

## The Spread of Amoebic Dysentery in Balad District/Salah Al-Din Governorate/Iraq

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### ABSTRACT

Fecal samples were collected from the laboratory of Balad General Hospital in Salah al-Din Governorate, for age groups that ranged between (1-60) years and for both sexes for the period from December 2022 until May 2023, and the *Entamoeba histolytica* parasite was diagnosed through microscopic examination. For fecal samples in 60 samples out of 225 samples, with a percentage of 26.66%.

The highest rate of infection with the parasite was recorded in March, at 37.5%, and the lowest rate of infection was in May, at 13.33%. The highest infection rate was recorded in females, reaching 30.43%, while it reached 22.72% in males. The highest percentage was in the age group 11-20 years, where the percentage reached 38.71%, while the lowest infection percentage was recorded in the group 1-10 years, which was 17.75%. The highest rate of infection with the parasite was recorded in Yathrib, at 28.76%, and the lowest rate of infection was in the Hadera area, at 23.18%. The highest rate of infection with the parasite was among uneducated people, at 31.25%, and the lowest rate of infection was among university students, at 21.42%. The study aimed to know the prevalence of amoebic dysentery in Balad district and the impact of some prevalence standards on the spread of the disease.

**KEYWORDS:** amoebic dysentery, *Entamoeba histolytica*, Iraq.

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### INTRODUCTION

*Entamoeba histolytica* is one of the intestinal protozoan parasites that causes what is known as amoebiasis (Ali, 2015). The main cause of diarrhea, especially in children, infection begins with the ingestion of infective stages, represented by the cystic form found in contaminated drinks and food. Dysentery is known as an infection resulting from tissue decomposition and may be symptomatic or asymptomatic (Pereira *et al.*, 2014). The infection spreads throughout the world, and poses a serious threat to health in tropical and subtropical developing regions (Gupta *et al.*, 2022).

The parasite is classified according to (Paniker and Ghosh, 2018) into Phylum: Sarcomastigophora, and... Class: Gymnamebi The amoeba *histolytica* parasite infects up to 90 million people every year, with a death rate exceeding 100,000 people annually in all countries of the world (Wesel *et al.*, 2021). This parasite causes amoebiasis and can develop into liver abscess and amoebic colitis, which is listed among the 15 most important causes of diarrhea in the first two years

of life of children living in the developing world (Gupta *et al.*, 2022). The life cycle of the parasite passes through four stages, which is the vegetative phase. (Feeding) or what is called the active Trophozoite, the precyst phase, the cyst phase, and the post-cyst phase (Mitchell *et al.*, 2023).

Its life cycle is simple and direct. The infection is transmitted when eating contaminated food and drink. The infection occurs by swallowing the infectious cysts with contaminated food and water or from contaminated hands. It passes through the stomach without being affected and does not show any activity in the acidic environment. When it reaches the basic environment in the small intestine, it is stimulated and escape occurs. From the excystation cyst, cytoplasmic and nuclear division begins, forming eight small amoebulas. The trophic stages after exocytosis are similar to the mature trophic stages, but differ in size (Ebert *et al.*, 2020).

The autotrophs live and multiply in the crypts of the mucous layer of the large intestine and feed on the mucous

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secretions. There is also a metabolic interaction or interaction with the intestinal bacteria. The autotrophs usually begin tissue invasion when they decompose the mucous cells with hydrolytic enzymes and absorb the decomposed product. Ulcers occur in the intestinal wall, and perhaps it continues to penetrate until it reaches beneath the surface lining and may spread sideways into the submucosal layer, forming a flask-shaped ulcer. The ulcer may develop in the cecum, appendix, ascending colon, ileocecal valve, terminal ileum, sigmoid colon, and rectum, and may reach the lower blood vessels, and from here it may travel with the blood. Through the hepatic portal vein, forming systematic amoebiasis or extraintestinal amoebiasis, and it continues to grow and multiply in the liver cells, causing amoebic liver abscess. It may reach the lung when it penetrates the diaphragm after infecting the liver, and it may be transmitted from the liver to the brain or skin through the blood, and the active phase may remain in the intestinal lumen. When unsuitable environmental conditions are available, the cyst begins to multiply and divide, and the mature cysts are thrown out with the feces to infect another new host, and thus the life cycle continues (Selberherr *et al.*, 2022).

Some cases of nutritive phases remain in the intestinal lumen for a limited period and are called non-invasive infection. The rate of infection reaches 90%. Individuals infected with this condition are called asymptomatic carriers of the disease. The cysts come out with the feces without showing any symptoms, and these individuals represent an important source of epidemiology. The parasite, while the remaining 10% of the infections of the feeding phases attack the mucous layer of the intestine and may penetrate it and pass through it into the bloodstream to infect sites outside the intestine such as the liver, spleen, brain, skin, heart, and lung (Guillen and Nancy, 2023).

