

Prevalence of *Entamoeba histolytica* and *Giardia lamblia* Associated with Infectious Diarrhea in Al-Shomally Population, Babil, Iraq

Falah Hasan Obayes AL-Khikani¹, Huda Ali Salman almosawey², Raghda Maitthem Hameed¹, Basim Abid Ali Abid alhussain³, Aalae Salman Ayit³, Mohanad kadhim Mirdan Al-Ibraheemi¹, Mohanad Mohammed ali Yassen Alsalami¹

¹Department of Microbiology, College of Medicine, University of Karbala, ²Department of Microbiology, All-Hussain University College, Karbala, ³Department of Microbiology, Al-Shomally General Hospital, Babil, Iraq

Abstract

Background: *Entamoeba histolytica* (Eh) causes amebiasis in humans and is in charge of 100,000 deaths yearly, making it the third driving reason for death because of a protozoan parasite. Giardiasis is a main diarrheal disease with international allocation caused by *Giardia lamblia*. **Aim of the Study:** To show the current prevalence of Eh and *G. lamblia* infection among people living in Al-Shomally region in Babil, Middle of Iraq, as a cause of diarrhea in the community and for thorough recognition of this social problem and its important drawbacks on the general health. **Methods:** A total of 3176 patients with different ages attending the Al-Shomally General Hospital in Babil Province, middle of Iraq, in 2015 were involved. After collection, samples examined via macroscopic and microscopic examination for the presence of Eh and *G. lamblia* utilizing normal saline and lugholes iodine by direct method examination. **Results:** From 3176 patients with diarrheal episodes, 699 (22%) were infected by either of Eh (17.91%) or by *G. lamblia* (4.09%). The highest rate of infections of Eh and *G. lamblia* was in the age group of 15–44 years and more than 45 years, respectively. Most infection of Eh occurs in February. No significant differences between male and female (50.65% and 49.35% respectively) were observed. **Conclusions:** This study demonstrated high prevalence of intestinal parasitic infection (Eh and *G. lamblia*) in the investigation region. Eh is prominent etiology of dysentery in Al-Shomally region. There is an urgent need to improve the living conditions, providing proper sewage disposal system and health education, and treat the infected persons by applying survey programs for parasites.

Keywords: Amebiasis, *Entamoeba histolytica*, enteric protozoa, *Giardia lamblia*, giardiasis

INTRODUCTION

Enteric protozoa continue to contribute to the burden from preventable infectious diseases influencing human and animal health in industrialized setting. *Giardia* spp. and *Entamoeba* spp. are the most common protozoa associated with enteric infection and are associated mainly with food-waterborne outbreaks.^[1] *Giardia lamblia* that causes giardiasis is responsible for about 1.2 million cases every year.^[2] About 100,000 deaths each year occur due to *Entamoeba histolytica* (Eh) that is the causative agent of human amebiasis as well as it affects 50 million individual around the world.^[3] The WHO regarded amebiasis in developing countries as one of the major health troubles; it is exceeding by only malaria and schistosomiasis for death due to parasitic infection.^[4] Amebiasis is transmitted in places

where improper sanitation allows contamination of drinking water and food with feces in these places; more than 40% of individuals with diarrhea may infect with amoebic dysentery.^[5] Eh infection develops symptoms only in 10%–20% of infected persons and its symptoms range from mild diarrhea, abdominal pain to fulminant dysentery that often be fatal.^[5]

Address for correspondence: Dr. Falah Hasan Obayes AL-Khikani, Department of Microbiology, College of Medicine, University of Karbala, Karbala, Iraq.
E-mail: falahgh38@gmail.com

ORCID: <https://orcid.org/0000-0002-8890-7090>

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How to cite this article: AL-Khikani FH, almosawey HA, Hameed RM, alhussain BA, Ayit AS, Al-Ibraheemi Mk, et al. Prevalence of *Entamoeba histolytica* and *Giardia lamblia* associated with infectious diarrhea in Al-Shomally population, Babil, Iraq. Biomed Biotechnol Res J 2019;3:245-8.

Received: 08.03.2019; **Revision:** 18.08.2019; **Accepted:** 22.08.2019; **Published:** 03.12.2019

Access this article online

Quick Response Code:



