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The Parasitic Infection with *Giardia Lamblia* in Al- Rifa'i District/ Thi-Qar Province

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Abstract

This study was carried out in Thi-Qar Province, Al-Rifa'i district which included a collection of a total of 640 samples of stool, from patients who have referred to general Al-Rifa'i Hospital and some medical centers from July to October 2023. The ages of patients ranged from ≤ 2 years to more than 55 years, and the sex of them were 265 males and 375 females. *Giardia lamblia* (trophozoite and cyst), 15 (2.34%).

Introduction

Parasitic infections may cause mortality and morbidity for human (Wang, 2017).

Parasitic infections are the commonest infections affecting 3.5 billion people leading 450 million illnesses. Parasites are major public health problems in developing countries (Tigabu *et al*., 2019). Also affect the poorest and deprived communities of low and middle-income countries of the tropical and subtropical regions (Thomas and Fomefret, 2015). The main reasons for the high prevalence of parasite infections in tropical and subtropical countries were increasing population density, poor sanitation conditions, poor public health practices, inadequate toilet facilities, contaminated food and water, malnutrition, low host resistance and environmental changes (Unasho, 2013).

In Iraq, many studies carried out in Baghdad, such as (Bdewi, 2009) who reported prevalence of intestinal parasites among patients attending some of Baghdad hospitals. Another study, in Al-Najaf city (Al-Shadood *et al*., 2009) reported prevalence of intestinal parasites. Few studies in Al-Rifai district, Thi-Qar province were conducted for

studying the prevalence of intestinal parasites, such as the study of (Akram, 2018) and (Ali, 2019) that they reported parasite infections.

According to the above mentioned, the present study is aimed to diagnose by:

1. Determination the parasitic infections existing in Al- Rifa'i district and in its surrounding area in Thi-Qar province.

2. Explain the relationship between parasitic infections which reported through the survey with age and sex of patients.

Giardia lamblia

G. lamblia is flagellated, unicellular, an anaerobic organism, found in a variety of mammalian hosts, including human (Feliziani *et al*., 2011).

Classification

G.lamblia is protozoan parasite belong class zomastigophora (Gabriel, 2010; Plutzer *et al*., 2010).

Morphology

Life cycle of *G. lamblia* consists of trophozoite and cyst stages. Trophozoites are pear-shaped cells, 10 to 20 µm long, 7- 10 µm across and 2 - 4 µm thick (Despommier *et al*., 2019). They are motile by way of four pairs of flagella, which propel the trophozoites through the intestine (Ryan, 2018). *G. lamblia* cell has two nuclei, both of which actively transcribe genes (Despommier *et al*., 2019). Adjacent to the nucleus, *G. lamblia* cells have an endoplasmic reticulum that extends through much of the cell. Trophozoites about to differentiate into cysts also contain prominent vesicles termed encystation-specific vesicles that disappear once cyst wall construction begins (Faso and Hehl, 2011). Unlike most other eukaryotes *G. lamblia* contain no visible mitochondria but instead contains a substantially reduced metabolic organelle termed a mitosome (Ryan, 2018). Additionally, cells appear to contain no Golgi bodies and instead the secretory system consists entirely of the endoplasmic reticulum and numerous vesicles spread throughout the cell, termed peripheral vesicles (Faso and Hehl, 2011). Peripheral vesicles are responsible both for taking up extracellular nutrients, and expelling waste outside the cell (Cernikova *et al*.,

2018). Each cell also contains a pair of rigid structures called median bodies which make up part of the *G. lamblia* cytoskeleton (Despommier *et al*., 2019). Trophozoites adhere to host epithelial cells via a specialized disk-shaped organelle called the ventral disk (Despommier *et al*., 2019). Cysts are oval-shaped cells slightly smaller than trophozoites They lack flagella, and are covered by a smooth, clear cyst wall (Ryan, 2018).

Life Cycle

G. lamblia life cycle consists of both trophozoite and cyst stages (Figure 2-2). The infection is acquired by ingestion of infective, dormant and quadri-nucleated cysts in contaminated food or water (Roberts *et al*., 2013). Excystation is triggered by digestive enzymes and gastric acid. Trophozoites attach the small intestine epithelial brush borders and reproduce by binary fission (John and Petri, 2006). Encystation is triggered by the presence of high pH and increased concentrations of bile. New host acquired infection by ingestion of infective cysts that are excreted in feces (Sinnis, 2009).

