ORIGINAL ARTICLE

An epidemiological study of intestinal parasitic infestation among children aged 6–12 years in rural area of Bareilly, Uttar Pradesh, India

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Background: According to a report of the World Health Organization, "the total number of protozoa and helminthic infestations currently existing worldwide far outnumber the total world population since multiple infestations are the rule rather than the exception." It is estimated that 3.5 billion people are affected and 450 million are ill as a result of these infections, the majority being children. In India, the overall prevalence rate of intestinal parasitic infection ranges from 12.5% to 66% with varying prevalence rate for individual parasite. About 50% of the urban population and 68% of the rural population in India are affected. **Materials and Methods:** A cross-sectional study was conducted using multistage random sampling technique in rural area of Bareilly, Uttar Pradesh, India, from November 2016 to October 2017. **Results:** Among 248 children, the prevalence of intestinal parasitic infestation in 6–12 years of aged children was found to be 33.90%. **Conclusion:** This study revealed high prevalence of intestinal parasitic infection among 6–12 years of age children in rural area of Bareilly district and found association between washing hands before eating meal, eat washed fruits, wear footwear, wash hands after defecation, cut nail when grown, handwash before own food, information and training about personal and environmental hygiene and sanitation to study participants, and mode of defecation.

KEY WORDS: Bareilly, handwashing and cooking practices, intestinal parasitic infestation

INTRODUCTION

Early childhood development is considered to be the most important phase in life which determines the quality of health, well-being, learning, and behavior across the life span.[1] According to a report of the World Health Organization, "The total number of protozoa and helminthic infestations currently existing worldwide far outnumber the total world population since multiple infestations are the rule rather than the exception."[2,3] It is estimated that 3.5 billion people are affected and 450 million are ill as a result of these infections, the majority being children.[4,5] In India, overall prevalence rate of intestinal parasitic infection ranges from 12.5% to 66% with varying prevalence rate for individual parasite. About 50% of the urban population and 68% of the rural population in India are affected. High rates of infestation are seen in rural areas due to poverty, poor sanitation, inadequate personal hygiene, lack of clean water supply, contaminated water supplies, and high population densities. Schoolchildren aged 5–10 years are at increased risk of helminthiasis.[6] There is a gap of knowledge about intestinal parasitic infestation which was seen in the last studies. Thus, the present study entitled, An epidemiological study of intestinal parasitic infestation among children aged 6–12 years in rural area of Bareilly, Uttar Pradesh, India, to evaluate the prevalence rate, knowledge transmission of intestinal parasitic infestation in 6–12 years of age children.

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Aim

This study aims to find out the prevalence and associated sociodemographic risk factors of intestinal parasitic infestation among children aged 6–12 years in a rural community of Bareilly, Uttar Pradesh, India.

Objectives

The objectives of the study were as follows:

- To estimate the prevalence of parasitic infestation among the children
- To find out the association of the parasitic infestation with behavioral factors.

MATERIALS AND METHODS

Study Setting

This study setting was children of 6–12 years of age fulfilling the inclusion criteria of the study.

Study Duration

The study duration was from November 2016 to October 2017.

Type of Study

this was a cross-sectional observational community-based study.

Study Population

Population was the residence of rural area of Bareilly.

Inclusion Criteria

Children whose parents gave consent to allow their children to participate in the study and residing in the study area for the past 6 months were included in the study.

Exclusion Criteria

Child's parents were not willing to provide stool sample after three consecutive house visits and counseling. Children who were not on any therapy, for example, antibiotic/any other drugs due to any disease during survey were excluded from the study.

Sample Size Estimation

Sample size estimated on the basis of prevalence. Initially, we calculated the sample size on the basis of the prevalence of parasitic infestation (37.6%).[2] P = 37%, Q = 100–P = 63, L (allowable error) = 15% of P (relative error) = 15% of 37, so sample size calculated by $4PQ/L^2$, sample size was 308. We took 10% of that sample size for pilot study, i.e. 30.8 = 30. On the basis of pilot study, we calculate prevalence which comes 44%. On the basis of this prevalence, we calculated sample size. *P* = 44%, Q = 100–*P* = 56, L (allowable error) = 15% of P (relative error) = 15% of 44, so final sample size calculated by $4PQ/L^2$, sample size was 226. On taking 10% non-response rate of total sample size = 22. Hence, final sample size was rounded up to 248 (approximate).

Sampling Technique

We used multistage sampling technique for all the study units until the required sample size was attained.

