



Ann Med Res

Current issue list available at [Ann Med Res](https://annalsmedres.org)

Annals of Medical Research

journal page: annalsmedres.org

Analysis of intestinal parasitic infections seen in the Southeastern Anatolia Region tertiary hospital between 2019-2024

Ali Karabulut ^{a, ID, *}, Leyla Gunduz ^{b, ID}^aUniversity of Health Sciences, Bağcılar Training and Research Hospital, Department of General Surgery, Istanbul, Türkiye^bSiirt Training and Research Hospital, Siirt, Türkiye*Corresponding author: alikaarabulut7676@gmail.com (Ali Karabulut)

■ MAIN POINTS

- This retrospective cross-sectional study evaluated 6,291 stool samples collected between 2019 and 2024 in a tertiary healthcare center in Southeastern Turkey to assess the epidemiology of intestinal parasitic infections (IPs).
- The overall prevalence of IPs was 5.9%, with *Entamoeba histolytica* (48.3%), *Blastocystis hominis* (28.2%), and *Giardia intestinalis* (22.5%) constituting the predominant protozoan species.
- A statistically significant correlation was found between age and IPI positivity ($p=0.006$), while gender-based differences were not significant ($p=0.528$).

■ ABSTRACT

Aim: The objective of this study was to determine the prevalence of intestinal parasites over time among patients who presented with dyspeptic complaints and sought stool samples from a Turkish tertiary hospital, and to investigate the correlation between intestinal parasites and age and gender.

Material and Methods: A retrospective study was conducted between 2019 and 2024 at Siirt Education and Research Hospital to determine the intestinal parasites (IP) trend. We assessed the association between IP and age and gender groupings, as well as the distribution of IP types by year. Stool samples were analyzed using the nativ-lugol technique under a direct light microscope. All data lacking sociodemographic characteristics and the year of stool examination were excluded from the study.

Results: Data from 6291 patients were analyzed. In total, 56.9% of the patients were male. The presence of parasites in accord with the gender did not differ significantly ($p=0.528$). The prevalence of parasites was 5.7% in the 18–65 age group and 9.0% in the over-65 age group ($p=0.006$). The most common IP species were *E. histolytica* (48.3%), *B. hominis* (28.2%), and *G. intestinalis* (22.5%, $n=84$). The incidence of *H. nana* (1.1%, $n=4$) was very low.

Conclusion: IP is a serious threat to health, particularly in developing countries. The prevalence of IP will decrease as our awareness increases together with efficient diagnosis, treatment, and prevention strategies.

Keywords: Intestinal parasites, Trend analysis, Turkey

Received: Mar 25, 2025 **Accepted:** Jun 12, 2025 **Available Online:** Aug 25, 2025

Cite this article as: Karabulut A, Gunduz L. Analysis of intestinal parasitic infections seen in the Southeastern Anatolia Region tertiary hospital between 2019-2024. *Ann Med Res*. 2025;32(8):344–349. doi: [10.5455/annalsmedres.2025.03.071](https://doi.org/10.5455/annalsmedres.2025.03.071).



Copyright © 2025 The author(s) - Available online at annalsmedres.org. This is an Open Access article distributed under the terms of Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

■ INTRODUCTION

Intestinal parasites (IP) represent a significant health concern, particularly in underdeveloped and impoverished nations [1]. Globally, approximately three billion individuals are affected by various intestinal parasites, often leading to considerable morbidity [2]. These parasites pose a worldwide public health threat in both industrialized and developing nations. Their prevalence is notably higher in disadvantaged populations, especially in tropical and subtropical regions, primarily due to hot, humid climates, inadequate sanitation, and/or limited access to safe drinking water [3]. Beyond geographical factors, several socioeconomic determinants, including age, climate, and hygiene, also influence their occurrence [4].

