Prevalence of STHs (Soil transmitted helminthes) of school children in Sadar upazila, Mymensingh, Bangladesh.

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Abstract

Soil transmitted helminthes (STHs) infections are common throughout the tropics and subtropics and represents a major public health problem in developing countries. The rate of STHs infection found in the present study was very high in comparison to other countries of this Subcontinent, though they are taking antihelmintics every 6 months interval under Government National Health Program. The present study was carried out to see the Prevalence of STHs infection among the school children in Mymensingh, Bangladesh. A total of 500 stool samples from healthy individuals were collected during April, 2012 to February, 2013 from 20 schools comprising 10 rural and 10 urbans under Sadar upazila, Mymensingh, Bangladesh. The samples were examined in the department of Microbiology, Mymensingh Medical College using saline and iodine preparation microscopy and McMaster technique for the detection of ova of STHs.

The STHs prevalence irrespective of the age and sex of the individuals were 37.0% (185) out of 500 specimens where 68.0% (340/500) individuals were male represents the prevalence 38.0% (129/340) and 32.0% (160/500) individuals were female represents the prevalence 35.0% (56/160). Majority of the cases belonged to the age group >5-10 years 50.2% (251/500) of the total, constituted the prevalence 20.2% (101/500) of the total population and 40.2% (101/251) of the individual age group. The distribution of different STHs with their prevalence in the study population where Ascaris lumbricoides (AL) was 63.8% (118), Trichuris trichiura (TT) 37.3% (69), Enterobius vermicularis (EV) 8.1% (15), Ancylostoma duodenale (AD) 7.5% (14), and mixed infection was 15.1% (28). The upper socio-economic class constituted 5.0% (25/500) of the total study population with the prevalence of 20.0% (5/25). The middle socio-economic class constituted 50.0% (250/500) of the total study population with the prevalence of 37.2% (93/250) and the lower socio-economic class constituted 45.0% (225/500) of the total study population with the prevalence of 38.6% (87/225). The urban population constituted 34.0% (170/500) of the total population representing the prevalence 31.2 % (53/170) and rural population constituted 66.0% (330/500) of the total population representing the prevalence 40.0% (132/330).

In this study, STHs detection by McMaster method was satisfactory. Thereby, McMaster method could be adapted for rapid detection and quantification of STHs. Moreover, one more frequent administration of antihelmintics with close monitoring of drug administration may reduce the prevalence of STHs infection in Bangladesh.

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Introduction

Infection by soil transmitted helminthes (STHs) is now being considered as an important public health concern, particularly in developing countries[1]. Typically, the helminthes involved are Ascaris lumbricoides (AL), Trichuris trichiura (TT), Ancylostoma duodenale (AD), Strongyloides stercoralis (SS) and sometimes Enterobius vermicularis (EV). The three major STHs are AL (round worm) TT (whip worm) and AD (hook worm) are amongst the most widespread parasites worldwide[1]. An estimated 4.5 billion individuals are at risk of STHs infection and more than one billion individuals are thought to be infected, of whom 450 million suffer morbidity from their infections, the majority of who are children. An additional 44 million infected pregnant women suffer significant morbidity and mortality due to hook-worn associated anemia[2]. Approximately 135,000 deaths occur per year, mainly due to infections with hookworms or round worms [3, 4, 5, 6]. STHs transmission is enhanced by poor socio-economic conditions, deficiencies in sanitary facilities, improper disposal of human faces, insufficient supplies of drinking water, poor personal hygiene, substandard housing and lack of education[5]. It causes malnutrition, anemia, growth and weight retardation as well as higher susceptibility to other infections. Hookworms cause blood loss and are one of the major contributors to iron deficiency anemia. It is an important health problem in our community[2].

The greatest number of STHs infections occur in tropical and subtropical regions of Asia, especially China, India and Southeast Asia, as well as in Sub-Saharan Africa. Of the 1-2 billion STHs infections worldwide, approximately 300 million infections result in severe morbidity, which are associated with the heaviest worm burdens[2,7]. STHs study in Nigeria in 2009 shows the prevalence 47.6% [7]. In 2012, STH study in China found the prevalence of TT, Al, AD respectively 81%, 44% and 6%. In 2011, study in Srilanka found the prevalence of STHs 29%[8] and in 2004, study in India shows the prevalence of STHs infections for AL 91%, TT 72% and AD 54%[9]. In 1990 there was a study in Mymensingh, Bangladesh shows the prevalence of STHs infections was 72.2%[10]. Recent study from Dhamrai, Dhaka (IEDCR-2011) showed the prevalence of STHs 32%. So, the objective of this study was to evaluate an easier technique for diagnosis of soil transmitted helminthes, as well as to determine the prevalence of soil transmitted helminthes and infection intensity in the study population.

