	15.93	32	17.58	182	100

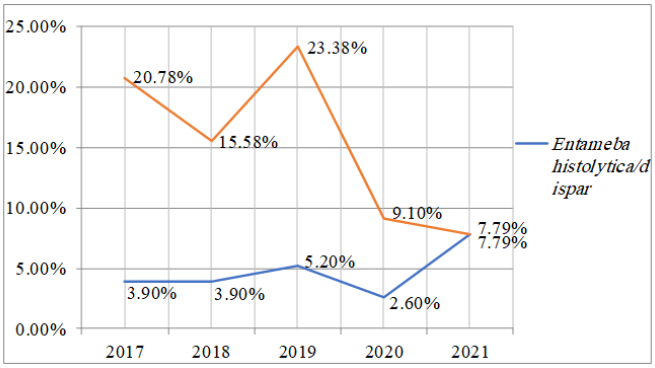

Fig. 1: The rate of intestinal protozoan over five years, 2017 to 2021 at MTUTH

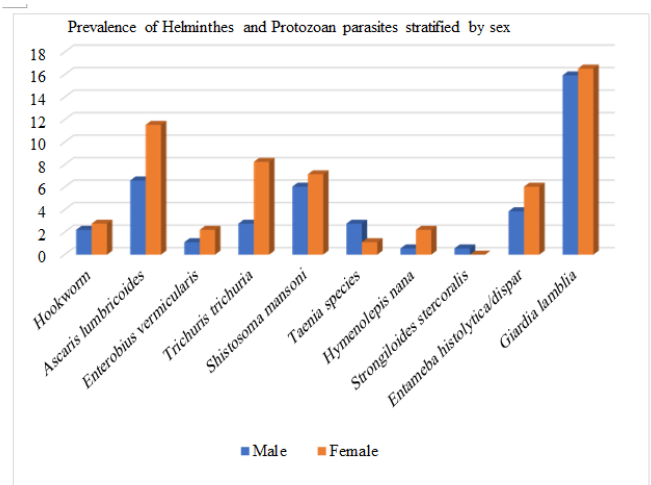

Fig. 2: Prevalence of Helminths and Protozoan parasites stratified by sex at MTUTH from 2017 to 2021

In this study, the overall intestinal parasite prevalence was relatively high among patients of age between 15-45 years (62.64%) and lowest among 0-4 years (1.9%). *Giardia lamblia* was identified in patients of all ages with the highest occurring in the age group between 15 and 45 years (Table 3).

Table 3: Prevalence of helminths and protozoan parasites at the Mizan-Tepi University of Teaching Hospital in South West Ethiopia from 2017 to 2021, by age.

Types of parasite infection	*Age groups (yr)*								*Total*	
	0-4		5-14		15-45		>45			
	No.	%	No.	%	No.	%	No.	%	No.	%
Hookworm	0	0.00	2	1.10	7	3.85	0	0.00	9	4.95
A. lumbricoides	0	0.00	11	6.04	20	10.99	2	1.10	33	18.13
E. vermicularis	0	0.00	5	2.75	1	0.55	0	0.00	6	3.30
T. trichiura	2	1.10	4	2.20	11	6.04	3	1.65	20	10.99
S. mansoni	0	0.00	5	2.75	19	10.44	1	0.55	24	13.19
Taenia species	0	0.00	1	0.55	6	3.30	0	0.00	7	3.85
H. nana	0	0.00	2	1.10	3	1.65	0	0.00	5	2.75
S. Stercoralis	0	0.00	1	0.55	0	0.00	0	0.00	1	0.55
E. histolytica/dispar	3	1.65	2	1.10	13	7.14	0	0.00	18	9.89
G. lamblia	5	2.75	14	7.69	34	18.68	6	3.30	59	32.42
Total	10	5.50	47	25.82	114	62.64	11	6.04	182	100

Discussion

The intestinal parasites' overall prevalence rate among patients that visited the Mizan-Tepi University of Teaching Hospital from 2017 to 2021 was (33.33%). In this study, it is shown that about one hundred eighty-two people were infected with at least one species of parasite. Intestinal helminths like *A. lumbricoides* (6.04%), *S. mansoni* (4.39%), *T. trichiura* (3.66%), and intestinal protozoan; *G. lamblia* and *Entamoeba histolytica/dispar* were the most prevalent relative to other intestinal parasites sharing (10.81%) and (3.30%) based on the 546 patient records assessed from the five years data.