Globally, over 10.5 million new cases are reported annually, with *Ascaris lumbricoides*, hookworms, *Trichuris trichiura*, *Giardia lamblia*, *Entamoeba histolytica*, and *Schistosoma* sp. being the most prevalent IP [5]. The most common mode of transmission for these parasites is the consumption of contaminated food and water. Additionally, infection can occur through the active penetration of the epidermis by infective larval stages from polluted soil. Intestinal parasites are a primary cause of various gastrointestinal issues, such as vomiting, diarrhea, dysentery, anorexia, and abdominal distension. They can also contribute to growth retardation, behavioral abnormalities, and iron deficiency anemia. These clinical issues disproportionately affect high-risk groups, includ-

ing children, pregnant women, and immunocompromised individuals [5].

The aim of this study was to examine the prevalence and distribution of intestinal parasites in stool samples provided by patients presenting with dyspeptic symptoms to a tertiary hospital in the Southeastern Anatolia Region.

■ MATERIALS AND METHODS

Study hypothesis

This retrospective study's primary outcome was the presence of intestinal parasites (IP) in stool samples, categorized as a binary variable (positive or negative). Beyond overall positivity, the study further hypothesized to evaluate:

- The distribution of IP positivity by specific parasite species.
- The association between IP positivity and gender.
- The association between IP positivity and age groups.

These additional stratifications aimed to provide a comprehensive understanding of the epidemiological characteristics of intestinal parasitic infections. Furthermore, all data were statistically analyzed to identify trends over time (2019–2024) and to determine which demographic groups were more frequently affected by intestinal parasites throughout the study period. This study received approval from the institutional review board of Siirt University (Date: 15.01.2025; No: 129496).

Sample size

This retrospective cross-sectional study employed a complete enumeration (census) sampling method. To determine the prevalence of intestinal parasites in the Siirt region, the sample size was calculated using G*Power statistical software (version 3.1.9.7) [6]. Based on a one-sample t-test design with a power of 0.99, an effect size of 0.5 (representing a moderate effect), and a Type I error rate (α) of 0.05, the minimum required sample size was 76 participants. However, the study ultimately included data from 6,291 individuals, significantly exceeding the calculated minimum sample size, thereby enhancing the statistical reliability and generalizability of the findings.

Data collection

IP data were retrospectively examined from 6,291 patients who submitted stool samples to Siirt Education and Research Hospital between January 2019 and November 2024. These patients presented with gastrointestinal (GIS) dyspeptic complaints, including abdominal pain, constipation, tension, bloating, burning, belching, postprandial bloating, nausea, and vomiting. The study evaluated the distribution of IP types across years and the relationship between IP positivity

and gender and age groups. Patients for whom sociodemographic characteristics or the year of stool examination were not determined were excluded.

As this was a retrospective observational study, no blinding (masking) method was applied. Blinding is typically employed in interventional studies, such as randomized controlled trials (RCTs), to reduce potential bias through the concealment of group allocation. However, in this study, data were obtained retrospectively from existing patient records, and no interventions or treatments were administered, rendering a blinding procedure neither applicable nor necessary. Stool samples were processed within one hour of collection. Macroscopic inspection for IP was performed, followed by microscopic examination of native-Lugol preparations under a direct light microscope. Direct microscopic examination is considered the gold standard for parasitological diagnosis [25]. Additionally, the *Entamoeba histolytica* (*E. histolytica*)/*Entamoeba dispar* (*E. dispar*) antigen was identified in stool samples using the Entamoeba Antigen Cassette Test (True Line China).

Parasite species were classified into two groups: helminths and protozoa. The protozoa group included *E. histolytica*, *Giardia intestinalis* (*G. intestinalis*), and *Blastocystis hominis* (*B. hominis*), while *Hymenolepis nana* (*H. nana*) was categorized within the helminth group. Both microscopic and antigen cassette test results were evaluated qualitatively as 'positive' or 'negative.' In the analysis of diagnostic data, direct microscopy was considered the reference test, and antigen card tests were evaluated as screening tests.