Materials and Methods

Following obtaining informed consent, school children between 4 and 18 years was recruited and asked to provide a recent stool sample of an interval of less than 4 hours to determine the prevalence of STHs infection. For the collection of specimens 20 different schools were selected randomly of which 10 from rural and 10 from urban area[11]. Laboratory work was done in the Department of Microbiology MMC from the period April, 2012 to February, 2013. All the specimens were examined by normal saline & iodine preparation microscopy for rapid detection of ova of helminthes. All fecal samples were processed using the McMaster egg counting technique (analytic sensitivity of 50 EPG) for the detection and the enumeration of infection intensity[11-18].

Result

Among the 500-stool specimen, irrespective of age and sex of the individual prevalence were 37.0% (185/500) where 340 (68.0%) individuals were male represents the prevalence 38.0% (129/340) and 160 (32.0%) individuals were female represents the prevalence 35.0% (56/160).

Table 1. Male female ratio of the study population with their prevalence (n=500)

	Number of Speciment (%)	Individual STHs Prevalence (%)
Male	340 (68.0)	129/340 (38.0)
Female	160 (32.0)	56/160 (35.0)
Total	**500(100)**	**185/500 (37.0)**

(Number in the parenthesis indicates percentage.)

Majority of the cases belonged to the age group >5-10 years, 50.2% (251/500) of the total study population, where 33.6% cases were male and 16.6% cases were female and constituted the prevalence of STHs 20.2% (101/500) of the total population and 40.2% (101/251) of the individual age group (Table II). In the age group 1-5 years were 2.4% (12/500) of the total study population, where 1.6% cases were male and 0.8% cases were female and constituted the prevalence of STHs 0.8% (4/500) of the total population and 33.3% (4/12) of the individual age group. In the age group >10-15 years were 34.2% (171/500) of the total study population, where 24.0% cases were male and 10.2% cases were female and constituted the prevalence of STHs 11.2% (56/500) of the total population and 32.7% (56/171) of the individual age group. In the age group >15-20 years were 10.2% (51/500) of the total study population, where 6.6% cases were male and 3.6% cases were female and constituted the prevalence of STHs 3.2% (16/500) of the total population and 31.4% (16/51) of the individual age group. In the age group >20 years were 3.0% (15/500) of the total study population, where 2.2% cases were male and 0.8% cases were female and constituted the prevalence of STHs 1.6% (8/500) of the total population and 53.3% (8/15) of the individual age group. In this study 15 cases were above 20 years of age. An Islamic school (madrasa) was selected for the study where some students were above 20 years of age; which is not uncommon in the perspective of our country

Table II. Detection of Soil transmitted helminthes (STHs) in the different age group of the study population (n=500).

Age group (Years)	Male (%)	Female (%)	Number of Patients (%)	STHs positive (%)	STHs prevalince for the individual age group (%)
1-5	8(1.6)	4(0.8)	12(02.4)	4(0.8)	33.3
>5-10	168(33.6)	83(16.6)	251(50.2)	101(20.2)	40.2
>10-15	120(24.0)	51(10.2)	171(34.2)	56(11.2)	32.7
>15-20	33(6.6)	18(3.6)	51(10.2)	16(03.2)	31.4
>20	11(2.2)	4(0.8)	15(03.0)	8(01.6)	53.3
Total	**340 (68)**	**160 (32)**	**500 (100)**	**185 (37.0)**	**37.0**

(Number in the parenthesis indicates percentage)

Study showed the distribution of different STHs with their prevalence where AL 63.8% (118/185), TT 37.3% (69/185), EV 8.1% (15/185), AD 7.5% (14/185), and mixed infection was 15.1% (28/185).

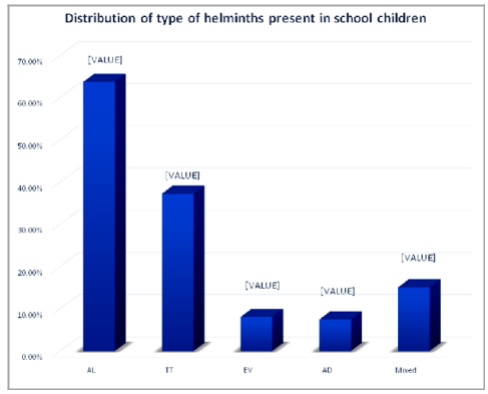

Fig: Bar diagram of different STHs with their prevalence

In this study the upper socio-economic class constituted 5.0% (25/500) of the total study population with the prevalence of 20.0% (5/25). The middle socio-economic class constituted 50.0% (250/500) of the total study population with the prevalence of 37.2% (93/250) and the lower socio-economic class constituted 45.0% (225/500) of the total study population with the prevalence of 38.6% (87/225).

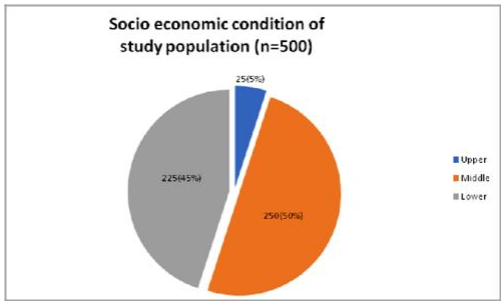

Fig: Socio economic condition of study population.

