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Original Research Article

Prevalence and Factors Associated With Worm Infestation among Lower Secondary School Children

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ABSTRACT

Background and Objective: Worm infestation is one of the major health problems confronting millions of school age children. The overall objective of the study was to identify the prevalence and factors associated with worm infestation among lower secondary school children.
Materials and Methods: A descriptive cross sectional study was used. A pretested semi structured questionnaire was used to collect data on socio-demographic characteristics and the information on those factors that could be associated with worm infestation. Laboratory method was used to test stool specimens. Chi-square test was used to measure those factors that could be associated with worm infestation.
Results: Prevalence of worm infestation was found to be 26.3% (40/152). The highest prevalence was seen with *Ascaris Lumbricoides* 90% followed by *Giardia lamblia* 2.5%, *Taenia Species* 2.5% and *Ascaris Lumbricoides* & *Giardia Lamblia* together 5%. Factors associated with worm infestation are gender ($p=0.045$), parent's occupation as agriculture ($p<0.001$), family size more than 5 persons ($p<0.001$), eating junk food ($p<0.001$), drinking impure water ($p<0.001$), bathing irregular ($p<0.001$), hand washing with only water ($p<0.001$), nail biting ($p<0.001$), helping in gardening/agriculture ($p<0.001$).
Conclusion: Worm infestation is still prevalent among lower secondary school children and remains as a common health problem. It can be concluded that the major factors associated with worm infestation are: parent's occupation as agriculture, size of family 5 persons or more, eating junk food, drinking impure water, bathing irregularly, and hand washing with only water, nail biting and helping in gardening.

Key Words: Factors Associated, Lower Secondary School Children, Worm Infestation,

INTRODUCTION

Globally, 2 billion people are infected with helminthes (worms). Helminthes and protozoa constitute the most frequent disease. The incidence has increased among school children. Young children are especially at risk because of their hand - mouth activity and uncontrolled faecal activity. [(1)]

Worm infestation is the major cause of morbidity and mortality in developing countries. [(2)] In Nepal, over 70% diseases are associated with infectious diseases and worm infestation is also reflected in the "top ten diseases" of Nepal. [(3)] Major causes of childhood malnutrition, anaemia, stunted physical and mental growth, psychosocial problems is worm infestation. It also causes recurrent gastrointestinal and upper respiratory tract infection in children. [(4, 5)]

Worm infestation is aggravated by hot and humid climate, poverty, high population density, and poor health. Multiple socio-economical, cultural,

physiological and behavioural parameters along with illiteracy and poor sanitation influence intestinal parasitic infection. [6]

The causes of nutritional and health problems among school children are multi-dimensional. Inadequate intake and lack of nutrition is among the major causes. Intestinal helminthes can use up to 25% of the food ingested by children. In most cases, nutrient intake may be adequate but the presence of intestinal helminthes prevents maximum absorption of these nutrients by the body. In addition, most nutrient intakes are based on plant foods with low bioavailability. [26]

Worm infestation contributes a major role in morbidity of school going children. [5] The specific objective of the study is to assess the prevalence of worm infestation among lower secondary level school children to find out the factors associated with worm infestation among lower secondary level school children. The overall prevalence of worm infestation ranges from 13.9% to 31.7%. [6,7] Hence, prevalence and factors associated with worm infestation among lower secondary school children is important to identify the morbidity. Associated factors identification will help to include worm infestation control measures in regular School Health Program. Findings of this study will also help in reducing the morbidity of worm infestation among lower secondary school children.