Statistical analysis

All statistical analyses were conducted using IBM SPSS Statistics for Windows version 24.0 (Armonk, NY, USA) (trial version). Frequency and percentage were calculated as descriptive statistics. The association between parasite groups and age and gender groups was assessed using the chi-square test or Fisher's exact test. A p-value < 0.05 was considered the threshold for statistical significance.

■ RESULTS

In total, 6,291 individuals examined, 2,713 (43.1%) were men and 3,578 (56.9%) were women (Table 1).

Temporal and demographic distribution of cases

The distribution of cases by year shows that 2022 had the highest number of instances (25.0%), followed by 2024 (23.2%), 2023 (17.2%), 2019 (16.7%), 2021 (13.4%), and 2020 (4.5%), respectively. This indicates a fluctuation in the number of cases over the study period (Table 1).

Regarding gender distribution, women constituted a larger proportion (56.9%, n=3578) compared to men (43.1%, n=2713). The majority of cases were in the 18–65 age group (93.3%, n=5867), with a smaller representation from the over 65 age group (6.7%, n=424) (Table 1).

Overall parasite prevalence and species distribution

Overall, intestinal parasites were detected in 5.9% (n=373) of cases, while 94.1% showed no parasites, indicating a relatively low infection rate within the general case distribution (Table 1). The most common parasite species identified was *E. histolytica* (48.3%, n=180), followed by *B. hominis* (28.2%, n=105) and *G. intestinalis* (22.5%, n=84). *H. nana* was detected at a very low frequency (1.1%, n=4) (Table 1). In terms of parasite groups, Protozoa were overwhelmingly dominant at 98.9% (n=369), while Helminthes accounted for a very low rate of 1.1% (n=4) (Table 1).

Annual trends in parasite presence and species

The presence of IP varied annually (Table 2). Parasite detection rates were: 4.8% (n=50) in 2019, 2.8% (n=8) in 2020, 3.7% (n=31) in 2021. There was a notable increase in 2022 (8.0%, n=126) and a peak in 2023 (10.1%, n=110). In 2024, the rate decreased to 3.3% (n=48).

E. histolytica/*E. dispar* remained the most common parasite species throughout the years, with varying detection rates: 80.0% (n=40) in 2019, 75.0% (n=6) in 2020, 48.4% (n=15) in 2021, 50.8% (n=64) in 2022, 30.9% (n=34) in 2023, and 43.8% (n=21) in 2024.

G. intestinalis detection rates were 16.0% (n=8) in 2019, 25.0% (n=2) in 2020, 25.8% (n=8) in 2021, 21.4% (n=27) in 2022, 34.5% (n=38) in 2023, and 2.1% (n=1) in 2024.

B. hominis showed an increasing trend in later years: 4.0% (n=2) in 2019, 0.0% in 2020, 12.9% (n=4) in 2021, 27.8% (n=35) in 2022, 34.5% (n=38) in 2023, and 54.2% (n=26) in 2024.

Table 1. IP distribution.

		n	%
Year	2019	1050	16.7
	2020	284	4.5
	2021	840	13.4
	2022	1571	25.0
	2023	1085	17.2
	2024	1461	23.2
Gender	Male	2713	43.1
	Female	3578	56.9
Age group	18-65	5867	93.3
	65>	424	6.7
Presence of parasites	Parasites negative	5918	94.1
	Parasites positive	373	5.9
Parasite type	Protozoa		
	• <i>E.histolytica</i>	180	48.3
	• <i>G.intestinalis</i>	84	22.5
	• <i>B.hominis</i>	105	28.2
	Helminths		
Parasite group	• <i>H.nana</i>	4	1.1
	Protozoa	369	98.9
	Helminths	4	1.1

H. nana was detected only in 2021 at a rate of 12.9% (n=4), with 0.0% in other years (Table 2).

Regarding parasite groups by year, Protozoa constituted 100.0% of parasite cases in all years except 2021. Helminthes were detected only in 2021 at a rate of 12.9% (n=4), with 0.0% in other years.

Parasite presence and groups by gender and age

When examining parasite presence by gender (Table 3), 5.7% (n=155) of men and 6.1% (n=218) of women were positive for parasites. There was no statistically significant difference in parasite presence between genders (p=0.528).

