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ORIGINAL ARTICLE

Intestinal parasites prevalence and related factors in hospitalized children age upto 12 years with diarrhea in Surat, India

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Abstract:

Background: *Intestinal parasitic infection is important public health problem in developing countries. Present study was conducted to identify the prevalence of intestinal parasites and risk factors among children upto age of 12 years hospitalized with diarrhea in tertiary care hospital.* ***Methods:*** *Total 298 children upto the age of 12 years except neonates, admitted in ward of pediatric department with complaints of diarrhea during one year period from May 2011 to April 2012 were included in this study. Various demographic and clinical characteristics were collected on a pretested proforma. Stool smears were examined under light microscope with direct saline smear and lugol`s iodine solution. Parasitic detection was confirmed by formalin ethyl acetate concentration method.* ***Results:*** *Prevalence of intestinal parasites was 8.7% reported among admitted children. Most common parasite isolated was Giardia Intestinalis (5.4%) followed by ascaris lumbricoids (1.3%). Half of study participants were male and belongs to lower socio-economic class. Toilet facility was not available for 26.8% children; 81.2% children received piped water supply of municipality. Duration of diarrhea for more than seven days (p=0.004, OR=4.50, CI=1.59-12.67), more than ten passage of stool per day (p=0.016, OR=2.76, CI=1.20-6.34), non availability of toilet facility (p=0.007, OR=3.05, CI=1.35-6.92) reported as risk factor for intestinal parasitic infection. Such children are more likely to present with vomiting (p=0.038, OR=2.89, CI=1.06-7.90) and abdominal pain (p=0.013, OR=0.35, CI=0.15-0.80).* ***Conclusion:*** *Low socio-economic status, longer duration and frequency of diarrhea, non availability of toilet facility and presence of dehydration were leading risk factors for parasitic infection in present study.*

Keywords: *Intestinal parasites, children, diarrhea, social status, toilet facility, dehydration*

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Introduction

Infective diarrhea is one of the leading causes of morbidity and mortality among children and caused by wide range of viruses, bacteria or parasites [1,2]. The prevalence of different enteric pathogens varies with geographical area [2]. Intestinal parasitic infection is a serious public health problem throughout the world particularly in developing countries [3-5]. Parasitic infections are more common in pediatric age group as children are more vulnerable population.[5] The consequences of these parasitic infections results in malnutrition, anemia, cognitive impairment and increased susceptibility to other infections [4, 6, 7].

World Health Organization (WHO) has suggested that the control of parasitic infestation should be effectively incorporated into a multi

disease approach together with tuberculosis, malaria and HIV/AIDS [8]. Studies from various states of India reported high prevalence (46.7% - 71.1%) of parasitic infections in children [9-11]. The present study was conducted to identify the prevalence of intestinal parasites and risk factors among children upto age of 12 years hospitalized with diarrhea in pediatric department ward of tertiary care hospital, Surat, India.

Material and Methods

Study population

A cross sectional study was conducted among children upto 12 years age by using a pretested self administered questionnaire in pediatric department of Government Medical College & Civil Hospital, Surat – a tertiary care center located in southern part of Gujarat state, India. The study was conducted after taking approval from institutional ethical committee.

Inclusion criteria

All children upto the age of 12 years except neonates, admitted in ward of pediatric department with complaints of diarrhea with or without mucous or blood, fever, abdominal pain, vomiting during one year period from May 2011 to April 2012 were included in this study.

Exclusion criteria

Those children admitted without complain of diarrhea and/or above 12 years of age, were excluded from the study. Children under 12 years of age presenting with diarrhea associated with other illnesses like hepatitis, respiratory infection, lactose intolerance history and surgical conditions like appendicitis were also excluded. Informed verbal consent was taken from the parents of enrolled children.

