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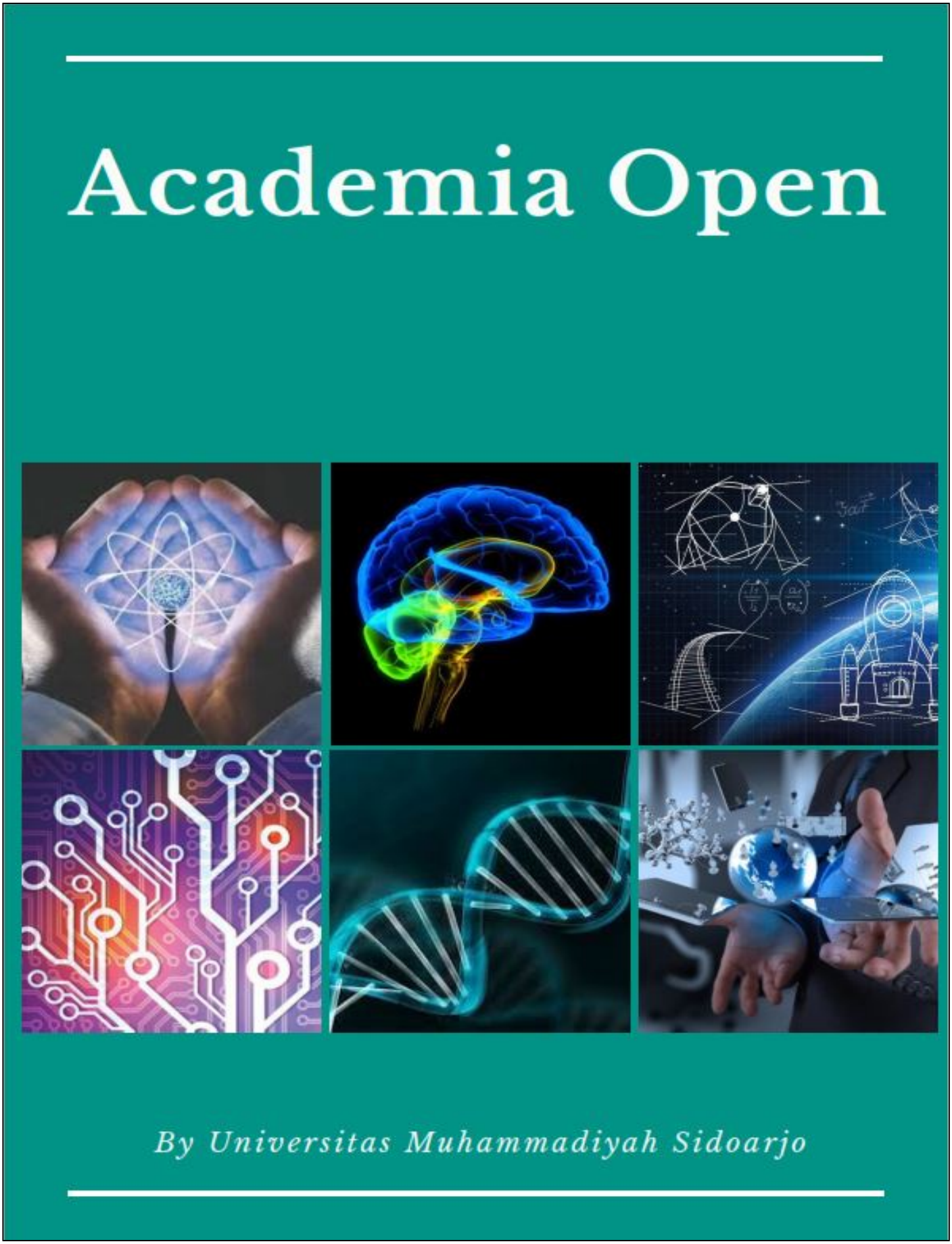

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Gender Age Disparity in Amoebiasis Prevalence in Iraq