For age groups (Table 3), 5.7% (n=335) of individuals aged 18–65 years had parasites, compared to 9.0% (n=38) in the over 65 age group. The difference in parasite presence across age groups was statistically significant (p=0.006).

Regarding parasite groups by gender, Protozoa accounted for 98.7% (n=153) of parasite cases in men and 99.1% (n=216) in women, while Helminthes were 1.3% (n=2) in men and 0.9% (n=2) in women. There was no statistically significant difference in parasite group distribution between genders (p=0.730; Fisher’s exact test).

When parasite groups were examined by age (Table 3), Protozoa comprised 98.8% (n=331) of cases in the 18–65 age group and 100.0% (n=38) in the over 65 age group. Helminthes were found in 1.2% (n=4) of the 18–65 age group but were absent (0.0%) in the over 65 age group. There was no statistically significant difference in parasite group distribution across age groups (p=0.498; Fisher’s exact test).

These findings indicate that Protozoa are consistently more dominant across all age groups and genders, with no significant difference in the distribution of Protozoa versus Helminthes based on either gender or age.

DISCUSSION

Intestinal parasite infections (IPI) remain a significant global health burden, particularly in developing nations. Their persistence is largely attributed to factors such as poverty, inadequate sanitation, malnutrition, and illiteracy [5]. Even when asymptomatic or presenting with atypical symptoms, IP can negatively impact national economies, public health, and contribute to mental and physical developmental delays, as well as workforce loss.

Regional epidemiological data are crucial for effective parasite prevention and treatment strategies. Numerous studies highlight the variability of parasite prevalence across different years and locations. For instance, research conducted in Senegal between 2011 and 2015 reported an IPI prevalence of 15.8% [7]. Other studies have indicated prevalences of 1.0% in Pakistan (52.8%), Nepal (31.5%), Ghana (17.33%), and the West African country of Burkina Faso (60.8%) [8-11]. In South America’s intertropical zone, Brazil recorded a frequency of

Table 2. IP group, type and presence by year.

		Year											
		2019		2020		2021		2022		2023		2024	
		n	%	n	%	n	%	n	%	n	%	n	%
Presence of parasites	Parasites negative	1000	95.2	276	97.2	809	96.3	1445	92.0	975	89.9	1413	96.7
	Parasites positive	50	4.8	8	2.8	31	3.7	126	8.0	110	10.1	48	3.3
Parasite type	<i>E.histolytica/E.dispar</i>	40	80.0	6	75.0	15	48.4	64	50.8	34	30.9	21	43.8
	<i>G.intestinalis</i>	8	16.0	2	25.0	8	25.8	27	21.4	38	34.5	1	2.1
	<i>B.hominis</i>	2	4.0	0	0.0	4	12.9	35	27.8	38	34.5	26	54.2
	<i>H.nana</i>	0	0.0	0	0.0	4	12.9	0	0.0	0	0.0	0	0.0
Parasite group	Protozoa	50	100.0	8	100.0	27	87.1	126	100.0	110	100.0	48	100.0
	Helminths	0	0.0	0	0.0	4	12.9	0	0.0	0	0.0	0	0.0

Table 3. Distribution of parasite presence according to gender and age groups.

		Presence of parasites				p value
		Parasites negative		Parasites positive		
		n	%	n	%	
Presence of parasites	Male	2558	94.3	155	5.7	0.528
	Female	3360	93.9	218	6.1	
Parasite group	18-65	5532	94.3	335	5.7	0.006
	65>	386	91.0	38	9.0	

Table 4. Distribution of parasite groups according to gender and age groups.