Tool

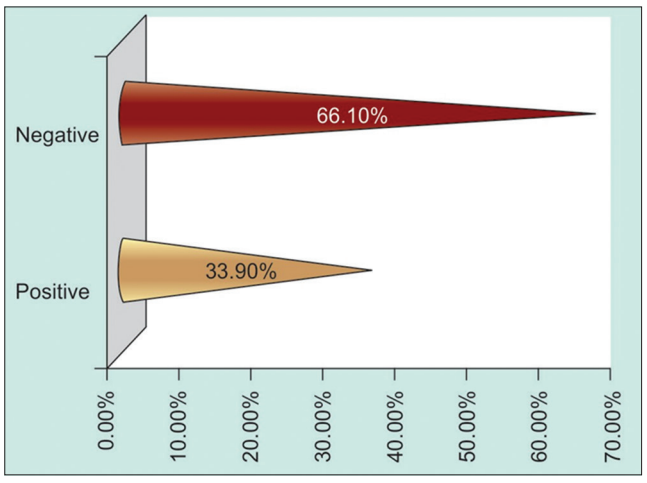
We used semi-structured schedule contains both open and close ended with fulfilling the inclusion criteria.

RESULTS

The cross-sectional study was conducted from November 2016 to October 2017. A total of 248 children of 6–12 years of age of rural area were interviewed and inspected with stool routine microscopic examination. Graph 1 shows that the prevalence of intestinal parasitic infestation in 6–12 years of aged children was found to be 33.90%. In our study, Tables 1 and 2 show that there was an association between parents education, type of house, washing hands before eating meal, eat washed fruits, wear footwear, wash hands after defecation, cut nail when grown, handwash before own food, information and training about personal and environmental hygiene and sanitation to study participants, and mode of defecation ($P < 0.05$). This is because some study participants had no knowledge of personal hygiene, environmental hygiene, and also sanitation, some study participants were using open field for defecation which leads to feco-oral transmission of parasitic infestation.

DISCUSSION

In the present study, the overall prevalence of intestinal parasitic infestation is 33.9% after screening the study participants (84/248) but on the other hand, in another study conducted in North Maharashtra by Mane *et al*.,[7] the overall prevalence of intestinal parasitic infestation was estimated to be 37.66% which is nearly similar to our study. Various studies have shown that the prevalence rate in India ranges from 12.5% to 66% with varying prevalence for individual parasites. The wide variation in the prevalence of intestinal parasites may be due to variations in factors such as quality of drinking water supply, sanitation,



Graph 1: Prevalence of intestinal parasitic infestation (*n*=248)

Table 1: Association between intestinal parasitic infestation and handwashing and cooking practices (*n*=248)

Children	Handwashing and cooking practices						Significance (Fisher's exact test for count data)
	Adequate			Inadequate			
	Stool routine microscopic examination			Stool routine microscopic examination			
	Positive	Negative	Total	Positive	Negative	Total	
Wash hands before eating meal	3 (2.70)	108 (97.29)	111 (100)	53 (38.68)	84 (61.31)	137 (100)	Value – 45.41 Df – 1 *P*<0.05
Eat washed and cooked vegetables	3 (2.94)	99 (97.06)	102 (100)	53 (36.30)	93 (63.70)	146 (100)	Value – 38.22 Df – 1 *P*<0.05
Eat washed fruits	4 (3.47)	115 (96.63)	119 (100)	52 (40.3)	77 (59.7)	129 (100)	Value – 48.33 Df – 1 *P*<0.05
Wear footwear	7 (5.46)	121 (94.54)	128 (100)	49 (40.8)	71 (59.2)	120 (100)	Value – 1.970 Df – 1 *P*<0.05
Wash hands after defecation	54 (23.6)	174 (76.4)	228 (100)	2 (10)	18 (90)	20 (100)	Value – 45.41 Df – 1 *P*<0.05
Use for washing hands		Water and soap			Mud and water		
	11 (18.96)	47 (81.04)	58 (100)	45 (23.68)	145 (76.32)	190 (100)	Value – 45.41 Df – 1 *P*>0.05
Nails		Trim regularly			Dirty nails		
	7 (5.78)	114 (94.22)	121 (100)	49 (39.58)	78 (61.42)	127 (100)	Value – 38.12 Df – 1 *P*<0.05
Information and training about personal and environmental hygiene and sanitation to children		Yes			No		
	5 (3.37)	143 (96.63)	148 (100)	51 (51)	49 (49)	100 (100)	Value – 77.41 Df – 1 *P*<0.05

and other environmental conditions and also lack of knowledge and personal hygiene.

In the present study, maximum study participants 44.8% (111) always wash hands before eating meal, but 55.3% (137) was washing hands before eating meal, in which 44.8% (111) of children sometimes wash their hands before eating meal followed by 10.5% (26) never wash their hands and habit of handwashing before eating meal, but another study was conducted in Nepal by Sah *et al*.[8] About 40% (80) never wash their hands before eating meal while 60% (120) were washing hands.

