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SOIL TRANSMITTED HELMINTHIASIS AMONG SCHOOL AGE CHILDREN IN AURANGABAD DISTRICT, MAHARASHTRA STATE, INDIA

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ABSTRACT

The prevalence of soil transmitted helminth infections in apparently healthy school children of mean age 9-10 years drawn randomly from one school in 7 tehsil of Zilla Parishad (Z.P) schools of Aurangabad district, Maharashtra, India during March 2011 to August 2012 were evaluated. Stool sample from 547 children were analysed using the Kato- Katz technique. The overall prevalence *Ascaris lumbricoides* was the most common STH (67.72 %) followed by *Trichuris trichiura* (28.48%) and hookworm (3.797%). Children age of 9-10 years had the highest rate of infection, respectively. Though there was no significant ($p>0.05$) sex related difference in the prevalence of helminth infection, *A. lumbricoides* and hookworm infection were relatively higher in male pupils. Mixed infections were recorded, with *Ascaris* and hookworm, and *Ascaris* and *Trichuris* being the two most commonly occurring combinations.

KEY WORDS: Aurangabad, Prevalence, school children, Soil transmitted helminthiasis.

INTRODUCTION

Soil-transmitted helminthes or STHs, which include hookworm, roundworm and whipworm infections have plagued humans since the earliest recorded history and are estimated to infect one billion people worldwide. These chronic, disabling and often disfiguring infections contribute to a downward cycle of poverty and deprivation and are considered a Neglected Tropical Disease (NTD). Neglected tropical diseases or NTDs are a group of up to 15 disabling conditions from common infections that primarily affect the estimated 2.7 billion people who live on less than $2 a day. Together, NTDs cause approximately 534,000 deaths annually. NTDs occur primarily in rural areas and in poor urban settings in sub-Saharan Africa, Asia and Latin America.

School age children are one of the groups at high-risk for intestinal parasitic infections. The adverse effects of intestinal parasites among children are diverse and alarming. Intestinal parasitic infections have detrimental effects on the survival, appetite, growth and physical fitness (Stephenson *et al*., 1993), school attendance (Nokes *et al*., 1993) and cognitive performance (Hadidjaja *et al*., 1998) of school age children. School aged children bear the greatest burden from these infections, which are associated with anemia, malnutrition, growth and cognitive delays, inflammatory bowel disease and can negatively impact physical development and school performance. Helminthes infections can also negatively impact the progression of malaria and HIV/AIDS by increasing the severity of malaria-induced anemia and contributing to decreased hemoglobin levels, which in turn, increase the risk of mortality. The incidence of human intestinal helminthic infestation is widely recognized to be quite general in tropical as well as in temperate countries the intensity of infestation varies considerably in different population groups and form different localities. Helminthic intestinal infection being a major public health problem in many developing countries like Africa, Saudi Arabia, Asia and South America, where as developed countries like the United States, Japan show very low incidence.

Soil-transmitted helminthiasis in humans is caused by nematodes that inhabit the gastrointestinal tract of more than 25% of the world's population (de Silva *et al*., 2003). This disease accounts for 2.95-39.0 million disability adjusted life years (DALY) lost and costs 12,000-135,000 lives each year (WHO, 2002, 2004; Utzinger and Keiser, 2004). The most common species responsible for soil-transmitted helminthiasis are the roundworm *Ascaris lumbricoide*s, the hookworms *Ancylostoma duodenale* and *Necator americanu*s) and the whipworm *(Trichuris trichiur*a). It is currently estimated that 1,200 million people are infected with *A. lumbricoides* worldwide, 795 million people are infected with *T. trichiura* and 740 million people are infected with hookworms (de Silva *et al*., 2003; Brooker *et al*., 2004; Hotez *et al*., 2004). Less severe infections are often asymptomatic, while heavy infection can lead to severe anaemia, adverse effects on pregnancy, impairment of children's growth and development as well as worker productivity. The prevalence of these helminthes varies not only from one locality to the other, but also among individuals, age, standard of sanitation, socioeconomic status of parents, with children of parents in the low income group having the highest prevalence of infection and sex with males being more infected than females of interest in intestinal helminthic infection is double or multiple infection occuring in various combinations and rates of infection.

