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Original Article

Occurrence of Intestinal Parasites Among the Slum Children

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ABSTRACT: A cross sectional research was undertaken in a slum area of Dhaka city, Bangladesh from March, 2015 to February, 2016, a total of 98 children were selected from this slum area between age group 0 to 15 years by random sampling. Thirteen species of parasites were identified by formol-ether concentration method. By formol- ether concentration method, the prevalence of *E. histolytica* (9.18%), *E. coli* (3.06%), *G. lamblia* (14.29%), *Trichominus honimis* (1.02%), *Balantidium coli* (1.02%), *Paragonimus westermani* (2.04%), *Taenia spp.* (5.10%), *H. nana* (11.22%), *A. lumbricoides* (36.73%), *T. trichiura (*27.55%), *A. duodenale* (10.20%), *E. vermicularis* (2.04%) and *Trichostrongylus spp*. (2.04%) were recorded. Statistically it was observed that age groups had significant association with parasitic infestation ($p<0.05$) but prevalence did not alter significantly according to sexes ($p>0.05$). Highest prevalence (91.67%) was found in age group 8-11 years and prevalence (82.61%) was recorded in summer season. The males (52.94%) were more infected than females (47.05%). Several risk factors such as practices, occupational and socio economic states showed significant ($p<0.05$) association with gastrointestinal parasitic infection.

Key words: Intestinal parasites, children, slum areas, risk factors

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INTRODUCTION

Parasitic disease is an infectious disease which is a major public health problem in the developing and underdeveloped countries including Bangladesh. It imposes a continual and unacceptable threat to the well being of millions of people in the tropics and subtropics and the cost of parasites in terms of human misery and economic loss is incalculable (Cox, 1982)[1]. Intestinal parasitic infections have always been a significant public health concern in the tropics, predominantly in developing countries like Bangladesh, due to the unhygienic environment, poor socio-economic status and geographical condition which contribute to the problem. This disease is predominant in children compared with adult. Additionally incessant infections deteriorate physical and mental growth and development of children in general. Infestation can occur in children of all ages. Infants, toddlers, and very young children are at risk for the parasitic diseases because of their behavioral aspect, general hygiene knowledge, environmental contamination and socio-economic status[2]. People of all ages are affected by the cycle of prevalent parasitic infections; however, children are the worst affected[3-4].

Parasitic infections have adverse effects on the survival, appetite, growth and physical fitness[5], school attendance[6] and cognitive performance of school age children[7]. Infection in early life results undernourishment and diarrhea, associated with poor cognitive function at school age[8-9]. Epidemiological research carried out in different countries has shown that the social and economical circumstances of the individual are significant cause in the prevalence of intestinal

parasites. The prevalence of intestinal parasitic infections is one of the most precise indicators of socioeconomic conditions of a population and may be associated with several socio-cultural and economic determinant factors.

Giardia intestinalis and *Entamoeba histolytica* are two major protozoan parasites responsible for diarrhea in children under 5 years[10-11]. *Entamoeba histolytica*is one of the deadly species of protozoan parasites and is associated with pathological abnormalities in liver and large bowel in human body[12]. It is responsible for dysentery, anemia and could impact on infant growth[13-14]. The gastrointestinal tract of a child living in poverty in a less developed country is likely to be parasitized with at least one, and in many cases all three soil-transmitted helminths, with resultant impairments in physical, intellectual, and cognitive development[15]. In Bangladesh infestation of intestinal protozoa and helminth parasites such as *Entamoeba histilytica*, *Giardia intestinalis*, *Ascaris lumbricoides* and *Trichuiris trichura* which is a major public health problem[16-17].

A lot of techniques can be employed for the diagnosis of intestinal parasites. Selection of a particular technique will depend on its affordability, easy to perform, its efficiency and level of professionalism involved. Some of these methods are DNA probes, PCR, and direct fluorescent antibody methods. They are highly sensitive, but costly for use in the developing world. Direct stool smear, formol-ether, and salt floatation techniques in the form of stool microscopy have many advantages over other diagnostic methods for detecting intestinal parasites. If performed appropriately, it is sensitive, easy, and cost-effective[18].

Intestinal parasitic infections are considered as severe public health problem, as they cause iron deficiency anemia, growth retardation in children and other physical and mental health problems[19].

Table. 1. Prevalence of different species of parasites in relation to sexes.