Study variables

After selection of study participants, a detailed history was taken and thorough physical examination was conducted to collect details about age, gender, socio-economic status, eating mud/pica, source of drinking water, method of purifying drinking water, anthropometry, nutritional status, clinical presentation, present /past history and laboratory investigations details were recorded. On admission, grade of dehydration was assessed by using WHO guidelines for assessment of dehydration in to no, some or severe dehydration [12]. Nutritional status was evaluated by Indian Association of Pediatrics (IAP) classification [13] for classifying protein energy malnutrition in study children, based on percentage of expected weight for age. According to IAP classification; 71-80% of weight for age : grade-1 malnutrition, 61-70%: grade-2 malnutrition, 51-60%: grade-3 malnutrition and <50%: grade-4 malnutrition. Modified Prasad`s socio-economic classification was used to determine the socio-economic status [14].

Intestinal parasitic examination

Mother/parents were explained how to collect the stool sample. For children less than two years of age, parents were explained to apply the diaper on the opposite side so that the fecal matter did not get absorbed and the sample was available for examination. Children above two years age were explained how to collect the sample in the bottle. The collected bottles were immediately sent to the laboratory for light microscopy and differential diagnosis of protozoa cyst. Stool smears were examined under light microscope with direct saline smear and lugol`s iodine solution. Parasitic detection was confirmed by formalin ethyl acetate concentration method.

Statistical analysis

The Epi Info software (version 3.5.1) [15] was used for processing and analyzing data. The chi-square test or Fisher`s exact test was applied for comparing proportions to evaluate the factors associated with intestinal parasitic infection: a 5% alpha error was admitted. Odds ratio (OR) was calculated for each studied variable, with 95% confidence interval (CI) limit. Variables that showed $p < 0.20$ in bivariate analysis were selected for logistic regression to examine the relation between variables of interest and risk of parasitic infection. Results from logistic regression analyses were expressed as odds ratio

and 95% confidence intervals. The p values and CIs reported here reflect a two tailed α level of 0.05.

Results

Total 298 children upto 12 years were enrolled for the study, including 52.4% children of 1-5 years (table 1). Prevalence of intestinal parasites was 8.7% reported among admitted children. Most common parasite isolated was Giardia Intestinalis (5.4%) followed by ascaris lumbricoids (1.3%), hook worm (1.0%), trichomonas species (0.7%), and H. nana (0.3%). Half of study participants were male and belongs to lower socio-economic class. Toilet facility was not available for 26.8% children; 81.2% children received piped water supply of municipality. Normal nutritional status was reported among 37.2% children.

Significant number of children with parasitic infection (p=0.002) reported diarrhea for more than seven days, some/severe dehydration (p=0.02) at time of admission and more than ten stool passage per day (table 2). Similarly, non availability of toilet facility (p=0.005), complain of vomiting (p=0.031) and abdominal pain was reported by significant number of hospitalized children having parasitic infection.

On further assessment with logistic regression analysis (table 3), duration of diarrhea for more than seven days (p=0.004, OR=4.50, CI=1.59-12.67), more than ten passage of stool per day (p=0.016, OR=2.76, CI=1.20-6.34), non availability of toilet facility (p=0.007, OR=3.05, CI=1.35-6.92) reported as independent risk factor for intestinal parasitic infection. Such children are more likely to present with vomiting (p=0.038, OR=2.89, CI=1.06-7.90) and abdominal pain (p=0.013, OR=0.35, CI=0.15-0.80).

Table 1. Demographic and clinical characteristics of hospitalized patients with diarrhea in Surat, India (n=298).

Characteristics	Number (n / %)
Age	
< 1 year	76 (25.5)
1-5 year	156 (52.4)
6-12 years	66 (22.1)
Sex	
Male	153 (51.3)
Female	145 (48.7)
Socio-economic status	
Upper	12 (4.0)
Middle	140 (47.0)
Lower	146 (49.0)
Duration of diarrhea	
≤ 7 days	277 (93.0)
> 7 days	21 (7.0)
Dehydration grade at time of hospitalization	
No dehydration	84 (28.2)
Some dehydration	121 (40.6)
Severe dehydration	93 (31.2)
Frequency of stool	
≤ 10 / day	230 (77.2)
> 10 / day	68 (22.8)
Child eating mud/pica	
Yes	28 (9.4)
No	270 (90.6)
Availability of toilet facility	
Yes	218 (73.2)
No	80 (26.8)
Source of drinking water	
Municipality (pipe lined)	242 (81.2)
Hand pump	25 (8.4)
Well	16 (5.4)
Tanker	8 (2.7)
Bore well	7 (2.3)
Method of water purification	
None	263 (88.3)
Filter / boiling	35 (11.7)
Protein energy malnutrition grades (as per IAP classification)	111 (37.2)
	55 (18.5)
Normal	73 (24.5)
Grade 1	40 (13.4)
Grade 2	19 (6.4)
Grade 3	
Grade 4	
Organism isolated	
None	272 (91.3)
Giardia Intestinalis	16 (5.4)
Ascaris lumbricoides	4 (1.3)
Hook worm	3 (1.0)
Trichomonas species	2 (0.7)
Hymenolepis Nana	1 (0.3)
Entamoeba Histolytica	0
Clinical features at time of hospitalization	182 (61.1)
Vomiting	138 (46.3)
Fever	114 (38.3)
Abdominal pain	

