BioMed Visions Journal

Volume 2 | Issue 2 Article 7

7-15-2026

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Recommended Citation

Jasim, Amani M.; Aboud, Rabia A.; and Al-Aybi, Mohamed Q. (2026) "The Incidence of Some Intestinal Protozoa: *Entamoeba histolytica*, *Blastocystis hominis* and *Giardia lamblia* Among Iraqi Individuals at Baghdad Province," *BioMed Visions Journal*: Vol. 2: Iss. 2, Article 7.
DOI: https://doi.org/10.63100/3078-6738.1026

BIOMED VISIONS JOURNAL 2026;2:112–117

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ORIGINAL STUDY

The Incidence of Some Intestinal Protozoa: *Entamoeba histolytica*, *Blastocystis hominis* and *Giardia lamblia* Among Iraqi Individuals at Baghdad Province

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ABSTRACT

This study investigates incidence of *Entamoeba histolytica, Blastocystis hominis* and *Giardia lamblia* at Baghdad province during during the months of 2024. Samples were collected from patients admitted Baghdad hospitals during a period of January to the end of December 2024 and examine by Macroscopic Examination by direct wet mounts and Concentration Methods using formalin-ethyl acetate sedimentation or zinc sulfate flotation to concentrate ova/cysts analyzed .The findings indicate that no significant differences among study groups individuals infected with *Entamoeba histolytica* out of 222,133 individulas infected with *Entamoeba histolytica* (32%) females most frequently infected than males (27%).*Giardia lambilia* according to gender of individuals, females most frequently infected than males (37.3, 34.4 %) age group of (18-32) was more frequently infected with Entamoeba histolytica, giardia lamblia and *Blastocystis hominis*,the study also showed that November was more frequent month spreading with infection by *Entamoeba histolytica*(18.8%) followed by *Blastocystis hominis* (16.3%).

Keywords: Amoebiasis, Giardia lamblia, Entamoeba histolytica blastocystis spp, Dysentery

1. Introduction

Amoebiasis, often known as amoebic dysentery, is caused by the protozoan Entamoeba histolytica. Most infections are asymptomatic, but invasive intestinal disease can last for weeks and produce cramping, abdominal discomfort, watery or bloody diarrhea, and weight loss (Prakash, 2017). Disseminated extraintestinal disease, including liver abscess, pneumonia, purulent pericarditis, and even cerebral amoebiasis, has been reported. *E. histolytica* is estimated to afflict up to 50 million people worldwide, primarily in developing countries, and causes more than 100,000 fatalities each year (Maltz and Knauer, 1991; Haque et al., 2003). Transmission primarily occurs through the consumption of infected food or drink as a result of cyst fecal discharge, as well as fecal-oral transmission inside the household and during male homosexual behaviors (Maltz and Knauer, 1991; Bernin et al., 2014). Blastocystis spp. is an organism, with most common forms being vacuolar, granular, amoeboid, and cystic. Avacuolar, multivacuolar, and with filamentous inclusions are all known forms (Stanley, 2003; Wuerz et al., 2012). Although a few researchers believe that the cyst designation is inadequate since it is a chromist, other researchers support that designation, which will be used in this review (Ramirez-Miranda et al., 2010). It is transmitted by a

Received 30 August 2025; revised 16 January 2026; accepted 15 February 2026.
Available online 15 July 2026

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https://doi.org/10.63100/3078-6738.1026