Intestinal helminths and intestinal protozoan accounted for 105(19.23%) and 77 (14.10%) of the total positive cases respectively which is higher than finding from the Nepal which showed a prevalence of 675 (5.72%) for intestinal protozoa and 289 (2.45%) for intestinal helminths respectively from a total of 11,791 samples examined (28). A retrospective study conducted on intestinal parasites from *St. Lucia,* a Caribbean Island, revealed an overall prevalence of 26.1% over four years (29) which was lower compared to the result of the current study. Intestinal protozoan parasite *Giardia intestinalis* was the most common protozoa infection, found in this study with prevalence rates of 32.42% which is in line with finding from different kinds of literature which reported giardia prevalence of 2 to 3% in wealthy countries but up to 30% in most underdeveloped countries (30). A study from Iraq revealed *E. histolytica/dispar* prevalence of (3.78%) (31) which was lower compared to the prevalence in our finding for this protozoan which was (9.89%). Another similar study from the University Hospital of Parma revealed an intestinal parasite prevalence of 16.6% (32) between 2006 and 2010, which is much lower than the current study's finding. Our finding was higher than those of studies conducted in four tertiary care institutions in India, which found intestinal parasite prevalence rates of (17.6%), (13.9%), (9.03%), and

(8.9%) (33-36). A seven-year retrospective examination of intestinal parasites at a University Hospital in Istanbul discovered 20,948 stool samples with a prevalence of (2.96%) (37), which is much lower than our five-year retrospective analysis. Furthermore, a study conducted in north-central Iran from 2012 to 2016 G.C discovered an intestinal parasite prevalence of (18.0%) (38), which was lower than the conclusion of this study.

In Ethiopia, a retrospective assessment indicated that *E. histolytica/dispar* had a prevalence of (36.1%), which is higher than our findings, while *G. lamblia* had a prevalence of (11%) (11), which is significantly lower than our findings. A retrospective investigation at Tikur Anbessa University Hospital Ethiopia reported the prevalence of intestinal parasites to be (34.5%0 (39), which is similar to the finding of this study. An intestinal parasite prevalence of (45.6 %) [13] was discovered in a study conducted at the University of Gondar in Northwest Ethiopia during a five-year period, which was much higher than the result of this study, which was conducted in the country's southwest. In a study conducted at Atat Hospital in Gurage Zone, Ethiopia, 7062 (45%) (40) Intestinal protozoans were discovered.

In this study, the most common intestinal parasites were *A. lumbricoides* and *G. lamblia*, respectively, among intestinal helminths and protozoans. *S. mansoni* was the second most common parasite among helminths, accounting for (13.19%) of all parasitic infections. The intestinal parasite *S. Stercoralis* had the lowest prevalence, with only (0.55%).

The majority of the findings above were lower than our findings, which could be attributable to variances in geographical locations and climate conditions in the research area (Mizan-Aman).

The low socioeconomic condition, which is characterized by insufficient water supply, poor sanitary disposal of feces in the tropical climate, low altitude, and a lack of awareness about parasite transmission, could be contributed to the high parasite rate seen in our retrospective analysis.

Conclusion

Intestinal parasites were discovered to be present in (33.33%) (182/546) of patients who visited Mizan-Tepi University of Teaching Hospital between 2017, and 2021. The parasite *Giardia Lamblia*, which was found in (32.42%) of the patients, was the most commonly reported. Helminthes and protozoan parasite prevalence by age group was highest in the 15–45 years age category (62.64%) and lowest in the >45year (6.06%). Females were more likely susceptible than males (57.69%) to be infected with an intestinal parasite (42.31%).

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Conflict of Interest

In this study, the authors declare no conflicts of interest.

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