Website:
www.bmbtrj.org

DOI:
10.4103/bbrj.bbrj_112_19

G. lamblia infection cause most emergency responses and outbreaks; it considers as significant public health problem because of high rate of infection and disease prevalence.^[6] Because of its ability to damage host tissues, it was called Eh (*histo* means tissue and *lytic* means dissolving), and it is capable of direct host cell killing as driving factor that causes tissue damage.^[7] Human is the only reservoir for Eh, because there is no animal or environmental reservoir.^[8] Parasites have two forms of life cycle, i.e. invading form called trophozoite and environmental resistant form called cyst; Eh infection begins with cyst ingestion, then trophozoite formed in small intestine that may established in large intestine and cause colitis or hepatic ulcer after invading intestinal epithelial cell. A cyst can be excreted in feces after trophozoite encysting, ingestion of excreted cyst start for new cycle. In spite of mechanism of action unknown clearly, it is contact dependent as established. Host cell can be killed within minutes due to strong cytotoxic effect of Eh that reflects potent pathogenesis of this parasite.^[9] Eh capable of inducing amebic colitis and issue within extra-intestinal organs depends on its fighting with indigenous bacteria and overcoming mucus barriers, inducing host cell death by binding with it, passing through the mucosa, and escaping from the immune responses.^[10] Hand-washing and hygiene is the single major important habit in preventing the spread of infectious disease, especially fecal-oral route transmission disease as amebiasis and giardiasis. Reducing diarrheal disease-associated mortality by up to 50% by hand-washing with water and soap, particularly before handling or preparing food, changing diapers, and after using the toilet.^[11] Although metronidazole is the most common drug against protozoal parasite (Eh and *G. lamblia*), the potential resistance of Eh to this treatment is a concern as well as many studies have mentioned that it may induce cerebral toxicity and mutagenic effects.^[12] Vaccine is unavailable for *G. lamblia* until now; treatment of *G. lamblia* is required to shorten the duration of the symptoms. However, treatment may limit transmission of disease and reduce postcomplications.^[13] Eh is the only potential pathogen in *Entamoeba* genus that has the ability to cause the disease amebiasis, although several species belong to this genus.^[14] Adaptation to the host environment is best mode of persistence of Eh because there is wide challenge of environmental stresses of host as intestinal normal flora changes, variation in glucose concentration, and oxidative mode of killing by macrophages and neutrophils.^[15]

This study tries to illustrate the prevalence of Eh and *G. lamblia* in Al-Shomally region due to the important to determine the distribution of these parasites associated with diarrheal disease for clinicians, laboratory workers, and interested persons.

METHODS

Study site and population

The study protocol was approved by the Ethical Committee in the Babil Health Directorate at January 3, 2015. In addition, verbal approval was obtained from the patients and/or their parents before taking the sample. Health measures and safety were taken when sampling.

In the present study, 3176 patients with different ages who were attended to the clinical centers during the time of the study suffering from diarrhea seeking treatment of their diarrheal episodes at Al-Shomally General Hospital in Babil province, middle of Iraq were included.

Specimens collection

Fecal samples were collected during the year 2015. Questioner included age, sex and other information was taken from involved persons. Fresh samples were obtained in clean screw-capped cups. The sample was examined immediately within 1 h after collection for parasitological examination. Collected samples examined macroscopically as color, consistency, blood, mucus, and smell; then microscopic examination performed to detect cyst and trophozoite of intestinal protozoan parasite (Eh and *G. lamblia*); normal saline and lugholes iodine were used for direct examination of these parasites during 12 months of the study.

Statistical analysis

Statistical Package for the Social Sciences program, version 20 (IBM, Armonk, New York, United States) for Windows as well as Microsoft Excel program was used for data analysis.

This study was approved by the Ethics Committee of the Ministry of Health and was performed in accordance with all national regulations.

RESULTS

This study showed that 22% of Al-Shomally population infected with amebiasis and giardiasis. The prevalence of amebiasis (17.91%) was higher than giardiasis (4.09%) [Figure 1].

The distribution of infection throughout the year revealed that the high rate of infection was found in February with Eh (34.9%) while in December with *G. lamblia* (5.7%) [Table 1].

No significant difference was found in the current study between male and female (50.65% and 49.35%, respectively) infected patients with Eh and *G. lamblia* [Figure 2].

The rate of infection with giardiasis increased in patients aged more than 45 years (33.07%) [Figure 3 and Table 2].

DISCUSSION

Over many years, gastrointestinal infections by unicellular parasites are considered a serious health problem among all age groups that can infect millions of people worldwide in developed and developing countries. This study showed that 22% of Al-Shomally population infected with amebiasis and giardiasis. The prevalence of amebiasis (17.91%) was higher than giardiasis (4.09%), which identical with the other studies^[16-19] according to long persistence of Eh cysts in environmental conditions. This result disagrees with the studies^[20-22] that found the prevalence of giardiasis higher than amebiasis.

