

Research Article

Giardiasis in Children with Acute Watery Diarrhea

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Abstract

Background: Giardia lamblia is a frequent cause of acute watery diarrhea and malabsorption in children in developing countries.

Objective: To assess the frequency and associated factors of acute giardiasis in children admitted in tertiary care hospital with acute watery diarrhea.

Methods: This cross sectional study was conducted in the department of Pediatrics, King Edward Medical University, Lahore from April to September 2018. Total of 250 children of both genders, between 6 months to 12 years of age having acute watery diarrhea were included in this study by non-probability consecutive sampling. Children with acute dysentery, persistent diarrhea and children who already have received drugs (antibiotics, metronidazole) were excluded from the study. Fresh fecal sample were collected from every child and diagnosis of giardiasis was established by evidence of giardia by positive stool antigen by ELIZA. Data were entered in SPSS 22.0. Quantitative variables like age was presented as mean. Qualitative variables like gender were presented as frequency and percentages. Chi square test was applied to compare the children with and without acute giardiasis. The p-value ≤ 0.05 was considered as significant.

Results: Among 250 children of age between 6 months- 12 years, presenting with acute watery diarrhea, 64 (25.6%) children had giardiasis. We found younger age (6-12 months) as an associated factor for giardiasis in children [p value 0.038, 1.578 (1.458-5.436)]. In this age group, 51.2% children had giardiasis. Gender of child, literacy level, socioeconomic status and area of residence of parents was not found to be the associated factor for acute giardiasis.

Conclusion: We found that among children presenting with acute watery diarrhea, 25.6% cases had giardiasis. Younger age (6-12 months) was found to be associated factor for acute giardiasis in children.

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Introduction

Acute watery diarrhea (AWD) is the second leading cause of under 5 childhood mortality and morbidity throughout the world and is responsible for mortality around 525 000 children every year. Pakistan is among those 15 countries where

there is maximum burden of this disease.¹ Etiology of AWD is quite diverse being viral, bacterial, protozoal and many others.² Among protozoa, Giardia lamblia is a frequent cause of diarrhea and malabsorption in children. Giardia lamblia is significantly associated with AWD in children in developing countries.⁵ A child may also get chronically infected with this

parasite resulting in failure to thrive. Local data shows the prevalence of giardiasis as 3.1% to 19.4%^{3,4} while regional statistics vary from 9% to 33.4%.^{6,7} Authors have reported drinking untreated water (62.5%) as major associated factor of giardiasis followed by poor socioeconomic status (28.1%), and low education status of parents (26.9%).⁸ Lack of proper water and sanitation system, eating unwashed raw vegetables and family history of parasitic infection are other studied associated factors for giardiasis.⁹

AWD in general and giardiasis in particular is not only treatable but also a preventable disease, yet the presence of very high morbidity & mortality rate with this disease highlight the necessity of immediate action. Local data regarding frequency of giardiasis in AWD is scanty and there is knowledge gap regarding associated factors pertaining to this common but preventable disease, so are the preventive strategies. Therefore, this study was designed to assess the frequency and associated factors for giardiasis in children admitted to tertiary care hospital with AWD.

Methods

This cross sectional study was conducted in the department of Pediatrics, King Edward Medical University/ Mayo Hospital Lahore from April to September 2018. The study was approved by the institutional review board and was funded by research grant of King Edward Medical University, Lahore. Total of 250 children of both genders, between 6 months to 12 years of age having clinical findings consistent with operational definition of AWD (defined as passage of 3 or more loose stools with duration of less than 14 days¹) were included in the study by non-probability consecutive sampling. (Sample size of 250 patients was estimated by using 0.5% level of significance, 95% power of test with expected % age of giardiasis 26.6% and non-giardiasis as 73.4%)⁸ Children with acute dysentery (blood in stool), persistent diarrhea (diarrhea more than 14 days duration) and children who already have received any drugs (antibiotics, metronidazole, nitazo-xanide) were excluded from the study. Demographic and clinical data of every patient was recorded. Informed consent was taken from the patient's guardian. Fresh fecal sample were collected from every child included in the study in 60 ml container with wide

mouth and screw caps and were clearly labeled. Sample was collected by the staff nurse with clear instructions on how to collect it properly (i.e not to mix it with urine and to collect at least thumb size amount). Sample was immediately sent to Pediatric microbiology laboratory for processing. The diagnosis of giardiasis was established by evidence of giardia by positive stool antigen by ELIZA. The results were reported by a consultant microbiologist. Each child was treated according to the individual merit. Data were entered in SPSS 22.0. Age was presented as mean, while gender were presented as frequency and percentages. Chi square test was applied to compare the children with and without acute giardiasis. Odds ratio and logistic regression (conditional forward method) were used to determine the risk factors. The p-value ≤ 0.05 was considered as significant.

