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Studies on prevalence rate of *Entamoeba histolytica* and *Giardia lamblia* among patients in Libya and Egypt

Shereen Fahmy ^{*1} Rugaia M. A. Elsalem ², Khadeejh A. M. Bawiyh ², Samar A.M. Zudan ², Ekhlass A. O. Alshaer ²

1- Department of Zoology, Faculty of Science, University of Damietta, Egypt

2- Department of Zoology, Faculty of Science, University of Sebha, Libya

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ABSTRACT

Background: Protozoan parasites are unicellular pathogens and responsible for painful disease in humans worldwide. It contributes significantly to severe morbidity and mortality. The infection is transmitted through contaminated food, water, or soil, as well as flies and other biological vectors. Globally, intestinal protozoan *E. histolytica* and *G. lamblia* are the cause of amoebiasis and giardiasis, respectively. **Methods:** A total of 442 fresh stool samples (231 males and 211 females) were collected and tested from May to September 2024. The stool samples were obtained from all participants and examined microscopically using a direct mount preparation with physiological normal saline (0.9%) and iodine stain. **Results:** The study showed that the general prevalence rate of *E. histolytica* and *G. lamblia* among the participants were 8.59% -2.71%, respectively. The results revealed that the prevalence of these two parasitic infections was higher in males than in females in Libya and Egypt. Infested participants of both sexes were 50 and uninfested of both sexes were 392. In Libya results revealed that parasitic infections was higher in males (6.18%) than in females (1.88%) and in Egypt results also appeared the prevalence was higher in males (18.57%) than in females (10%). The prevalence rate of intestinal protozoan was higher in the age group between 11-35years (4.75%), followed by the age group 36-75years (3.39%) then in children group 7months -10years (3.17%). **Conclusion:** This research collaboration for the first time between Libya and Egypt aims to assess the prevalence of amoebiasis and giardiasis among participants who were confirmed to be infected with intestinal parasites.

Introduction

Protozoan infections were amongst the leading causes of morbidity and mortality throughout the world [1]. Protozoa are unicellular organisms inhabiting the intestinal tract of humans [2]. There are two pathogenic gastrointestinal parasites including *Entamoeba histolytica* and *Giardia lamblia*, being the most common and

significant causes of illnesses in developing countries. They have similar symptoms and life cycles [3] and are responsible for causing diarrhea and deaths in infected people [4]. *Entamoeba histolytica* is the causative agent of amoebiasis and it is a major parasite of the human gastrointestinal tract [5]. Several factors contribute to their widespread epidemiological distribution, such as

contamination of drinking water and food, substructure deficiencies, environmental and climatic characteristics, socioeconomic level, educational status, nutrition, and clean habits [6-9]. Numerous protozoa inhabit the gastro-intestinal tract of humans. The majorities of these protozoa are non-pathogenic or only result in mild disease [10].

Humans become infected with *Giardia lamblia* through contaminated water and food with cyst stage [11,12]. Laboratory diagnosis of these protozoan parasites for many years has relied on the traditional microscopic examination of stool samples. This is regarded as the gold standard when performed by an experienced and highly skilled microscopist [10].

Various studies have been recorded in many parts of Libya and reported different values of the prevalence of intestinal parasites [13-15]. In Egypt, the prevalence of intestinal parasite infections has been reported to vary by area [16-18].

Accordingly, our study aims to provide an updated report on the current profile of amoebiasis and giardiasis among patients attending reference laboratories in Sebha-Libya and medical centers in New Damietta-Egypt.

Materials and methods

Collecting samples and microscopy

A total of 442 stool samples were examined using a direct mount preparation with physiological normal saline (0.9%) and iodine stain. Saline wet mounts and iodine wet mount were prepared by separately mixing a small volume of stool sample with a drop of physiological saline, methylene blue dye, and Lugol's iodine (diluted in 1 : 5 distilled water), respectively, on a glass slide and placing a coverslip over the smear [19]. Fresh stool samples were examined under an optical microscope to detect protozoan cysts and trophozoites.

All 442 participants symptomatic and asymptomatic up to 75 years old who attend reference laboratories in Sebha-Libya and medical centers in New Damietta-Egypt were included in this study. Among them 211 (47.73%) were females, and 231 (52.26%) were males. In Libya, the number of participants in the current study were 372, of whom 30 (8.06%) were infested with intestinal parasites. On the other hand, the number of participants in this study in Egypt were 70, of whom 20 (28.57%) were infested. Notice; the participants in this study were from different regions that frequented both the

laboratories in Libya and the medical center in Egypt.

Ethical approval

This descriptive study was conducted from May to September 2024 and was approved by the Reference Laboratory Administration in Sebha City - Libya and the General Medical Center-New Damietta - Egypt.

