Erbil City Food-Handler Entamoeba Histolytica Investigation

Ahmed Akil Al-Daoody [1], Fattma A. Ali[1], Jihad A. Sulaiman[2], Bashdar Mahmud Hussen[3], Gashbin Ali Khalid [1], Avan Sharif Awlla [1], Rayan Esmail Aziz [1], Zhyan Hassan Asaad[1]

[1]College of Health Sciences, Hawler Medical University, Erbil, Iraq

[2] College of Dentistry, Hawler Medical University,Erbil, Iraq

[3]Department of Clinical Analysis, College of Pharmacy, Hawler Medical university, Kurdistan Region, Erbil, Iraq

Abstract— **The intestinal parasite of *Entamoeba histolytica* is a major contributor to the global prevalence of amoebiasis. Although diagnostic tools for parasite illnesses have significantly advanced and there is ongoing knowledge about their treatment and management, resulting in a noticeable decrease in the prevalence of these diseases in some affluent and industrialised nations. Nevertheless, parasitic illnesses of many kinds persist as a significant health issue in several nations.**

Detection of *Entamoeba histolytica* was done by macroscopically and microscopically. The stool samples should be assessed visually using macroscopic examination by naked eyes Regarding colour, forms of stool, odor, white blood cells (pus), blood and presence of mucus in stool samples. Microscopic examination was done by using direct smear with either normal saline or iodine wet mount. The purpose of this research was to examine the prevalence and risk of Entamoeba histolytica infection among food workers in the city of Erbil.

Out of (23600) samples examined, 845 (3.6%) were positive by using direct wet mount examination, the parasitic species found in the fecal sample were Entamoeba histolytica (3.6%), Giardia lamblia (1.1%). The incidence rate of parasite infection among men (3.8%) was greater compared to females (2.5%) with a statistically significant difference. According to months the result showed no significant difference, but in March the infection rate reached its peak (5%) and The minimum rate was seen in July (1.9%). According to age group the result showed no significant difference, but the highest distribution was observed in the age (16-25) (5.5%) followed by age (46-55) (3.3%), while the lowest distribution was observed in the age (36-45) (2.6%).

According to our study throughout the year, Entamoeba histolytica has the highest rate followed by Giardia lamblia with male being more commonly infected.

Index Terms*— *Stool examination, Entamoeba histolytica, Giardia lamblia, Erbil, Iraq.

I. Introduction

T Entamoeba histolytica is a parasitic protozoan that is responsible for causing intestinal amebiasis, often known as amoebic dysentery. While the majority of E. histolytica infections do not show any symptoms, over 50 million individuals have symptoms, resulting in around 100,000 fatalities each year [1].

Entamoeba histolytica is a parasitic single-celled organism that may invade the intestines [2]. Excystation takes place in the small intestine when movable trophozoites are released and then go to the big intestine. Both stages are eliminated in faeces, but only cysts may transmit disease due to their outer coating [3, 4].

The infection of Entamoeba histolytica is initiated when the parasite attaches itself to the mucous membrane layer of the colon. Trophozoites have a protein called Gal/GalNAc lectin on their cell surface, which has a special affinity for galactose and N-acetyl-d-galactosamine. They stick to colonic epithelial cells and host mucus membranes [5]. The parasites that have been colonised have the ability to cause severe damage to tissues. Hydrolytic enzymes, namely cysteine proteases (CP), are crucial tools used by parasites to infiltrate the epithelium and break down components of the host's extracellular matrix [6].

Factors that elevate the risk of more severe illness and higher death rates include youth, pregnancy, cancer, malnourishment, alcohol addiction, and the utilisation of corticosteroids [7].
This research was conducted to address the dearth of knowledge on the dissemination of this parasite. In order to examine the prevalence of amoebiasis infection among food handlers in Erbil City, The objective is to analyse the distribution of amoebiasis infection based on gender and months, as well as to identify cases of both single and double infection.Procedure for Paper Submission.

II. Materials and Methods

The research was done from January 2023 to December 2023 in Erbil City at Central laboratory. A total sample were taken from (23600) individuals (19262 males, 4338 females), from different age groups were randomly selected for this investigation

A fresh stool specimen was collected in a clean sterile screw-top plastic container [8]. Specimens must be promptly sent to the laboratory, ideally within 30 minutes following collection. If immediate delivery is not feasible, the specimen should be preserved using appropriate methods. Additionally, the specimen container must be properly labelled with the patient's name, date, and time of collection [9, 10].

The faeces specimen checked for being free from any contamination by urine or water, and numerous specimens were

DOI: http://doi.org/10.24086/biohs2024/paper.1375

collected for testing, to ensure that they are collected at various times on different days.

