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PERSONAL HYGIENE PRACTICES AND SOCIO-ECONOMIC CONDITIONS AS INFLUENTIAL FACTORS FOR INTESTINAL PARASITIC INFECTION IN DHAKA CITY DWELLERS

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Abstract: A total of 200 stool samples were examined and five species of intestinal parasites were identified. Two of them were protozoans (*Entamoeba histolytica* and *Giardia intestinalis*) and the rest of which three species were nematode parasites (*Ascaris lumbricoides, Trichuris trichiura* and *Strongyloids stercoralis*). The overall prevalence of parasitic infection was 50%. Individually the prevalence of *Ascaris lumbricoides*, *Entamoeba histolytica*, *Giardia intestinalis, Trichuris trichiura* and *Strongyloids stercoralis* was 25%, 13%, 6%, 3.5% and 2.5%, respectively. Patients of different age and sex had a variable degree of infection. Children aged under ten years showed the highest prevalence (73.97%) compared to other groups. Accordingly, male patients were found slightly more susceptible to the infection (50.38%) compared to the female (49.29%). People belonging to different occupation and educational qualification had various degree of infection. As expected patients who had no education and poor monthly income, showed the highest prevalence of infection, 77.77% and 90%, respectively. Personal hygiene practices of the patients had much influence on the parasitic prevalence and rate of infection. Respectively 58.82%, 91.42%, 80% and 63.55% prevalence were found among the patients who used to drink unsafe water, wash hands without soap, stay barefooted most of the time and do not trim their nails regularly. The present study supposed to reveal that socioeconomic conditions and behavioral factors may influence the prevalence of parasitic infections.

Key words: Intestinal parasitic infection, prevalence, socio-economic status, personal hygiene behavior

INTRODUCTION

Parasitic infections are common health problems in the tropics as the environment is favorable for the transmission. In Bangladesh, intestinal worms are severely prevalent specially among children and adolescent constituting one of the ten most common causation of hospital morbidity (Banu *et al.* 2003). Its prevalence is alarmingly high especially in rural and urban areas as the environment fulfils the criteria for successful transmission of infection from host to host (Muttalib 1995). The first five-year plan of Bangladesh (1973-1978) reported 64% of children of the country suffered from intestinal parasitic

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infections (Jennifer *et al.* 2010). Evidences revealed that by the time the children in northern Bangladesh reached four years of age, 90 per cent already had patent *Ascaris* infection (Martin *et al.* 1983). In another study, the incidence rates for *Ascaris* and *Trichuris* documented for children with moderate to heavy helminthic infections was 60.4 and 23.2%, respectively.

The atmospheric and climatic conditions of Bangladesh are convenient for the viability of the larvae and rapid completion of the helminthes' life cycle, specifically the humid air, moist sandy soil, heavy rainfall, ample water sources, seasonal variation ensure the sustainable development and successful transmission of the helminthes to their host. As most of the protozoans and helminthes follow the fecal oral route or hand to mouth rout for being transmitted, the personal hygiene behavior of the host thus plays a crucial role in the successful establishment of the infection. Additionally, rural regions in Bangladesh where agricultural practices promote constant contact with moist soil also explain the higher prevalence of helminthes in this region (Jennifer *et al.* 2010).

As being the third world country, the standard of living is very marginal in Bangladesh, which may be responsible for high incidence of parasitic infestation. Despite several efforts were made such as National Plan of Action against Soil Transmitted Helminthic Infection (STHI) to eliminate worm infection in Bangladesh, still they are endemic in poor communities because of the continuous increase in population and the lack of recognition of the disease burdens by these communities (Chan 1997). It is supposed to be for several factors such as bad hygiene condition, poor sanitation system, poverty, illiteracy, ignorance, flood, famine, overpopulation, malnutrition, lack of mass education, lack of safe water supply, poor hygienic habits, lack of proper health awareness and general insanity of the population (Khanum *et al.* 1999). This is a cross sectional study that has been conducted to estimate the overall prevalence and incidence of the intestinal parasitic infection among the people residing in Dhaka city, the capital of Bangladesh as well as to know the associated factors regarding the infections.

MATERIAL AND METHODS

The study was conducted randomly among 200 patients residing in Dhaka city who came to the Department of Clinical Pathology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh for fecal test (both R/E and Floatation test). This hospital is situated at the center of the city and people of various socio-economic status use to come here for diagnosis and treatment.

