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Prevalence of Giardiasis among Patients Attending Central Laboratory in Sebha, South Libya

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Abstract
Giardia lamblia is a protozoan parasite in humans that causes giardiasis across all ages and is prevalent in tropical, subtropical, developed, and developing countries. This study aimed to investigate the prevalence of *G. lamblia* among patients attending the Central Laboratory in Sebha, Southern Libya. A total of 550 stool samples (215 males and 335 females) were collected from outpatients attending the Central Laboratory, Sebha. All stool samples were subjected to routine microscopic examination using direct smear (wet mount). The results of this study showed that 4.36% (24 of 550) of patients were infected with *Giardia lamblia*. Overall, females (4.77%) were more infected than males (4.65%). However, the difference was not statistically significant ($\chi^2 = 2.272$, $p = 0.760$). A higher (5.88%) and lower (3.07%) prevalence of *G. lamblia* was found among patients aged 41–60 and 61–80 years, respectively. **Conclusion:** The prevalence of *G. lamblia* in Sebha is low but still affects both sexes and all age groups. These findings highlight the need for further studies in the field.
Keywords: *Giardia lamblia*, giardiasis, Libya, patients, prevalence.

انتشار داء الجيارديا بين المرضى الذين يزورون المختبر المركزي في سبها، جنوب ليبيا

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الملخص
Giardia lamblia هو طفيل أولي في الإنسان ويسبب داء الجيارديا، ويصيب جميع الأعمار، وينتشر في الدول الاستوائية وشبه الاستوائية، وكذلك في الدول النامية والمتقدمة. تهدف هذه الدراسة إلى معرفة انتشار طفيل *Giardia lamblia* بين المرضى الذين يزورون المختبر المركزي في سبها، جنوب غرب ليبيا. تم جمع 550 عينة برازية (215 ذكور، 335 إناث) وفُحصت العينات باستخدام المجهر الضوئي العادي مع طريقة العينة الرطبة. وبلغت نسبة الإصابة العامة 4.36% (24 من 550)، حيث سجلت نسبة الإصابة بين الإناث 4.77% وبين الذكور 4.65%، ولا يوجد فرق معنوي إحصائي بين الجنسين. سجلت أعلى نسبة إصابة في الفئة العمرية 41–60 سنة بنسبة 5.88%، بينما كانت أقل نسبة في الفئة العمرية 61–80 سنة بنسبة 3.07%.

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الخلاصة :انتشار *Giardia lamblia* في سبها منخفض، إلا أن الإصابة ما زالت موجودة في كلا الجنسين ولجميع الأعمار، وتشير الدراسة إلى الحاجة لإجراء المزيد من الدراسات المستقبلية في هذا المجال.

الكلمات المفتاحية الجارديا لامبليا، داء الجيارديا، ليبيا، المرضى، الانتشار.

Introduction

Giardia lamblia is a flagellated protozoan that infects the small intestine of humans and is a major cause of enteric infection worldwide, especially in children (Boonchai *et al*., 2023; Ghenghesh *et al*., 2016; Mohmed, 2019). Approximately 200 million people are infected each year globally, with 500,000 deaths reported annually (Omazia *et al*., 2022). *G. lamblia* is widely distributed and detected in both developing and developed countries (Omazia *et al*., 2022; Renay *et al*., 2022; Ghenghesh *et al*., 2016; Alqeer *et al*., 2025).

The main causes of infection include the consumption of inadequately treated or contaminated water, ingestion of contaminated undercooked vegetables or unwashed fruits, and person-to-person transmission via the fecal–oral route. The prevalence of infection is higher in areas with poor sanitation, ranging from 2–5% in developed countries to 20–30% in developing countries. Variation in prevalence may be attributed to geographical location, urban or rural setting, age composition, and socio-economic conditions (Yibeltal and Simenew, 2015). Transmission occurs mainly through contaminated water and food. Other contributing factors include poor living conditions, overcrowding, inadequate environmental sanitation, unhygienic personal habits, unsafe water supply, and low socioeconomic status (Boonchai et al., 2023; Alqeer et al., 2025).