The stool samples were macroscopically assessed for colour, such as brown. The usual colour of faeces is brown, which is caused by the presence of bilirubin and bile. However, stool might seem yellow or other odd colours. In newborns, stool can appear green and its consistency can vary between watery and pasty [11]. It is normal to have a small amount of mucus in stool, but having a large amount or bloody mucus was considered as abnormal [12].

Stool specimens taken from the mucus area undergo microscopic examination to identify moving organisms. Fresh stool can be examined immediately, but if this is not feasible, it should be preserved in 10% formalin. To identify cysts, the least amount of stool needed to be concentrated and stained with iodine. Microscopic examination is done by using direct smear with either normal saline or iodine wet mount [13].

The data collected throughout the year has been coded using special designed system and entered into Microsoft excel sheets. Results were expressed as numbers and percentages. Imported into the statistical program (SPSS) version 23 is a software program used for statistical analysis in the social sciences. The association between two variables in this study was analyzed and assessed by chi-square test. T-test used to investigate the difference between two groups, P-value < 0.05 were considered as statically significant, while result > 0.05 were considered as statically insignificant.

III. Result

A. Total number of amoebic infection by using direct smear in Erbil City

The overall percentage of infection was 845 (3.6%) from (23600) samples were examined in current study in the Central laboratory in Erbil city for Entamoeba histolytica by using direct smear, as shown in Figure (1).

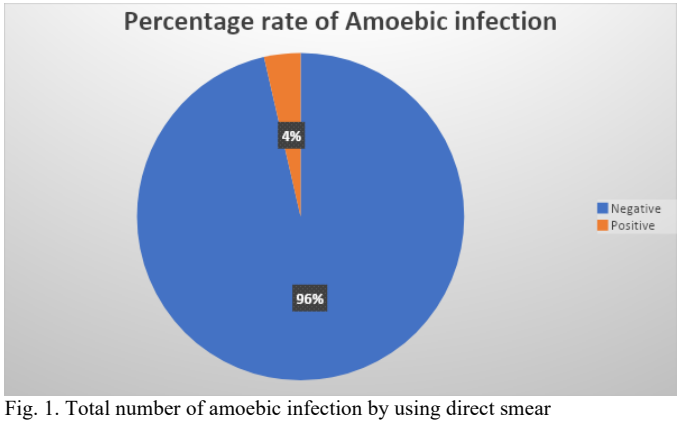

Fig. 1. Total number of amoebic infection by using direct smear

B. Prevalence of amoebic infection in relation to gender

The higher percentage of amoebic infection was observed among males (3.8%) than females (2.5%), and the difference was statistically significant (P-value = 0.0384) using Chi-square as seen in Table (1).

Table 1: Prevalence of amoebic infection according to gender among Erbil City

Gender	No. of sample	Positive Samples		Negative Samples		*P-value*
		No. +ve	**(%)**	**No. -ve**	**(%)**	
Male	19262	735	3.8	18527	96.2	0.0384
Female	4338	110	2.5	4228	97.5	
Total	23600	845	3.6	22755	96.4	

C. Distribution of amoebic infection according to the months of the study

As shown in (Figure 2), the highest distribution was observed in March (5%) followed by January and February (4.3%) for each, while the lowest distribution was observed in July (1.9%), the differences statistically was non-significant (P-value = 5.189) using T-test.

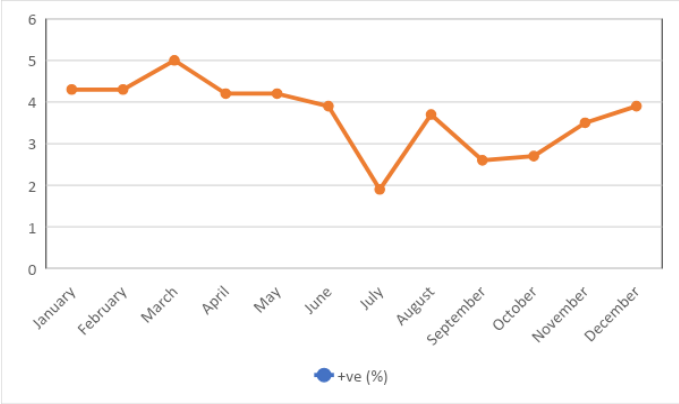

Fig. 2. Distribution of amoebic infection according to the months

D. Distribution of amoebic infection according to the age

As shown in (Table 2), the highest distribution was observed in the age (16-25) (5.5%) followed by age (46-55) (3.3%), while the lowest distribution was observed in the age (36-45) (2.6%), the differences statistically was non-significant (P-value = 2.945) using T-test.