The success of parasite infection depends on many factors, including: the amount of dose, the virulence of the parasite, intestinal motility, the host's diet, the presence or absence of intestinal bacteria normal flora, the ability of the amoeba to adhere to colonic mucosal cells, and the activators penetrate the epithelial cells in the colon through their movement and enzymes that it possesses a histolysin enzyme and a lytic enzyme that causes damage to the mucous membranes, and Lactin mediates the adhesion of the active phase to host cells such as mucous cells in the colon (Guillen and Nancy, 2023).

*Entamoeba histolytica* is one of the most widespread parasites in all parts of the world. The infection is widespread and endemic in poor and developing countries that suffer from deteriorating health conditions. Amoeba disease is considered one of the global health problems and one of the most dangerous infectious diseases, especially in developing countries. Amoeba disease occurs in... It ranks third after malaria and schistosomiasis as a cause of death (Shirley *et al.*, 2018). The World Health Organization reports that *Entamoeba histolytica* affects approximately 90 million people worldwide, resulting in symptomatic illness in 50

million and death in 100,000 people annually (Wesel *et al.*, 2021).

Dysentery is increasing in warmer regions and developing countries, due to the resistance of parasitic cysts to prolonged survival in warm, humid conditions and poor hygiene (Slater *et al.*, 2019). It may spread to developed countries with travelers and immigrants to endemic areas (Gwaairgi and Ghildyal, 2018).

The study aimed to investigate the extent of the prevalence of amoebic dysentery among residents of Balad District, and the extent to which some prevalence criteria affect the infection rate, such as age groups, area of residence, standard of living, and others.

### MATERIALS AND WORKING METHODS

1: Collection of stool samples: The study included collecting 225 samples of feces from people lying in bed and attending Balad General Hospital and some private laboratories in Salah al-Din Governorate who were suffering from illness symptoms such as fever, diarrhea, loss of appetite, etc., during the period extending from the beginning of December 2022 until the end of May 2023, for different age groups. The samples were placed in dry, clean plastic containers with a capacity of 30 ml, with a wide opening and a tight lid to prevent the sample from drying out and to maintain its moisture. A paper sticker was placed on one side of it to record the patient's name and sample number. Other information was taken from the patients, such as age, gender, residential location, and educational level.

2: Examination of stool samples: Faecal samples were examined by preparing a direct wet swab to detect the presence of cystic or eutrophic stages of the amoebic dysentery parasite. Two slides were prepared for each sample using clean glass slides. I placed a small drop of 1% local iodine or 0.85% saline solution on the slide and mixed well, adding a small amount of feces and mixing using stick wood. Then the cover slide was placed well, and the sample was examined using Optical microscopy under 40x magnification and then under 100x power (WHO, 1991).

3: Statistical analysis: The program Statistical analysis system-SAS (2010) was used in the statistical analysis of the studied data, and percentages were extracted.

### RESULTS AND DISCUSSION

Stool samples were collected from the laboratory of Balad General Hospital for age groups ranging from (1-60) years and for both sexes for the period from the beginning of December 2022 until the end of May 2023. The *E. histolytica* parasite was diagnosed through microscopic examination of stool samples in 60 of the original samples. 225 samples, with a percentage of 26.66% (Table 4-1).

The results of this study are consistent with what was recorded by (ALYassaree, 2004) in Babil Governorate, where he recorded an infection rate of 29.5%, while they did not agree with what was recorded by (Kadir *et al.*, 2018) in Tikrit,

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who recorded an infection rate of 9.3%, and with what was recorded by (Ibraheem, 2008) in the city of Kirkuk, where the infection rate reached 41.1% when examining 1,250 samples for children under 5 years of age, and what was recorded by (Ismail, 2006), where he recorded in his study an infection rate of 47.7% in the city of Kirkuk, and what was recorded by (Ibraheem, 2018) in Baghdad, where the infection rate reached 19.5%, and the findings of (Al-masoudi, 2009) in Babylon, where he recorded an infection rate of 34.3%.

The difference in the rate of parasite infection in this study and the studies mentioned may be due to the difference in the level of sanitation, population density, personal hygiene, climatic conditions, geographical location, the number of samples examined, the extent of the study and the age groups in the population on which the study was conducted. As for the similarity in the rates The incidence may be due to similarity in cultural, social, and health levels (Kurt *et al.*, 2007).

The highest rate of infection with the parasite was recorded in the month of March, at 37.5%, and the lowest rate of infection was in the month of May, at 13.33% (Table 4-2).

This study is consistent with the findings of (Ibraheem, 2008) in Tikrit, where the percentage gradually increased with the entry of the spring season, and the reason for this is due to the seasonal changes that play a role in the difference in this percentage, in addition to the factors of humidity and temperature. In the cold and humid months of the year, it helps in vitality. Parasite cysts that cause infection and its persistence for a longer period.