Attachment of the trophozoite of *G. lamblia* to the mucosal surface causes shortening of the villi in the small intestine, inflammation of the crypts and lamina propria, and lesions on mucosal cells. This results in impaired absorption of essential fat-soluble substances such as carotene, vitamin B12, and folate, which may lead to reduced secretion of intestinal digestive enzymes, including disaccharidases (Bogitsh and Cheng, 1998).

Symptoms of giardiasis in humans are highly variable. Some individuals may be asymptomatic, while others develop acute or chronic diarrhea. The incubation period is 1–2 weeks post-ingestion, and the acute stage can last 3–4 days but may persist longer.(Omazia *et al*., 2022). Infection can range from asymptomatic to severe, including diarrhea with or without malabsorption, nausea, vomiting, and weight loss. Host factors, such as immune status, nutritional status, age, concurrent enteric infections, environmental factors, and variations in *G. duodenalis* strains, influence the severity of infection (Omazia *et al*., 2022). Chronic giardiasis may cause diarrhea, steatorrhea, constipation, and vitamin deficiencies, including vitamin B12 and folate, potentially leading to anemia (Omazia *et al*., 2022).

Routine diagnosis of *G. lamblia* relies on identifying trophozoite or cyst forms during microscopic stool examination. Macroscopically, the stool is often offensive, bulky, pale, non-bloody, mucoid (fatty), or watery (Despommier *et al*., 2017). Symptoms vary widely, with some patients remaining asymptomatic while others experience prolonged diarrhea, malabsorption, cholecystitis, and weight loss (Omazia *et al*., 2022).

The prevalence of intestinal parasites in neighboring countries is high: Sudan (70.3%) (Dolo *et al*., 1996), Niger (42.1%) (Julvez et al., 1998), Algeria (26.0–34.2%) (Bachta *et al*., 1988; Lalle *et al*., 2009), Egypt (10.9–27.2%) (Al Ghwass *et*

al., 2015), and Tunisia (31.5%) (Fathalla *et al*., 2004). In Libya, previous studies reported prevalence rates of 1.2–11.4% in different cities (Dar *et al*., 1979; Ali *et al*., 2005; Sadaga and Kassem, 2007; Gelani *et al*., 2009; Daw *et al*., 2013; Bernawi *et al*., 2013; Margani *et al*., 2014). Data from 2000–2015 showed prevalence rates of 0.9–13% (mean 3.4%) among individuals with gastroenteritis (Ghenghesh *et al*., 2016). In remote desert agricultural communities, Giardia was found in 29.6% of symptomatic populations, often associated with childhood diarrhea (Saaed and Ongerth, 2019). Among schoolchildren in the Brack region, prevalence was 2.85% (Mohamed, 2019). Most studies are hospital-based.

The objective of the present study was to investigate the prevalence of *G. lamblia* through routine stool examination (direct smear microscopy) among patients attending the Central Laboratory in Sebha.

Materials and Methods

This study was conducted on randomly selected outpatients seeking medical services and residing in Sebha city. For each participating patient, one stool specimen was collected in a sterile, labeled, disposable plastic container. A questionnaire was completed through an interview with each patient, recording their age and gender. A total of 550 stool samples were collected during the period from 13 May 2024 to 7 October 2024 from outpatients attending the Central Laboratory in Sebha. As soon as the stool samples were collected, they were processed for the detection of *G. lamblia* infection using direct smear microscopy in normal saline and iodine stain (Garcia and Procop, 2016).

Each sample was processed and examined immediately after collection by routine direct fecal smear microscopy, using normal saline and Lugol's iodine preparation to record the presence of *G. lamblia*. The entire coverslip area was examined using low-power (10×) and high-power (40×) objectives.

The chi-square test was used to compare the prevalence of *G. lamblia* infections between genders and age groups. A p-value of less than 0.05 was considered statistically significant.

Results

This study aimed to determine the prevalence of *G. lamblia* among randomly selected outpatients attending the Central Laboratory in Sebha city. The results are presented in Table 1. A total of 24 out of 550 samples (4.36%) tested positive for *G. lamblia*. Among these, twenty samples showed cysts, while four samples showed trophozoites of *G. lamblia*.

