Original Article

Prevalence of Intestinal Helminthic Infections and associated Risk Factors

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Abstract

Background: Parasitic infection is still a serious public health problem in the world, especially in developing countries, and represents a major cause of morbidity and mortality in childhood and among high-risk groups in most parts of the world.

Objectives: To measure the prevalence of intestinal helminthic infections and to identify risk factors associated with helminthic infection among the school children of Itahari Municipality.

Materials and Methods: The cross sectional study was conducted in Grade VI, VII and VIII in schools of Itahari Municipality. Stratified random sampling method was applied to choose the schools and the study subjects. Semi-structured questionnaire was administered to the study subjects and microscopic examination of stool was done.The Chi-square test was used to measure the association of risk factors and intestinal helminthic infections.

Results: Overall intestinal helminthic infection was found to be 13 percent. Taenia species was found high (6.5%) in comparison to other worms i.e. Hookworm (3%), Ascaris lumbricoides (2%) and Trichuris trichiura (1.5%). The use of soap and water after defecation showed lower prevalence of helminthic infections (8%) than only uses water (34.2%). The helminthic infection was also seen lower who wear sandal (2%) than who do not wear sandal (23.8%).

Conclusions: The result of this study indicated that intestinal helminthic infections among school going children is a common health problem and was seen more who do not use soap to wash hand, do not wear sandal and having unhygienic skin, nail and clothes.

Keywords: Prevalence, Risk factors, School children, Intestinal helminthic infections

Introduction:

Parasitic infections, particularly intestinal helminths, cause hundreds of thousands of avoidable deaths each year, and are among the world's most common infectious diseases. Intestinal helminths are more prevalent throughout the tropics, especially among poor communities. Records show increasing trends in helminthiasis infections, particularly in developing nations[1].

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[2], appetite, growth and physical fitness[3], school attendance[4], and cognitive performance[5] of school age children.

In Nepal, over seventy percent of morbidity and mortality are associated with infectious diseases[6] and is also reflected in the "top ten diseases" of Nepal[7]. Of them, intestinal parasitosis alone constitutes one of the major causes of health problems. The reported rate of intestinal parasitosis in some rural areas approaches nearly one hundred percent has been attributed to the lack of hygienic and sanitary awareness among locals[6]. Therefore, this study was designed to measure the prevalence of intestinal helminthic infections and to identify risk factors associated with helminthic infection among the school children of Itahari Municipality.

Materials and Methods:

The cross sectional study was conducted from 15th Nov 2011 to 14th March 2012 in Grade VI, VII and VIII in Government and Private schools of Itahari Municipality. This research was based on random selection of the study area Itahari Municipality. Stratified random sampling method was applied to choose the schools and the study subjects. The representative sample i.e. 200 was taken for the study on the basis of prevalence of 66.2%, 95% confidence level and 10% allowable error

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(Agbolade OM et al in 2007) aged 12-15 years. Out of total 47 schools in Itahari Municipality, 7 were Government (15%) and 40 were Private schools (85%). One Government and two private schools were taken. Children who were in Grade VI, VII, and VIII were listed first and 15 percent (30) were taken from Government schools and 85 percent (170) were taken from Private schools on the basis of probability proportionate to sample size. Study subjects were enrolled till the required sample size was full filled.

Written permission was taken from each schools head and verbal consent was taken from each student. Students of Grade VI, VII and VIII of both sexes, who are available after three visits and willing to give verbal consents, are included in the study.

Semi-structured questionnaire was administered to the study subjects and microscopic examination of stool was done. In each visit more than 20 students were enrolled & same number of plastic bottles was given for stool collection and collected next day morning. Microscopic examination of stool was done by preparing slide using Normal Saline and Lugol's Iodine to observe the ova of different helminthic parasites. First we used low power lens and afterwards the high power lens. Then we observed ova, cyst of helminthic parasites[8].

The prevalence was calculated, Chi-square test was used to measure the association of risk factors and intestinal helminthic infection. The probability of occurrence by chance is significant if $P< 0.05$ with 95% Confidence Interval.

Results:

Table 1 shows the status of worm infestation among the school children of Itahari. Taenia species was seen highest in comparison to other worms.

Worm infestation was seen high in female children among gender, in Hindu religion wise but the difference was not significant. Worm infestation was found to be significantly higher in Kirati as compared to other ethnic groups (Table 2).

