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INCIDENCE OF NEMATODE INFECTIONS AMONG THE CHILDREN BROUGHT TO ICDDR, B HOSPITAL, DHAKA, BANGLADESH

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Helminthic infection due to nematodes is a major public health problem in the developing and underdeveloped countries including Bangladesh. This is due to poor hygienic habits and living condition of the majority of the population. The common nematodes found in Bangladesh are *Ascaris lumbricoides*, *Trichuris trichiura, Ancylostoma duodenale* etc. Ascariasis, Trichuriasis and Ancylostomiasis appear to flourish in the communities where the socio-economic status is dominated by poverty, poor housing, insufficient sanitation and a need of health education (Crompton 1988).

Children are more exposed to these soil transmitted worms which are also associated with stunted growth (Cooper and Bundy 1987, Adams *et al.* 1994) and impaired cognitive functions (Nokes *et al.* 1998). Helminths infection causes decreased body resistance, retardation of physical and mental development of children, indigestion, diarrhoea, anorexia and lack of memory, increased morbidity rate, greater incidence of abortion, sterility, stillbirth and impaired lactation, anaemia, pneumonia, bronchitis, appendicitis, increased susceptibility to various non-helminthic diseases (Stephenson 1987; Adams *et al*. 1994). The high prevalence rate of the parasite was correlated with poverty , poor sanitation and impoverished health services (WHO 1987).

A number of studies have been conducted throughout Bangladesh during the past half century regarding to the infestation of intestinal nematodes. Among them Kuntz (1960), Muazzem and Ali (1961,1968), Muttalib *et al*. (1976), Ahmed (1986), Shakur and Ehsan (1993), Rousham (1994), Khanum *et al.* (1997, 1999, 2000) were very important. Almost all of them reported very high infection rate of nematodes specially *Ascaris lumbricoides.* Poor hygiene and sanitation, illiteracy, ignorance, flood, malnourishment and overpopulation etc. factors were found associated with the high rate of infection among target people.

The aim of the present study was to confirm the relations between the socioeconomic condition and the prevalence of infection of the common intestinal nematodes. A number of studies regarding the same aim have so far been conducted in slum areas and other parts of Dhaka city where the socio-economic condition is miserable. Low socioeconomic conditions, poor hygienic habits, lack of sanitary latrines and lack of health education are related to the wider prevalence of *Ascaris lumbricoides* and hook worm infections (Khanum *et*

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al. 1999). The present study highlights on the prevalence of infection of *Ascaris lumbricoides* among the children (0-5 years) admitted to ICDDR, B hospital during January 2006 to March 2006. The objectives of the present study were to determine the actual prevalence of *Ascaris lumbricoides,* the factors influencing the transmission of *Ascaris lumbricoides* in relation to socio-economic and livelihood status of the infected children.

2285 stool samples were collected from the ICDDR, B (International Centre for Diarrhoeal Disease Research in Bangladesh) hospital and routine examination of stool were taken in the Clinical Laboratory of the same centre. Fresh specimens were collected into clean and dry container. Identifying label (name, time and date of collection) was marked, transported to the laboratory in a closed container, within 1 hour of collection and were examined as soon as possible. Samples were preserved in 10% formalin if they were processed later. Direct smear method was used for parasitological examination. Approximately 0.1 gm of stool samples was taken on the clean glass slide. A drop of NaCl saline and Lugol's iodine was mixed up vigorously with the sample. Then the stool solution was covered by a cover slip and placed under a microscope for examining the presence of ova of *Ascaris lumbricoides*, *Trichuris trichiura* and *Ancylostoma duodenale*. Both fertilized and unfertilized eggs of *Ascaris lumbricoides* were found in the samples. Fertilized eggs were oval or rounded with an outer thick shell. But unfertilized eggs were elongated or elliptical with outer thin shell. The eggs of *Trichuris trichiura* were barrel-shaped with a plug at each end. The eggs have a brownish outer shell and transparent inner shell. The eggs of *Ancylostoma duodenale* were oval or elliptical in shape. It was surrounded by a thin and transparent shell membrane. The egg contains a segmented ovum usually with 4 to 16 blastomeres. There was a clear space between the egg shell and the segmented ovum.

Of 2285 stool samples, 27 were found infected with *A. lumbricoides.* The overall prevalence of *A. lumbricoides* was only 1.18 %. A small prevalence of nematode infections was observed because all the children were inhabitants of high socio-economic status.

The prevalence of the single infection of *A. lumbricoides* was 0.96%*,* the mixed infection of *A. lumbricoides and T. trichiura* was 0.18%; whereas the mixed infection of *A. lumbricoides* and *Ancylostoma duodenale* was only 0.04% (Table 1).

Table 1. Prevalence of single and mixed infection of *A. lumbricoides* observed during the study.

Type of infections	Total sample examined	No. of infection	Prevalence %
Ascaris lumbricoides	2285	22	0.96
Ascaris umbricoides + *Trichuris trichiura*	2285	4	0.18
Ascaris lumbricoides + *Ancylostoma duodenale*	2285	1	0.04
Total	2285	27	1.18

Table 2. Prevalence of *A. lumbricoides* infection according to age groups of the children.

Age groups (years)	No. of the samples	No. of infected samples	Prevalence %
0-1 year	889	2	0.23
1-3 year	766	13	1.70
3-4 year	205	3	1.46
4-5 year	425	9	2.12
Total	2285	27	1.18

The prevalence of *A. lumbricoides* of the infected children according to the age groups is presented in Table 2. The highest prevalence was 2.12% found between 4-5 age groups. Whereas the lowest prevalence was 0.23% found between 0-1 age group. Out of 2285 samples, only 27 were infected and among the infected samples 13 were collected from 1319 males and 14 from 966 females. The highest prevalence was found in female and the rate was 1.44%. Thus, females were more infected than the males (Table 3).