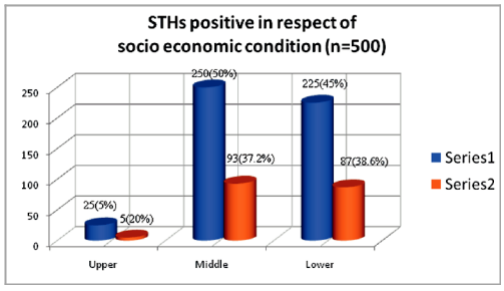

Fig: Socio economic condition of study population.

Study showed the STHs prevalence among the urban and rural study population (n=500), where the urban population constituted 34.0% (170/500) of the total population representing the prevalence 31.2% (53/170). For the rural population constituted 66.0% (330/500) of the total population representing the prevalence 40.0% (132/330).

Discussion

The burden of parasitic worm infections is considerable, particularly in developing countries. It is acknowledged that parasitic worm infections negatively impact on children's school performance and physical development. In this study, the prevalence was 37% is noticeable, because of these children are receiving anthelmintics in every 6 months interval under Government National Anthelmintics Program. In this study, three techniques were applied to identify the STHs,

1) Normal saline preparation slide microscopy[12]

2) Lugholes' Iodine preparation slide microscopy[12] and

3) McMaster slide preparation microscopy[4].

Till today, saline and iodine preparation slide microscopy is the gold standard for detection of STHs, but there may be chance of missing of helminthes detection because of a small amount of specimen is used in this method. This study applied the very recent McMaster technique for identification of STHs; which may have less chance of missing of ova[11,18].

In the present study, the prevalence of STHs among school children of Mymensingh area was 37.0%, which is similar or very close to the study from home and abroad. In 2009 a STHs study in South-West Cameroon included school children showed the prevalence 42.4%[13].

In 2009 a STHs study in Holland comprising school children showed the prevalence 47.6%[14]. In 1990 there was a study in Mymensingh, Bangladesh showed the prevalence of STHs infections 72.2%[14,15]. Recent study from Dhamrai, Dhaka (IEDCR-2011) showed the prevalence of STHs 32%.

In the present study, 340 (68.0%) individuals were male represents 38.0% prevalence of STHs and 160 (32.0%) individuals were female representing the prevalence of 35.0%. This is similar to that of other studies done in Asia and South Asian subcontinent where boys and girls ratio was 2:1[1,20], which well correlated with the present study where boys are more encouraged to go to school and girls are deprived from school

especially in rural areas. A study in Nigeria (2008) showed, (149/300) 49.7% individuals were male represents (134/300) 44.7% positive as parasite and (151/300) 50.3% individuals were female represents (126/300) 42.0% positive as parasite[1].

In the present study, the prevalence of STHs was AL 63.8%, TT 37.3%, EV 8.1%, AD 7.5% and mixed infection 15.1% A study from India (2004) showed the prevalence of STHs infections for AL 91.0%, TT 72.0% and AD 54.0%[16]. Another study in Nigeria (2008) showed the prevalence of STHs infections for AL 67.7%, TT 31.3%, AD 45.0% and SS being the lowest 18.0%[1]. These study results were compatible with the present study.

In this study, the prevalence in different age group were, 33.3% in 1-5 years of age, 40.2% in >5-10 years, 32.7% in >10-15 years, 31.4% in >15-20 years and 53.3% in >20 years of age. The highest prevalence in adult age group of >20 years, probably they are detached from national deworming program or may be due to involve in ground work. The most focal age group was >5-10 years and >10-15 years of age. These two age groups of Children were more susceptible to STHs infection because, they spend more time in ground for playing in bare foot, lack of personal hygiene maintenance, open field defecation in villagers. A study in Zanzibar, Africa (2007) showed the selected age group from 3 to 19 years and their overall prevalence was (166/336) 49.4%[14].

The study also found the STHs prevalence in respect of socio-economic condition of the study population, where upper socio-economic class found 20.0% (5/25), middle socio-economic class found 37.2% (93/250) and the lower socio-economic class found 38.6% (87/225) STHs prevalence. It was observed that the highest prevalence was among the lower socio-economic group followed by the middle and upper group. Worm transmission is enhanced by poor socio-economic conditions, deficiencies in sanitary facilities, improper disposal of human faces, insufficient supplies of potable water, poor personal hygiene, substandard housing and lack of education[17].

The present study showed the STHs prevalence was high in rural area 132(40.0%) then in urban area 53(31.2%). This indicates parasitic distribution is not homogeneous and varies in relation to geographical areas, especially high in the plantation sector[6]. The high incidence of STHs in rural area highlights the poor sanitation facility resulting in open-air defecation, which results in helminthes egg contamination with soil.

Analyzing the findings of the present study, the prevalence of Soil Transmitted Helminthes (STHs) was found to very high and alarming. For this health education for school children should be actively considered.

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