

Giardiasis: A review study in Iraq

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Abstract

Background: *Giardia lamblia* is the parasite that causes giardiasis, small intestine infection can result in severe issues and persistent symptoms, especially in children, giardiasis is a common diarrheal disease that can affect anyone everywhere in the world. It may not show any signs at all or it may result in symptoms like intermittent flatulence or persistent malabsorption, *Giardia* antigen test, molecular test for the presence of parasite DNA in feces, and identification of the organism in fresh stool or duodenal contents are all methods of diagnosis.

Aims: Finding the prevalence of giardiasis among cities is the purpose of this review and governorates in Iraq and the review was focused on some epidemiological factors concerned with the infection such as age, sex, area of residence and diagnostic tests on it is spread.

Conclusions: The present investigation reviewed *Giardia lamblia* infection in Iraq and serves as a crucial resource for all researchers and authors who intend to investigate this topic in greater depth in the future. Incidence of *Giardia* is more prevalent in children than in adults, and numerous earlier studies have demonstrated this trend.

Keywords: Parasite, Giardiasis, Review, Iraq

Introduction

The high prevalence of intestinal protozoan parasites is one of the major health problems, affecting more than three billion people across the globe (Yilmaz & Abdullah, 2017). The majority of infected people are children and infants, and based on World Health Organization, 450 million children and infants are infected by these parasites worldwide (Abdulhaleem et al., 2017).

Giardia lamblia sometimes called *Giardia intestinalis*, is a small parasite that causes giardiasis by colonizing and reproducing in the small intestine (Bekele, 2023), it can be found on contaminated surfaces, food, or water with animal or human feces (Gillin & Reiner, 1996), the highest prevalence of *Giardia lamblia* occurs in tropics and sub tropics where sanitation is poor and it infects 200 million people worldwide and it is common in children than adult (Arora, 2011) approximately 500 instance new of symptomatic giardiasis are reported year, affecting around Asian, African, and Latin American populations total 200 million (Östan et al., 2007).

The infection can be transmitted by ingesting infectious cysts (Minvielle et al., 2008; Khudhair, 2022),

which are hardy and protect against various degrees of heat, cold, desiccation, and infection from other organisms (Tovar et al., 2003), and it can spread from person to person, via the fecal oral route in low-quality day care facilities for children (Centers for Disease Control and Prevention [CDC], 2012), giardiasis is most commonly acquired from consuming water that has *G. lamblia* contamination, which is present in lakes, swimming pools, spas, and other bodies of water animal feces are another source of contamination, diapers, and agricultural runoff. Giardiasis is less frequently acquired through food because heat kills the parasites (Healthline, 2023). However, it's believed that only a little infection (10–25 cysts) is needed to infect humans (Wolfe, 1992), 15% or more of the samples of filtered water (Robertson et al., 2009), diarrhea, stomach pains, bloating, weight loss, and malabsorption are symptoms of giardiasis (Thompson, 2000). Up to 80% of raw water sources have been found to have *Giardia lamblia* and can induce asymptomatic colonization as well as acute or chronic diarrhea illness, most of which come from lakes, streams, ponds, and rivers.

The parasite lives in two phases during its life, beginning with the inactive (cyst) phase, and during

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this phase it is present in the faces of the infected person, and polluted surface water, and during this phase it is characterized by the ability to resist heat and cold and resist traditional methods of water sterilization, so it can remain for weeks or months (Despommier et al., 2019) and active stage (trophozoites) produced by excystation, each cyst generates two trophozoites. Trophozoites reproduce via longitudinal double fission and stay in the proximal small intestine's lumen, where they either free or affixed to the mucosa via the ventral sucker.

Because the cysts may pass from person to person whether they are passed on in the feces or immediately afterwards. *Giardia* completes its life cycle by encysting in the lower intestinal area after being ingested, and infection with the parasite can lead to diarrhea that is copious and greasy (Rojas-Lopez et al., 2022).