The patients of all ages, educational background and occupation were communicated and explained about the nature of study. Only those patients were enrolled for the study who were interested and supportive. An informed written consent was taken from every patient at the beginning of the enrollment. Both adult male and female patients including children and adolescents were included in this study. A preset questionnaire was filled up by enquiring each patient through face to face interview. The contents of the questionnaire represents the demographic, socio-economic status and personal hygiene behavior of the patients. An invoice number was maintained for each questionnaire. As far as possible absolute information regarding age, sex, occupation, present address and permanent addresses were noted down in the preformed questionnaire. Many important socio-economic and household factors like monthly income, number of family member, types of house, food habit, source of drinking water, habit of washing hands, types of toilet, using of shoes, using of hand wash or soap, trimming of nails, child care practices etc. were considered for the complete analysis of this study. All these factors might have relation with the prevalence of intestinal parasitic infection. After completion of questionnaire formation, their pathological reports were collected according to their invoice number from the Clinical Pathology Department of the hospital. Diagnosis was confirmed from pathological reports of the patients.

Laboratory screening:

R/E: It refers to a series of tests performed on stool sample to help diagnose certain conditions affecting the digestive tract. These conditions can include infection such as from parasites, viruses or bacteria, poor nutrient absorption or cancer. Direct saline and iodine wet mount were done to diagnose the parasites. Saline wet mount was made by mixing a small quantity (2 mg) of feces in a drop of saline placed on a clean glass slide. In case of iodine wet mounts, smears were prepared by mixing a small volume of stool to a drop of Lugol's iodine on the glass slide that contained saline. The smears were then examined under microscope.

Fecal floatation: It test is a routine test for the detection of zoonotic internal parasites or worms to detect the eggs of mature parasites that live inside the body and pass their eggs to the outside by shedding them into the hosts stool. Feces either fresh or formalin-fixed were mixed with supersaturated solution of sugar or salt, filtered and centrifuged. The surface supernatant was transferred to a slide and examined microscopically for parasite ova (Cheesebrough 1987).

RESULTS AND DISCUSSION

Of 200 patients examined, over all prevalence of parasitic infection was found to be 50% (n = 100) of which nematode and protozoan infections were more prevalent. In this study, parasites were found under two groups (Protozoa and Nematode) and five species - *A. lumbricoides, S. stercoralis, T. trichiura, E. histolytica* and *G. intestinalis. A. lumbricoides* had the highest prevalence (25%) while nematode parasite *S. stercoralis* had the lowest prevalence (2.5%). The prevalence of the other parasites found in this study were 3.5% for *T. trichiura*, 13% for *E. hystolitica* and 6% for *G. intestinalis* among the enrolled patients of BSMMU (Table 1).

Table 1. Prevalence of intestinal parasitic infection in respect of age and sex

Variables	Type	Name of the parasites	No. of infected cases	Prevalence (%)
Parasites	Protozoa	*Entamoeba histolytica*	26	13.0
	Protozoa	*Giardia intestinalis*	12	6.0
	Nematoda	*Ascaris lumbricoides*	50	25.0
	Nematoda	*Strongyloides stercoralis*	5	2.5
	Nematoda	*Trichuris trichiura*	7	3.5
	Range	No. of enrolled patients	No. of infected cases	Prevalence (%)
Age	0-10 years	73	54	73.97
	11-20 years	42	18	42.85
	21-30 years	16	2	12.50
	31-40 years	19	4	21.05
	41-50 years	23	8	34.78
	51-60 years	27	14	51.85
	Type	No. of enrolled patients	No. of infected cases	Prevalence (%)
Sex	Male	129	65	50.38
	Female	71	35	49.29

During microscopic examination of Clinical Pathology Department of BSMMU, ova of *T. trichiura*, larva of *S. stercoralis*, cyst and trophozoite of *E. histolytica* and *G. intestinalis* were analyzed and respectively 7, 5, 26 and 12 patients were found positive for these parasites among the enrolled patients. Chowdhury (1978) investigated intestinal parasitic infection among the inhabitants of Dhaka and reported 52.76% prevalence that supported the present findings. Eight species of parasites found in that study were - *E. histolytica, G. intestinalis, A. lumbricoides, T. trichiura, Ancylostoma duodenale, S.*

stercoralis, Hymenolepis nana and *Enterobius vermicularis* (Chowdhury *et al*. 1978). Khaled (1983) studied on the incidence of intestinal parasitic infection among the soldiers of Border Guard Bangladesh and found eight species of intestinal parasites - *E. histolytica, G. intestinalis, A. lumbricoides, T. trichiura, S. stercoralis, H. nana, E. vermicularis* and *A. duodenale*. Taiwo and Agbolade (2000) found 1.7% prevalence of *S. stercoralis,* 5.4% of *T. trichiura* and 10.5% of *E. histolytica* which are very close to the present study.