Discussion

Morbidity due to intestinal parasites has always been an important public health problem in various countries, but the severity may vary depending on the location and period of time. Present study was conducted among hospitalized children with diarrhea in Surat city – western part of India. The study reported intestinal parasite prevalence of 8.7% among hospitalized children upto 12 years of age. Present study

Table 2. Prevalence of parasitic infection of hospitalized children with diarrhea according to demographic characteristics in Surat, India

Characteristics	n (298)	Present (%) (n=26)	p value	Risk Estimate (OR)	Confidence Interval (95%)
Age					
< 5 years	232	20 (76.9)	0.904	0.94	0.36-2.45
5-12 years	66	6 (23.1)		1.00	
Sex					
Male	153	16 (61.5)	0.276	1.57	0.69-3.59
Female	145	10 (38.5)		1.00	
Social class					
Upper & Middle	152	17 (65.4)	0.124	1.91	0.82-4.45
Lower	146	9 (34.6)		1.00	
Duration of diarrhea					
≤ 7 days	277	20 (76.9)	0.002	0.22	0.07-0.62
> 7 days	21	6 (23.1)		1.00	
Dehydration at time of hospitalization					
No dehydration	84	5 (19.2)			
Some dehydration	121	17 (65.4)	0.02	-	-
Severe dehydration	93	4 (15.4)			
Frequency of stool					
≤ 10 / day	230	15 (57.7)	0.013	0.36	0.15-0.82
> 10 / day	68	11 (42.3)		1.00	
Child eating mud/pica					
Yes	28	2 (7.7)	0.75	0.78	0.17-3.52
No	270	24 (92.3)		1.00	
Availability of toilet facility					
Yes	218	13 (50.0)	0.005	0.32	0.14-0.73
No	80	13 (50.0)		1.00	
Source of drinking water					
Municipality (piped)	242	18 (69.2)	0.101	0.48	0.19-1.17
Others	56	8 (30.8)		1.00	
Method of water purification					
None	263	24 (92.3)	0.501	1.65	0.37-7.33
Filter / boiling	35	2 (7.7)		1.00	
Protein energy malnutrition grades					
Any grade	187	16 (61.5)	0.893	1.05	0.46-2.42
Normal	111	10 (38.5)		1.00	
Vomiting					
Yes	182	21 (80.8)	0.031	2.89	1.06-7.90
No	116	5 (19.2)		1.00	
Abdominal pain					
Yes	114	16 (61.5)	0.010	2.84	1.24-6.50
No	184	10 (38.5)		1.00	
Fever					
Yes	138	10 (38.5)	0.400	0.70	0.30-1.60
No	160	16 (61.5)		1.00	

Table 3. Logistic regression analysis of diarrhea associated with parasitic infection among hospitalized children in Surat, India