Parasites	Male			Female			Total		
	No. of sample	Infected samples	Prevalence (%)	No. of sample	Infected samples	Prevalence (%)	No. of sample	Infected samples	Prevalence (%)
Entamoeba histolytica	54	4	7.41	44	5	11.36	98	09	9.18
Entamoeba coli		2	3.70		1	2.27		03	3.06
Giardia lamblia		9	16.67		5	11.36		14	14.29
Trichomonus hominis		0	0		1	2.27		01	1.02
Balantidium coli		1	1.85		0	0		01	1.02
Paragonimus westermani		2	3.70		0	0		02	2.04
Taenia sp.		3	5.56		2	4.55		05	5.10
Hymenolepis nana		7	12.96		4	9.09		11	11.22
Ascaris lumbricoides		27	50		9	20.45		36	36.73
Trichuris trichiura		17	31.48		10	22.73		27	27.55
Ancylostoma duodenale		3	3.56		7	15.91		10	10.20
Enterobius vermicularis		0	0		2	4.55		02	2.04
Trichostrongylus sp.		0	0		2	4.55		02	2.04

The aim of the study is to measure the prevalence of the intestinal parasite with regard to the sex, age group, season and associated risk factors among the children.

Table 2. Prevalence of parasites in relation to age groups and sexes

Age group (Year)	Male			Female			Total		
	Total no. of sample examined	No. of infected samples	Prevalence (%)	Total no. of sample examined	No. of infected samples	Prevalence (%)	Total no. of sample examined	No. of infected samples	Prevalence (%)
0-3	10	8	80	0	0	0	10	8	80.00
4-7	8	4	50.00	16	10	62.5	24	14	58.33
8-11	20	18	90.00	16	15	93.75	36	33	91.67
12-15	16	6	37.50	12	7	58.33	28	13	34.21

MATERIALS AND METHODS

The present study was a community based cross sectional study to determine the occurrence of parasitic infection among the children of age group (0-15). This study was conducted during March, 2015 to February 2016 in the Mohakhali

slum areas of Dhaka city on a total of 138 children aged between (0-15). The Laboratory tests were performed in the Parasitology Laboratory of Department of Zoology, University of Dhaka, Dhaka, Bangladesh. For microscopic examination, formol- ether concentration technique was used. Finally the ova and cysts were observed and identified according to the following the descriptions by Chatterjee (1975)[20], Chessbrough (1987)[21], Schmidt and Roberts (1989)[22].

RESULT AND DISCUSSION

A total of 98 stool samples were collected from Mohakhali slum area, of which 54 samples from male children and 44 samples from female children, 69.39% samples were found infected with different intestinal protozoa and helminths. The percentage of infection in male children was higher (52.94%) than in female (47.05%). A total of 13 species of parasites were found in 98 stool samples. The highest prevalence (36.73%) was found in *Ascaris lumbricoides* and the lowest prevalence (1.02%) was in *Balantidium coli* (Table 1).

observed in April and overall lowest (50%) prevalence was observed in August, January and February. No sample was observed in September. In F – test (F – value 1.468, p- value 0.2673, p> .05) showed that the variation of monthly prevalence in different sexes were not significantly different (Fig. 1). During the present study, the maternal educational status of the children was observed. The prevalence of parasites was 85.71%, 72%, 58.82% in case of illiterate mothers, mothers who can sign only and primarily educated respectively (Fig. 2). Most of the samples were collected from children living in tin-shed house (67.89%). The prevalence of parasites was 100% among the children who are living kacha and semi pucca house (Table 4). Statistical analysis showed that, by Chi – square, the association of housing status with the prevalence of parasites were significant.