		Parasite group				p value
		Protozoa		Helminths		
		n	%	n	%	
Presence of parasites	Male	153	98.7	2	1.3	0.730
	Female	216	99.1	2	0.9	
Parasite group	18-65	331	98.8	4	1.2	0.498
	65>	38	100.0	0	0.0	

70.7% in 2005 [12]. These figures clearly demonstrate substantial international variations, which are influenced by diverse geographic characteristics and environmental circumstances. A survey conducted in Turkey between 2012 and 2014 found an overall IP prevalence of 3.7% [13]. In our study, conducted in the Southeastern Anatolia Region, the prevalence of IP was determined to be 5.9%. (It is worth noting that some recent meta-analyses on intestinal parasites in school-aged children in Turkey report higher pooled prevalences, such as 29% overall and 41% specifically in the Southeastern Anatolia region, highlighting regional variations and the specific population studied [ResearchGate search results, specifically, "Prevalence of intestinal parasites in school-age children in Turkey: A systematic review and meta-analysis", published June 25, 2025])).

The prevalence of parasitic illnesses in a community is a complex interplay of factors including the parasite species, the host individual, the environment, local infrastructure, and the degree of community knowledge [14]. Age and socioe-

conomic status are also significant determinants of prevalence disparities [15]. A review of the literature, including a study conducted in Somalia, revealed higher parasite prevalence among individuals aged 0–15 years (45.5%) compared to other age groups. Similarly, intestinal parasite infections were commonly found among schoolchildren in Mauritania (2009) and Moroccan school-age individuals (68.1%) [5]. In our study, the rate of parasite positivity in the group over 65 years of age was 9.0%, and we observed a statistically significant variation in the prevalence of parasites by age group (p=0.006).

When analyzing the distribution of the parasite population by gender in our study, no statistically significant difference was discovered (p=0.528), with a parasite occurrence rate of 6% in women and 5.7% in men. This finding is consistent with the Somalia research, which also reported no statistically significant gender difference (p=0.235), with prevalence rates of 52.2% in women and 47.8% in men [5]. Similarly, a Senegalese study indicated that IPIs were more common in women

(50.7%) than in men (49.3%), though this difference was not statistically significant [7]. A study on intestinal protozoa in Malaysia also found similar proportions between males (51%) and females (49%) [16]. Other research further supports that there is no discernible difference in intestinal parasite prevalence between men and women [14]. However, some studies present conflicting results; for example, a study conducted in Turkey reported IPIs to be more common in women (53%) than in men (47%) [17], and an Ethiopian study found rates of 35.9% in women and 32.1% in men [18]. Conversely, studies in Nepal and Brazil have reported higher IPI rates in men compared to women [19, 20]. Despite these variations, the overall proximity of parasite rates between genders suggests that significant variation in frequency between men and women may not be a universal finding.

In our research, the most common IP species identified were *E. histolytica* (48.3%), *B. hominis* (28.2%), and *G. intestinalis* (22.5%). *H. nana* was detected at a very low frequency (1.1%). In comparison, a study in Somalia analyzing 56,824 stool samples found IP in 11.9% of them, with the most prevalent species being *G. lamblia* (60.84%), *E. histolytica* (33.07%), and *A. lumbricoides* (3.18%); other parasite species had extremely low prevalence [5]. Research conducted in Egypt reported *G. lamblia* (12.6%), *E. histolytica/dispar* (10%), *A. lumbricoides* (8.8%), and *H. nana* (8.6%) as the most prevalent [21]. In Ethiopia, the most common parasites found in asymptomatic food handlers were *G. lamblia* (3%), *A. lumbricoides* (4%), and *E. histolytica/dispar* (5.5%) [22]. Another study indicated that hookworm (22%), *E. histolytica/dispar* (24.5%), *A. lumbricoides* (13.6%), and *G. lamblia* (11.4%) were the most common IP. This particular research also highlighted a strong association between the source of drinking water, handwashing habits, unclean nails, and *E. histolytica/dispar* infection [2]. These comparisons underscore the notable variations in the most prevalent parasite species among different nations, which are often attributable to their unique geographic characteristics and climatic circumstances.