Results

Of the 442 examined samples, more than 50 samples (11.31%) of the cases who provided stool samples were symptomatic. 38 of the *Entamoeba histolytica* samples (8.59%) and 12 of *Giardia lamblia* samples (2.71%) were found to be positive using direct observation. Gender distributions of participants with positive results are shown in table (1). Mixed infections of pathogenic protozoa, *Entamoeba histolytica* and *Giardia lamblia* were detected in 18 samples. The highest rate of multiple infections was presented in males 13 (2.94%) than in females 5 (1.13%). Based on the gender, the percentage of amoebiasis and giardiasis in males was higher than that of females, (**Table 1**) as its rate in males reached 30/442 (6.78%) and in females reached 20/442 (4.52%).

According to age groups, the ages of this study ranged from 7 months to 75 years. The rate of prevalence varied across different age groups as presented in **table (2)**. The infection rate of amoebiasis in all age groups was higher than in giardiasis. The highest infection rate of amoebiasis 17 (3.84%) was found in the age range of 11-35 years followed by the age group 36-75 years 12 (2.71%) then the lowest infection rate 9 (2.04%) was recorded in the age group (7months - 10 years), (**Table 2**).

On the other hand, the infection rate of giardiasis was higher 5 (1.13%) in the age range of (7months - 10 years) followed by the age group 11-35 years 4 (0.90%) then the lowest infection rate 3 (0.67%) was presented in the age group 36-75 years, (**Table 2**).

Figure 1 shows the overall prevalence rate of parasitic infection throughout the study period.

The infection rate of amoebiasis was (70%), while the rate of giardiasis was (30%).

According to nationality, the infection rate of intestinal protozoans, *E. histolytica* was higher in Libya and Egypt than *G. lamblia* as showed in **figure (2)**.

In Libya and Egypt, the highest infection of intestinal protozoans was among uneducated (an illiterate) then learners (**Figure 3**).

Table 1. Prevalence of amoebiasis and giardiasis according to the Sex.

Intestinal parasites infection	Gender		
	Female(N=211) No.(%)	Male(N=231) No.(%)	Total(N=442) No. (%)
<i>Entamoeba histolytica</i>	14 (3.16)	24 (5.42)	38 (8.59)
<i>Giardia lamblia</i>	6 (1.35)	6 (1.35)	12 (2.71)
<i>E. histolytica</i> + <i>G. lamblia</i>	5 (1.13)	13 (2.94)	50 (11.31)
			18 (4.07)

Table 2. Prevalence of amoebiasis and giardiasis according to the age group.

Age group	Cases of amoebiasis No. (%)	Cases of giardiasis No. (%)	Total no. examination 442	Total infected cases No. (%)
7m-10y	9 (2.04)	5 (1.13)	88	14 (3.17)
11-35y	17 (3.84)	4 (0.90)	217	21 (4.75)
36-75y	12 (2.71)	3 (0.67)	137	15 (3.39)
Total	38 (8.59)	12 (2.71)	442	50 (11.31)

Figure 1. Infection rate of intestinal protozoa, *E. histolytica* (E.h.) and *G. lamblia* (G.l.) among the patients.

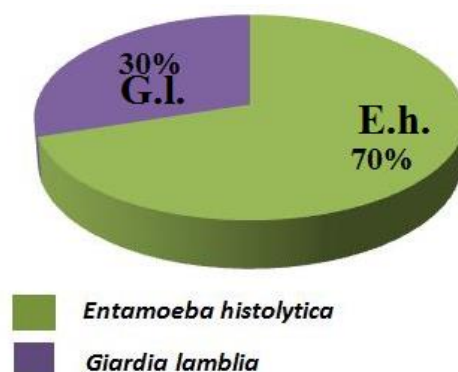


Figure 2. The infection rate of intestinal protozoans, *E. histolytica* and *G. lamblia* according to the nationality areas.