Results

Among 250 children of age between 6 months-12 years, presenting with AWD, 64 (25.6%) children had positive ELIZA test for acute giardiasis while 186 (74.4%) had negative ELIZA test. This constituted 25.6% of acute giardiasis among children presenting with acute watery diarrhea (Figure I). The overall mean age of patients was 25.62 ± 26.2 months, with 61 (24.4%) cases <5 years. There was male preponderance (n=149, 54.4%) in our study. There were 41 (16.4%) children who belonged to rural areas and 209 (83.6%) cases were from urban areas. A total of 78 (31.2%), 124 (49.6%) and 48 (19.6%) cases belonged to low, middle and high socioeconomic status respectively. Regarding parental education, 59 (23.6%) mothers and 31 (12.4%) fathers were illiterate. On the basis of demography, frequency of giardiasis was non-significantly different between the groups (Table 1).

We found younger age (6-12 months) as a associated factor for giardiasis in children [p value 0.038, 1.578 (1.458-5.436)]. In this age group, 51.2% children had giardiasis. If we compare the results for other associated factors between both the groups, the important finding is comparable figure of children suffering from AWD. Total of 57.8% male had giardiasis while 53.2% had non-giardia AWD. Among rural children, 15.6% had giardiasis while 26.3% had non-giardia AWD. Similarly, 4.7% and 3.8% of both parents were

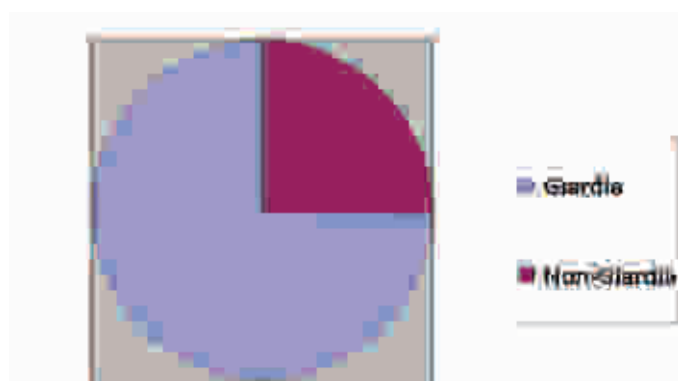
Table 1: Demography (n=250)

		Giardiasis		Total	p-value
		Positive	Negative		
Age groups	3-12 months	33(13.2%)	67(26.8%)	100(40%)	0.400
	1-3 years	24(9.6%)	84(33.6%)	108(43.2%)	
	4-5 years	4 (1.6%)	24 (9.6%)	28(11.2%)	
	6-10 years	2 (0.8%)	6(2.4%)	8(3.2%)	
	11-12 years	1(0.4%)	5(2%)	6(2.4%)	
Gender	Male	37(14.8%)	99(39.6%)	136(54.4%)	1.000
	Female	27(10.8%)	87(34.8%)	114(45.6%)	
Residence	Rural	10(4%)	31(12.4%)	41(16.4%)	0.689
	Urban	54(21.6%)	155(62%)	209(83.6%)	
Monthly income (PKR)	<10,000	16(6.4%)	62(24.8%)	78(31.2%)	0.241
	>10,000-50,000	34(13.6%)	90(36%)	124(49.6%)	
	>50,000	14(5.6%)	34(13.6%)	48(19.6%)	
Mother's Education	Illiterate	10(4%)	49(19.6%)	59(23.6%)	0.770
	Primary	33(13.2%)	84(33.6%)	117(46.8%)	
	Secondary	15(6%)	37(14.8%)	52(20.8%)	
	Higher	6(2.4%)	16(6.4%)	22(8.8%)	
Father's Education	Illiterate	7(2.8%)	24(9.6%)	31(12.4%)	0.931
	Primary	27(10.8%)	83(33.2%)	110(44%)	
	Secondary	13(5.2%)	35(14%)	48(19.2%)	
	Higher	17(6.8%)	44(17.6%)	61(24.4%)	
Total		64(25.6%)	186(74.4%)	250(100.0%)	