Limitations

Our research was retrospective and single-centered, encompassing a limited geographic area within the Southeastern Anatolia region of Turkey. The subjective nature of direct microscopic inspection means that the expertise and educational background of the healthcare professional conducting the evaluation could influence diagnostic outcomes. Furthermore, highly sensitive molecular methods were not employed for diagnosis. These factors highlight the inherent limitations of our study.

CONCLUSION

Intestinal parasites continue to pose a serious public health threat, particularly in developing nations. Reducing their incidence necessitates comprehensive educational initiatives for

the public regarding IP, coupled with the implementation of effective diagnostic, treatment, and preventive measures.

Ethics Committee Approval: The procedures used in this study adhere to the tenets of the Declaration of Helsinki. The ethics committee approval of the study was obtained from the Siirt University Ethics Committee (Ethics code: 2025/01/01/6 - 8754).

Informed Consent: Not necessary for this manuscript.

Peer-review: Externally peer-reviewed.

Conflict of Interest: The authors declare no conflict of interest.

Author Contributions: Conception: AK, LG; Design: AK; Supervision: AK, LG; Materials: AK, LG; Data Collection and/or Processing: AK, LG; Analysis and/or Interpretation: AK, LG; Literature Review: AK, LG; Writing: AK; Critical Review: AK.

Financial Disclosure: The authors did not receive support from any organization for the submitted work.

REFERENCES

1. Taghipour A, Ghodsian S, Jabbari M, Olfatifar M, Abdoli A, Ghafarifar F. Global prevalence of intestinal parasitic infections and associated risk factors in pregnant women: a systematic review and meta-analysis. *Trans R Soc Trop Med Hyg*. 2021;115(5): 457-470. doi: 10.1093/trstmh/traa101.
2. Hailegebriel T. Prevalence of intestinal parasitic infections and associated risk factors among students at Dona Berber primary school, Bahir Dar, Ethiopia. *BMC Infect Dis*. 2017;17(1): 362. doi: 10.1186/s12879-017-2466-x.
3. Sahimin N, Lim YA, Ariffin F, Behnke JM, Lewis JW, Mohd Zain SN. Migrant Workers in Malaysia: Current Implications of Sociodemographic and Environmental Characteristics in the Transmission of Intestinal Parasitic Infections. *PLoS Negl Trop Dis*. 2016;10(11):e0005110. doi: 10.1371/journal.pntd.0005110.
4. Dhital S, Pant ND, Neupane S, Khatiwada S, Gaire B, Sherchand JB, Shrestha P. Prevalence of entero pathogens in children under 15 years of age with special reference to parasites in Kathmandu, Nepal; a cross sectional study. *Springerplus*. 2016;5(1):1813. doi: 10.1186/s40064-016-3477-6.
5. Doğan S, Mohamud SM, Mohamud RYH, Ali Orey AM, Orhan Z. Distribution of the Intestinal Parasites According to Species and Gender in Patients Presented to the Microbiology Laboratory in a Tertiary Hospital, in Somalia Between January 2018 and October 2022. *Infect Drug Resist*. 2023;16:7007-7014. doi: 10.2147/IDR.S434214.
6. Faul F and Erdfelder E. "GPOWER: A priori, post-hoc, and compromise power analyses for MS-DOS [Computer program]". Bonn, FRG: Bonn University, Department of Psychology. (1992-2020).
7. Mahmud MA, Spigt M, Bezabih AM, Dinant GJ, Velasco RB. Associations between intestinal parasitic infections, anaemia, and diarrhoea among school aged children, and the impact of hand-washing and nail clipping. *BMC Res Notes*. 2020;13(1): 1. doi: 10.1186/s13104-019-4871-2.
8. Diongue K, Ndiaye M, Seck MC, Diallo MA, Ndiaye YD. et al. Distribution of Parasites Detected in Stool Samples of Patients in Le Dantec University Hospital of Dakar, Senegal, from 2011 to 2015. *J Trop Med*. 2017;2017:8296313. doi: 10.1155/2017/8296313.
9. Mirisho R, Neizer ML, Sarfo B. Prevalence of Intestinal Helminths Infestation in Children Attending Princess Marie Louise Children's Hospital in Accra, Ghana. *J Parasitol Res*. 2017;2017:8524985. doi: 10.1155/2017/8524985.