The worm infestation was significantly higher in those who do not treat water before drinking, unhygienic skin, nail and clothes, and habit of nail biting and thumb sucking (Table 3).

Table 1: Distribution of worm infestation among study population

helminths	Frequency	Percent
Positive	26	13.0
Taenia Species	13	6.5
Ascaris lumbricoides	4	2.0
Trichuris Trichiura	3	1.5
Hookworm	6	3.0
Negative	174	87.0
Total	**200**	**100.0**

Table 2: Distribution of study population by socio-demographic characteristics with worm infestation

Characteristics	Worm Positive	Worm negative	Total	P- value
Gender				
Male	10 (9.7)	93 (90.3)	103	0.154
Female	16 (16.5)	81 (83.5)	97	
Religion				
Hindu	24 (13.3)	157 (86.7)	181	0.736
Others(Buddhist, Christian)	2 (10.5)	17 (89.5)	19	
Ethnicity				
Brahmin/ Chhetri	8 (9.8)	74 (90.2)	82	0.045
Kirati	7 (24.1)	22 (75.9)	29	
Janajati/ Dalit	9 (19.1)	38 (80.9)	47	
Terai caste	2 (4.8)	40 (95.2)	42	
Fathers education				
Below SLC	9 (17.6)	42 (82.4)	51	0.253
SLC & above	17 (11.4)	132 (88.6)	149	
Mothers education				
Below SLC	18 (15.3)	100 (84.7)	118	0.255
SLC & above	8 (9.8)	74 (90.2)	82	
Total	26 (13.0)	174 (87.0)	200	

Table 3: Personal hygiene and worm infestation

Characteristics	Worm positive	Worm negative	Total	P-value
Source of drinking water at home				
Tap	10 (7.9)	116 (92.1)	126	0.005
Tube well	16 (21.6)	58 (78.4)	74	
Water treat at home				
Yes	0 (0.0)	54 (100.0)	54	0.001
No	26 (17.8)	120 (82.2)	146	
Hand wash before meal				
No wash	18 (22.5)	62 (77.5)	80	0.002
Water only	8 (9.1)	80 (90.9)	88	
Soap	0 (0.0)	32 (100.0)	32	
Hand wash after defecation				
Soap	13 (8.0)	149 (92.0)	162	<0.001
Water	13 (34.2)	25 (65.8)	38	
Bath				
Regular	3 (2.5)	117 (97.5)	120	<0.001
Irregular	23 (28.8)	57 (71.3)	80	
Sandal wear				
Yes	2 (2.0)	97 (98.0)	99	<0.001
No	24 (23.8)	77 (76.2)	101	
Skin				
Clean	0 (0.0)	70 (100.0)	70	<0.001
Not-clean	26 (20.0)	104 (80.0)	130	
Nail				
Clean	0 (0.0)	67 (100.0)	67	<0.001
Unclean	26 (19.5)	107 (80.5)	133	
Clothes				
Clean	0 (0.0)	70 (100.0)	70	<0.001
Not-clean	26 (20.0)	104 (80.0)	130	
Habit of nail biting				
Yes	20 (29.0)	49 (71.0)	69	<0.001
No	6 (4.6)	125 (95.4)	131	
Habit of thumb sucking				
Yes	18 (27.7)	47 (72.3)	65	<0.001
No	8 (5.9)	127 (94.1)	135	
Food habit				
Vegetarian	2 (8.0)	23 (92.0)	25	0.427
Non-vegetarian	24 (13.7)	151 (86.3)	175	
Total	26 (13.0)	174 (87.0)	200	

Discussion:

Infestation by soil-transmitted helminthes is a serious public health problem in developing countries like India, Nepal. It is a major cause of morbidity in school-age children. Some of the morbid conditions attributed to intestinal helminthiasis are malnutrition, growth retardation, anemia, vitamin A deficiency, and impaired intellectual performance. Impairment of physical and mental development have also been identified as a deleterious effect of helminthic infection[9].

The present study showed the prevalence of intestinal helminthic parasites (13%) in the school children of Itahari. But studies conducted by Bundy DA *et al* (1988) in Malaysia showed prevalence of worm infestation (62%)[10], Rodriguez ZR *et al* (2000) in Maracaibo, Venezuela (72%)[11] and Legesse M et al (2004) in Ethiopia (88.2%)[12]. Which are higher than our study. Itahari is a comparatively developed town with only a small number of people working in the fields and the periodic campaign of anti-helminthic drug administration to the children could possibly explain the lower prevalence of helminthic infections seen in this study.