fecal-oral route, ingestion of contaminated water and food, and zoonotic dissemination (Casero et al., 2015; Yersal et al., 2016). This infectious agent has a global distribution and is the most common stramenopile in humans, with prevalence rates ranging from less than 1% in developed nations to 100% in underdeveloped areas. The relatively recent interest in the subject (Tan et al., 2002; Tan, 2008). *Blastocystis*, despite being described a century ago, is due to belief to cause intestinal illness (Escobedo and Angel Núñez, 1997). *Giardia lamblia* is a unicellular, flagellated protozoan parasite that lives in the small intestine of the host. It causes giardiasis, a gastrointestinal infection that is a leading cause of death and morbidity worldwide (Prakash, 2017). It is extremely widespread, potentially infecting more than one-third of the population in impoverished nations. The parasite causes acute or chronic diarrhea in humans, particularly young people, and it can infect other mammals (Vidal et al., 2010). This parasite lives adherent to the mucosal lining of the host's duodenum and jejunum and colonizes the small intestine. Its life cycle consists of two stages: the resistant, dormant cyst stage and the multiplying, motile trophozoite stage (Zhang et al., 2016). Amoebiasis is a worldwide disease, although people in developing countries are especially vulnerable due to poor sanitation and socioeconomic conditions. Increased emigration and travel from endemic places is making infection more likely in industrialized countries like North America (Maltz and Knauer, 1991). The infection rate in amoebic colitis is nearly identical in males and females (Maltz and Knauer, 1991; Haque et al., 2003). Amoebic liver abscess (ALA) is ten times more common in males than in females and often affects persons between the ages of 18 and 50 (Stanley, 2003). *Entamoeba histolytica* is a invasive intestinal protozoan (Casero et al., 2015). Infection is mainly caused by eating mature, quadrinucleated cysts found in feces-contaminated food or drinks. Excystation results in the small intestine, producing motile trophozoites that inhibit the large intestine (Wuerz et al., 2012). Cysts can live in the environment for days to weeks; however trophozoites are promptly killed once they leave the body or are eaten by gastric secretions (Bernin et al., 2014; Yersal et al., 2016). Baghdad province represents a particularly important setting for studying intestinal protozoan infections due to its high population density, rapid urban expansion, and variable sanitation infrastructure. In several districts of Baghdad, overcrowding, intermittent water supply, aging sewage systems, and increased population mobility may facilitate fecal–oral transmission of intestinal parasites (AL-Kubaisy et al., 2014). Furthermore, the province receives continuous internal migration from rural and conflict-affected areas, which may contribute to the circulation of parasitic infections and complicate disease control efforts. Despite these risk factors, updated epidemiological data on intestinal protozoa in Baghdad remain limited, emphasizing the need for local surveillance studies (AL-Kubaisy et al., 2014).

Seasonal variation is another critical factor influencing the transmission dynamics of intestinal protozoa. Sampling across different seasons provides a more accurate estimation of infection patterns, as climatic conditions such as rainfall, temperature, and humidity directly affect parasite survival, cyst viability, and water contamination, In Iraq, seasonal rainfall during autumn and winter may increase runoff and sewage overflow, leading to contamination of drinking water sources, while higher temperatures during summer can promote parasite persistence in water and food (Anas et al., 2021).

2. Methodology

2.1. Sample collection

Sample colleccted using a sterile, dry, leak-proof container,the sample then transport to the laboratory with not more than 1–2 hours.

2.2. Macroscopic examination

Mixed stool thoroughly with a sterile spatula or glass rod to ensure uniformity then direct wet mounts prepared with normal saline then in diluted lugol solution

Direct wet mounts were prepared using normal saline to detect motile trophozoites and Lugol's iodine solution to enhance visualization of cysts. Microscopic examination was performed using a light microscope (Olympus CX23, Japan) under 10× and 40× objective magnifications for identification of protozoan cysts and trophozoites (Vielma et al., 2016).

2.3. Concentration methods

To increase diagnostic sensitivity, stool samples were subjected to concentration methods:

Formalin–ethyl acetate sedimentation technique, in which samples were fixed with 10% formalin and centrifuged to concentrate parasite stages in the sediment.

Zinc sulfate flotation technique, utilizing high-specific-gravity solution to separate protozoan cysts from fecal debris. The surface layer was examined microscopically following centrifugation.

Parasites were identified based on standard morphological criteria described in established parasitological references (Vielma et al., 2016).

2.3.1. Formalin-ethyl acetate sedimentation or zinc sulfate flotation to concentrate

The sample is mixed with formalin (to fix parasites) and ether/ethyl acetate (to dissolve fat and debris). Centrifugation concentrates the parasites in the sediment, which can be examined under a microscope.