10. Mehraj V, Hatcher J, Akhtar S, Rafique G, Beg MA. Prevalence and factors associated with intestinal parasitic infection among children in an urban slum of Karachi. *PLoS One*. 2008;3(11): e3680. doi: 10.1371/journal.pone.0003680.
11. Ouermi D, Karou DS, Ouattara I, Gnoula C, Pietra V. et al. Prevalence of intestinal parasites at Saint-Camille medical center in Ouagadougou (Burkina Faso), 1991 to 2010. *Med Sante Trop*. 2012;22(1): 40-4. doi: 10.1684/mst.2012.0008.
12. Nascimento SA, Moitinho Mda L. Blastocystis hominis and other intestinal parasites in a community of Pitanga City, Parana State, Brazil. *Rev Inst Med Trop Sao Paulo*. 2005;47(4): 213-7. doi: 10.1590/s0036-46652005000400007.
13. Selek MB, Bektöre B, Karagöz E, Baylan O, Özyurt M. Distribution of Parasites Detected in Stool Samples of Patients Admitted to Our Parasitology Laboratory during a Three-Year Period between 2012 and 2014. *Türkiye Parazitol Derg*. 2016;40(3):137-140. doi: 10.5152/tpd.2016.4533.
14. Alver, O. and O. Tore. The prevalence and distribution of intestinal parasites detected by the Uludag University Medical School. *Türkiye Parazitol Derg*. 2006;30(4):296-301. PMID: 17309032.
15. Casmo V, Chicumbe S, Chambisse R, Nalá R. Regional Differences in Intestinal Parasitic Infections among Army Recruits in a Southern Mozambique Training Center: A Cross-Sectional Study. *Pathogens*. 2023;12(9):1105. doi: 10.3390/pathogens12091105.
16. Noor Azian MY, San YM, Gan CC, Yusri MY, Nurulsyamzawaty Y. Prevalence of intestinal protozoa in an aborigine community in Pahang, Malaysia. *Trop Biomed*. 2007;24(1):55-62. PMID: 17568378.
17. Doğan N, Demirüstü C, Aybey A. [The prevalence of intestinal parasites according to the distribution of the patients' gender and parasite species for five years at the Osmangazi University Medical Faculty]. *Türkiye Parazitol Derg*. 2008;32(2):120-5. PMID: 18645941.
18. Gelaw A, Anagaw B, Nigussie B, Silesh B, Yirga A. et al. Prevalence of intestinal parasitic infections and risk factors among schoolchildren at the University of Gondar Community School, Northwest Ethiopia: a cross-sectional study. *BMC Public Health*. 2013;13:304. doi: 10.1186/1471-2458-13-304.
19. Khanal LK, Choudhury DR, Rai SK, Sapkota J, Barakoti A. et al. Prevalence of intestinal worm infestations among school children in Kathmandu, Nepal. *Nepal Med Coll J*. 2011;13(4):272-4. PMID: 23016478.
20. Faria CP, Zanini GM, Dias GS, da Silva S, de Freitas MB. et al. Geospatial distribution of intestinal parasitic infections in Rio de Janeiro (Brazil) and its association with social determinants. *PLoS Negl Trop Dis*. 2017;11(3):e0005445. doi: 10.1371/journal.pntd.0005445.
21. Omar M, Abdelal HO. Current status of intestinal parasitosis among patients attending teaching hospitals in Zagazig district, Northeastern Egypt. *Parasitol Res*. 2022;121(6):1651-1662. doi: 10.1007/s00436-022-07500-z.
22. Kebede E, Seid A, Akele S. Prevalence and associated risk factors of intestinal parasitic infections among asymptomatic food handlers in Wollo University student's cafeteria, Northeastern Ethiopia. *BMC Res Notes*. 2019;12(1):139. doi: 10.1186/s13104-019-4182-7.