In the present study, maximum study participants 41.1% (102) were adequately eat washed and cooked vegetables, but 58.9% (146) of study participants were inadequately eating unwashed and uncooked vegetables, in which 45.2% (112) of children sometime eat washed and cooked food.

In the present study, maximum study participants 51.6% (128) adequately wear footwear, but 48.3% (120) were inadequately wear footwear, in which 32.3% (80) of children sometimes wear footwear followed by 16.1% of(40) children never wear footwear but another study was conducted in Dakshina, Kannada by Champa and Sreeshma.[4] About 66.3% (345) of study participants were wearing footwear while 29.80% (155) of study participants were not using footwear in this comparison.

In the present study, maximum study participants 91.9% (228) adequately wash hands after defecation/toilet followed by 7.7% (19) never wash hands after defecation/toilet and least 0.4% (1) sometimes wash hands after defecation/toilet and another study was conducted in Ethiopia by Gebru *et al*.[9] One hundred and seventy-nine (48.6%) had habit of handwashing after defecation and 189 (51.3%) had not habit of handwashing after defecation.

Table 2: Association between intestinal parasitic infestation and defecation practices (*n*=248)

Yes			No			Significance (Fisher's exact test for count data)
Stool routine microscopic examination			Stool routine microscopic examination			
Positive	Negative	Total	Positive	Negative	Total	
Latrine inside house						
43 (21.93)	153 (78.0)	196 (100)	13 (25)	39 (75)	52 (100)	Value – 0.220 Df – 1 *P*>0.05
Adequate			Inadequate			
Mode of defecation						
5 (4.54)	105 (95.46)	110 (100)	51 (36.95)	87 (63.05)	138 (100)	Value – 36.78 Df – 1 *P*<0.05

In the present study, 76.6% (190) of study participants were using mud and water for handwashing while 23.4% (58) of study participants were using soap and water for handwashing while another study was conducted in Bhopal by Kiran *et al*.[10] Maximum study participants 92% (276) were using soap and water while 8% (24) of study participants were using mud and water. There are different variations in washing after defecation due to difference in the study participants, lack of knowledge and parent's education to child in different regions results in variations in prevalence of intestinal parasitic infestation. In the present study, maximum study participants 97.2% (241) of children had trim nails when grown followed by 2.8% (7) of children had dirty nails while in another study conducted in Bhopal by Kiran *et al*.[10] Maximum study participants 86.33% (259) had dirty nails while 13.00% (41) of study participants had trimmed nails.

In the present study, maximum study participants 59.7% (148) were informed and trained about personal and environmental hygiene and sanitation. About 40.3% (100) were not informed and trained.

In the present study, maximum 50.8% (126) had latrine inside house followed by 49.2% (122) had not latrine inside house in these 25.8% (64) while in another study conducted in Ethiopia by Wale *et al*.[11] showed that 61.4% (246) of study participants had latrine inside house, but 38.6% (154) had not latrine inside house and in this study. In the present study, maximum study participants were using simple pit latrines for defecation followed by 16.1% (40) were using public latrines for defecation, but 33.0% (82) were using open field for defecation and least 25.0% (62) used excreta manually removed by service or bucket latrines. In some studies showed a variation in defecation practices, while some of them showed similarity in defecation practices as a study conducted in Gujarat by Assudani *et al*.[12] Maximum study participants 58.33% (105) were having outside the house, but minimum 41.67% (75) were having inside the house and further 58.33% (105) of study participants were using open-field defecation while 41.67% (75) of study participants were using sanitary latrine for defecation. This is due to insufficient water supplies, poor hygienic practice, poor socioeconomic status of the study subjects, and contamination of vegetables with fecal materials in the farm.

All the aspects of health status, lifestyle, life satisfaction, mental state, or well-being together reflect the multidimensional nature of quality of life in an individual. Child health problems with respect to the quality of life often remain neglected. Hence, this health study was conducted to explore the different variables such as sociodemographic, personal habits, and also the mode of defecation relationship with intestinal parasitic infestation.

CONCLUSION

This study revealed high prevalence of intestinal parasitic infection among 6–12 years of age children in rural area of Bareilly district and found association between washing hands before eating meal, eat washed fruits, wear footwear, wash hands after defecation, cut nail when grown, handwash before own food, information and training about personal and environmental hygiene and sanitation to study participants, and mode of defecation. These infected children can transmit the infection to general population. There is a need for integrated control programs for prevention including periodic deworming, regular epidemiological surveillance, raising awareness about personal hygiene, absence of handwashing habit after defecation, habit of walking on barefoot, and occupation which are necessary steps for the prevention of infections. Early diagnosis by parasitological examination and complete treatment of those infected are important for controlling infections.

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