

A study of prevalence of worm infestation and associated risk factors among the school children of Dharan, Eastern Region of Nepal

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ABSTRACT

Background: Worm infestation has remained major zoonotic diseases in Nepal especially among children.

Objectives: To measure the prevalence of worm infestation and to identify risk factors associated with worm infestation among the school children of Dharan.

Material and Methods: A cross sectional study was conducted among school children of Dharan. Stratified random sampling method was applied to choose the schools and the study subjects. The Chi-square test was used to measure the association of risk factors and worm infestation.

Results: Overall prevalence of worm infestation among the school children was 11.3 percent. Taenia species was found very high (5.3%) in comparison to other worms i.e. Hookworm (2%), Ascaris lumbricoides (1.9%), Trichuris trichiura (1%), Hymenolepis nana (0.7%) and Enterobius vermicularis (0.3%). No significant relationship was traced among the factors in the causation of worm infestation although slight indications present.

Conclusions: Overall prevalence of worm infestation among the school children has remained high.

Key words: Dharan, Prevalence, Risk factors, School children, Worm infestation

Introduction

Intestinal parasitic infections are endemic worldwide and have been described as constituting the greatest single worldwide cause of illness and disease. Parasitic helminths are responsible for some of the most devastating and prevalent diseases of humans. Intestinal parasitic infections (IPI) constitute a global health burden causing clinical morbidity in 450 million people, many of these children in developing countries.^[1]

Infections with helminths e.g. Ascaris lumbricoides, hookworm, Hymenolepis nana and Trichuris trichiura are closely linked with conditions of

poverty, unsafe water, sanitation and hygiene.^[2] At highest risk of morbidity are pre-school and school-aged children.^[3] Negative effects of helminth infections include diminished physical fitness and growth retardation, and delayed intellectual development and cognition.^[3] Indeed, helminths have been linked with an increased risk for nutritional anemias, protein-energy malnutrition.^[4]

Recently, the World Health Organization (WHO) presented a simple methodology to assess the prevalence of helminths, stratified by ecozones, for settings where information is scarce.^[5] Therefore, the present study was chosen to

measure the prevalence of worm infestation and to identify risk factors associated with worm infestation.

Material and Methods

A cross-sectional study was conducted during August 2007 to August 2008 in Grade 6, 7 and 8 in Government and Private Schools of Dharan. Stratified random sampling method was applied to choose the schools and the study subjects. Out of total 90 schools in Dharan, 22 were Government (25%) and 68 were Private schools (75%). To represent the children for 30% worm infestation (Oninla SO et al in 2007) sample size calculated was 935. Out of 935, 25 percent (229) were taken from Government schools and 75 percent (705) 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.

Ethical clearance was taken by Institutional Ethical Review Board of B P Koirala Institute of Health Sciences, Dharan, Nepal. Written permission was taken from each schools head and verbal consents were taken from each student. Those students 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 worms. [6]

The Chi-square test was used to measure the association of risk factors and worm infestation. The confidence level was set at 5% in which probability of occurrence by chance will be significant if $P < 0.05$.

Results

Table 1 provides the status of worm distribution among the school children of Dharan. Total intestinal worm infestation was found to be 11.3 percent. Taenia species was seen highest (5.3%) among the worm infestation followed by Hookworm (2%), Ascaris lumbricoides (1.9%), Trichuris trichiura (1.0%), Hymenolepsis nana (0.7%) and Enterobius vermicularis (0.3%).

Table 1: Distribution of worm infestation among study population

Characteristics	Frequency	Percent
Worms		
Positive	106	11.3
Negative	829	88.7
Total	935	100.0
Name of worms		
Taenia species	50	5.3
Ascaris lumbricoides	18	1.9
Hookworm	19	2.0
Trichuris trichiura	9	1.0
Enterobius vermicularis	3	0.3
Hymenolepsis nana	7	0.7
Total	106	11.3

Infection rate of worm among the male children (12.4 %) was slightly higher than female with (10.1 %) but the difference was not significant. Worm positive includes all kinds of worms. The worm infestation was higher among children whose father's education was below School Leaving

Certificate (SLC) than whose father's education was School Leaving Certificate (SLC) and above but the difference was not significant. Same trend was also found in mother's education where no significant relationship was found (Table 2).

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

Characteristics	Worm Positive	Worm negative	Total	P- value
Gender				
Male	62 (12.4)	436 (87.6)	498	0.252
Female	44 (10.1)	393 (89.9)	437	
Religion				
Hindu	98 (11.7)	743(88.3)	841	0.410
Buddhist	6 (11.3)	47 (88.7)	53	
Others (Muslim, Christian)	2 (4.9)	39 (95.1)	41	
Fathers Education				
Below SLC	41 (13.6)	260 (86.4)	301	0.128
SLC & above	65 (10.3)	569 (89.7)	634	
Mothers Education				
Below SLC	67 (12.4%)	473 (87.6%)	540	0.227
SLC & above	39 (9.9%)	356 (90.1%)	395	
Total	106 (11.3)	829 (88.7)	935	

SLC: School Leaving Certificate

Table 3 shows there was no significant relationship found in the hand washing after defecation and worm infestation. The worm infestation was seen slightly higher (12%) in those who did not treat water before drinking than those treat water (11.2%) The worm infestation among washing hands with soap and water after

defecation was slightly lower (11%) than those washing hands with water only (11.6%). Same trend was also found in bathing habit, skin, nail and cloth cleanliness where no significant relationship was found between these variables and worm infestation (Table 3).

