Original Article

Prevalence Study for *Giardia Lamblia* in Babylon City

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Abstract

Background: *Giardia lamblia* is a flagellated protozoan parasite and a leading cause of giardiasis, one of the most prevalent intestinal parasitic infections worldwide. It is transmitted mainly via the fecal–oral route through contaminated water, food, or direct person-to-person contact. Infections present with a spectrum of clinical outcomes, ranging from mild diarrhea to severe malabsorption and chronic gastrointestinal disturbances. Children, particularly in developing countries, are the most vulnerable population. **Objective:** This study aimed to determine the prevalence of *Giardia lamblia* infection among both local and displaced children attending Babylon Hospital, with a particular focus on possible variations according to age and gender. **Materials and Methods:** A total of 200 stool samples were collected from children attending Babylon Hospital between September and December 2024. Each sample was examined macroscopically and microscopically for the presence of *G. lamblia*. Direct wet mount preparations using saline and iodine, in combination with Giemsa staining, were employed for the detection of cysts and trophozoites. Data were analyzed to determine prevalence rates according to age group, sex, and residency status (local vs displaced). **Results:** Microscopic examination successfully identified *G. lamblia* cysts and trophozoites in 80 out of 200 stool samples, corresponding to an overall prevalence of 40%. The highest rate of infection was recorded in December compared with earlier months of the study period. Age distribution analysis revealed that infection was most frequent among children aged 4–6 years (14.81%), followed by those aged 7–10 years (9.04%), while the lowest prevalence was observed in the 1–3 years age group (3.03%). Among displaced children, infection was more common in males (26.31%) than in females (18.54%). **Conclusion:** The present study demonstrated a relatively high prevalence of *Giardia lamblia* infection among children attending Babylon Hospital. Seasonal variation was observed, with infection rates peaking in the colder months, suggesting the influence of environmental and behavioral factors on transmission. Age-related differences indicated greater susceptibility in children aged 4–6 years, while displaced populations were disproportionately affected, particularly males. These findings underscore the importance of targeted prevention and control measures, especially among vulnerable groups.

Keyword: Giardia lamblia, Giemsa staining, Giardiasis, Prevalence, Children.

Introduction

Giardia lamblia (also known as *G. duodenalis* or *G. intestinalis*) is a globally prevalent flagellated protozoan that inhabits the small intestine of humans and other mammals. First observed by Antonie van Leeuwenhoek in diarrheal samples in 1681, it was later formally named in honor of Vilém Lambl and Alfred Mathieu Giard [1]. The parasite exists in two key life stages: a motile trophozoite that attaches to the intestinal epithelium via its adhesive ventral disk and replicates via binary fission, and a resilient cyst that is excreted with feces and can survive in the environment for extended periods under favorable conditions [2]. Transmission of *G. lamblia* occurs primarily via the fecal–oral route through ingestion of cysts present in contaminated water or food, but direct person-to-person spread especially in settings with inadequate hygiene such as daycare centers is

also common. Zoonotic transmission is possible but less frequent [3]. Epidemiologically, giardiasis poses a significant public health challenge worldwide. In developing regions, prevalence can reach 20–30%, whereas in developed countries, rates are estimated at 2–5%; among children under age 10, prevalence may rise to 15–20% [4]. The World Health Organization classifies giardiasis as a neglected infectious disease, reflecting its substantial impact on child health and development [5]. Clinically, infection outcomes range from asymptomatic carriage to acute or chronic gastrointestinal illness. Symptoms can include diarrhea, abdominal cramps, bloating, and malabsorption, which may contribute to growth impairment in children [6]. This study aimed to determine the prevalence of *Giardia lamblia* infection among both local and displaced children attending Babylon Hospital, with a particular focus on possible variations according to age and gender.

Materials and Methods

Subjects

In this study 200 stool sample collected from children Babylon hospital for the period between September – December 2024 and the result concentrated on the prevalence of Giardia lamblia sex and age. The stool samples were collected, examined macroscopically and microscopically to detect for the presence of Giardia lamblia trophozoites.

Specimen collection

The fecal samples collected (one sample for each patient) in clean & dry plastic cap with wide opening & tight cover to prevent drying of sample & avoid contaminate it with urine that kill trophozoites in fecal samples.

Methods

Direct wet film preparation the fecal samples taken from patients suffer from diarrhea & examined according to direct wet film preparation by using normal saline & geimsa stain solution.