Although several studies on parasitic infections of school children have been carried out in some part of India, it is still necessary to do similar studies in different other parts of the country at different times, in view of the changing dynamic of parasitic infections. The present study aims at the identification of various soils transmitted helminthes, which infect

primary school children to determine the overall prevalence of infection and the pattern of infestation in relation to age and sex of the children and reports the results of the investigation on intestinal helminthiasis in school children in Aurangabad district in primary schools, Maharashtra state, India.

MATERIALS AND METHODS

The survey was conducted during June 2011 to April 2012. The stool samples were collected from 547 number of male and female school children in the age group 9-10 years from different 7 Talukas of Aurangabad district Maharashtra, India.

Prevalence and Intensity: Five hundred and forty seven school children, age 9-10 years, in 8 randomly selected primary schools in Aurangabad district, Maharashtra state, were investigated for their intestinal helminthic infections between June 2011 to April 2012.
The schools included are as follows:

Sr.no.	School	Code
1.	Bhartiya Primay School, Hudco, N-11 Aurangabad	S1
2.	Amar Primary School, Sanjay Nagar, Aurangabad	S2
3.	Zilla Parishad School, (Z.P.), Waluj, Tal –Gangapur	S3
4.	Zilla Parishad School, (Z.P.), Dongergaon, Tal – Phulambri.	S4
5.	Ramkrishna School, Tal- Sillod	S5
6.	Zilla Parishad School, (Z.P.), Tal. Paithan	S6
7.	Central school, Yellora, Tal- Khultabad	S7
8.	Zilla Parishad School, (Z.P.), Tal – Vaijapur.	S8

Collection and examination of faecal samples:
The pupils were educated on the causes of intestinal helminthic infections among school aged children and they were convinced that every child ought to be free from such infections, thus the necessity of participating in the research work was appreciated by them. Thereafter, wide mouth corked sterile bottles were given to the pupils for the collection of their stool samples at home and structured questionnaires were distributed among the participating pupils for the collection of demographic information such name (optional), age, sex, type of toilet facility used, and number of individuals in the house, parents occupation, religion, foot were habits, pet/domestic animals reared, regularity of deworming etc. and accordingly labeled (ID).

The pupils were taught how to collect stool samples and with the aid of their teachers, the questionnaires were correctly filled. The height and weight of the pupils were taken in the morning of the following day as they submitted their stool samples between 7.30 and 8.30 am. The stool samples were properly labeled and were carried in a cold box filled with ice packs and transported to the private laboratory for analysis. The samples that could not be analysed immediately were preserved using 10% formalin until they were examined (Cheesbrough M, 1998). Stool analysis was performed using the Kato-Katz technique (WHO, 2003).

The following formula is used to calculate the prevalence and intensity of infection in a community according to WHO guidelines.

$$\text{Prevalence} = \frac{\text{Number of subjects testing positive}}{\text{Number of subjects investigated}} \times 100$$

Stool examination:
Fresh morning stool samples were collected in nylon containers containing 10 ml of 10% formaldehyde. The containers were labeled, and immediately transported to the pathology laboratory for further processing. The stool specimens were processed using Water low's classification.

RESULTS AND DISCUSSION

Table 1: The prevalence of intestinal helminthes in school children in selected primary school in Aurangabad District, Maharashtra, India.

School code	No of pupils Examined	No of infected %	The prevalence of intestinal helminthes (%)		
			Ascaris	*T. trichuries*	Hook worm
S1	72	28	34.72	4.16	-
S2	77	17	15.58	6.49	-
S3	78	34	32.05	8.97	2.56
S4	66	21	21.21	7.57	3.03
S5	54	15	16.66	7.40	3.70
S6	57	14	19.28	5.26	-
S7	74	29	31.08	8.10	-
S8	69	28	30.43	10.14	-

Table No.1 shows that the prevalence of infection of infection among the school ranged between 34.72 (S1) and 32.05 (S3). There were significant differences in the prevalence of infection between schools (S1, S2, S3, S4, S5, S6, S7 and S8).

Table 2: Prevalence of intestinal helminthes infections in relation to age and sex of pupils.

