



Frequency of Giardia in Acute Watery Diarrhea

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ABSTRACT

Objective: This study was executed to assess the frequency of giardia in acute watery diarrhea among children presented at Ittefaq Hospital, Lahore using the microscopic method.

Methods: This cross-sectional study was done at Pediatrics department, Ittefaq Hospital, Lahore. The study was completed in 6 months. Stool samples from 275 patients, aged 6 months to 12 years, having acute watery diarrhea were taken and sent to hospital laboratory for analysis. Giardiasis was confirmed using microscopic assessment of the fecal specimens indicating cysts, trophozoites and eggs of the giardia parasite. Numerical data was documented as mean and standard deviation whereas categorical data was presented as frequencies and percentages. To address the effect modifiers, data was stratified for age, gender, residence status, and economics status. Post-stratification Chi-square test was applied and $p \leq 0.05$ was regarded as significant.

Results: The mean age of patients was 5.29 ± 2.77 years with minimum and maximum ages as 6 months and 12 years. There were 144(52.36%) male and 131(47.64%) female cases. A total of 97(35.27%) cases had Giardia on microscopic examination of stools. There was no significant association between Giardia infection and different age groups, gender, area of residence, and monthly household income ($p > 0.05$). A very high frequency of Giardia lamblia (35.27%) in children with diarrhea is of serious public health concern.

Conclusion: To combat this, adequate precautionary measures should be opted including clean water supply, proper sanitation facilities, health education and promotion of personal and household hygiene, and most importantly regular deworming of pediatric population.

Keywords: Acute watery diarrhea, Parasite, Giardia, Frequency, Children, Microscopy.

1. INTRODUCTION

Diarrhea has been a prominent contributor to childhood morbidity and mortality in the developing countries¹. Pakistan has the highest ratio of infant deaths due to diarrhea among all Asian countries². Pakistan is regarded to be at 23rd rank, as per WHO, in terms of childhood mortality due to diarrheal diseases, with approximately 6.4 million cases of diarrhea in children per annum³. Young children are more prone to diarrheal diseases and a large number of mortalities happen during the first 2 years of life⁴.

A wide number of microorganisms are responsible of causing diarrhea. Giardia is one of them. It is the most common parasite infecting the human intestine and causing enteric infection, typically in children⁵. It was first reported by Leeuwenhoek in 1681⁶. The spread of parasite occurs through contaminated food and water. There are two stages of the life cycle of Giardia: cysts and trophozoites. Cysts are unaffected by environment and remain unchanged for months even after water treatment. They are responsible of transmitting disease in the humans. Once ingested by the host, excystation happens causing liberation of trophozoites and development of clinical signs and symptoms^{5,7}.

Giardiasis clinically presents as abdominal cramps, flatulence, watery diarrhea, bloating, and weight loss⁸. Although clinical presentation is utilized for the preliminary diagnosis of Giradia infection, confirmed diagnosis is made upon the microscopic presence of cysts and trophozoites in the stool specimens⁹.

Numerous studies have been executed earlier to find out the prevalence of giardia infection. However the prevalence differs between the developed¹⁰ and the underdeveloped regions(2.46%-30.96¹¹⁻¹⁴). The documented prevalence of Giardia

infection ranges from 2.75% to 31% in Pakistan^{15,16}.

Although a number of studies have previously reported the prevalence of Giardia infection, a very few have documented the prevalence in pediatric population in certain regions in Pakistan. So, this study was executed to assess the frequency of giardia in acute watery diarrhea among children presented at Ittefaq Hospital, Lahore using the microscopic method.

2. METHODOLOGY

A cross-sectional study was executed at the pediatrics department, Ittefaq Hospital, Lahore. The study was completed in 6 months. A total of 275 children presenting with acute watery diarrhea were estimated using 95% confidence level, 5% absolute precision and percentage of Giardiasis as 23%¹⁷ in children with acute watery diarrhea. Convenient sampling technique was utilized to gather the data. The study included 275 children aged between 6 months to 12 years, of either gender, having acute watery diarrhea i.e. passing 3 or more loose stools per day within the last 2 weeks. Children having bloody diarrhea, known malignancy, or already receiving antibiotics were excluded.