2.3.2. Flotation techniques

This method used solutions with high specific gravity to separate lighter parasite eggs, cysts, and oocytes from debris. Zinc Sulfate Flotation The sample is mixed with a zinc sulfate solution, causing parasites (e.g., protozoan cysts) to float while debris sinks. A thin layer of the supernatant is examined under a microscope (Katagiri and Oliveira-Sequeira, 2010).

3. Result and discussion

Table 1 shows the results of the distribution parasitic *infection Entamoeba histolytica, Blastocystis hominis, Giardia lambilia* according to gender of individuals,no significant differences among study groups at p value = 0.712, out of 222,133 individulas infected with Entamoeba histolytica (32.88%) females most frequently infected than males (27%). *Blastocystis hominis* 37.7% of females are more highly infected than males; 34.4% less infection was caused by *Giardia lamblia* and males were also higher in percentage than females, which may be attributed to increased exposure during household activities such as food preparation, water handling, and childcare. Similar findings have been reported in regional and international studies, suggesting that socio-behavioral factors play an important role in infection risk.

In a study by Saqur et al. (2017) Infection rates for *E. histolytica/dispar* were significantly higher than for *G. lamblia*, which may be due to the activity of cysts in environment conditions. The results agree with the present work .giardiasis as the most frequent intestinal protozoan infection. Another study by Katagiri and Oliveira-Sequeira (2010) documented that parasitic infections in Riyadh, Saudi Arabia, were associated with protozoa (95.6%) and intestinal worms (4.4%).

Table 1. Distribution the parasitic infections according to gender (n = 80).

Study Groups	Female	Male	Total
Entamoeba histolytica			
Count	73	60	133
%	32.88%	27.03%	59.9%
Blastocystis hominis			
Count	47	33	80
%	37.3%	34.4%	36.0%
Giardia lamblia			
Count	6	3	9
%	4.8%	3.1%	4.1%

P-value = 0.712 (non significant).

Table 2. Distribution the parasitic infections according to age range groups (years).

Study Groups	E.histolytica	B.hominis	G.lambilia	Total
Age range(Years)				
(18-32)				
Count	50	39	5	94
%	37.6%	48.8%	35.5%	42.3%
(33-47)				
Count	47	23	3	73
%	35.3%	28.8%	33.3%	32.9%
(48-62)				
Count	25	15	1	41
%	18.8%	18.8%	11.1%	18.5%
<62				
Count	11	3	0	14
%	8.3%	3.8%	0.0%	6.3%
Total				
Count	133	80	9	222
%	100.0%	100.0%	100.0%	100.0%

P-value = 0.5 4 (non significant).

Age-related distribution showed that individuals aged 18–32 years were the most affected group. This may be explained by increased occupational exposure, outdoor activities, and consumption of food from public sources, which may increase contact with contaminated water or food (Al-Yousofi et al., 2022).

In Iran, helminths and protozoa caused 95.33% and 4.87% of parasitic infections, respectively. According to Ashtiani et al. (2011) and Júlio et al. (2012), females have a higher prevalence of infections than males. This variation could be because these women are housewives, responsible for housework, agricultural practices, and animal breeding.

Shows age group of (18-32) was more frequently infected with *Entamoeba histolytica, Giardia lamblia and Blastocystis hominis.*

Table 2 and Fig. 1 display the results of parasitic infections caused by *Entamoeba histolytica, Blastocystis hominis,* and *Giardia lamblia* based on the ages of individuals, showing no significant differences between the study groups with a p value of 0.54. The age group of 22-47 had the highest infection rate for *Entamoeba histolytica* at 37.6%, followed by *Blastocystis hominis* at 48.8% and *Giardia lamblia* at 35.5%. These results are consistent with the findings of The results agree with Lengongo et al. (2020), who revealed, intestinal parasite infection frequency increased, 83% among the youngest and 36% among the oldest individuaand.