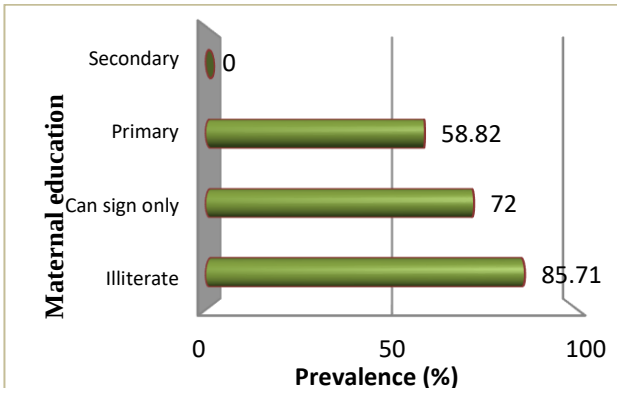
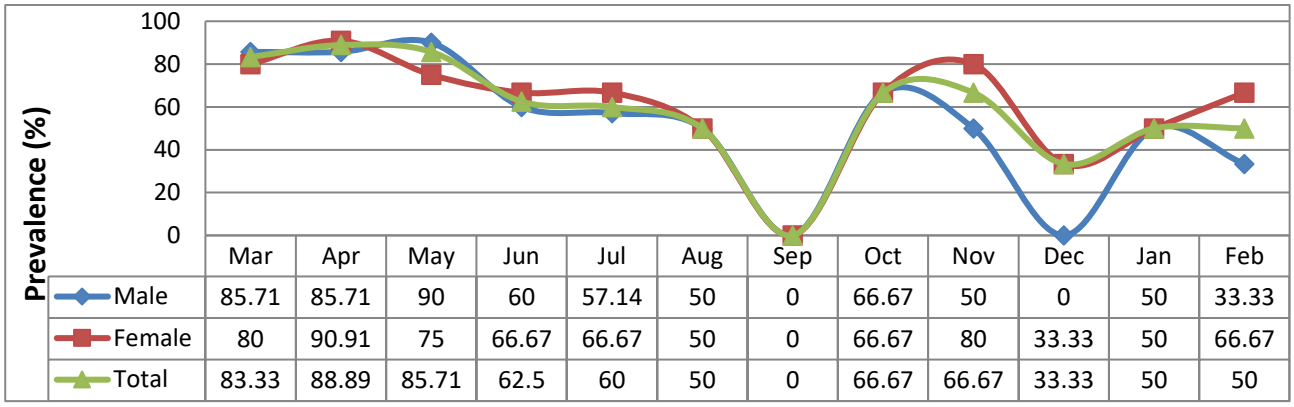


Fig. 2. Prevalence of parasites according to maternal educational status



	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Male	85.71	85.71	90	60	57.14	50	0	66.67	50	0	50	33.33
Female	80	90.91	75	66.67	66.67	50	0	66.67	80	33.33	50	66.67
Total	83.33	88.89	85.71	62.5	60	50	0	66.67	66.67	33.33	50	50

Fig. 1. Monthly prevalence of parasites according to sex groups.

At the age of 00-03 years the overall prevalence was 80.00%, 80% in male. In case of age group 04-07 years, the total prevalence was 58.33%, 50.00% in male and 62.50% in female. In case of age group 08-11 years the overall prevalence was 91.67%, 90% in male and 93.75% in female. In case of age group 12-15 years, the prevalence was 34.21%, 37.5% in male and 58.335% in female. The highest prevalence (91.67%) was found in the age group of 08-11 years and the lowest (43.21%) in the age group of 12-15 years. F- test (F= 0.398, p- value = 0.235, p > .05) showed that variation of prevalence of infection in different age groups and sexes were not significantly different (Table 2).

Monthly prevalence of parasites in the stool samples was examined during the study period. The overall highest prevalence (88.89%) was

In the present study, the prevalence of parasites in accordance with type of latrine was noticed. The highest prevalence (85.19%) was calculated in children using kacha pit latrine and the lowest prevalence (64.71%) among the children using sanitary latrine (Table 5). Statistical analysis showed that (χ^2 = 5.09, p- value 0.05, p< 0.05) the

association of type of latrine with parasitic infection was significant at 5% level.

In this study the variation of prevalence of parasite according to habit of washing hand after defecation, the highest prevalence (84.21%) was found in children using only water for washing hand and the lowest (46.89%) in children using soap and water for washing hand (Table 6). Statistically the association of washing hand after defecation with prevalence of parasites was significant at 5% level while (χ^2 = 14.96, p- value 0.004, p< 0.05).