After taking acceptance from the ethical committee and written consent from the parents or attendants of the patients, samples were taken from pediatrics department, Ittefaq Hospital, Lahore. Demographic and clinical details of each patient were noted in pre-structured proforma. Fresh fecal samples were collected in 60 ml containers from all selected patients, with the help of staff nurses. The sample was then sent to hospital laboratory for further analysis. Giardiasis was confirmed using microscopic assessment of the fecal specimens indicating cysts, trophozoites and eggs of the giardia parasite.

Data was analyzed utilizing SPSS version 26. Numerical data was documented as mean and standard deviation whereas categorical data was presented as frequencies and percentages. To address the effect modifiers, data was stratified for age, gender, residence status (urban or rural), and economics status (<15000 Rupees, 15000-50000 Rupees and > 50,000 Rupees). Post-stratification Chi-square test was applied and $p \leq 0.05$ was regarded as significant.

3. RESULTS

This study consisted of 275 children having acute watery diarrhea. Descriptive statistics are demonstrated in Table 1. The mean age of children was 5.29 ± 2.77 years. Of 275 children, 144(52.36%) were male and 131(47.64%) were female. The mean weight, height, and BMI of children was 19.26 ± 6.57 kg, 0.98 ± 0.18 m, and 19.74 ± 2.72 kg/m², respectively. A total of 97(35.27%) cases had Giardia in their stool specimens, as illustrated in figure 1.

Figure 1: descriptive statistics of giardia lamblia in acute watery diarrhea

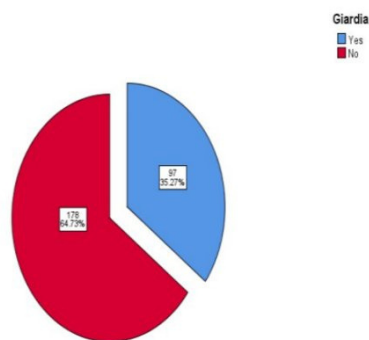


Table 1: descriptive parameters of children (N=275)

Parameters	N (%)
Age* (years)	5.29 ± 2.77
Age groups (years)	
0.5 – 5	147 (53.5)
6 – 12	128 (46.5)
Gender	
Male	144(52.36%)
Female	131(47.64%)
Weight* (kg)	19.26 ± 6.57
Height* (m)	0.98 ± 0.18
BMI* (kg/m ²)	19.74 ± 2.72
Area of residence	
Urban	133 (48.4)
Rural	142 (51.6)
Monthly household income (rupees)	
<15000	83 (30.2)
15000-50000	109 (39.6)
>50000	83 (30.2)

numerical data is documented as mean \pm standard deviation whereas discrete data as number and Percentage; % = percentage; N= number of study participants; kg = kilogram; m = meter; kg/m² = kilogram per meter square; BMI = Body mass index.

Table 2 showed frequency of giardia in children with acute watery diarrhea with respect to demographic parameters such as age, gender, monthly household income and area of residence. Results demonstrated that there was no significant association between presence of giardia in children with AWD and the demographic parameters ($p > 0.05$).