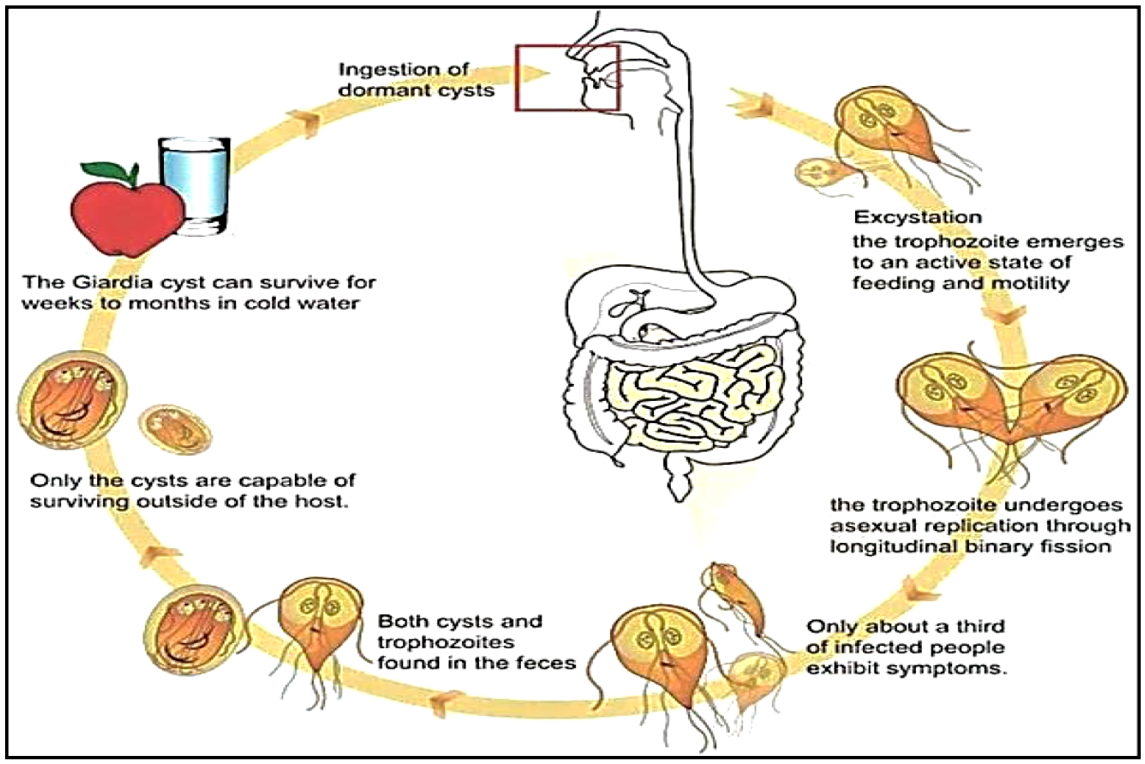

Figure. Life cycle of *Giardia lamblia* (Rodney and Adam, 2018).

Diagnosis

Microscopic examination of the stool can be performed for diagnosis the infection with *G. lamblia*, this method is not preferred, however, due to inconsistent shedding of trophozoites and cysts in infected hosts. Multiple samples over a period time, typically one week, must be examined for confirm the infection (Minetti *et al*., 2016). Duodenal aspiration and biopsy primarily also used for identify trophozoites of *G. lamblia* (Gordts *et al*., 1985). Immunologic enzyme-linked immunosorbent assay (ELISA) testing may be used for diagnosis *G. lamblia*, these tests are capable of a 90% detection rate or more (Rosenblatt *et al*., 2009).

Materials and Methods

Samples collection

A total of 640 samples of stool, urine, vaginal discharge and blood were collected from persons attending to general Al- Rifa'i Hospital (Al- Rifa'i district, Thi-Qar province) through the period from July to October 2019. The age of persons was ranged from 1 months to more than 55 years old and the sex of them was males (265) and females (375). Some collected data were determined in questionnaire format from persons as age, sex, living area in center and in wide range of villages around Al- Rifa'i district.

Fresh fecal samples were collected in sterile containers and then transported to the laboratory for detect gastrointestinal parasites according to (Zeibig, 2013).

Stool Sample Examination

Macroscopic examination

Before microscopic examination of stool samples, the stool was examined by the naked eye for its characteristics such as its consistency, color, texture, Macroscopic examination has several implications and includes: consistency (formed or un-formed; liquid, semi liquid, solid) and gross abnormalities (mucoid, bloody, watery). These features can be referring clinically to the type of parasite may be detected in the sample. (Zeibig, 2013).

Microscopic examination

Direct wet mount by using normal saline (0.9%)

Stool samples observed by the preparation of direct smear methods using clean glass slides, a small drop of normal saline (0.9%) or Iodine stain put on slide glass and mix well with a small portion of feces using wooden stick, then was put cover slides, and examined the sample under power amplify 40×&100×, (Tanyuksel and Petri, 2003**).**

Direct smear by using Lugol's Iodine

The method was done as follows (Salman, 2019):

1- A drop of lugol's iodin solution was placed on a glass slide.

2- Small amount of human fecal sample was put on lugol's iodin drop and mixed thoroughly using wooden stick.

3- Cover slip was applied with forceps or fingers.

4- Examination of slide under 40× &100×, powers of microscope (Salman, 2019).

Results

Through the period from July to October 2023, the present study was performed in Al-Rifa'i district, Thi-Qar province to identify the parasitic infections with *G. lamblia* Fecal, from 640 patients were examined G. lamblia

G. lamblia detected in 32 (5.00%) patients, with higher prevalence (8.30%) in the villages compared with city center (2.66%).