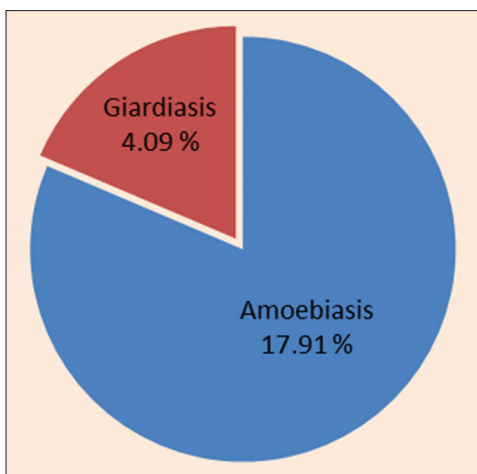


Figure 1: Distribution of amebiasis and giardiasis among study region population

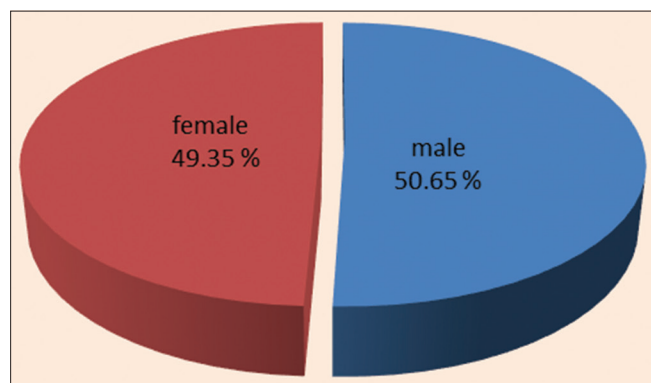


Figure 2: Distribution of infection among gender

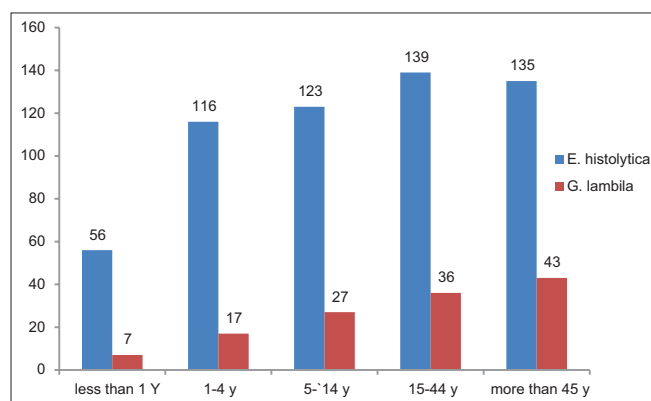


Figure 3: Distribution of infection according to age

The infection is present throughout the year. High rate of infection was found in February with Eh (34.9%) while in December with *G. lamblia* (5.7%). This result disagrees with^[23] that showed high rate of infection with Eh appeared in September. Another study^[17] showed the high rate of Eh prevalence in June, while infection with *G. lamblia* was highest during March. Eh infections were more common in hot months from April to September.^[24]

Table 1: Distribution of parasitic infection during 2015

Month	No examined	Positive case <i>Entamoeba histolytica</i> , n (%)	Positive case of <i>Giardia lamblia</i> , n (%)
January	200	38 (19)	7 (3.5)
February	106	37 (34.9)	6 (5.66)
March	127	18 (14.17)	1 (0.78)
April	184	37 (20.1)	3 (1.63)
May	290	32 (11.03)	8 (2.75)
June	177	30 (16.94)	5 (2.82)
July	236	28 (11.86)	13 (5.5)
August	217	46 (21.19)	12 (5.52)
September	463	61 (13.17)	26 (5.61)
October	566	89 (15.72)	26 (4.59)
November	382	94 (24.6)	10 (2.61)
December	228	59 (25.87)	13 (5.7)
Total	3176	569 (17.91)	130 (4.09)

Table 2: Distribution of infection according to age

Age group (years)	Positive case <i>Entamoeba histolytica</i> , n (%)	Positive case of <i>Giardia lamblia</i> , n (%)
<1	56 (9.84)	7 (5.38)
1-4	116 (20.38)	17 (13.07)
5-14	123 (21.61)	27 (20.76)
15-44	139 (24.42)	36 (27.69)
>45	135 (23.72)	43 (33.07)
Total	569	130

No significant difference was found between male and female patients (50.65%, 49.35%, respectively) infected with Eh and *G. lamblia*. However, the rate of infection in males was more than females^[16,23-26] when there were no significant differences in rate infection with these parasites between male and female patients. It is suggested that the two sexes were equally involved in outdoor and indoor activities which lead to the parasite transmission in both sexes and that disagree with other studies that found female more than male.^[17,18,21,27]

The rate of infection with giardiasis increased in patients aged more than 45 years (33.07%). It is perhaps due to the poor hygiene in this category This finding disagrees with^[28] that revealed high rate of giardiasis is observed in New Zealand in the age group 25–44 years. Another study showed Eh infections are prevalent in the age group of 25–29 years.^[29]

CONCLUSIONS

The current study revealed that the amebiasis and giardiasis spread among the inhabitants of Al-Shomally region are very high. Amebiasis is most prevalent in 15–45 years of age group. The most basic steps to prevent Eh and *G. lamblia* infections are washing hands with soap and water before eating; sterilizing the vegetables well; do not eat unclean food outdoor; drink clean water and improving sanitation; proper

dealing with infected persons; increasing health awareness in endemic regions.

There is an urgent need from the government to improve the living conditions, providing proper sewage disposal system and health education, and treat the infected persons by applying survey programs for parasites.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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