Table 3: Personal hygiene and worm infestation

Characteristics	Worm positive	Worm negative	Total	P-value
Water treat at home				
Yes	81 (11.2)	645 (88.8)	726	0.414
No	25 (12.0)	184 (88.0)	209	
Hand washing after defecation				
Soap	42 (11.0)	340 (89.0)	382	0.834
Water	64 (11.6)	489 (88.4)	553	
Bath				
Regular	93 (11.1)	744 (88.9)	837	0.524
Irregular	13 (13.3)	85 (86.7)	98	
Skin				
Clean	61 (10.9)	498 (89.1)	559	0.618
Not-clean	45 (12.0)	331 (88.0)	376	
Nail				
Clean	50 (11.0)	404 (89.0)	454	0.761
Not clean	56 (11.6)	425 (88.4)	481	
Clothes				
Clean	57 (11.1)	456 (88.9)	513	0.810
Not-clean	49 (11.6)	373 (88.4)	422	
Habit of nail biting				
Yes	29 (13.6)	185 (86.4)	214	0.245
No	77 (10.7)	644 (89.3)	721	
Habit of thumb sucking				
Yes	11 (13.4)	71 (86.6)	82	0.534
No	95 (11.1)	758 (88.9)	853	
Total	106(11.3%)	829 (88.7%)	935	

Discussion

Intestinal parasitic infections (IPIs) are still among the major health problems of the world. It is estimated that about 3.5 billion people are affected, and that 450 million are ill due to these infections, the majority being children. [7] The World Health Organization estimates that there are 800-1000 million cases of ascariasis, 700- 900 million hookworm, 500 million trichuriasis, 200 million giardiasis and 500 million amoebiasis. [8]

The study subjects covered in this study are the students of grade 6, 7 and 8, falling in the age group between 12 to 16

years. Prevalence of worm infestation in this age group was 11.3 percent which is less as compared to the study conducted by Sharma BK et al in Kathmandu valley, Nepal (71%), [9] Wani SA et al in Srinagar city, Kashmir, India (46.7%), [10] Legesse M et al in Ethiopia (88.2%) [11] respectively. Dharan is the town where majority of the population belongs to ex-British Army, educational level is high, surroundings and environmental condition is better than other parts of the country. Because of this factor, the prevalence of worm infestation may be low as compared to the study

conducted in different parts of different country.

A study conducted by Wandra T et al in Bali, Indonesia in which 13.4% fecal samples were confirmed to be taeniasis ^[12] which is high in comparison to our study (5.3%). Low prevalence rate of Taenia infestation (1.4%, 2.5% and 2%) have been reported from different parts of the Ethiopia. ^[13-15]

The prevalence rate of Hookworm was found to be 2% followed by Ascaris lumbricoides (1.9%) and Trichuris trichiura (1%). 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%) ^[16] Which are higher than our study. The lower prevalence of Soil Transmitted Helminths (STHs) in children in this population is probably linked to the mass de-worming intervention in school children in this area.

Our study showed the prevalence of worm infestation higher in males (12.4%) than females (10.1%) but the difference was not significant. A similar study conducted by Wani SA et al in Jammu and Kashmir State, India where males were also more likely to be infected (78.1%) than females (70.2%). ^[17] But study conducted by Shakya SR in Dhankuta and Sunsari, Nepal showed slightly higher among females (66%) than males (65%) respectively. ^[18] This indicated that the gender may or may not play role in parasitosis depending on the region and other environmental or behavioral factors. Generally, the increased mobility of the male increases the risk of infection among them, while female have more soil contact during growing vegetables and eat raw vegetable with prepared food more often than males.

The infection rate of helminthic parasites was higher in children whose mothers had below School Leaving Certificate (13.6%) than School Leaving Certificate (SLC) and above (10.3%) 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. ^[17] 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. ^[19]

The prevalence of worm infestation was slightly higher among the children drinking untreated water (12%) as compared to those drinking treated water (11.2%). A study conducted by Shakya B et al in Nepal also showed the infection rate was higher among the children drinking untreated water (15%) as compared to those drinking treated water (5.5%). ^[20]

The infection rate of worm infestation among hand washing with soap and water after defecation was slightly lower (11%) than only use water (11.6%) which was not significant. Similar study conducted by Tadesse G which showed positive parasites among hand washing with soap and water was also lower but not significant. ^[21]

Worm infestation among school children having clean nail was insignificantly lower (11%) than children with not clean nail (11.6%). A similar study conducted by Tadesse G also showed positive parasites among clean nail (25.4%) not significantly different as compared to not clean nail (28%). ^[21] But a study conducted by Wani SA

et al in Gurez Valley of Jammu and Kashmir State, India showed positive rates of parasites among clean nail was significantly lower (58.03%) than not clean nail (83.33%).^[17]

The main limitation of this study was the risk factors of worm infestation can not determined because Grade 6, 7 and 8 may not give the exact information regarding personal hygiene and habits which was purely based on respondents answer.

Overall prevalence of worm infestation was high among school children of Dharan. Some risk factors like water treatment before drinking, hand washing after defecation, bathing, skin, nail and cloth cleanliness, habit of nail biting and thumb sucking have higher chance of having worm infestation than their counterparts, but not a single factor was emerged as a determinants. Further study with large sample size is needed to conclude the result.

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