The age group (22-47) was more frequently infected with *Entamoeba histolytica* (37.6%), followed by *Blastocystis hominis* (48.8%) and *Giardia lamblia* (35.5%). ls.Age and gender were important and

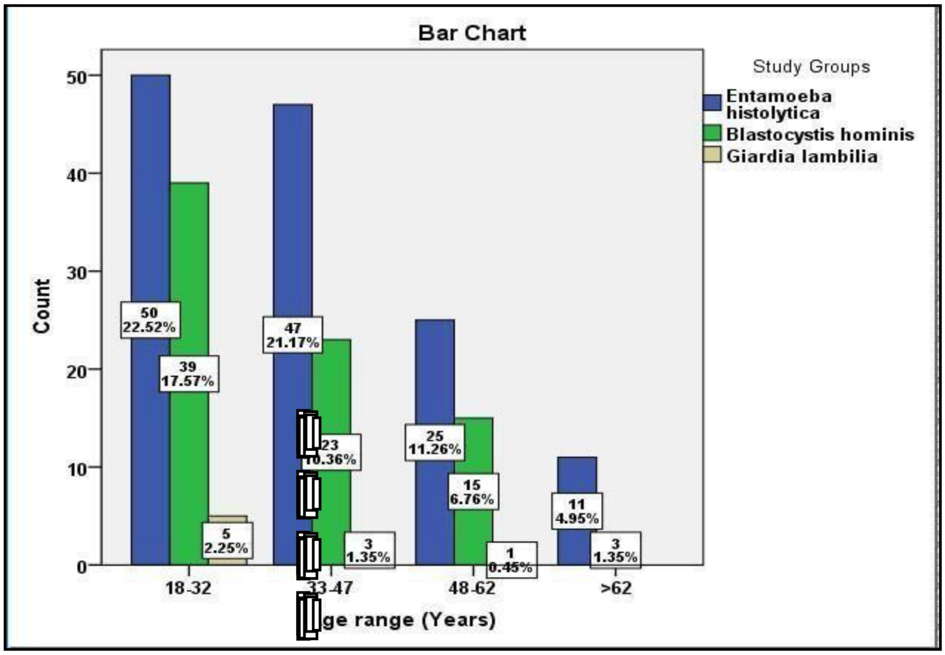


Fig. 1. Distribution the parasitic infections according to age range groups (years).

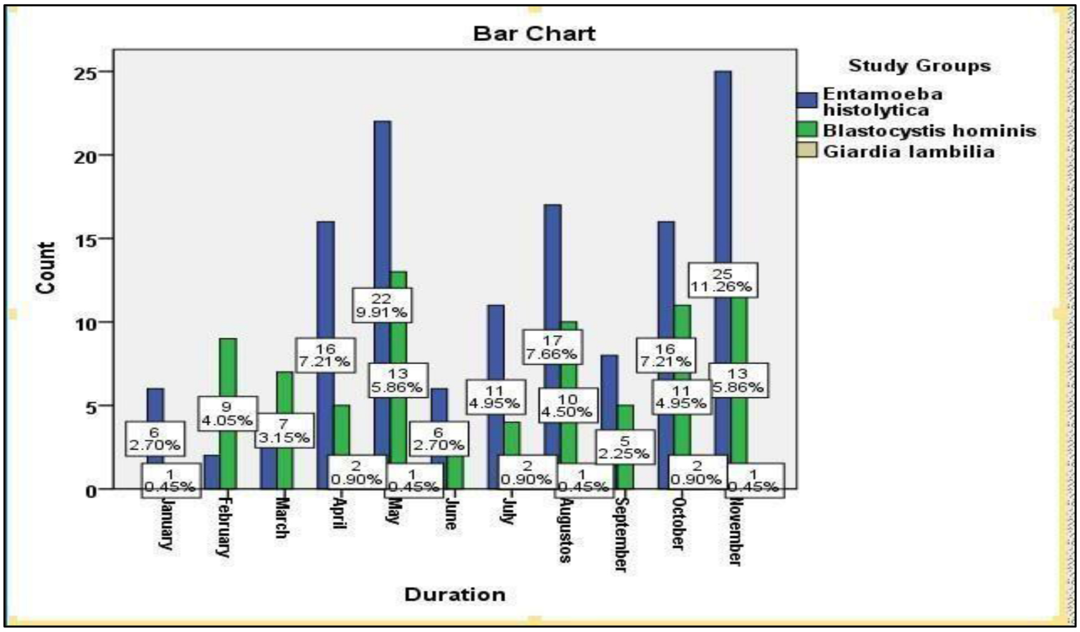
Table 3. Distribution the parasitic infections according to duration (month).