This study does not agree with the findings of (Ibraheem, 2018) in Baghdad and with the findings of (Al-Araeqi *et al.*, 2017) in Yemen, as they recorded the highest rate of parasite infection in the winter.

The infection rate increases in the fall and spring seasons, when the temperature and humidity are moderate, and these conditions are better for the presence of tissue amoeba cysts and cysts. As for the winter season, the humidity is high and the temperature is low, which affects the presence of the parasite cysts and their spread, thus reducing the infection rate (Ibraheem, 2008).

The highest infection rate was recorded in females, reaching 30.43%, while it reached 22.72% in males, as shown in Table (4-3).

This result is consistent with what was found by (Ibraheem, 2008) in Kirkuk, where he recorded the infection rate in males at 49.1% and in females at 34.6%, and with (Jasim, 2011) in Baghdad, where he recorded the infection rate in males at 54.6%, while in females it was recorded as 54.6%. 45 4%, these differences may be due to environmental and physiological differences, especially hormonal ones. Environmental factors include the difference in exposure to

pathogens due to different behavior between males and females (Zuk and Mckean, 2000), and the differences between immune and endocrine interactions make a difference in infection between Males and females (Zahida *et al.*, 2010).

The results showed the highest percentage in the age group 11-20 years, where the percentage reached 38.71%, while the lowest infection percentage was recorded in the group 1-10 years, which was 17.75%. As in Table (4-4).

This study is consistent with the findings of (Jasim, 2011) in Baghdad, where the highest incidence of parasite infection was found in the age group 10-19, and it is also consistent with the findings of (Zahida *et al.*, 2010), where the highest infection rate was recorded in the age group 11- 20, did not agree with the findings of (Ibraheem, 2018), as these researchers explained that the reason for the high percentage in this category 1-10 is due to various reasons, including the incomplete immune system and thus the child is less resistant to infection, as well as their increased contact with The environment, as well as their failure to adhere to hygiene rules such as washing hands and contact with pets, and children who carry bags habitually putting their fingers in their mouths. The increase in infection in this period is also due to the fact that this age group is eager to taste anything that may fall into their hands (Ibraheem, 2008).

The results of the current study showed that the highest rate of infection with the parasite reached 28.76% in Yathrib, and the lowest rate of infection in the Hadera area, reaching 23.18%, as in Table (4-5)

In our current study, the infection rate in the areas surrounding the city center was higher than the city center, and this result agreed with Ibraheem in (2018), as he obtained a higher infection rate in the areas surrounding the center, while this percentage differed with Rabatti and Rasheed (2008), who recorded a higher rate in The city center. The reason for the high incidence of infection in the suburbs and countryside of the city is due to the lack of services, including the lack of pure drinking water, reliance on river water as a direct source of water, or reliance on water stored in concrete basins that may be exposed in most cases, making it easily vulnerable to contamination. About the decline in the health and cultural level of the rural population and the use of animal waste as organic fertilizer.

The results of the current study showed that the highest rate of infection with the parasite was among uneducated people, at a rate of 31.25%, and the lowest rate of infection was among university students, at a rate of 21.42%, as in Table (4-6).

Our current study agrees with AL-Areeqi *et al.*, 2017, who found a higher infection rate among the uneducated and attributed this to a lack of cultural awareness, unwelcoming workplaces, and many other factors.

**Table (1): Percentage of the number of samples positive for the E. histolytica parasite**

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total number of samples tested	number of infected samples	Percentage Percentage
225	60	26.66 %

**Table (2) Percentage of infection by month of the year**

months	number of people examined	number of infected people	Percentage
November	%19.56	%19.56	%19.56
January	% 21.1	% 21.1	% 21.1
February	% 32.14	% 32.14	% 32.14
March	% 37.5	% 37.5	% 37.5
April	% 36.84	% 36.84	% 36.84
May	% 13.33	% 13.33	% 13.33
Total	% 26.66	% 26.66	% 26.66

**Table (3): Percentage of infection by gender**

Gender	number of people tested	number of infected people	percentage
Females	115	35	30.43%
Males	110	25	22.72%
Total	225	60	26.66 %

**Table (4) Percentage of infected people by age groups for both genders**

Age groups	number of people tested	, number of infected people	percentage
1-10	107	19	17.75%
11-20	31	12	38.71%
21-30	25	9	%36
31-40	29	11	% 37.93
41-50	20	6	% 30
51-60	13	3	% 23.1
Total	225	60	% 26.66

**Table (5) Percentage by area of residence**

Area of residence	number of people tested	number of infected people	percentage
Balad District	83	23	27.71%
Yathrib	73	21	28.76 %
Hadera	69	16	% 23.18
Total	225	60	26.66%

**Table (6) Percentage of infections by educational level**

Educational level	Number of people examined	Number of infected people	Percentage%
Uneducated	96	30	% 31.25
Primary	51	12	% 23.52

Secondary	36	9	% 25
University	42	9	% 21.42
Total	225	60	26.66%

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