Perbedaan Usia Jenis Kelamin dalam Prevalensi Amoebiasis di Irak

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Abstract

This comparative cross-sectional study evaluates the prevalence of *Entamoeba histolytica*, the causative agent of amoebiasis, in the human population of Diyala Governorate, conducted at Alshams Medical Labs in Baqubah city. Despite the global health burden of amoebiasis, particularly in developing countries, data on its age and gender-specific prevalence remain sparse. Aimed at filling this knowledge gap, our research specifically assessed the distribution of E. histolytica in males and females across two age groups (1-15 years and 15-45 years). The study found that 74% of females aged 1-15 years harbored both cysts and trophozoites, while males of the same age group showed a markedly lower prevalence at 19%. In the 15-45 year age group, males demonstrated a higher prevalence (50%) compared to females (9%). These findings suggest significant gender and age-related disparities in the prevalence of *E. histolytica*. The results could inform targeted public health interventions and contribute to more effective management and prevention strategies for amoebiasis in endemic regions.

Highlights:

- Gender Disparity: Marked differences in infection rates between males and females.
- Age Influence: Varied prevalence across different age groups.
- Health Strategy Needs: Highlights the necessity for targeted public health interventions.

Keywords: Amoebiasis, Entamoeba Histolytica, Prevalence, Gender Disparity

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Introduction

The human intestine is infected with the protozoan parasite Entamoeba histolytica. Amoebiasis, a serious public health issue in many impoverished nations, is caused by it. The parasite can produce a variety of clinical symptoms, from asymptomatic colonization to invasive intestinal and extraintestinal illnesses. It is spread via the consumption of contaminated food or water [1]. A protozoan parasite called Entamoeba histolytica infects people and causes amoebiasis, commonly referred to as amoebic dysentery. It is thought to infect about 50 million individuals annually throughout the world, resulting in a high rate of illness and mortality. The main way that E. histolytica is spread is by eating or drinking tainted food or water that contains the parasite's cyst stage [2]. After entering the human body, E. histolytica may settle in the large intestine, where it may live as a benign commensal or as an invasive pathogen that causes tissue damage and a range of clinical symptoms. These can include intestinal amoebiasis, which causes diarrhea, dysentery, and abdominal discomfort, or asymptomatic colonization [3]. When a parasite infestation is severe enough, it can break through the intestinal wall, enter the bloodstream, and spread to other organs—most frequently the liver—where it can result in amoebic liver abscesses [4].

The fecal-oral pathway is the principal means of Entamoeba histolytica transmission. This indicates that the parasite is disseminated through the consumption of food or water tainted with excrement that contains mature E. histolytica cysts. Poor sanitation procedures, insufficient water treatment, inappropriate waste disposal, or eating food touched by diseased people who have not followed basic hygiene can all lead to this contamination. The cysts enter the stomach and travel through it to the small intestine after being consumed. The infectious trophozoites are subsequently released when stomach acid and enzymes disintegrate the cyst wall. The large intestine is the destination of these trophozoites' migration, where they might spread infection and induce illness.

Methods

A. Study Design

This comparative cross-sectional study was conducted at Alshams Medical Labs in Baqubah city . It involved various patients who showed symptoms of amoebic dysentery (bloody diarrhea) (Fig1).