MATERIALS AND METHODS

Descriptive cross sectional study design was adopted for the study to find out the prevalence and factors associated with worm infestation among lower secondary school children. The study was carried out at Gautam Secondary School, Birgunj, Nepal. The selection of setting was done by simple random sampling. All together there are 36 private schools in Birgunj Sub Metropolitan City, Nepal. The number and name of each school was then written on small pieces of paper. The papers were then folded, mixed and one paper was picked at random to select the school to be included in the study. The population for the study was students studying in class 6, 7 and 8 at Gautam Secondary School, Birgunj. Prior to the commencement of the study, the study proposal was approved by the Institutional Review Committee of National Medical College (NMC-IRC). Written permission was obtained from the school authority before the collection of data. Written informed consent was obtained from their parents/legal guardian prior to data collection. Verbal informed consent was obtained from each student. Total students in class 6, 7 and 8 were 115, 145 and 90 respectively. Sample size was calculated at 95% confidence level and 5% confidence interval.

Level of significance (α) was assumed 5%
$Z\alpha = Z_{5\%} = 1.96$,
E stand for difference of sample proportion and population proportion of prevalence = error = 5% = 0.05
Sample size was calculated by using formula,

$$n = PQ\left(\frac{Z\alpha}{E}\right)^2$$

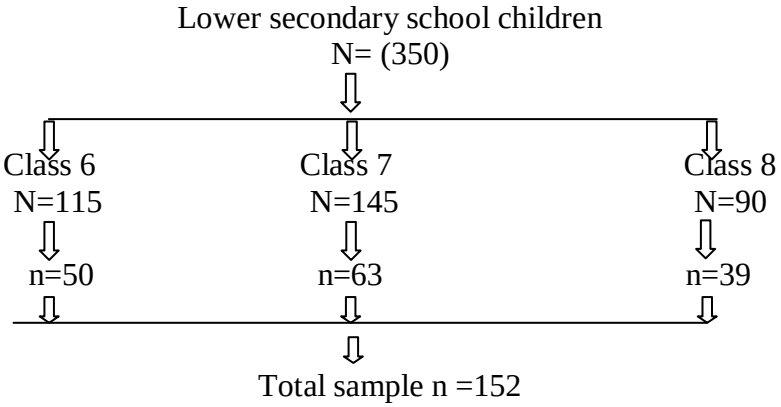
$$= PQ\left(\frac{Z_{5\%}}{E}\right)^2$$

$$= 0.11 \times 0.89\left(\frac{1.96}{0.05}\right)^2$$

$$= 150.43$$

A total of 152 samples were selected by using proportionate stratified random sampling technique from the sampling frame that included 50 samples from class 6, 63 samples from class 7 and 39 samples from class 8.

Lottery method without replacement was used to select the sample. A pretested semi structured questionnaire was used to collect data on socio-demographic characteristics and the information on those factors that could be associated with worm infestation. The duration of data collection for self-administered semi structured questionnaire was 20 to 30 minutes



Laboratory method was used to test stool specimens. For stool sample specimen collection, each of the students was provided with appropriately labelled sterile, screw capped, transparent, wide mouthed stool container. Students were given comprehensive instruction regarding bringing stool sample. Students' were asked to bring early morning stool specimen the other day when they come to school. The stool samples were asked to be kept at school toilet, where a place was separated to keep stool sample safely. The samples were then carried by researcher herself to Central Laboratory of National Medical College & Teaching Hospital, Birgunj, Parsa. On receipt of the stool samples at the laboratory, the details of each student was verified and entered in the laboratory document. The samples were examined within 6 hours so that the viability of the various stages of the worms could be maintained. The stool samples were examined using direct smear technique (saline preparation) for detection of ova or cyst of any of the worms. Stool smear was prepared by direct smear technique, saline preparation by using wooden applicator stick by laboratory technician. The slide was then covered with a cover slip and examined under X10 and X40 magnifying objectives of Olympus microscope (Germany). Presence of different parasitic infections (ova, cyst or larvae) in each stool sample was confirmed through microscopic examination by using X40 (high power microscopic field). When positive cases were detected, they were confirmed by medical microbiologist of the hospital. Any observation made was then recorded on the respondent's laboratory report form and stool samples were finally discarded and incinerated as per hospital protocol.