Characteristics	Parasitic infection		p value	Odds Ratio (OR)	95% Confidence Interval
	Present (%) (n=26)	Absent (%) (n=272)			
Social class					
Upper & Middle	17 (65.4)	135 (49.6)	0.129	0.52	0.22-1.21
Lower	9 (34.6)	137 (50.4)			
Duration of diarrhea					
≤ 7 days	20 (76.9)	255 (93.8)	0.004	4.50	1.59-12.67
> 7 days	6 (23.1)	17 (6.2)			
Dehydration at time of hospitalization					
No dehydration	5 (19.2)	79 (29.0)	0.292	1.71	0.62-4.71
Some/severe dehydration	21 (80.8)	193 (71.0)			
Frequency of stool					
≤ 10 / day	15 (57.7)	215 (79.0)	0.016	2.76	1.20-6.34
> 10 / day	11 (42.3)	57 (21.0)			
Availability of toilet facility					
Yes	13 (50.0)	205 (75.4)	0.007	3.05	1.35-6.92
No	13 (50.0)	67 (24.6)			
Source of drinking water					
Municipality (piped)	18 (69.2)	224 (82.4)	0.107	2.07	0.85-5.04
Others	8 (30.8)	48 (17.6)			
Vomiting					
Yes	21 (80.8)	161 (59.2)	0.038	2.89	1.06-7.90
No	5 (19.2)	111 (40.8)			
Abdominal pain					
Yes	16 (61.5)	98 (36.0)	0.013	0.35	0.15-0.80
No	10 (38.5)	174 (64.0)			

reported low prevalence compare to various studies conducted in different other states/regions of India (15.5%-71.1%) [9-11, 16-18] and studies from other countries also [19-22]. Various studies reported different prevalence in same country, may be because of different study population, sample size, geographical conditions, and demographic characteristics. The prevalence in the communities may be altered because of changes in social behavior and life style during years. Different epidemiological studies of such infections will provide better understanding of the health status of various regions/countries [23].

Similar to other studies [3,5], children reported protozoan infection more than helminthes infection. As reported by various studies, Giardia Intestinalis (5.4%) was the commonest protozoa [5,24,25] and ascaris lumbricoides (1.3%) [3,16, 26], the commonest helminthes reported in present study. Parasitic diarrhea affects all age but pediatric age affected most commonly [26]. Various studies reported significant parasitic diarrhea in different pediatric age groups [5,24, 27,28], but no such significance reported for any age group in current study. Like different studies [23,25] reported, prevalence of intestinal parasitic infection was higher in male child than in female child.

As reported by various studies [4,29,30], high prevalence of parasitic infection reported among children belongs to lower socio-economic class. A patient with diarrhea due to parasitic etiology has prolonged history of illness compared to diarrhea due to viral or bacterial etiology [3]. Longer duration of diarrhea more than 7 days, was significant (p=0.004, OR=4.50, 95%CI=1.59-12.67) for intestinal parasitic infection in present study. Presence of some/severe dehydration (p=0.02) and frequency of stool >10/day (p=0.016, OR=2.76, 95%CI=1.20-6.34) were another significant risk factor suggesting intestinal parasitic infection. Non-availability of toilet facility at home (p=0.007, OR=3.05, 95% CI=1.35-6.92) leads to open field defecation [4], favors spread of intestinal parasites through fecal-oral route. National Family Health Survey (NFHS)-3 during the year 2005-06 in India, reported that 55% households in whole country and in Gujarat state also do not have any toilet facility and have to go for open field defecation [31].

Majority of study children (81.2%) receiving the treated water through piped water supply by municipality, no association was reported for source of water supply and diarrhea like other [4]. Purifying water before drinking is essential to prevent parasitic and other water borne infections. Large majority (88.3%) of population don't use any water treatment method for drinking water, as they receive it through piped water which was considered as treated and doesn't contain any infection. In contrast, other studies reported significant association between parasitic diarrhea and non purification of water [5,7]. Nutritional status determines the child well being and over all development. Studies have reported significant association between parasitic infections and malnutrition [5,32]. Present study reported no such association of parasitic infection and malnutrition. More children with parasitic infection reported vomiting (80.8%) and abdominal pain (61.5%) at time of hospitalization, like other studies [33,34]. Significant number of children with parasitic infection reported vomiting (p=0.038, OR=2.89, 95%CI=1.06-7.90) and abdominal pain (p=0.013, OR=0.35, 95%CI=0.15-0.80) in present study.

The present study has some limitations including a cross-sectional study design, hospitalized children as a study participants (selection bias), non availability of some demographic characteristics, no testing for virus infection because of limited resources and non availability of testing for virus infection at the institute.