Table 1: *Giardia lamblia* infection among patients

Methods	No. of samples examined	No. of samples infected	Positive (%)
Direct smear microscopy (Saline / Iodine)	550	24	*4.36*

The present study data on prevalence rates of *G. lamblia* in stool samples are compared with other previous studies made in Libya are shown in Table 2.

Table 2: Prevalence of *Giardia lamblia* in Libya.

Category/ Locality	Giardia lamblia (%)	References
School children in Benghazi.	11.4	Dar et al (1979)
Outpatients in Tripoli.	8.7	Bolbol et al (1981)
Expatriates in Benghazi.	7.8	El-Buni et al (1998)
Children attending Hospital in Benghazi.	6.2	El-Buni and Khan (1998)
Children with gastroenteritis in Children Hospital in Benghazi.	5.85	Bugharara et al (1999)
Children with diarrhea in Children Hospital Benghazi.	3.77	Al-Tawaty et al (2002)
Outpatients in Sebha.	1.62	Al-Fellani et al (2005)
Children with diarrhea in Zileten.	1.2	Ali et al (2005)
Libyan patients in Sirte.	7.2	Salem et al (2007)
Primary school children in Derna	12.7	Sadaga and Kassem (2007)
Children and neonates in Sirte Hospital	10.29	Kassem et al (2007)
Out- patients in Sebha	1.28	Saleh (2007)
School aged children in Tripoli	2.0	Ben Mousa (2007)
School children from, Brack Al-Shati	1.76	Gelani et al (2009)
Children from diiferent villages of Brck Al-Shati	3.1	Daw et al (2013)
Humans visited Central Laboratory, Sebha	3.19	Bernawi et al (2013)
Libyans in Al-Khoms	7.0	El Ammari and Nair (2015)
School children Houn city	3.5	Abd-Alsalam (2018)
School children in Brack Al- Shati	1.80	Mohamed (2019)
Symptomatic children in Kufra	29.6	Saaed and Ongerth (2019)
Random Patients attending Central Laboratory, Sebha	4.36	Present study (2024)

Table 3: Prevalence of *Giardia lamblia* according to gender of patients.

Gender	No. of sample examined	No. of samples infected	Prevalence (%)
Males	215	10	4.6
Females*	335	*14*	4.77

*P > 0.05

The prevalence of *Giardia lamblia* among male and female patients is shown in Table 3. Ten males (4.65%) and fourteen females (4.77%) were found to be infected with *G. lamblia*. There was no statistically significant difference in infection rates between genders ($\chi^2 = 2.272$, $p = .760$).

The prevalence of *G. lamblia* among males and females according to age groups is presented in Table 4. The lowest rate (3.07%) was recorded among patients aged 41–60 years, whereas the highest rate (5.88%) was observed in the 61–80-year age group. No significant difference was found in prevalence rates among the different age groups ($\chi^2 = 5.482$, $p = .410$).

Table 4: Prevalence of *Giardia lamblia* according to age group and gender among patients.

Age group (Years)	No. of samples examined			No. of samples infected with Giardia lamblia			Prevalence (%)		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
< 20	23	*29*	*52*	*1*	*1*	*2*	4.34	3.44	3.84*
21-40	*52*	*48*	*100*	*3*	*2*	*5*	5.67	4.16	5.00
41-60	*59*	*111*	*170*	*4*	*6*	*10*	6.77	5.40	5.88
61 –80	*81*	*147*	*228*	*2*	*5*	*7*	2.49	3.40	3.07

*P > 0.05

Discussion

G. lamblia is a protozoan parasite associated with diarrhea and malabsorption, particularly among children, and continues to pose a growing public health concern in many parts of the world (Ayman *et al*., 2025). Stool examination remains the gold-standard diagnostic method for giardiasis. Most epidemiological data from Libya have been hospital-based, while community-based studies are still limited.

This cross-sectional study investigated the prevalence of *G. lamblia* among randomly selected outpatients attending the Central Laboratory in Sebha City. The overall prevalence was low (4.36%; 24/550), which is consistent with previous findings from some regions in Libya. Lower prevalence rates were reported in Benghazi (3.77%; Al-Tawaty *et al*., 2002), Zliten (1.2%; Ali *et al*., 2005), Tripoli (2.0%; Ben Mousa, 2007), and Wadi Al-Shati (1.76% and 3.1%; Gelani et al., 2009; Daw et al., 2013). Similarly, Bernawi *et al*. (2013), Algazoui *et al*. (2016), Abd-Alsalam (2018), and Mohamed (2019) found low prevalence rates ranging from 1.80% to 5.0% in different populations within Southern Libya.