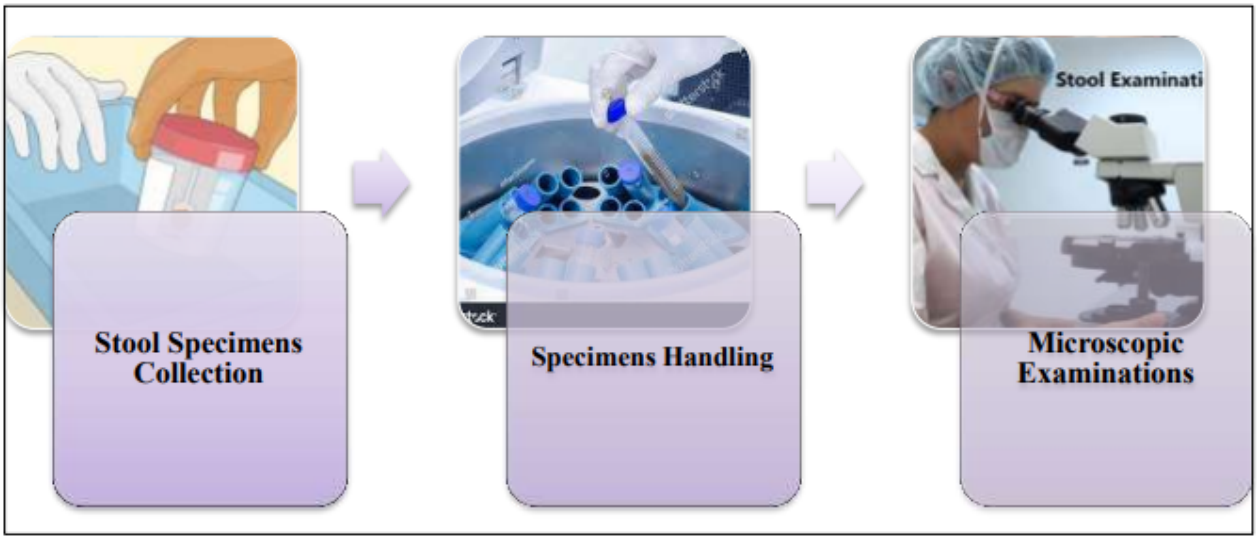

Figure 1. *The main steps of the current study*

B. Materials

Laboratory Apparatus and Instruments

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ID	Apparatus and equipment	Company	Origin
1.	Centrifuge	bioMérieux	USA
2.	Centrifuge tubes	Medeco	UAE
3.	Disposable gloves	Broche	Turkey
4.	Light Microscope	Philippine Medical Supplies	Philippine
5.	Lugol's iodine and normal saline	Thermo Fisher Scientific	USA
6.	Micropipette	Brand	Germany
7.	Microscope slides and Coverslips	bioMérieux	USA
8.	Stool container	GMI	China
9.	Transport containers	Gelson	France
10.	Tube Rack	Thermo Fisher Scientific	USA

Figure 2. *Devices and Instruments*

Laboratory apparatus and instruments used in this study are shown in Figure (2).

C. Sample Collection

1. Stool samples were collected from patients exhibiting symptoms of gastrointestinal distress, such as bloody diarrhea, at Alshams Medical Labs in Baqubah city.

2. Samples were collected, adhering to standard sterile procedures.

3. Each sample was collected in a clean, labeled container to avoid crosscontamination.

4. Samples were transported to the laboratory promptly for further analysis.

D. Sample Preparation

1. Upon receipt in the laboratory, stool samples were visually inspected for

consistency and color.

2. Samples were homogenized using a spatula or mixing rod to ensure an

even distribution of material.

3. Approximately 1-2 grams of the homogenized stool sample was

transferred into a sterile centrifuge tube.

4. To concentrate any potential Entamoeba histolytica cysts or trophozoites,

samples were suspended in physiological saline solution and centrifuged

at 1500-2000 rpm for 5 minutes.

5. Supernatant was carefully decanted, leaving behind a pellet of

concentrated material.

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6. The pellet was resuspended in a small volume of physiological saline

solution, ensuring thorough mixing.

7. A small aliquot of the suspension was then transferred onto a clean

microscope slide for microscopic examination.

E. Diagnosis of Entamoeba H istolytica (Sample 70)

1. A drop of Lugol's iodine solution was added to the prepared slide containing the stool suspension.

2. The slide was covered with a coverslip and examined under a light microscope at 100x magnification.

3. Entamoeba histolytica cysts and trophozoites were identified based on

characteristic features, including size, shape, motility (in trophozoites),

and presence of internal structures.

4. Confirmation of diagnosis was made by experienced laboratory personnel

trained in the identification of parasitic organisms.

5. The number of Entamoeba histolytica organisms observed per highpower field (HPF) was recorded.

6. Results were documented and reported accordingly for further analysis.

F. Statistical Analysis

Statistical Package for Social Science (SPSS) version 26 software was used to analyze the data.

Results and Discussion

A. Characterization of Samples in the Current Study

The general characteristics of the total study samples include age and sex. A total of 70 patients with Entamoeba histolytica were classified into groups based on age. The first group comprised 50 patients aged between 1 and 15 years, while the second group comprised 20 patients aged between 15 and 45 years (Figure 3).

