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Intestinal Parasitism amongst School Children in Khurdha District, Odisha, India

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A B S T R A C T

To determine the prevalence of intestinal parasites among school children belonged to different communities from urban, peri-urban and rural areas in Khurda district, Odisha, India. Stool samples were collected from the school children according to the standard procedures. All the stool samples were examined by the direct microscopic examination and by the formalin - ether concentration methods. A total of 1114 stool specimen were collected from different schools in 1995. The total prevalence rate of parasitic infection was 50.5%; 24.5% had single protozoan infection, 14.7 had single helminthic infection and 11.2% had mix infection. It was observed that *Ascaris lumbricoids* was the predominant helminthic infection (8.6%) and *Entamoeba histolytica* was the predominant protozoan infection (11.7%) in school children from semi-urban area in the vicinity of Bhubaneswar city, which revealed a higher rate (68.3%) of parasitic infections than rural Odisha school children (40.3%) and urban (40.6%) school children from the city of Bhubaneswar. School children from Hindu communities were found to be infected more with protozoan infections (26.6%) while; Muslim children were infected more with helminthic infection (54.4%). The Semi-urban school children possess high parasitic infections than rural Odisha school children. However, there was no significant difference in the rate of parasitic infections between the two sexes in any given group.

Introduction

Intestinal parasitic infections of mankind are of considerable medical importance throughout the developing world (Warren *et al.*, 1986). Less importance has been given to the study on effect of intestinal helminthiasis on health and economy. Prolonged worm infestation coupled with malnutrition has been evidenced as one of the major factor that lead to ill health among school children (Berding. *et al.*, 1986). An estimate revealed 480 million people are infected with *E. histolytica*, 800-1000 million people are infected with *Ascaris lumbricoids*, 700-900 million with hookworm, *Ancylostoma duodenale* and *Necator americanus* and 500 million with the whipworm *Trichuris trichiura*. Studies from different parts of India (Singh *et al.*, 1981; Singh *et al.*, 2004; Sehgal *et al.*, 2010; Chowdhury *et al.*, 1968) and outside India (Rivero *et al.*, 2000; Lege *et al.*, 2004) have reported a parasite prevalence rate of 25% to 81%. The prevalence of intestinal parasitic infections varies with different geographical regions. However, the available information

on the prevalence of intestinal parasites does not adequately bring out the differences between various groups like urban/semi-urban and rural areas in the same geographical region. Therefore, in the present study, a survey was conducted in three groups of children having different type of living habit in Khurdha district of Odisha, to get baseline data on the prevalence of parasites transmitted by fecal-oral route.

Such surveys will enable evaluation of the level of environmental sanitation and the impact of corrective measures adopted for amelioration of the problem, in the area under study.

Materials and Methods

Study population

The study was conducted during 1995 among school children from randomly selected - 3 areas in the 1st one (Bhubaneswar, the capital city of Odisha and also the headquarters of Khurdha district) represents urban population; 2nd one (Jadupur / Sarkantara villages about 4kms from Bhubaneswar) represents the semi-urban population and the 3rd one (Bajapur/Jamujhari villages about 35/38kms from Bhubaneswar) represents the rural population of Odisha. The school children covered during the study was between 5-15 years of age, from these villages.

Sample collection

Sterile paper cups were distributed to the children during the school hour and instructions for the sample collection given. The next day the children brought their stool samples to the school. Samples were transported to the laboratory in Regional Medical Research center (RMRC), Bhubaneswar within 2-3 hours of collection and examined the same day.

Faeces examination

Samples were examined microscopically by 1. Direct smear with the emulsion of stool in the normal saline with 1% Lugol's iodine and 2.formal ether concentration techniques to detect various parasites.

Statistical analysis

$\chi 2$ test has been applied to test the level of significance.

Results and Discussion

The species wise prevalence of intestinal parasites in the selected population has been presented in table 1. The protozoan infections are *E. histilytica, Giardia lamblia* and *Entamoeba coli* and helminhtic infections were *Ascaris lumbricoids*, Hook worms, *T. trichiura, S. stercolaris, H.nana, H.dimunita* and *E. vermicularis*. The multiple infections include various combinations of either protozoan or helminthic infections.

The prevalence rate of *E. histolytica* in both urban (16.3%) and rural (11.3%) localities were generally higher compared to semi urban (6.0%) localities. But, the *G. lamblia* infection was higher in semi urban (16.0%) than urban (8.0%) and rural (7.8%) localities. However, the prevalence rate of total protozoan infection does not show ecological variation.