At first, the collected data was reviewed and checked for its completeness, consistency and accuracy after getting back from respondents'. The collected data was organized, coded and entered in Epi. Data 3.1 version and exported to Statistical Package for Social Science (IBM SPSS) version 20. The data were summarized using the descriptive statistics like frequency, percentage, mean and standard deviation and inferential statistics like chi-square test. To find out the association of prevalence of worm infestation with selected factors chi-square test was used with 0.05% level of significance.

RESULTS

Out of total 152 stool samples collected, a total worm positive case was found to be 26.3 % (40/152) Figure 1.

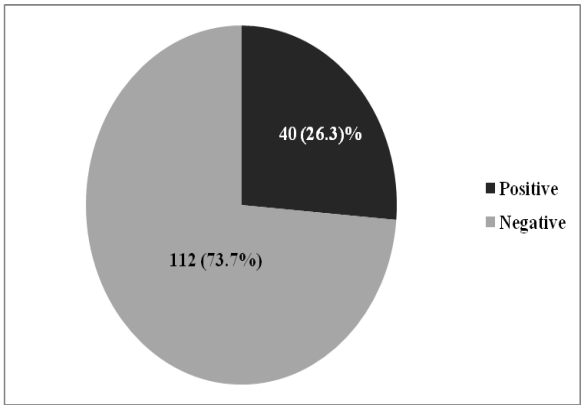


Figure 1: Status of worm distribution n=152

Table 1: About, 90% of the positive cases were *Ascaris Lumbricoides,* followed by *Giardia Lamblia* 2.5% and *Taenia Species* 2.5% (Table 1).

Table 1: Types of worms identified n=152

Characteristics	Frequency	Percentage
Type of worms identified		
Ascaris Lumbricoides only	36	90
Giardia Lamblia only	1	2.5
Taenia Species only	1	2.5
Ascaris Lumbricoides & Giardia Lamblia	2	5

Table 2 shows association between worm infestation and socio demographic characteristics. Higher prevalence was found in male (32.9%) than female (18.6%) (p=0.045). Worm infestation was not statistically significant with religion (p=1.000). Worm infestation was prevalent in those children residing in joint family (76.5%) than nuclear family (1%) (p<0.001) and family members >5 (40.6%) than family members <4 (1.8%) (p<0.001). The children from the parents with agriculture as an occupation had higher infestation rate mother (96.2%) & father (86%) (p<0.001) as compared to those from parents with occupation other than agriculture. The findings showed that mother's education being able to read and write and illiterate had highest prevalence of worm infestation i.e. 90.1% and 83.1% respectively (p<0.001) (Table 2).

Table 2: Association between worm infestation and socio demographic characteristics n=152

Characteristics	Worm Infestation		χ^2	p-value
	Absent no. (%)	Present no. (%)		
Sex				
Male	55(67.1)	27(32.9)	4.013	0.045*
Female	57(81.4)	13(18.6)		
Religion				
Hindu	98(73.7)	35(26.3)	0.000	1.000
Other than Hindu (Muslim & Christian)	14(73.7)	5(26.3)		
Type of family ¥				
Nuclear	100(99)	1(1)	95.715	<0.001*
Joint	12(23.5)	39(76.5)		
Size of family ¥				
≤ 4 persons	55(98.2)	1(1.8)	25.548	<0.001*
≥ 5 persons	57 (59.4)	39(40.6)		
Father's occupation ¥				
Agriculture	6(14)	37(86)	106.075	<0.001*
Other than Agriculture 106(97.2)		3(2.8)		
Mother's Education				
Illiterate	1(16.7)	5(83.5)	70.32	<0.001*
Able to read and write 2(9.1)		20(90.1)		
Primary and above	109(87.9)	15(12.1)		
Mother's occupation ¥				
Agriculture	1(3.8)	25(96.2)	84.523	<0.001*
Other than agriculture 64(97)		2(3)		
Home Maker	47(78.3)	13(21.7)		