Conclusion

Low socio-economic status, longer duration and frequency of diarrhea, non availability of toilet facility and presence of dehydration were leading risk factors for parasitic infection in present study. Large scale studies should be performed repeatedly in order to observe the prevalence and changes in the epidemiology of parasites.

References

1. Guerrant RL, Hughes JM, Lima NL, Crane J. Diarrhea in developed and developing countries: magnitude, special settings and etiologies. Rev Infect Dis 1990: 12: 541-550.
2. Gracey M. Diarrhea and malnutrition: a challenge for pediatricians. J Pediatr Gastroenterol Nutr 1996; 22: 6-16.
3. Ogunlesi T, Okeniyi J, Oseni S, Oyelami O, Njokanma F, Dedeke O. Parasitic etiology of childhood diarrhea. Ind J Paediatr 2006; 73: 1081-1084.
4. Quihui L, Valencia ME, Crompton DWT, Phillips S, Hagen P, Morales G, et al. Role of the employment status and education of mothers in the prevalence of intestinal parasitic infections in Mexican rural school children. BMC Public Health 2006; 6: 225-232.
5. Mumtaz S, Siddiqui H, Ashfaq T. Frequency and risk factors for intestinal parasitic infection in children under five years age at a tertiary care hospital in Karachi. J Pak Med Assoc 2009; 59: 216-219.
6. Okyay P, Ertug S, Gultekin B, Onen O, Beser F. Intestinal parasites prevalence and related factors in school children, a western city sample-Turkey. BMC Public Health 2004; 4: 64-69.
7. Ostan I, Kilimcioğlu AA, Girginkardeşler N, Ozyurt BC, Limoncu ME, Ok UZ. Health inequities: lower socio-economic conditions and higher incidences of intestinal parasites. BMC Public Health 2007; 7: 342.