Table 3. Prevalence (%) of parasites among male and female children in different seasons

Season	Sex	No. of sample examined	No. of infected samples	Prevalence (%)
Winter (November to February)	Male	9	4	44.44
	Female	13	8	61.53
	Total	22	12	54.55
Summer (March to June)	Male	29	24	82.76
	Female	23	19	82.61
	Total	52	43	82.69
Rainy (July to October)	Male	16	8	50.00
	Female	8	5	62.50
	Total	24	13	54.17
Total	Male	54	36	66.67
	Female	44	32	72.73

Table 4. Prevalence of parasitic infection according to housing status

Type of house	No. of sample examined	Positive case	Prevalence (%)
Pucca	0	0	0
Semi Pucca	4	4	100
Kacha	2	2	100
Tinshed	92	62	67.89

Overall prevalence of parasitic infestation was 69.39%, which is lower than the finding of[17] (99.03%). While in the present study, prevalence was higher than the findings (21.3%) of Chandrashekhar, *et al.* (2005)[23] and Ahmed and Hady, (1989)[24] (10.94%). The cause behind the contradiction might be due to different geographical and socio- economic condition and gender majority.

During the present study, 52.94% male and 47.05% female were found infected with one or more parasites. Statistical analysis (p> 0.05) showed that there is no significant association between sex and parasitic infestation. Sex predominance for parasitic infestation is still not confirmed. Some report showed that prevalence of parasites was similar in both sexes[25] while in some findings males were predominant[26-27] and in some females were predominant[28].

Table 5. Prevalence of parasites according to type of latrine

Type of latrine	No. of sample examined	Positive case	Prevalence (%)
Sanitary	62	38	61.29
Kaccha pit	16	13	81.25
Open space	20	17	85
Bamboo slit	00	00	00

To some extent, infestation of parasites has relation with the age group. There was no association between age group and parasitic infestation. Highest prevalence (92.45%) was found in case of 08 – 11 years age group by formol – ether concentration method but Khanum *et al.* (2010)[29] found lowest prevalence in 08- 10 years age group in an investigation. There was no significant association between age group and parasitic infestation (p - value 0.33)[25]. However this association was lack in case of direct smear in the present study.

Table 6. Prevalence of parasites according to washing hand after defecation

Washing hand after defecation	No. of sample examined	Positive case	Prevalence (%)
With soap and water	23	9	39.13
With ash and water	7	5	71.43
With soil and water	20	15	75 15
With water only	42	34	80.91
Do not wash	6	5	83.33

In the present observation, the highest prevalence (88.89%) was observed in April and lowest (50%) prevalence was observed in August, January and February. Amin (2002)[30] found highest prevalence (36- 43%) between July and October and gradually decreased to 32% during December.

The current result revealed that the prevalence of *E. histolytica* was 9.18% and *G. intestinalis* was 14.29% by formol – ether concentration method. Khanum *et al.* (2010)[29] found the prevalence of *Entamoeba histolytica* (3.95%) and *Giardia intestinalis* (6.31%) and Khanum, *et al.* (2014)[31]

estimated prevalence of these two parasites; *E. histolytica* (4.61%) and *G. intestinalis* (3.71%), which do not support the present result. *Balantidium coli* and *Trichomonus hominis* also appear to have been detected in very few studies and they were very uncommon in the present study. A study from Bangkok reported a prevalence of 1.4%, which is higher than the prevalence (1.02%) seen in the present study by formol – ether concentration technique[32]. Rim *et al*. (2003)[33] investigated that the prevalence of *Teania spp.* was only 0.6% in Laos. But the present study revealed a higher rate of prevalence (5.10%) in children. *Trichostrongylus spp.* was found to occur only in two samples (1/98; 1.02%) while in southwest Iran and in a village in Egypt, up to 70% of human population had been found infected[34].

Rowsam (1994)[35] showed that the prevalence of helminth infection were very much high (92.3%) among the children whose mother were illiterate. In present study the highest prevalence found (85.71%) in case of illiterate mother. In most of the past studies types of houses were not observed. In the present study, the relation between the housing type and parasitic infestation was marginally significant ($0.05<p<0.13$) and the association between the prevalence and types of latrine was not significant ($p>0.05$). This does not resemble with other studies done[36]. During the study period, it was found that there was significant association (p- value 0.004) between the habit of washing hand after defecation and parasite infestation.

CONCLUSION

The present research was a cross sectional study accomplished by interviewing the children and their mother or the family head to find out the household condition and hygienic state followed and maintained with regard to intestinal parasitic infection in the children. It was also tried to find out the prevalence of the parasites identified. In conclusion, a control program for intestinal helminths in Bangladesh should target areas and districts with a high prevalence of infection. To be effective, the program will also need a continuous surveillance process directed at monitoring the utilization of passive case detection, assessing the impact of health education messages, and evaluating change in infection patterns.

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