* Significant at the level of 0.05, ¥: p value is obtained by Yate's Correction

Table 3 shows association between worm infestation and eating habit, water purification practice and hygiene practice. Worm infestation is insignificant with washing raw vegetables and fruits before eating (p=0.096) and eating food that is fallen on ground (p=0.940). Worm infestation is statistically significant with type of lunch taken; eating junk food at school had higher prevalence 86.4% (p<0.001) and drinking water without purification had higher prevalence 73.1% (p<0.001). Worm infestation is statistically significant with bathing irregularly 65.5 % (p<0.001) and washing hand before meal with only water 76.6% (p<0.001). Worm infestation is insignificant with hand washing after going toilet (p=1.000), thumb sucking (p=0.069) and walking without shoes and slippers (p=1.000). Worm infestation is statistically significant with habit of nail biting 74.5% (p<0.001). Worm infestation is statistically significant with helping in gardening work (p<0.001).

Table 3: Association between worm infestation and eating habit, water purification practice and hygiene practice n=152

Characteristics	Worm Infestation		χ^2	p-value
	Absent no. (%)	Present no. (%)		
Wash raw vegetables and fruits before eating ¥			2.77	0.096
Yes	111(75)	37(25)		
No	1(25)	3(75)		
Eat food that is fallen on ground ¥			0.006	0.940
Yes	5(81.3)	1(16.7)		
No	107(73.3)	39(26.7)		
Type of lunch taken at school ¥			110.836	<0.001*
Cooked	106(98.1)	2(1.9)		
Junk	6(13.6)	38(86.4)		
Water Purification ¥			85.503	<0.001*
Yes	98(98)	2(2)		
No	14(26.9)	38(73.1)		
Bath ¥			71.096	<0.001*
Regular (Daily) 92(97.9)		2(2.1)		
Irregular	20(34.5)	38(65.5)		
Wash hand before meal ¥			84.992	<0.001*
Soap and water 101(96.2)		4(3.8)		
Water only	11(23.4)	36(76.6)		
Habit of thumb sucking ¥			3.302	0.069
Yes	2(33.3)	4(66.7)		
No	110(75.3)	36(24.7)		
Habit of nail biting ¥			88.234	<0.001*
Yes	13(25.5)	38(74.5)		
No	99(98)	2(2)		
Walk without shoes / slippers ¥			74.34	1.000
Yes	10(71.4)	4(28.6)		
No	102(73.9)	36(26.1)		
Helps family in gardening/agriculture			23.186	<0.001*
Yes	40(55.6)	30(44.4)		
No	72(90)	8(10)		

* Significant at the level of 0.05, ¥: p value is obtained by Yate's Correction

DISCUSSION

This study attempted to find the prevalence of worm infestation in lower secondary level school children of private school of Birgunj, Nepal. Overall, prevalence rate of worm infestation among lower secondary level school children was 26.3% (40/152) which was similar to some of the research studies i.e. 23.3%, 23.7%, 27% & 27.63% respectively. [8-10,12] However, the prevalence was less as compared to similar study conducted in Birgunj (13.9%) [6] and other several studies showed relatively lower prevalence i.e. 7.8%, 17.6% & 21.05% respectively. [11,14,16] In contradictory some of the study showed higher prevalence rate upto 40%, 48.8% & 71.2% respectively. [13,15,28] These differences might be due to environmental, geographical, climatic condition, variation in economic status, individual behavioural habit of selected children, technique used for identification and the sample size taken for study. However we cannot deny the fact of open defecation.

This study revealed that the prevalence of helminthes infection i.e *Ascaris Lumbricoides* was found to be higher than that of protozoal parasite i.e *Giardia Lamblia*. This finding is in consistence with the results of some of the studies which showed helminthes infection to be higher in rate i.e. 22.63%, 32.6%, 72.6% respectively. [10,28-31] On the contrary, some studies showed the prevalence of protozoal infection to be higher than that of helminthes i.e. 17%, 58.6, 34% respectively. [8,9,32] Higher prevalence of helminth may be associated with unsanitary living style, usual contact with soil and consumption of vegetables, fruits contaminated with infected faeces.