Table 2: Prevalence of amoebic infection according to the age

Age						P-value
Age	**No. +ve**	**+ve %**	**No. -ve**	**-ve %**	**Total**	
(16-25)	283	5.5	4851	94.5	5134	2.945
(26-35)	199	3.2	5955	96.8	6154	
(36-45)	141	2.6	5351	97.4	5492	
(46-55)	222	3.3	6598	96.7	6820	
Total	845	3.6	22755	96.4	23600	

E. Total number of Amoebiasis and Giradiasis infection by using direct smear in Erbil City

After examined a total of (23600) samples in the Central laboratory in Erbil City for Entamoeba histolytica, also we detect Giardia lamblia in this research using direct smear. The overall percentage of infection was 845 (3.6%) amoebic

DOI: http://doi.org/10.24086/biohs2024/paper.1375

infection and 247 (1.1%) giardiasis infection from (23600) investigated as shown in Figure (3).

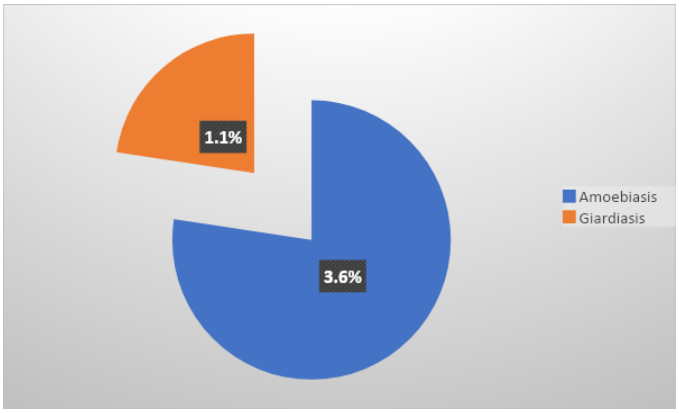

Fig.3. Percentage of Amoebiasis and Giardiasis infection by using direct smear.

IV. Discussion

Parasitic infections are a significant health issue in humans, with varying incidence rates depending on socioeconomic status, lifestyle choices, and hygiene practices [14]. Entamoeba histolytica continues to be a significant pathogen in several communities worldwide [15].

In our study about Entamoeba histolytica among food handlers we collected a total of (23600) samples among Central laboratory in Erbil City were (19262) males and (4338) females included for prevalence of parasitic infection during one year, from January to December 2022, (845) samples were positive (3.6) Figure (1).while one of the previous researches conducted in the United Arab Emirates have reported a similar outcome, with a prevalence rate of (3.3%) [16], and (4.2%) [17].Whereas higher result was recorded in both Duhok and Erbil cities (26.1% and 22.8%) by H. Yilmaz and A. Arshad [18], and in India (70.7%) by M. Shobha, D. Bithika, and S. Bhavesh [19]. The differences in these results may be due to environmental, nutritional, socio-economic, geographical condition, and health related behavior as well as lack of laboratories technician's education on parasitic infection, or lack of technicians which has efficiency to diagnosis parasites, or that different studies may be using different methods to diagnosis parasites or there are differences of the experience of laboratory experience [20].

According to gender, the percentage of Amoebiasis infection in males (3.8%) was higher than in females (2.5%) and this difference was statistically significant (P-value = 0.0384) (Table 1). Similar result was obtained by other study carried out in Mosul City by Z. Dhubyan Mohammed Zaki [21]. Opposite result was obtained by other studies carried out in Negeria by A. Damak [22], and Saudi Arabia by O. S. O. Amer et al. [23], in which the ratio of positive females was higher than males. While another study like that of Baghdad province/Iraq by M. J. Shaker and R. A. Hussein [24] have shown no significant difference between males and female's positive rates of parasitic infection.

The prevalence of intestinal protozoa infections among males can be attributed to their higher levels of activity, mobility, and integration into the environment. This is closely related to poor sanitary habits, lack of access to safe drinking water, and improper hygiene [25].

According to months our study in comparison to the study of (M. J. Shaker and R. A. Hussein and B. R. Maharana) [24, 26] were somehow similar as both are non-significant. While was different from the study in Kuwait by R. M. AlAyyar et al. [27].Although the different months were differ in results, these may be due to people do specific activities in each months also may the rate of people who visit the hospital to do the test , the lowest distribution to occur in July by (1.9%), on the other hand the highest distribution in March (5%) followed by January (4.3%) and February(4.3%) as shown in (Figure 2) which might be due to the seasonal change as people go outside, do outdoor activities, and meet each other more which affect the rate of transmission, and might be at the beginning and end of the year more people come to do the tests.