Age range years	No. Examined	No. of infected %	*A. Lumbricoides %*	*T. Trichuris %*	Hookworms %
9-10	M - 362	138 (74.19)	90 (72)	45 (81.81)	3 (50)
	F - 185	48 (25.80)	35 (28)	10 (18.18)	3 (50)
	T - 547	186 (34)	125 (67.2)	55 (29.57)	6 (3.797)

% Prevalence of infection in parenthesis * p>0.05.
M =Male, F = Female, T = Total.

Table 2 shows that the overall prevalence of infection of the infection of the helminths was highest in pupils age 9-10 respectively, the table further shows that *A. lumbricoides*. Infection were highest in 9-10 years old pupils. Table 2 shows that out of 547 pupils examined 362 (66.17) and 185 (33.82) were males and females, respectively, of these 138 (74.19) males and 48 (25.80) females were infected; the difference was not significant. The prevalence of infection of *A. lumbricoides* and *T. trichiura* were higher in males than females, where as those of *A. lumbricoides* were and *T. trichiura* were higher in males, the differences are not significant (5.9 %) of the 186 infected subjects, 125 (67.2) and 55 (29.57) had double and triple intestinal helminth infections respectively. *Ascaris lumbbricodes* occurred mostly with the other helminths, *Ascaris* + *T. trichuries* were the most common occuring combination. These results are shown in table 3 as above.

Table 3: Polyparasitism in school children in Aurangabad district school.

Parasite combination	No. of infected	Percentage of infection (%)
Ascaris +*T. trichura*	152	(27.79)
Ascaris + *T. trichura* + Hookworm	186	(34.00)

Total number of samples examined = 547
Total number infected with intestinal helminths = 186
% Prevalence of infection in parenthesis based on 186 infected.

In this study mix infection of *Ascaris* and *T. trichura* was common, which is in consonance with the finding of Mba and Amadi, (2001) as well as Ukpai and Ugwu (2003). The high prevalence of intestinal helminths in school children of Aurangabad municipal corporation and Z.P. could be due to refuse dumps around marked areas, along the major roads, which attracted stray cattle, dogs, cat, goats, rodents etc. these animals serve as potential source of zoonotic transfer of parasite to children who are found handling dogs and cats as shown by Nwoke (2001), whereas dipterans transmit the parasites to foodstuffs. Prevention of these intestinal helminths infections is possible by restricting goat, cattle from straying, avoiding ingestion of contaminated food, avoiding use of human and animal excreta as fertilizer in agriculture and by maintaining personal hygiene. From different provinces of India, 24.6-91.0% of prevalence of helminthic infection has been reported by several workers (Fornandez *et al*., 2002; Rao *et al*., 2002; Singh *et al*., 2004). Occur in the lower age group. Such variation could be correlated with different degrees of poverty, hygiene, sanitation facilities

and health care or education which provide favorable lower age group (Children) is highly associated with the lack of awareness pertaining to hygiene and sanitation 58.57-74.11% where reported by Larisha *et al*., (2002).

Bora, *et al*., (2006) studied school children of 9-10 year age group (class IV-V) of eleven schools were surveyed. For examination of stool samples, 41.7 mgm templates and multiplication factor 24 were used. A total of l257 stool samples from eleven schools were examined of whom 81 samples (31.5%) were found positive for one or more STH. Prevalence of all STH was 31.5% and range being 5.3% in primary school Kansket to 55.3% in Primary school of Salda village. Only four children (1.6%) had high intensity of infection, of which 3 were from Salda School.

World Health Organization, Geneva, (1994), the community falls under category III (i.e. low prevalence, low intensity), hence only case management, IEC, improvement in sanitation, water supply and appropriate waste management has been recommended. Similar survey carried out by the same team in Kangra district, Himachal Pradesh showed overall STH prevalence form community survey of other hilly area was reported by Bora *et al*. (2006). WHO guidelines recommended periodic treatment rounds for groups with high intensity infections of 10% and above, regardless of the prevalence of overall infections. Since only 7.8% was recorded in this study, a different approach of treatment of only infected persons in school- base control Programmes may be more cost-affective, given the semi-urban nature of the study area with relatively high population.

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