However, higher rates have been reported in Northern Libya, including 11.4% in Benghazi and 12.7% in Derna (Dar *et al*., 1979; Sadaga and Kassem, 2007). Other

studies also indicated elevated prevalence among Libyan populations, ranging from 5.85% to 10.29% in different age groups and health-care settings (Bolbol *et al*., 1981; El-Buni *et al*., 1998; Kassem *et al*., 2007; Ben Rashid, 2010). In addition, Saaed and Ongerth (2019) reported a much higher prevalence (29.6%) among children in Kufra.

Compared with other Arab and African countries, the prevalence observed in this study is considerably lower. Reported rates were 53% in Yemen (Farag, 1985), 35% in Egypt (Ayman *et al*., 2025), 22.8% in Bahrain (Abdulrahman and William, 1990), 10.9% in Saudi Arabia (Omar *et al*., 1991), 36% in Jordan (Nimri, 1994), 37.14% in Tunisia (Gharbi *et al*., 1999), 8% in Gaza Strip (Astal, 2004), 10.9% in Iran (Elnaz *et al*., 2020), 7.3% in Ethiopia (Tadesse and Getaneh, 2024), 8.1% in Iraq (Bassad, 2020), and 12.3% in Sudan (Mohamed *et al*., 2009).

In this study, females demonstrated a slightly higher infection rate than males (4.77% vs. 4.65%), but the difference was not statistically significant ($\chi^2 = 2.272$, $p = .760$). This finding is consistent with several Libyan studies that reported similar prevalence between genders without significant differences (Al-Fellani *et al*., 2005; Ben Mousa, 2007; Gelani *et al*., 2009; Bernawi *et al*., 2013; Daw *et al*., 2013). Comparable results were reported among schoolchildren in Iraq and Afghanistan (Amjad, 2012; Ebadullah *et al*., 2025). Although some studies found higher infection in males (Algazoui *et al*., 2016; Mohamed, 2019), the majority of evidence concludes that gender does not play a decisive role in giardiasis susceptibility.

Regarding age-related prevalence, this study found higher infection rates among the 61–80-year age group, while the lowest rate was observed among patients aged 41–60 years. The variation among age groups was not statistically significant ($\chi^2 = 5.482$, $p = .410$). Previous studies in Libya mainly focused on school-age children and frequently reported higher susceptibility among those aged 5–10 years, likely due to poor hygiene habits and higher exposure in communal environments (Alsirieti *et al*., 2006; Sadaga and Kassem, 2007; Al-Mubrook *et al*., 2013; Ghenghesh *et al*., 2016; Abd-Alsalam, 2018). In contrast, Kubti *et al*. (2011) documented higher infection rates among adults aged 30–50 years working as food handlers in Benghazi. Bernawi *et al*. (2013) suggested that natural immunity may contribute to lower rates in adults.

Overall, the findings of the present study indicate that the prevalence of *G. lamblia* in Sebha is relatively low compared with many national and regional reports. Gender and age did not demonstrate statistically significant associations with infection, suggesting that environmental factors, sanitation practices, and personal hygiene behaviors across all groups are likely the main determinants influencing transmission in this population.

Conclusions

The present study reports on giardiasis among randomly selected patients attending the Central Laboratory in Sebha City, Libya. This region could be classified as a low-prevalence area for giardiasis, with a prevalence rate of 4.36%. This may reflect better socio-economic conditions, living standards, and sanitary practices in the communities, as well as the weather conditions of the region. Confirmation of these findings requires further studies in this field.

Recommendations

There may be several factors associated with *G. lamblia* infection among patients. Therefore, studies are recommended to identify the risk factors associated with Giardia infection in the study area. Consistent implementation of stool examinations for intestinal parasites at least every six months is needed to treat infected patients

and to protect adolescents from the harmful effects of intestinal parasites, particularly *G. lamblia* infection**.**

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