Table 2: Associated Factors for Giardiasis (n=250)

Associated factors	Giardia (n=64)	Non- giardia (n=186)	p value	Crude OR (CI)	Adjusted OR (CI)
6-12 months	33 (51.2%)	67 (36%)	0.038	1.875 (1.055-3.331)	1.578 (1.458-5.436)
Male	37 (57.8%)	99 (53.2%)	0.564	1.190 (0.670-2.114)	0.386 (0.128-1.167)
Rural area	10 (15.6%)	31 (16.7%)	1.000	0.920 (0.423-2.001)	0.039 (0.010-0.157)
Illiterate mother	10 (15.6%)	49 (26.3%)	0.165	1.830 (0.791-4.235)	3.375 (0.463-24.591)
Illiterate father	7 (10.9%)	24 (12.9%)	0.565	1.341 (0.447-4.017)	0.470 (0.020-10.966)
Both mother & father illiterate	3 (4.7%)	7 (3.8%)	0.720	1.251 (0.314-4.988)	0.193 (0.003-13.773)
Lower income	16 (25%)	62 (33.3%)	0.578	1.305 (0.606-2.808)	1.469 (0.430-5.012)

illiterate in cases and controls respectively. Although odds ratio for illiteracy of mother and father, low socioeconomic status, was in risk range, but adjusted odds ratio on multi-variant analysis did not favor it. (Table II)

**Figure 1:** Frequency of Acute Giardiasis by Positive ELIZA Test (n=250)

Discussion

Present study has reported 25.6% of giardiasis among children presenting with AWD. Naz et al¹⁰ reported overall prevalence of Giardia lamblia as 9.5%, but this was from community samples of four districts from the province of Punjab. However, on the basis of area, authors found no difference in the prevalence of Giardia lamblia, indicating that the disease is equally prevalent in geographically different districts. Other local and regional studies have also found variable results. Haider et al³ from Peshawar, Pakistan reported it as 19.4%, while it is reported as 37.7% in Afghan refugees in Punjab,¹¹ 3% in internally displaced children in Waziristan,⁴ 9% in Afghanistan,⁶ 33.4% from India⁷, and 23% from Iraq.⁵ In present study, overall mean age of patients was 25.62 ± 26.2 months, with 61 (24.4%) cases <5 years. Naz et al¹⁰

from Punjab found 11.1% *Giardia lamblia* infection among children under 5 years. Anim et al¹² also reported similar results. However, Bello et al⁸ from Cuba found > 5 years old children. This variation in the prevalence of *Giardia lamblia* is probably due to differences in socioeconomic level and geographic locations of the countries.

We did not find gender, parental education, and socioeconomic status as significantly comparable. In present study, younger age <1 year was found to be more affected. Our results are in accordance with local^{3,10} and regional^{7,11,12} data where authors found younger age as associated factors for giardiasis. Parental educational level was reported as contributory factor for giardiasis by Naz et al¹⁰ and Haider et al³ from Pakistan, and also from Choy et al from Malaysia.⁹ This might be due to the fact that the parental educational level is also reflected in knowledge of hygiene. Although our findings are not in accordance with previous data, but we think that since there is no statistically significant difference in both the groups, the findings from this study can be explained as to improve the general awareness regarding personal hygiene, and sanitary facilities diarrhea in children in our population in both rural and urban settings.

There are few limitations of the present study. Enrolment period was only 6 months, leading to small number of cases. This study was restricted to inpatients only, and did not truly focused on clinical syndrome of “giardiasis”, rather than only considered on positivity of stool antigen. Also, as the results only show statistical associations between giardia infection and certain of the factors that were investigated, valid cause-effect inferences cannot be made. We did not truly investigate the associated factors qualitatively. Despite these limitations, however, the present results indicate that many diarrhea and giardia-attributable hospitalizations could be prevented without applying extraordinary input. Health education to improve food and personal hygiene, simply focusing on increasing hand washing, is recommended. Further studies are needed to determine the epidemiology and associated factors of giardiasis at community and national levels.

Conclusion

We found that among children presenting with AWD,

25.6% cases had positive ELIZA test for acute giardiasis. Younger age (6-12 months) was found to be associated factor for acute giardiasis in children.

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