	Study Groups			
	Entamoeba histolytica	Blastocystis hominis	Giardia lambilia	Total
Duration				
January				
Count	6	1	0	7
%	4.5%	1.3%	0.0%	3.2%
February				
Count	2	9	0	11
%	8.3%	5.0%	22.2%	7.7%
August				
Count	17	10	1	28
%	12.8%	12.5%	11.1%	12.6%
September				
Count	8	5	0	13
%	6.0%	6.3%	0.0%	5.9%
October				
Count	16	11	2	29
%	12.0%	13.8%	22.2%	13.1%
November				
Count	25	13	1	39
%	18.8%	16.3%	11.1%	17.6%
Total				
Count	133	80	9	222
%	100.0%	100.0%	100.0%	100.0%

P-value = 0.212 (non signifcant).

significant factors affecting the prevalence of both *G. lamblia* and *E. histolytica/dispar* in our surveyed population. The majority of G. *lamblia* and *E. histolytica/dispar* positive samples came from the young age group, which may be due to the fact that this age group is more likely to be engaged in the many work activities that might expose individuals to infection through contaminated soil, water and food (Wegayehu et al., 2013).

Table 3 and Fig. 2 show the results of the distribution of parasitic infections, *Entamoeba histolytica, Blastocystis* hominis, and *Giardia lambilia* according to duration in months. No significant differences among study groups at p value = 212, November was the



P-value=0.212 (non signifcant).

Fig. 2. Distribution the parasitic infections according to duration (month).

most frequently occurring month, spreading with infection Entamoeba *histolytica* (18.8 %), followed by *Blastocystis hominis* (16.3 %) and *Giardia lamblia* (11.1%).Seasonal analysis indicated that November recorded the highest prevalence of E. histolytica and Blastocystis hominis. This peak may be associated with climatic conditions in Baghdad, particularly increased rainfall and moderate temperatures during autumn, which can enhance parasite survival and facilitate water contamination. Seasonal flooding and sewage overflow during this period may further increase the risk of fecal contamination of drinking water sources. These findings are consistent with previous studies reporting higher intestinal parasite prevalence during rainy and cooler seasons (Hamad and Ramzy, 2012).

Overall, the seasonal trend observed in this study highlights the importance of continuous surveillance and the implementation of season-specific public health interventions, particularly before and during high-risk months (Baker et al., 2021).

Rayan et al. (2010) suggested that seasonality was shown to play a significant role in the prevalence of *G. lamblia* and *E. histolytica/dispar*. The highest prevalence rates were seen in winter and spring. This result agreed with other studies, which showed that a high peak incidence of these parasites occurred in the rainy seasons

The current study documented that January is the month with fewer infections. This result agrees with another study by Amin (2002), who found that the frequency of asymptomatic intestinal illness in this district was almost twice during the rainy season and was dominated by *Blastocystis*. Although, as previously reported, nearly half of the infections were mixed; their roles and interactions require further investigation. As described by others, the majority of intestinal parasite infections discovered during the dry season were nonpathogenic protozoa, E. nana, and helminthes.

4. Conclusion

The study concluded that *Entamoeba histolytica* was the most prevalent parasite among the intestinal parasites studied in Baghdad province during 2024, with an infection rate of 32%, higher than other parasites. The results also showed that women were more susceptible to infection with *Entamoeba histolytica* and *Giardia lamblia* than men, particularly in the 18-32 age groups. The study also showed that November was the most month for outbreak of *Entamoeba histolytica* infection, 18.8%, followed by *Blastocystis hominis* 16.3%.

Acknowledgments

The authors thank all hospitals in Baghdad Medical City and patients who volunteered to participate in our study and facilitated the sample collection process. They also appreciate the Research Center, Middle Technical University, College of Medical and Health Technology for the initiative in providing its laboratories (microbiology and parasitology) for the success of this project.

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