Even if they don't show any symptoms, some *Giardia* patients still carry the parasite and can spread it to others through their feces. Affected individuals typically experience signs and symptoms one to three weeks after exposure, which may include nausea, stomach cramps, in addition to malabsorption, acute or ongoing diarrhea and developmental delays in children being both sub-clinical and symptomatic (Solaymani-Mohammadi & Singer, 2010). Less common signs include a fever, itching, hives, and swelling of the eyes and joints. Giardiasis can eventually cause weight loss and impair the body's ability to absorb important nutrients such as fat, lactose, vitamin A, and vitamin B12 (Centers for Disease Control and Prevention). Cysts and trophozoites discovered in stool samples provide as confirmation for the initial clinical symptoms required to obtain the diagnosis. Detecting cysts and trophozoites in stool samples.

The usual techniques used to boost the sensitivity of *Giardia* detection are, using formalin ethyl acetate centrifugation, iodine-stained wet, smear, and trichrome-stained cyst concentration was created (Burke, 1977), the round or oval shaped cysts, which are the infective form of the *Giardia*, are approximately 11–14 μm long and 7–10 μm wide (Garcia, 1999), metronidazole and tinidazole are the two anti-giardia medications that are most frequently used (Ericsson et al., 2001), but a more recent technique called an enzyme immunoassay (ELISA) for detecting stool antigens is more sensitive (Al-Saeed & Issa, 2010), repeated stool testing, stool immunoassays, and even an upper bowel sample may be required for a definitive diagnosis (Savioli et al., 2006). Giardiasis is not typically diagnosed using molecular methods in routine medical laboratories; Instead, pcr-based methods are often limited to research

laboratories and are primarily used to suggest subtypes, such as identifying clusters or subgroups of *Giardia duodenalis* (Smith and Mank, 2011).

Discussion

The most frequent cause of diarrhea globally is giardiasis and is highly endemic in Iraq due to the unsanitary conditions and favorable climate. The prevalence of the disease varies from study to study and is dependent on geographic areas, the habitat of local animal populations, and the availability of signaling facilities and systems. *Giardia lumbilla* infection was detected in humans (30.1%) and cattle (30.6%) in Basra province (Savioli et al., 2006), whereas in Baghdad it was found in humans (11.66%) and horses (26.11%) respectively (AL-Warid, 2012; Hamed & Abbas, 2020).

In children (1–2 years old), the incidence of *Giardia lamblia* infection was high (93.3%), according to a case study on the condition. The findings also indicated that mixed giardiasis infections were twice as common (62.3%) and that the cystic phase was more prevalent (61.6%) than the trophozoite in the city of Al-Nassiria (38.3%) (Hassen, 2009).

In the province of Anbar *Giardia* infection rates were noted for patients who attended In a study of patients who went to several of the hospitals, Hit Hospital, Ramadi Teaching Hospital for Women and Children, Fallujah Teaching Hospital, and Ramadi Teaching Hospital all received 41.7% of the patients (Shahatha, 2019).

In Mousal-Ibn Al-Atheer hospital (Dhubyan & Zaki, 2022) received reports of children with diarrheal symptoms who were between the ages of one year and twelve years old, *Giardia* has been identified (10, 0.86%) and (12, 1.04%) respectively (Hasan et al., 2020).

Giardiasis infection rates varied based on sample size and the results of diagnostic tests. For example, in the cities of Hawler, Soran and Chamchamal in northern Iraq, of the (5,258) samples tested, by direct microscopy, 219 (4.2%) individuals tested positive for *Giardia lamblia* (Al Saeed & Issa, 2006), and in the southern Iraqi province of Maysan, 80 (200) individuals tested positive at a rate of 40% (Al-haidare & Mala, 2017). In Zakho and Duhok Province, a wet concentration study was conducted the results revealed a total incidence of *Giardia lamblia* of 6.15% (31/504) on (504) baby stool specimens and young children who attended a workshop in Zakho General Hospital, Heevie Pediatric Hospital, Chamisku Camps, and Bersive 1 as well as in children who did not have diarrhea in various primary schools (Qadir et al., 2022). The detection and quantification of

Giardia cysts in feces have become more sensitive because of the introduction of direct immunofluorescence microscopy and estimated the frequency and intensity of cyst leaks more accurately than traditional microscopy, which has limited epidemiological value for *Giardia* detection (Al-haidare & Mala, 2017).