Total Numbers 70 patients	
First groups	(1-15 years)
Second groups	(15-45years)
Sex	
First groups	23 males (46%)
	27 females (54%)
First groups	10 males (50%)
	10 females (50%)

Figure 3. *Characterization of patients groups*

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B. Results in Patients Aged 1-15 Years

The distribution of Entamoeba histolytica cysts and trophozoites varied significantly between male and female patients, aged 1 to 15 years, according to the study's findings (Figure 4). Among females, a higher proportion of individuals exhibited both cysts and trophozoites, accounting for 74% of cases, whereas 14.8% presented cysts alone and 11.2% trophozoites alone. Conversely, males showed a higher overall percentage of E. histolytica presence at 19%, with 17.2% presenting cysts alone and no cases of trophozoites detected. These results underscore a potential gender-specific variation in the manifestation of E. histolytica infection within the studied age group.

Gander	Cyst	Trophozoite	Cyst and trophozoite
Female Number 27	4 (14.8%)	3 (11.2%)	20 (74%)
Male Number 23	4 (17.2%)	0	19 (82.8%)

Figure 4. *Distribution of Entamoeba histolytica Cysts and Trophozoites in Patients Aged 1-15 Years*

C. Results in Patients Aged 15-45 Years

The results highlighted a notable difference in the prevalence of Entamoeba histolytica cysts and trophozoites among females and males aged 15-45 years (Figure 4-5). Among females, the prevalence was relatively lower, with 9% of cases showing either cysts or trophozoites. Specifically, cysts were detected in 0% of cases, while trophozoites were absent (10%). In contrast, males exhibited a higher prevalence, with 50% of cases demonstrating the presence of either cysts or trophozoites. Cysts were observed in 20% of cases, while trophozoites were identified in 30%. These findings underscore a significant gender-based variation in the presentation of E. histolytica infection within the specified age range.

Gander	Cyst	Trophozoite	Cyst and trophozoite
Female Number 10	0	1 (10%)	9 (9%)
Male Number 10	2 (20%)	3 (30%)	5 (50%)

Figure 5. *Distribution of Entamoeba histolytica Cysts and Trophozoites in Patients Aged 15-45 Years.*

In our study focusing on patients aged 1-15 and 15-45 years in Diyala province, significant differences were observed in the distribution of Entamoeba histolytica cysts and trophozoites between male and female participants. These findings indicate a potential gender-specific variation in the manifestation of E. histolytica infection within the studied age groups, with females exhibiting a higher prevalence and a greater likelihood of co-infection with both cysts and trophozoites.

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With an emphasis on the Diyala area, the study published [5] used epidemiological research to look at the prevalence of E. histolytica infection in Iraq. According to their findings, inadequate planning and environmental neglect have led to the establishment of E. histolytica as a serious health concern, which has increased the prevalence of parasitic disorders such amebiasis.

In a similar vein, [6] looked into the frequency of Giardia lamblia and E. histolytica infections in people who had diarrhea in the Al-Shomally area of Babil, Iraq. According to their research, intestinal parasite infections were highly common; 22% of patients tested positive for G. lamblia or E. histolytica. Fascinatingly, there were no appreciable variations in infection rates between males and females, suggesting a more widespread spread of parasitic illnesses in this area. In addition, our analysis reveals age- and gender-specific differences in the prevalence of E. histolytica infections. These results highlight the significance of taking gender into account in disease preventive and control measures, since they imply that gender may have a role in the presentation of E. histolytica infection.

Numerous factors may have an impact on gender-specific differences in the prevalence of E. histolytica infections. These discrepancies may be caused by behavioral differences between males and females, including differences in food handling behaviors, cleanliness routines, and exposure to polluted water sources. Hormonal variations and cultural and societal norms may also have an impact on immune responses and infection susceptibility. To discover the precise processes behind gender-specific differences in E. histolytica infection and to create focused strategies for illness prevention and control, more study is required.

Conclusions

1. The results highlighted a notable difference in the prevalence of Entamoeba histolytica cysts and trophozoites among females and males aged 1-15and 15-45 years.

2. The high prevalence of Entamoeba histolytica in Diyala Governorate underscores the urgent need for targeted interventions and improved public health measures to control the spread of the infection and mitigate its impact on the population.

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