Our study showed difference in prevalence of Entamoeba histoytica infection in different ages, we observed the higher percentage of infection in age (16-25) was (5.5%) followed by age (46-55) which (3.3%), and the lowest percentage of infection in age (36-45) which (2.6%) which illustrated in (Table 2).

Our result agreement with Q. M. Koyee and A. M. Faraj [28]. Higher rate observed among age (16-25) largely due to lack of personal and environmental sanitation, human behavioral, ignorance of health promotion, and may be they eat a lot of outdoor food contaminated with Entamoeba histolytic [29].

Most infection in the hospitals are single infections by different protozoa, in our study among the intestinal protozoa Entamoeba histolytica, exhibited the highest rate of infection (3.6%) followed by Giardia lamblia (1.1%) as observed in (Figure 3).

These two protozoans remain the most common intestinal parasitic pathogens. Our result was close to finding in Saudia Arabia by O. Hassen Amer et al. [30], and was different from northern Jordon [31]. The detection of Entamoeba histolytica in the faeces indicates that the patient may have been exposed to environmental circumstances that might lead to the intake of contaminated food or water carrying disease-causing parasites. Additionally, this might be ascribed to the vulnerability to infection by Entamoeba and/or the accessibility of the infection sources caused by this parasite [32].

In conclusion, it was finalized that Entamoeba hisolytica is present particularly during cold seasons. Prevalence of amoebic infection among food handlers in Erbil city was low. Statistically significant difference was observed in infection according to gender.

REFERENCES

T. E. Bercu, W. A. Petri, and J. W. Behm, "Amebic colitis: new insights into pathogenesis and treatment," (in eng), Curr Gastroenterol Rep, vol. 9, no. 5, pp. 429-33, Oct 2007.

[2] A. Leon-Coria, M. Kumar, and K. Chadee, "The delicate balance between Entamoeba histolytica, mucus and microbiota," (in eng), Gut Microbes, vol. 11, no. 1, pp. 118-125, 2020.

DOI: http://doi.org/10.24086/biohs2024/paper.1375

[3] A. Pinilla, M. López, and D. Viasus, "Historia del protozoo Entamoeba histolytica," Revista Medica De Chile - REV MED CHILE, vol. 136, 01/01 2008.

[4] R. Haque, C. D. Huston, M. Hughes, E. Houpt, and W. A. Petri, Jr., "Amebiasis," (in eng), N Engl J Med, vol. 348, no. 16, pp. 1565-73, Apr 17 2003.

[5] S. Cornick and K. Chadee, "Entamoeba histolytica: Host parasite interactions at the colonic epithelium," (in eng), Tissue Barriers, vol. 5, no. 1, p. e1283386, Jan 2 2017.

[6] R. Thibeaux et al., "Identification of the virulence landscape essential for Entamoeba histolytica invasion of the human colon," (in eng), PLoS Pathog, vol. 9, no. 12, p. e1003824, 2013.

[7] S. L. Stanley, Jr., "Amoebiasis," (in eng), Lancet, vol. 361, no. 9362, pp. 1025-34, Mar 22 2003.

[8] L. S. Garcia et al., "Practical Guidance for Clinical Microbiology Laboratories: Laboratory Diagnosis of Parasites from the Gastrointestinal Tract," (in eng), Clin Microbiol Rev, vol. 31, no. 1, Jan 2018.

[9] R. A. Hiatt, E. K. Markell, and E. Ng, "How many stool examinations are necessary to detect pathogenic intestinal protozoa?," The American journal of tropical medicine and hygiene, vol. 53 1, pp. 36-9, 1995.

[10] A. Akil, K. Al-Daoody, S. Mohammad, Z. Ezadin, and D. Kakl, "PREVALENCE OF GIARDIA LAMBLIA AMONG RESIDENTS OF HAWLER, SORAN AND CHAMCHAMAL CITIES, NORTH OF IRAQ," Pak-Euro Journal of Medical and Life Sciences, vol. 3, pp. 28-36, 01/01 2020.

[11] T. H. Lien et al., "Effects of the infant stool color card screening program on 5-year outcome of biliary atresia in Taiwan," (in eng), Hepatology, vol. 53, no. 1, pp. 202-8, Jan 2011.

[12] E. Kasirga, "Cocuklarda sindirim sistemi hastaliklarinin tani ve izleminde diski incelemelerinin yeri/The Douglass, C.B. (1984). "toro muerto, vaca es": An interpretation of the Spanish bullfight. *American Ethnologist*, *11*, 242-258. Retrieved from http://www.jstor.org.

DOI: http://doi.org/10.24086/biohs2024/paper.1375