Because men are more active and mobile, frequent in public places, and represent the working class in society by purchasing their food and beverages from traveling vendors, several studies have shown a significant difference in the frequencies of *G. lamblia* infection based on the gender of the patients; in Tikrit city (Hasan et al., 2020) for example, the infection rate among men was higher (17.30%) than that among women (11.2%), this is because men are more mobile and energetic than women and frequently consume in public spaces, 1261 stool samples were examined taken from kids in Dohuk city, boys had a higher infected than girls to be infected with *Giardia lamblia* (Ali et al., 2022), *Giardia lamblia* infection rates in Al-Diwaniyah hospital reached 44% for men and 36% for women (Al-haidare & Mala, 2017). In Sulaimani city (Qadir et al., 2022) who noticed that out of 6600 samples tested, the prevalence rate of *Giardia* was greater in men (57.9%) than in women (42.1%), and that in Kirkuk Province, *Giardia lamblia* was more common in adults aged between one year and ten years than in other age groups (Salman et al., 2016), in AL-Muthanna Province, 200 stool samples were collected from elderly people (>1–40) with severe or persistent diarrhea. The samples were examined using flotation techniques and a traditional PCR test; the results revealed that the infection rate was highest (60%) in the age group (>1–10) and lowest (60%) in the age group (21–30) (31–40) years (all 4%) (Turki et al., 2015). Giardiasis is more prevalent in rural regions than in cities, according to several earlier research. These investigations found a substantial difference between the rates of *Giardia* infection in urban and rural settings, with rural areas having a higher infection rate than cities. Having no access to clean water and having to use river water as a direct source were the causes of this discrepancy; Soil pest control in farms and gardens; Breeding and contact with animal parasite reservoirs (Sadoon & Al-Sabawi, 2023) and the use of animal waste as organic fertilizer. Low cultural standards, relative crowding, poor sanitation, and poor health of the rural people the rural population's poor health and cultural levels, including relative overcrowding, inadequate sanitation, low socioeconomic status, and poor personal hygiene practices, all contribute to an increase in illnesses

(Rinne et al., 2005; Al-Jubouri and Hamad, 2008). In Tikrit city, for example, Hasan et al. (2020) showed significant differences in *Giardia lamblia* infection rates in urban and rural areas, with the infection rate in the former being greater (20.87%) than the latter (11.54%) (Mohammad, 2012), as well as in Al-Taameem Province (Yahya, 1999) observed that the infection rate in rural areas was greater (44.92%) than in urban areas (37.96%).

Many studies about the giardiasis were done in many countries like the study in Iran which showed infection was 20% (Taherkhani et al., 2009), while the infection with giardiasis in Khartoum State, Sudan was 14% (Ahmed et al., 2016). Also there are many studies were done in another countries like the study in Al-Kuwait showed the percentage of infection with giardiasis 27% (AlAyyar et al., 2022), while a study was done in Syria about the prevalence of giardiasis showed the infection percentage 14% (Almerie et al., 2008).

Conclusion

The present investigation reviewed *Giardia lamblia* infection in Iraq and serves as a crucial resource for all researchers and authors who intend to investigate this topic in greater depth in the future. Incidence of *giardia* is more prevalent in children than in adults, and numerous earlier studies have demonstrated this trend. Males also reported higher infection rates than females, and infection rates in rural as opposed to urban areas were also higher.

Conflict of interest

There is no conflict of interest.

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