Statistical analysis

All data in the present study were stored in Microsoft Excel 2013 program (USA) so that we can calculate the variables for each variable according to the study for individuals who have confirmed *Giardia lamblia*.

Ethical Approval

The agreements of all subjects' intended in this study were obtained before taking the patient specimens. Furthermore, the study design was approved by research ethical committee.

Results

The results of this study demonstrated that direct microscopic examination of fresh stool samples using saline and iodine wet mounts was effective in identifying the characteristic cysts and trophozoites of Giardia lamblia. The cysts appeared oval with four nuclei, while trophozoites showed a pear-shaped structure with flagella and two nuclei resembling "eyes." The use of Giemsa staining significantly enhanced the visibility of internal structures, improving diagnostic accuracy and aiding in the differentiation of Giardia from other intestinal organisms (Figure 1, 2).

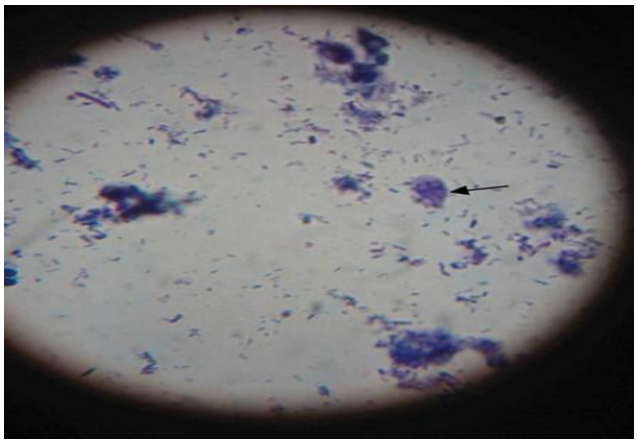

Figure 1: Trophozoit of *Giardia lamblia*

Figure 2: Trophozoit of *Giardia lamblia* by Giemsa stain

During this period, 200 stool samples were collected from children and their examination. The number of infection by giardia lamblia was 80 samples from 200 samples as other infection (Figure 3).

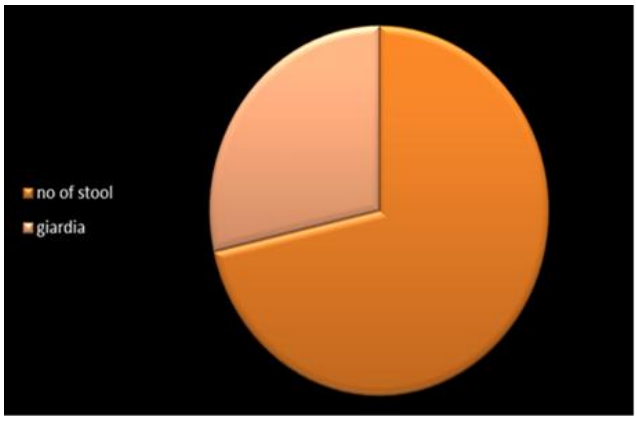

Figure 3: the rate of infection

The result showed that the high prevalence of Giardia lamblia recorded in December Highest incidence while the lower prevalence was recorder in January and February in patients. The present study shows that the rate of Giardia lamblia among local children was highest among 4-6 years old, followed by 7-10 years and the lowest was among 1-3 years Table 1. The rate of infection among displaced children according to sex was higher in males 26.31%, than females 18.54%.The difference in the rate of infection between genders was not significant between difference sexes, Figure 4.

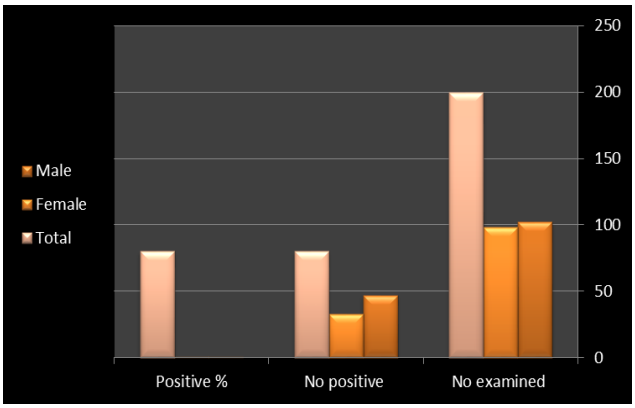

Figure 4: Distribution of Giardia lamblia among local children according to sex.

Table 1: Distribution of Giardia lamblia among local children according to age group.