Prevalence of worm infestation was found higher among male respondents 32.9% than female respondents 18.6% (p=0.045). Few of the studies showed similar findings, male respondents with higher prevalence 34.2%, 45.3% 63.3% & 34.4% respectively. [7,11,17,33] This could be due to more active and outdoor travelling

nature of male than female. However, on the contrary, some studies from Nepal have shown higher positive rate among girls 19.1%, 12.4%, 26.8% respectively. [6,20,21] On the other hand, equal prevalence has been reported in some study i.e. 33%. [27] This variation indicates that gender is independent of the worm infestation.

Prevalence of worm infestation was found higher among those children residing in joint family ($p<0.001$) and with family size ≥5 ($p<0.001$). Similar trend has been reported in some of the studies. [6,22,23] This may be due to limited distribution of nutrition and health care and inadequate hygiene and sanitation in the crowded family.

In this study, prevalence of worm infestation was found higher among parental occupation as agricultural father's 86% and mother's 96.2% than that of other than agriculture ($p<0.001$). This finding is similar with some studies with children of farmers with higher prevalence. [18,19] The possible reasons may be due to working in "faecal fields", improper hand washing, and lack of supervision to their children and eating faecal contaminated improperly washed vegetables and fruits.

Students who ate junk food for lunch had higher prevalence of worm infestation than that of those who ate cooked food for lunch regularly ($p<0.001$). Prevalence was higher among those children who drink purified water ($p<0.001$). Some of the studies conducted in Nepal showed similar findings which showed children drinking untreated water had higher prevalence of worm infestation 77.6% & 15%. [6,20] Children who maintained their personal hygiene like bathing regularly, hand washing with soap and water before meal, using toilet were less likely to have worm infestation than those who did not maintained their personal hygiene ($p<0.001$). Similar findings has been supported by some of the research studies which reported that those who bath regularly had , who washed hand with soap and water before meal were less likely to have worm infestation. [11,17,19,20,24] It may be due to the fact that primary school children usually are under the direct observation of their parents and the secondary school children can understand the values of the proper hygiene but lower secondary level children are in their transition phase and are seldom under the control of their parents regarding dietary habits, usually lack the education regarding healthy dietary habits and neglect hygiene maintenance.

Those school children who had habit of nail biting were more prevalent to worm infestation ($p<0.001$). However the findings was contradictory to the study conducted by Sah et al. which showed no evidence of nail biting in prevalence of worm infestation. [20] Children who helped their family in gardening had higher prevalence than those who did not helped their family in gardening ($p<0.001$). The findings were similar to the study conducted by Owiti which showed children who helped in gardening/agriculture had higher prevalence than those who did not help their family. [25] The possible reason may be due socioeconomic condition, lack of awareness regarding nail trimming and proper hand washing with soap and water.

The study was conducted only among lower secondary school children. Similar study can be conducted in large scale. Intervention programs including health education can be carried out to raise awareness regarding worm infestation. Public health education on prevention and control of soil - transmitted helminthes should be intensified in the community. This also indicates that the local health sector should collaborate with school health program for delivering health education to enhance knowledge against transmission of worms. Recommending schools for compulsory use of anti-helminthic drugs every 6 months for their students, along with maintenance of hygienic practices might help to reduce the burden of disease. These findings also point out the need for regular screening of worm infestation

among school children for effective management of these infestations. Also it aids in developing information, education and communication for school children of Nepal.

CONCLUSION

On the basis of findings it can be concluded that the major factors associated with worm infestation are: gender, parent's occupation as agriculture, size of family 5 persons or more, eating junk food, drinking impure water, bathing irregularly, hand washing with only water, nail biting and helping in gardening. Regardless of periodic mass de-worming program by Government of Nepal, worm infestation is still prevalent among lower secondary level school children as a common health problem.

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