This study showed relatively high prevalence of Taenia (6.5%) compared to that reported by Merid Y et al in South Ethiopia (1.4%)[13]. But the study conducted by Joshi DD et al in Nepal showed higher prevalence of taeniasis among the ethnic groups surveyed, i.e. Magars, Sarkies, Darai and bote was found to be 50%, 28%, 10%, and 30%, respectively. Magar people are known for rearing pigs and eating much more pork than other ethnic groups, while the Sarkies are the poorest of the ethnic groups and are known to consume rotting cattle carcasses[14].

The prevalence rate of Hookworm was found to be (3%) followed by Ascaris lumbricoides *(*2%) and Trichuris trichiura (1.5%). The study conducted by Ragunathan L et al in Puducherry, South India showed the prevalence rate of Ascaris lumbricoides *(*43.2%) followed by hookworm (28.9%) and Trichuris trichiura (10.9%)[15] Which are higher than our study.The lower prevalence of STHs in children in this population is probably linked to the mass de-worming intervention under-five children in this area.

Even though gender was not a significant risk factor for prevalence of intestinal helminthic infections, females were more likely to be infected (16.5%) than males (9.7%). Similar studies conducted by Rajeshwari B et al in Malaysia and Kightliner LK et al in Madagascar reported higher prevalence in females than males respectively[16,17]. Elsewhere, female reportedly have more soil contact during growing vegetables and eat raw vegetable with prepared food more often than males[18].

The infection rate of helminthic parasites was higher in mothers who have below SLC (15.3%) than SLC and above (9.8%) but difference was not significant. But study conducted by Wani SA et al in Jammu and Kashmir State, India showed that maternal education was a significant risk factor for the prevalence of infection i.e. prevalence of infection decreases as the level of maternal education increases[19]. Apparently, this factor extensively contributes to controlling risk factors for intestinal parasitic infections. Maternal education has been found to be the most important risk factor for parasitism in other studies as well[20].

In this study no other infection was found among the children drinking treated water. A study conducted by Shakya B et al in Nepal showed the infection rate was higher among the children drinking untreated water (15.0%) as compared to those drinking treated water (5.5%), however, the difference was non-significant[21]. This finding can be explained by the status of drinking water. In Nepal, drinking water is highly contaminated with fecal matter[22].

This study showed that no child was infected with helminths those using soap and water before meal. The prevalence of helminthic infection was significantly lower (9.1%) among hand washing only with water as compared to those did not washing hand (22.5%). Similarly a study conducted by Tadesse G in Ethiopia also showed a higher rate of helminthic infection among children those didn't wash their hands regularly before meals ($p<0.05$)[23]. In this study no any infection was found among having clean nail. A study conducted by Wani SA et al in Jammu and Kashmir State, India showed lower infection rates among children having clean nail (58.3%) than dirty nail (83.3%) which was not a significant[19]. Another study conducted by Tadesse G in Ethiopia showed also higher infection rates among children having dirty fingernail (28%) than clean fingernail (25.4%)[23].

The infection rate was found significantly lower (2.0%) among the children those wore sandal or shoes than not wear sandal or shoes (23.8%). A similar study conducted by Tadesse G in Ethiopia also showed the prevalence rate of helminthic infection was significantly lower in children those wore sandal or shoes regularly (3.9%) than not wear (9.6%)[23].

In this study the prevalence of intestinal helminthic infection was found lower among vegetarian (8.0%) than non vegetarian (13.7%) but the finding was insignificant. A similar study conducted by Rai SK et al in Nepal also showed Vegetarians had higher parasitic infection rate as compared to their non-vegetarian counter parts. Consumption of unwashed fruits and vegetables appeared to be the source of infection among the vegetarians[24].

Conclusions:

The result of this study indicated that intestinal helminthic infections among school going children is a common health problem. The prevalence of helminthic infections was seen high among not treat water before drinking, not washing hand before meal, hand washing with water only after defecation, irregular bath, not wear sandal, not having the skin, nail and clothes cleanliness, habit of nail biting and thumb sucking. Health education regarding hygienic practices in the school at primary levels can have substantial effect in prevention of helminthic infections among the children.

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