Table (1): Prevalence of infection with gastrointestinal parasites

Center of Al-Rifa'i district	No. of examined	375
	No. of infected	10
	Prevalence of infection %	2.66
Villages of Al-Rifa'i district	No. of examined	265
	No. of infected	22
	Prevalence of infection %	8.30
Total	No. of examined	640
	No. of infected	32
	Prevalence of infection %	5.00

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Parasitic infections according to the gender of patients

Gastrointestinal parasitic infections

The present study revealed some gastrointestinal parasite infection in stool sample detected in 192 (30.00%) of examined patients. The prevalence of these gastrointestinal parasitic infections was higher in females 130 (34.66%) than in males 62 (23.39%) of all recorded parasite species. The flagellated protozoan parasite *G. lamblia* was identified in 32(5.00%) patients, 10 (3.77%) males and 22 (5.86%) females.

Parasitic infections according to the age of patients

Gastrointestinal parasitic infections

The current study included 640 patients, 375 females and 265 males (Table1), the gastrointestinal parasitic infections detected in 192 patients of all age groups started from ≤ 2 years old to ≥ 55 years old. Infection with *G. lamblia* was detected in 32 patients from all age groups. The peak of prevalence with this flagellate was 7 (1.09%) within ≥ 55 age group, followed by 6 cases (0.93%) in 20-26 years age group. However, the lowest prevalence of infection was recorded in ≤ 2 age group.

Table (2): Prevalence of infection with gastrointestinal parasitic infections in AL- Rifa'i district, Thi-Qar province according to the gender.

Group	**Male No. of examined = 265**		**Female No. of examined = 375**		**Total No. of examined = 640**	
	No. of infection	Prevalence of infection %	No. of infection	Prevalence of infection %	No. of infection	Prevalence of infection %
G. lamblia	10	3.77	22	5.86	32	5.00

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Table (3): Prevalence of infections with gastrointestinal parasites in Al- Rifa'i district, Thi-Qar province according to the age of patients.

Age (year)	No. of infected	Prevalence of infection %
≤ 2	1	0.15
3- 5	1	0.15
6 – 12	4	0.62
13 – 19	1	0.15
20 – 26	6	0.93
27 – 33	3	0.46
34 – 40	5	0.78
41 – 47	3	0.46
48 – 54	1	0.15
≥ 55	7	1.09

Discussion

Parasitic infections

In present study, the second common intestinal protozoon was ***G. lamblia*** with prevalence rate of 5%. Giardiasis is the most common parasitic infection of the human intestine worldwide. *G. lamblia* transmission usually take place by fecal-oral route through food, drinking water, or recreational water contaminated with feces containing cysts (Omarova *et al*., 2018). Therefore, sanitary condition, personal hygiene and environmental factors are responsible for this rate of infection. Many studies considered *G.lamblia* as one of the most common identified causes of water borne outbreaks (Nikaeen *et al*., 2003; Nygård *et al*., 2006). *Giardia* cysts have been isolated from water supplies in different parts of the world, the contamination of drinking water with *Giardia* spp. had been recognized (Younas *et al*., 2008). The rate of infection with Giardiasis could be related to a number of factors such as poor health hygiene and toilet training, overcrowding, low education of children, low socioeconomic status and climatic cond itions (Hellard *et al*., 1984). Another important factor which affects the rate of giardiasis is the presence of asymptomatic patients in the community who can be considered as the main source of infection through continuously excreting the cysts stages with their stools (Al-Saeed *et al*., 2001). Most of the cases in this study were infected with cysts. Regarding the life-cycle of these parasites, those carrier patients act as a source of infection by continuously excreting the cyst stage with their stool, Although, carrier persons are asymptomatic, the infection may be converted to acute infection through excystation of cysts inside the intestine resulting in the main complaints of giardiasis such as abdominal pain, steatorrhea and loss of weight (Farag, 1999). The rate of infection in the present is compared with other researches had done in the Iraq, for example, in Baghdad 31% (Al-Jebori and Shafiq, 1976), 25.3% (Al-Mashhadani, 2000), 2% (Mehdi, 1998), in Basra showed 15.8% (Mahdi, and jasim, 1987), 21.2% (Issa, 2001); in 1998); in Tikrit 16.8% (Al-Saadi, 1992); in Dohok 17.6% (Al- Saeed *et al*., Diyala 13.6%, (Mawllod *et al*., 1997); in the city of Mosul 4% (Al-Mallah, 1998).

Conclusions

Detection of many parasitic infections in Al- Rifa'i distract, Thi–Qar Province. The parasitic infections reported in 235 (36.71%) patients from a collection of a total of 640 samples.

Recommendations

1- Extending the study of parasitic infections in all areas of Thi–Qar Province.

2. Diagnosis of parasitic infections must be alone to avoid complication associated with the infections.

3-Applying education an programs and preventive measures for parasitic infections.

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Figure. *Giardia lamblia* (Trophozoit) from stool sample