The rates of total helminthic infections were higher in semi urban localities (24.5%) than the urban (8.6%) and rural (10.8%) localities. *A. lumbricoids* prevalence rate was` more in semi urban (17.8%) than the urban (2.2%) and rural (6.9%) areas. The prevalence of other helminthic parasites ranged from 0.5% to 3.6% in the various groups of the studied population.

Table.1 Prevalence of intestinal parasites by the species

Parasites	Urba no (%)	Semi-urban no (%)	Rural no (%)	Overall no (%)
(A) **Single**				
• Protozoan	134(26.3)	94(23.5)	45(.1)	273(24.5)
E.histolytica	83(16.3)	24(6.0)	23(11.3)	130(11.7)
G.lamblia	41(8.0)	16(7.8)	16(7.8)	121(10.0)
E.coli	10(2.0)	6(3.0)	6(3.0)	22(2.0)
• Helminthes				164(14.7)
A.lumbricoides	44(8.6)	98(24.5)	2(10.8)	96(8.6)
hookworm	11(2.2)	71(17.8)	14(6.9)	30(2.7)
T.trichiura	19(3.6)	6(1.5)	5(2.4)	13(1.2)
S.stercoloris	1(0.2)	11(2.8)	1(0.5)	10(0.9)
H.nana	5(1.0)	5(1.2)	-	5(0.5)
H.dimunita	-	-	1(0.5)	1(0.1)
E.vermiculoris	3(0.6)	5(1.2)	1(0.5)	9(0.8)
(B) **Multiple**				
Mixed protozoan	29(5.7)	81(20.3)	15(7.4)	125(11.2)
Mixed helminthes	11(2.2)	12(3.0)	3(1.5)	26(2.3)
Mixed protozoan+ helminthes	2(0.4)	20(5.0)	2(1.0)	24(2.2)
	16(3.1)	49(12.3)	10(4.9)	75(6.7)
Total infected no (%)	207 (40.6)	273 (68.3)	82 (40.3)	562 (50.5)
Total cases studied	510	400	204	1114

Table.2 Single and multiple parasitic infections in different sexes

Sex (n)	Cases	Infected No (%)	Single		Multiple		
			Protozoan No (%)	Helminthes No (%)	Protozoan No (%)	Helminthes No (%)	Protozoan+helminthes No (%)
Male	578	289 (50)	137 (23.7)	90 (15.5)	15 (2.5)	13 (2.2)	41 7.0)
Female	536	273 (50.9)	136 (25.4)	74 (13.8)	11 (2.0)	11 (2.0)	34 (6.3)
Total	1114	562 (50.5)	273 (24.5)	164 (14.7)	26 (2.3)	24 (2.2)	75 (6.7)

Table.3 Single and multiple infestations in different communities

Community (n)	Single		Multiple		
	Protozoan no (%)	Helminthes no(%)	Protozoan no(%)	Helminthes no(%)	Protozoan+ helminthes no(%)
Hindu	269 (26.6)	108(10.7)	30 (3.0)	18(1.8)	56(5.5)
Muslim	4(3.9)	56 (54.4)	-	15(14.6)	6(5.8)

Table.4 Relative prevalence of parasites as reported by some other authors in their studies