Age wise prevalence of the patients was calculated (Table 1). The highest prevalence was found in under ten year's age group which was 73.97%. The lowest prevalence (12.5%) was found in 21-30 years' age group. So this is evident that the prevalence of intestinal parasitic infection was high in children and very low in middle aged people. It may be due to their strength and immunity difference. Another explanation for the children being more susceptible to the intestinal infection supposed to be lack of proper hygiene maintenance during food intake such as taking food with soiled hands and even picking up food from the ground.

Out of 200 patients 129 were male and 71 were female. The prevalence of intestinal parasitic infection in male was 50.38% and in female it was 49.29% (Table 1). Prevalence was found slightly higher in male which was in conformity with by other studies in Bangladesh (Muttalib 1995, Khanum 1999). Some different studies in another country found significantly higher prevalence in males rather than females (Faust and Giardia 1960) which supported the present findings. The reason behind the males being more susceptible to helminthiasis than females supposed to be their more involvement in different soil related activities like agriculture.

To know the influences of socio-economic factors in intestinal parasitic infection, prevalence of infection with respect to different occupation, educational qualification and personal behavior were determined (Table 2). In terms of occupation, the highest prevalence was found 85.71% among day laborer whereas the lowest prevalence was 27.90%, found among service holders. Prevalence of infection among patients of other occupations were 56.25%, 53.48%, 42.85% and 77.77%, respectively in housewife, in businessmen, in students and in other types.

The present study demonstrated a considerable difference of prevalence based on income of patients. Lowest prevalence (23.52%) was detected in high income (> 25000/month) group patients as expected. Similarly, highest prevalence (90%) was found in low income group (Tk. 5000-10000/month).

Table 2. Prevalence of intestinal parasitic infection in patients among different socio-economic status

Variables	Types/Ranges	No. of patients examined	No. of infected cases	Prevalence (%)
Occupation	Student	49	21	42.85
	Businessman	43	23	53.48
	Service-holder	33	12	27.90
	Housewife	32	18	56.25
	Day laborer	14	12	85.71
	Others	18	14	77.77
Monthly income (Tk.)	5000-10000	20	18	90.00
	10000-15000	52	39	75.00
	15000-20000	64	24	37.50
	20000-25000	47	15	31.91
	> 25000	17	04	23.52
Education	Illiterate	27	21	77.77
	Primary	73	36	49.31
	Secondary	62	20	32.25
	Vocational	38	23	60.52
House material	Tin shed with mud floor	49	42	85.71
	Tin shed with cement floor	68	32	47.05
	Brick built house	83	26	31.32

Prevalence of intestinal parasitic infection in respect of different educational qualifications was determined in the present study. The highest prevalence was (77.77%) among the illiterate patients as against the lowest prevalence was (32.25%) among secondary level of educated patients. The other prevalence was 49.31% in primary educated patients, 60.52% in vocational educated patients. The findings inferred that the knowledge of hygiene might be relevant with parasitic infection (Table 2). Another influential socio economic factor might be the type of house and the living environment. The patients residing in the tin shed with mud floor had the highest prevalence (85.71%) of infection. The lowest prevalence was found 31.32% among the patients residing in bricks built houses (Table 2). Shakur and Ehsan (1993) reported that the main factor for the parasitic infection tends to be the transmission of eggs and larval stages through the environment. This high rate of infections might be occurred due to the transmission of intestinal parasites through mud and unhygienic environmental condition.

Personal behavior of the patients was also considered as important influential factors for infection. It is revealed that patients who used to remain bare footed most of the time found more likely to get infected in comparison with the patients who wear shoes. The prevalence was 80% in bare footed and 35.55% in patients who wear shoes. Similarly, the patients who used to wash hands with soaps had a low prevalence (41.21%) compared to the people who

used to wash hands without soaps having high prevalence (91.42%) (Table 3). Islam and Zeitlyn (1991) showed that although hand washing is important after defecation, since this is considered as a luxury commodity in Bangladesh. The children who used water only for hand washing before serving a meal, have the highest rate of infection (93.62%). Nails can play a role in the transmission of food borne infections. Here in this study, it was found that the people who regularly trim nails had a low prevalence (34.40%) than the people who does not do (63.55%).