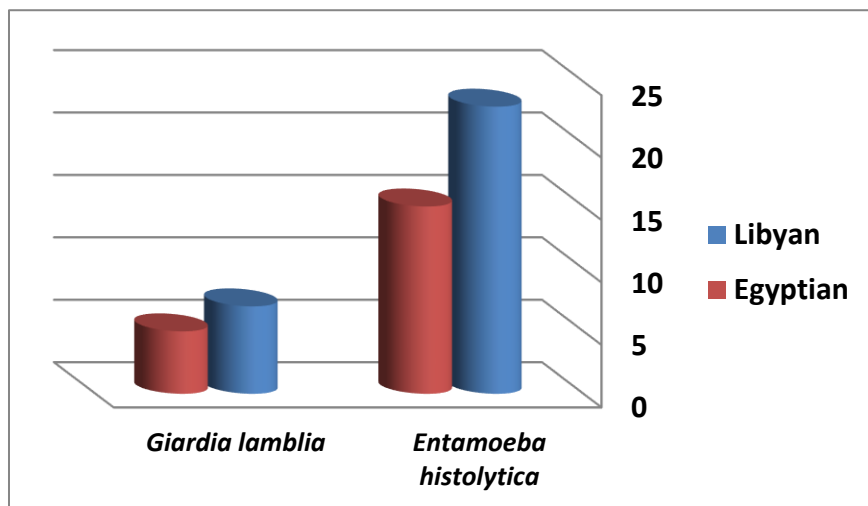
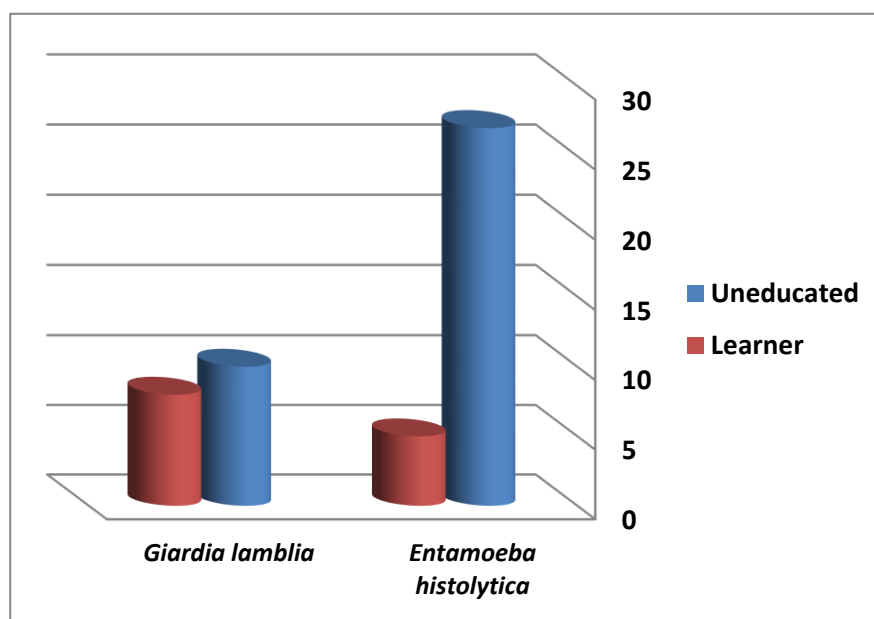


Figure 3. The infection rate of *E. histolytica* and *G. lamblia* according to the educational of the patients.



Discussion

Parasitic infections cause critical health threats because of their morbid nature [20]. The current study assessed the prevalence rate of human intestinal parasitism among patients attending the reference laboratories in Sebha-Libya and medical centers in New Damietta-Egypt. The results of the present study showed that the prevalence rate of intestinal protozoa infection was (11.31%), this finding agreed with previous studies in Libya, Egypt and Turkey [13-16, 21]. In some studies [22-24] the percentage of intestinal protozoa infection was

higher than our study. It is possible that this increase is due to a lack of healthy water and food and contact with sick pets and lack of health awareness.

The results of the current study revealed the prevalence of *E. histolytica* was higher 38 (8.59%) in both sexes than *G. lamblia* 12 (2.71%) which may be due to the cyst of *E. histolytica* being more active and more resistant than the cyst of the latter. This result was in agreement with the previous reports [25- 27].

The present study showed that the age group (11-35) years was the most infected with the intestinal protozoa, amoebiasis and giardiasis its rate

was 21 (4.75%), while the age group (7 months - 10 years) was the lowest percentage, reaching 14 (3.17%). This result is consistent with the results of many previous studies [28- 31]. This epidemiological data can be used as a tool to identify areas of social vulnerability as intestinal parasitosis is strongly associated with the socioeconomic level of the population [31]. The results of this study revealed that the incidence of intestinal parasites in Libya and Egypt was higher for *Entamoeba histolytica* than *Giardia lamblia*. In addition, the incidence of *Entamoeba histolytica* and *Giardia lamblia* was higher in the uneducated than the learners. Similar several data were reported agreed with this study [32-34]. To date, detailed studies about intestinal parasites in worldwide have suggested that this type of infection is still a hygiene-related issue, due to the lack of basic amenities and provision of sanitary services [36]. There is an urgent need to provide health education and treat the infected persons by applying survey programs for parasites [37]. The current study recommends paying attention to health awareness and personal hygiene for both sexes and all ages, as well as eating vegetables and fruits rich in vitamins that increase human immune health to avoid infection with these pathogenic intestinal parasites.

Conclusion

In conclusion, There is a gap between the global health standards set by the World Health Organization and the social reality, due to several factors, most notably the physical environment, contamination of drinking water, poor facilities, lack of regular attention to the cleanliness of streets and canals, in addition to the pollution of agricultural crops, all of which are reflected in human health. The present study revealed a comparison of the prevalence of amoebiasis and giardiasis among participants in Libya and Egypt. The study showed the overall prevalence was (11.31%), *Entamoeba histolytica* was (8.59%) and *Giardia lamblia* was (2.71%). The highest level of infection was among males and those aged 11-35 years and those uneducated group.

Conflict of interest

The authors declare that they have no conflicts of interest.

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No funding was received for this study.

Data availability

All data generated or analyzed during this study are included in this published article.

Authors' contribution

All authors made significant contributions to the work presented, including study design, data collection, analysis, and interpretation. They also contributed to the article's writing, revising, or critical evaluation, gave final approval for the version to be published.

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