Age group (year)	NO examined	NO positive	Positive %
1-3	44	12	27%
4-6	60	26	43%
7-10	46	22	47%
11-13	50	20	2.5%
Total	200	80	100%

Discussion

The present study confirms that direct microscopic examination of fresh stool using saline and iodine wet mounts, when combined with Giemsa staining, is a practical and effective method for detecting Giardia lamblia cysts and trophozoites in pediatric samples. The observed morphology oval cysts containing four nuclei and pear-shaped trophozoites with anterior flagella and two prominent “eye-like” nuclei is consistent with classical descriptions of G. lamblia and supports the diagnostic reliability of light microscopy in identifying typical infections [7-9]. Giemsa staining in particular enhanced visualization of internal structures and nuclear detail, facilitating differentiation of Giardia from other intestinal protozoa and debris; this agrees with prior reports that cytological and

differential stains improve parasite contrast and diagnostic yield in microscopy-based workflows [10]. The observed prevalence of Giardia lamblia in this study (80/200; 40%) indicates a substantial burden of giardiasis among the sampled pediatric population and is higher than many community-based estimates reported from comparable settings. Such elevated prevalence commonly reflects one or more local transmission drivers, including contaminated drinking water, inadequate sanitation, crowded living or childcare conditions that facilitate person-to-person spread, and gaps in hygiene practices (e.g., handwashing) [11[[12]. In particular, young children are vulnerable because of frequent hand-to-mouth behaviors and close contact in day-care or school environments, which amplify transmission cycles [13]. The observed seasonal variation in case counts, with peak incidence in December and a subsequent decline during January and February (see Fig. 4), points toward underlying environmental or behavioral drivers that fluctuate with the seasons. Such patterns are commonly reported in both temperate and subtropical settings, where climate-driven factors like rainfall, temperature, and water source usage often play a critical role in pathogen transmission dynamics [14]. Increased incidence during December may be linked to intensified rainfall events, which can lead to runoff and contamination of surface and groundwater sources, particularly in regions with inadequate water treatment infrastructure [14]. Additionally, social behaviors during the holiday season—including large gatherings, increased travel, and temporary overcrowding—may enhance person-to-person transmission, especially of enteric or respiratory pathogens [15]. The age-specific distribution of infection revealed the highest prevalence among children aged 4–6 years (14.81%), followed by those aged 7–10 years (9.04%), while the lowest rates were observed in the 1–3 year age group (3.03%) (Table 1). This age pattern is consistent with previous studies showing that preschool and early school-age children bear a disproportionate burden of enteric infections and other communicable diseases [16[. The elevated risk in the 4–10-year group may be attributed to developmental behaviors—such as increased mobility, hand-to-mouth activity, and interaction with contaminated surfaces—as well as greater social mixing in daycare and school environments, which facilitates transmission of pathogens [17]. In contrast, the lower prevalence among 1–3-year-olds may reflect several protective factors. Younger children are typically under closer parental supervision, have reduced exposure to group settings, and may benefit from improved hygiene practices within the home [18[.However, under-detection in this age group cannot be ruled out, as challenges in stool sample collection—due to inconsistent bowel movements or caregiver hesitancy—can lead to underestimation of actual infection rates ([19].

Sex-specific analysis showed a higher infection rate among male children (26.31%) compared to females (18.54%), though this difference was not statistically significant (Fig. 5). While the observed difference may hint at behavioral or environmental exposure variations—such as boys engaging more frequently in outdoor activities or risk-prone behaviors that increase contact with contaminated surfaces or environments—caution is warranted in interpretation due to the lack of statistical significance [20]. Such gender-based patterns have been inconsistently reported across studies, with some suggesting higher enteric or parasitic infection rates in boys, potentially due to differential play habits or hygiene behaviors [21], while others find no significant association

after controlling for confounders like socioeconomic status, age, and sanitation access [22].

Conclusion

This study highlights a notable prevalence of *Giardia lamblia* infection among children, particularly in the 4–6-year age group, with an overall infection rate of 40% (80 out of 200 samples). Microscopic examination using saline and iodine wet mounts proved effective in identifying cysts and trophozoites, while Giemsa staining enhanced structural visibility and diagnostic accuracy. The highest infection rate was observed in December, suggesting potential seasonal or environmental influences on transmission. Although male children exhibited a higher infection rate than females, the difference was not statistically significant.

Interest Conflicts

None.

Financial support and sponsorship

None.

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