Table 3. Prevalence of intestinal parasitic infection based on patients' personal hygiene maintenance

Variables	Types/ranges	No. of patients examined	No. of infected cases	Prevalence
Using of shoes	Bare footed	65	52	80.00
	Wear shoes	135	48	35.55
Using of soaps	Wash hands with soaps	165	68	41.21
	Wash hand without soaps	35	32	91.42
Trim nail	Regular	93	32	34.40
	Irregular	107	68	63.55
Source of drinking water	Supply water	51	30	58.82
	Tube well water/boiled water/ filtered water	149	70	46.97

The prevalence of intestinal parasitic infection was also varied respecting the source of drinking water of the patients. Patients used to take supply water (not boiled) possessed relatively higher infection (58.82%) than the patients used to take tube well water or boiled supply water (46.97%). Usually parasitic eggs, cysts and larval stages are usually transmitted by water and if it is taken without boiling or other treatment then infection occurs. Hall *et al.* (2008) also referred source of drinking water as a factor related to parasitic infection though significant difference between case and control group was not found. De Silva *et al.* (1996) in Sri Lanka showed that prevalence of soil transmitted helminthes tended to increase as the socio-economic class and mother education level declined. Poor sanitation, unsatisfactory knowledge of health care, personal hygiene maintenance and poverty may be the important factors of high intestinal parasitic prevalence.

LITERATURE CITED

BANU, H., DE SILVA, J. and ISLAM, N. 2003. Epidemiological factors and pinworm infection in children. *Bangladesh J. Zool.* **31**: 243-246.

CHAN, M. S. 1997. The global burden of intestinal nematodes infections - fifty years on. *Parasitol. Today*. **13**: 438-43.

CHEESBROUGH, M. 1987. Medical Laboratory Manual for Tropical Countries. Blackworth Co. Publishers. pp. 413-565.

CHOWDHURY, M.R. 1978. Intestinal parasitic infection in privileged class of Dhaka City population. *Bangladesh Armed Forces Medical Journal* **4**: 5-12.

DE SILVA, N.R., JAYAPANI, V.P. and DE SILVA, H.J. 1996. Socio-economic and behavioral factors effecting the prevalence of geo-helminthes in pre-school children. *Southeast. Asian. J. Trop. Med. Public Health.* **27**: 36-42.

FAUST, E.C. and GIARDIA, L.E. 1960. Parasitology surveys in Cali, Department of Valle, Colombia. Strongyloidiasis in Barrio Siloe, Cali, Colombia. *Trans. R. Soc. Trop. Med. Hyg.* **54**: 556-563.

HALL, A., HEWITT, G., TUFFREY, V. and DE SILVA, N. 2008. A review and meta-analysis of the impact of intestinal worms on child growth and nutrition. *Matern. Child. Nutr.* **4**: 118-236.

ISLAM, F. and ZEITLYN, S. 1991. The use of soap and water in two Bangladeshi communities, implication for the transmission of diarrhea. *Rev. Infect. Dis.* **13**: 52-59.

JENNIFER, L.B., PEACE, N.E., AMANDA, J.B., MEGAN, E.K., MICHAEL, D.S. and JARRYD, M.C. 2010. The impact of Perception and Knowledge on the treatment and Prevention of intestinal Worms in the Manikganj district of Bangladesh. *Yale J. Biol. Med.* **83**: 171-184.

KHALED, G.A. 1983. Incidence of intestinal parasitic infection in Bangladesh Riffles. *Bangladesh Armed Forces Medical Journal* **7**(1): 29-31.

KHANUM, H., ISLAM, M.N. and NAHAR, N. 1999. Intestinal nematodes infestation among children of lower income group employees in Dhaka city. *Bangladesh. J. Zool.* **27**: 177-183.

MARTIN, J., KEYMER, A. and ISHERWOOD, R.J. 1983. The prevalence and intensity of *Ascaris lumbricoides* infections in Moslem children from northern Bangladesh. *Trans. R. Soc. Trop. Med. Hyg.* **77**(5): 702-706.

MUTTALIB, M.A. 1995. Intestinal parasites in University of Dhaka students. *J. Trop. Med. Hyg.* **78**: 10-11.

SHAKUR, M.S. and EHSAN, M.A. 1993. Intestinal parasite a frequent association and contributing factor of loose motion in malnourished children. *Bangladesh Journal of Child Health* **17**(1): 10-13.

TAIWO, A.K. and AGBOLADE, O.M. 2000. Intestinal helminthiasis among school children in Oru, Ogun State, Nigeria. *Nigerian Journal of Sciences* **34**: 283-286.

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