Parasites	Chowdhury *et al.*, 1968	Rao *et al.*, 1971a	Rao *et al.*, 1971b	Present study
(A) Single	11.4	32.7	41.9	2.0
(i) Protozoan	NR	13.5	9.8	0.0
E. coli	2.3	19.6	7.4	12.1
E. hartmanni	4.7	14.4	7.4	0.0
E. histolytica	5.3	17.1	12.3	0.0
E. nana	0.6	0.3	1.2	0.0
I. butschlii	NR	NR	2.4	0.0
Chilomastin Sp	NR	NR	1.2	0.0
Embadomas Sp	9.9	23.5	7.4	11.3
G.lamblia	1.5	NR	0.0	0.0
Trichomonas Sp	NR	0.3	0.9	0.0
Tsospora Sp	NR	0.0	1.2	0.0
B. coli			0.0	8.6
(ii) Helminthes		4.6		0.8
A. lumbricoides		0.3	33.3	2.8
E. vermicularis		5.8	1.2	1.2
HookWorm		6.1	13.5	0.5
T. trichuria		3.4	0.9	0.1
H. nana		NR	4.9	
H. diminata			NR	
(B)Mix				
mixed protozoan	NR	NR	NR	0.5
E.h+G.l.	NR	NR	NR	1.1
E. coli+E.h.	NR	NR	NR	0.1
E.h.+G.l.+E.coli				
mixed helminthes	NR	NR	NR	1.3
A.lumb+Tt.l	NR			
A.lumb+S.s	NR			
Hook worm+*E.v.*	NR			
Tt.t.S.s.	NR	NR	NR	0.1
A.lumb+H.nana	NR		NR	
mixed protozoan			NR	0.4
+ helminthes	NR	NR	NR	0.4
E.h.+hook worms	NR	NR	NR	0.3
E.h.+A.lumb	NR	NR		0.3
G.lamb+A.lumb	NR	NR		0.3
G.lamb+hook worm	NR	NR		
T.t+E.h.				
h.w+*A.lumb+G.lamb+T.t+E.coli+E.h+E.v+*	NR			
S.s+G.l+h.w+E.*h+G.l.+H.nana+G.l+E.v+E.coli+*	NR			
E.coli+S.s+A.lumb+E.coli	NR	NR	NR	0.1

Semi urban population had higher prevalence of (20.3%) mix infections than urban (5.7%) and rural (7.4%) population. Amongst the multiple infections, the *E. coli* + *E. histilytica* combination was most common in protozoan group, the *A. Lumbricoids* + *T. trichuria* in helminthic group and *E.histolytica* + *A.lumbricoids* in mixed protozoan and helminthic group.

Table 2 shows the distribution of single and multiple parasite infestations according to sex of the population irrespective of their age. There was no significant difference between the two sexes of the overall infestation with various intestinal parasites.

Table 3 represents the community wise distribution of single and multiple parasite infestations, which reveals that Hindu children had six-fold higher rate of protozoan infestations (26.6% versus 3.9%),while Muslim children had five fold higher (54.4% versus 10.7%) helminthic infestations. The multiple protozoan infestations were 'zero' in Muslim communities, but the multiple helminthic infestations and multiple protozoan/helminthic infestations were more than that of Hindu children.

We particularly wished to obtain data on intestinal parasitism amongst school children of different areas with different living habits in Khurdha district.

This was achieved and differences in infection pattern were observed. The high prevalence rate of intestinal parasitic infections (50.4%) amongst the school children (5-15 years of age) in the present study are in line with the results of similar studies earlier (Singh *et al.,* 1991; Chowdhury *et al.,* 1968; Lege, 2004). The protozoan infection rates in all three group are same (26.3% in urban 23.5% in semi urban and 23.5% in rural) representing the poor water sanitation. Prevalence of the intestinal parasites as reported by some of the authors in India is given in the table 4.

The Muslim communities are the worst affected (54.4%) with the helminthic infections. The *A. lumbricoides* infestations are more in semi urban and rural populations compared to hook worm infestations, but interestingly in urban areas the hook worm infestations are marginally higher than *A.lumbricoids* in urban populations. However, the overall high prevalence rate of *A.lumbricoides* (8.6%) compared to the lower prevalent of hook worm (2.8%) in the present study is at par with the findings of Rao *et al.,* (1971b) but differ with the findings of Rao *et al.,* (1971a) and Chowdhury *et al.,* (1968). Such high rates are indicators of high faceo-oral contact in the population due to poor personal-hygiene and extensive contamination of soil due to poor environmental sanitation. Personal hygiene disposal of human excreta and environmental sanitation appear to be more important and overriding than the climate and topography in the transmission of these infections. It may be noted that, the presence of *H. dimunita* infection, through the prevalence rate is very low (0.1%) was not reported in other parts of the country by other authors.

The distribution of single and multiple infections according to sex, revealed no statistical difference, which support the earlier observation of Chhotray and Ranjit (1990) and Rao *et al.,* (1971a) but in contrast to the findings of Chowdhury *et al.,* (1968) for a rural population living the plains of west Bengal.

Under certain conditions these parasitic infection may adversely affect the health of children. It is difficult to separate the influence of infestations on general health status and often there may be associated

conditions such as malnutrition, mal-absorption, anaemia and impairment of immune response. This study will serve as a baseline data for the program to monitor the successful of MDA activity going in the state since 2001.

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Conflict of interest statement

We declare that we have no conflict of interest

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