8. World Health Organization (WHO). Deworming for health and development: WHO Report of third PCC meeting. Available from: http://whqlibdoc.who.int/hq/2005/who_cds_cpe_pvc_2005.14.pdf. (accessed on February 21, 2013).
9. Wani SA, Ahmed F, Zargar SA, Dar PA, Dar ZA, Jan TR. Intestinal helminthes in a population of children from Kashmir Valley. Ind J Helminthology 2008; 2: 1-5.
10. Wani SA, Ahmed F, Zargar SA, Ahmed Z, Ahmed P, Tak H. Prevalence of intestinal parasites and associated risk factors among school children in Srinagar city, Kashmir, India. J Parasitol 2007; 93: 1541-1543.
11. Saha DR, Gupta DN, Sengupta PG, Mondal SK, Ghosh S, Saha NC, et al. Intestinal parasitism: a childhood problem in rural Bengal. J Commun Dis 1995; 27: 170-174.
12. World Health Organization (WHO). Ministry of Health & Family Welfare, Government of India: Integrated Management of Neonatal & Childhood Illness, Module 5. Available from http://mohfw.nic.in/NRHM/Documents/CH/IMNCI_Training_Modules/Module_5.pdf. (accessed on February 19, 2013).
13. Nutrition Sub-Committee of the Indian Academy of Pediatrics. Report of Convener. Indian Pediatr, 1972; 7: 360.
14. Kumar P. Social classification – need for constant updating. Indian J Community Med 1993: 18: 2.
15. Centers for Disease Control and Prevention. Epi Info version 3.5.1, August 18, 2008. Available from http://cdc.gov/epinfo/. (accessed on January 10, 2010).
16. Kaur R, Rawat D, Kakkar M, Uppal B, Sharma VK. Intestinal parasites in children with diarrhea in Delhi, India. Southeast Asian J Trop Med public Health 2002; 33: 725-729.
17. Ganga N, Ravichandran R. Intestinal parasites in children from middle income families. Indian pediatrics 1995; 32: 828.
18. Sethi S, Sehgal R, Malla N, Dubey ML, Mahajan RC. Changing trade of intestinal parasitic infections in Chandigarh (Northern India): hospital based study. Ind J Med Microbiol 2000; 18: 106-109.
19. Mehraj V, Hatcher J, Akhtar S, Rafique G, Beg MA. Prevalence and factors associated with intestinal parasitic infection among children in an urban slum of Karachi. PLoS One 2008; 3: e3680. doi: 10.1371/journal.pone.0003680.
20. Nduka FO, Nwaugo VO, Nwachukwu NC. Human intestinal parasite infections in Ishiagu, a leading mining area of Abia state. Animal Research International 2006; 3: 505-507.
21. Kia EB, Hossein M, Nilforoushan MR, Meamar AR, Rezaeian M. Study of intestinal protozoan parasites in rural inhabitants of Mazandaran Province, Northern Iran. Iranian J Parasitol 2008; 3: 22-25.
22. Mbanugo JI, Onyebuchi CJ. Prevalence of intestinal parasites in Ezinifite community, Aguata Local Government Area of Anambra state. Nigerian J Parasitol 2002; 23: 27-34.
23. Nasiri V, Esmailnia K, Karimi G, Nasiri M, Akhavan O. Intestinal parasitic infections among inhabitants of Karaj city, Tehran province, Iran in 2006-2008. Korean J Parasitol 2009; 47: 265-268.
24. Reither K, Ignatius R, Weitzel T, Seidu-Korkar A, Anyidoho L, Saad E, et al. Acute childhood diarrhea in northern Ghana: epidemiological, clinical and microbiological characteristics. BMC Infectious Diseases 2007: 7: 104. doi:10.1186/1471-2334/7/104.
25. Moyo SJ, Gro N, Matee MI, Kitundu J, Myrmel H, Mylvaganam H et al. Age specific aetiological agents of diarrhea in hospitalized children aged less than five years in Dar es Salaam, Tanzania. BMC Pediatrics 2011; 11: 19. doi: 10.1186/1471-2431-11-19.
26. Marothi Y, Singh B. Prevalence of intestinal parasites in Ujjain, Madhya Pradesh India: five year study. Afr J Microbiol Res 2011; 5: 2711-2714.
27. Jacobsen KH, Ribeiro PS, Quist BK, Rybeck BV. Prevalence of intestinal parasites in young Quichua children in the Highlands of rural Ecuador. J Health Popul Nutr 2007; 25: 399-405.
28. Akinbo FO, Omoregie R, Eromwon R, Igbenimah IO, Airueghiomon UE. Prevalence of intestinal parasites among patients of a tertiary hospital in Benin city, Nigeria. N Am J Med Sci 2011; 3: 462-464.
29. Ostan I, Kilimcioğlu AA, Girginkardeşler N, Ozyurt BC, Limoncu ME, Ok UZ. Health inequities: lower socio-economic conditions and higher incidences of intestinal parasites. BMC Public Health 2007; 7: 342. doi:10.1186/1471-2458-7-342.
30. Balcioglu IC, Kurt O, Limoncu ME, Dinç G, Gümüş M, Kilimcioglu AA, et al. Rural life, lower socioeconomic status and parasitic infections. Parasitol Int 2007; 56: 129-133.
31. National Family Health Survey (NFHS-3), 2005-06, India: Key Findings. Mumbai: IIPS. International Institute for Population Sciences (IIPS) and Macro International 2007. Available from: http://www.rchiips.org/NFHS/factsheet.shtml. (accessed on February 26, 2013).
32. Asfaw ST, Goitom L .Malnutrition and enteric parasitoses among under-five children in Aynalem Village, Tigray. Ethiop J Health Dev 2000; 14:67-75.

33. Haque R, Mondal D, Kirkpatrick BD, Akther S, Farr BM, Sack RB, et al. Epidemiologic and clinical characteristics of acute diarrhea with emphasis on Entamoeba histolytica infections in preschool children in an urban slum of Dhaka, Bangladesh. Am J Trop Med Hyg 2003; 69: 398-405.
34. Haque R, Mondal D, Karim A, Molla IH, Rahim A, Faruque AS, et al. Prospective case-control study of the association between common enteric protozoal parasites and diarrhea in Bangladesh. Clin Infect Dis 2009; 48: 1191-97. doi: 10.1086/597580.