Table 2: frequency of Giardia in children with acute watery diarrhea, with respect to demographic parameters (N = 275)

Factors	Giardia in stool specimen			p-value *
	Yes	No	Total	
Age (years)				0.471
0.5-5	49(33.3%)	98(66.7%)	147(100%)	
5-12	)	80(62.5%))	
Total	48(37.5%)	178(64.7%)	128(100%)	
)))	
	97(35.3%)		275(100%)	
))	

Frequency of acute watery diarrhea

<i>Gender</i>	47(32.6%)			0.338
Male	)	97(67.4%)	144(100%)
Female	50(38.2%)	81(61.8%))	
Total	)	178(64.7%)	131(100%)
	97(35.3%)	)	275(100%)
<i>Monthly household income (Rupees)</i>	26(31.3%)			0.401
<15000	)	57(68.7%)	83(100%)
15000-50000	37(33.9%)	72(66.1%)	109(100%)	
>50000	34(41.0%)	49(59.0%))	
Total	)	178(64.7%)	83(100%)
<i>Area of residence</i>	48(36.1%)			0.784
Urban	)	85(63.9%)	133(100%)
Rural	49(34.5%)	93(65.5%))	
Total	)	178(64.7%)	142(100%)
	97(35.3%)	)	275(100%)

N = Number of study participants; *= Chi-square test was utilized to calculate p-value and $p \leq 0.05$ was taken significant.

4. DISCUSSION

Diarrhea has been a prominent reason of childhood morbidity and mortality since decades in the developing countries. Annually, 60% of infant and child mortalities occur because of diarrheal diseases in Pakistan³. *Giardia lamblia* is one of the most common parasites responsible of causing acute watery diarrhea in children¹⁸.

The current study used the traditional microscopic method to assess the frequency of *Giardia* infestation in children having acute watery diarrhea and found out that 35.27% cases were positive for *Giardia lamblia* upon direct microscopic examination. This study had quite a high prevalence of *Giardia lamblia* as compared to the majority of the other studies carried out in various countries including Pakistan^{5, 8, 9, 11, 14, 15, 18-25}. The high rate of infection can be

linked to various factors including age, gender, area of residence, monthly household income, poor hygiene and sanitation facilities, climate conditions, and contaminated food and water supply²⁶. The current study reported that there was no significant difference in acquiring *Giardia* infection among different age groups, genders, areas of residence, and monthly household income ($p > 0.05$, each). The present study revealed that frequency of *Giardia* infection was 33.3% in children aged 6 months to 5 years while it was 37.5% in those aged 6-12 years. However this difference was not statistically significant ($p > 0.05$). A study by Naz et al. showed that there was a significant association of *Giardia* infection with age ($p = 0.035$). *Giardia* infection was reported in 11.1% cases of age 0-5 years and 5.97% cases of age 6-10 years⁵. Khattak et al. reported that Children aged 1-2 years were at higher risk of getting infected by *Giardia lamblia*⁸.

According to the findings of Naz et al. gender was not associated with *Giardia* infection ($p = 0.08$)⁵. Studies by Nawaz et al. and Belkessa et al. also showed that *Giardia* infestation was independent of gender ($p > 0.05$)^{15, 27}. These findings are comparable to the findings of the present study.

Naz et al. also reported that *Giardia* infection was more prevalent in rural areas than in urban area ($p = 0.032$)⁵. Another study revealed that area of residence and socioeconomic status were significantly associated with the prevalence of *Giardia lamblia* infection ($p < 0.05$)¹⁵. Similarly, a study by Hussein et al. revealed that *Giardia* infection was more prevalent in males and in those living in rural areas ($p < 0.05$)¹⁷. However, the findings of the present study ($p > 0.05$) contradicted the findings of these studies.

There are few limitations of the present study. Firstly, cross-sectional study design was used so it gave the picture of only one point of time. Secondly, only microscopic examination was used to find out the frequency of *Giardia lamblia* in stool specimens. Other methods such as ELISA can be used to give clearer picture of the prevalence of *Giardia* in children presenting with acute watery diarrhea.

5. CONCLUSION

A very high frequency of *Giardia lamblia* was found in children with diarrhea is of serious public health concern. To combat this, adequate precautionary measures should be opted including clean water supply, proper sanitation facilities, health education and promotion of personal and household hygiene, and most importantly regular deworming of pediatric population.

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