Table 3. Prevalence of *Ascaris lumbricoides* infection according to sex of the children.

Sex of the children	No. of the samples	No. of infected samples	Prevalence %
Male	1319	13	0.99
Female	966	14	1.44
Total	2285	27	1.18

The prevalence of the single and mixed infection of *A. lumbricoides* according to age and sex groups is showed in Table 4. The highest prevalence of *A. lumbricoides* of male was 2.61% found between 3-4 age groups and the lowest prevalence was 0.18% found between 0-1 age group. The highest prevalence of *A. lumbricoides* of female was 4.25% found between 3-4 age groups and the lowest prevalence was 0.29% found between 0-1 age group. The highest prevalence of male was 0.33% found between 1-3 age groups and the lowest prevalence was 0% found between 0-1, 3-4 and 4-5 age groups for the mixed infection of *A. lumbricoides and T. trichiura*. In case of female the highest prevalence of them were 2.82% found between 4-5 age groups and the lowest prevalence was 0% found between both 0-1 and 3-4 age groups. On the other hand the mixed infection of *A. lumbricoides* and *Ancylostoma duodenale* was only present in male, which was 0.33% found between 1-3 age groups. But the mixed infection of *A. lumbricoides* and *Ancylostoma duodenale* was not found in female.

Table 4. Prevalence of *A. lumbricoides* and mixed infection of *A. lumbricoides* & *T. trichiura;* and *A. lumbricoides* & *Ancylostoma duodenale* according to age and sex groups.

Type of Infections	Age groups (years)	No. of samples	Gender of the children		No. of infected children		Prevalence of Infection (%)	
			Male	Female	Male	Female	Male	Female
Ascaris lumbricoides	0-1	889	550	339	1	1	0.18	0.29
	1-3	766	300	466	4	5	1.33	1.07
	3-4	205	115	90	3	3	2.61	4.23
	4-5	425	354	71	3	2	0.85	2.82
Total		2285	1319	966	11	11	0.83	1.14
A. lumbricoides + *Trichuris trichiura*	0-1	889	550	339	0	0	0.00	0.00
	1-3	766	300	466	1	0	0.33	0.00
	3-4	205	115	90	0	1	0.00	1.11
	4-5	425	354	71	0	2	0.00	2.82
Total		2285	1319	966	1	3	0.08	0.31
A. lumbricoides + *Ancylostoma duodenale*	0-1	889	550	339	0	0	0.00	0.00
	1-3	766	300	466	1	0	0.33	0.00
	3-4	205	15	90	0	0	0.00	0.00
	4-5	425	54	71	0	0	0.00	0.00
Total		2285	1319	966	1	0	0.08	0.00

The first report on the status of human gastro-intestinal infection in our country came into account through Kuntz (1960) who examined the stools of the students of Tejgaon Polytechnic High School and Mirpur High School. This study showed a high infection rate of intestinal parasites especially *A. lumbricoides*. Muazzem and Ali (1968) detected prevalence rate in Pakistan among the children and it was 25.6% for *Ascaris lumbricoides.* Muttalib *et al*. (1976) selected 13 villages in 4 Districts of Bangladesh, comprising 6000 children within the age groups of 1-15 years; the rate of intestinal parasitic infection was 99.03%. Islam (1990) showed that there is a significant sex variation in the prevalence of intestinal parasites among the children of Pathokoli School in Dhaka.

Khanum *et al.* (1997) studied and combined a total 400 cases in the four slum areas and found that *A. lumbricoides (*52.58%) and *T. trichiura* (27.23%) were more prevalent in male than in female children. The total prevalence of *A. lumbricoides* was 45%, *T. trichiura* was 23.50% and the mixed infection of *A. lumbricoides* and *T. trichiura* was 15.25%. Khanum *et al*. (1999) reported a study among the children of lower employees in Dhaka city. They found that 20.39% were positive for *A. lumbricoides* infection, 15.30% for *T. trichiura* infection and 11.57% for the mixed infection of *A. lumbricoides* and *T. trichiura.* They also detected prevalence rate of intestinal worm among the children of 3 selected rural areas of Bangladesh and the total prevalence of *A. lumbricoides* was 53.50% in Kaliganj, 40.50% in Bhaluka and 21.50% in Mirzapur. The total mixed infection of *A. lumbricoides* and *A. duodenale* was 1.27%. Later on, Khanum *et al.* (2000) found the prevalence of *A. duodenale* infection among children in Mirzapur (30%), Bhaluka (26%) and Kaliganj (30%).

Mizanur Rahman *et al*. (2005) studied hookworm infection among the rural children. The prevalence of hookworm infection was higher in Kutumbopur, Comilla (30%) than Gazirchat, Savar (26.7%). The prevalence was higher in males than females. Alam and Khanum (2005) studied the infection of *A. lumbricoides* and *T. trichiura* among the children of two slum areas in Dhaka city. The overall prevalence of *A. lumbricoides, T. trichiura* and their mixed infection were 34.38%, 17.39% and 12.65%, respectively. Girls showed the higher prevalence rate of *A. lumbricoides* (35.20%) than boys (33.59%).

From the present observation it can be inferred that poor socio-economic conditions are mostly responsible for the higher prevalence of ascariasis. Poor livelihood, sanitation and bad hygienic practices by the people are also contributing as a key factor for the higher prevalence of infection. The present study clearly shows the lower prevalence of nematode infections among the children who live in good hygienic conditions.

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