

International Journal of Current Research in Medical Sciences

ISSN: 2454-5716

(A Peer Reviewed, Indexed and Open Access Journal)

www.ijcrims.com



Original Research Article

Volume 10, Issue 6 - 2024

DOI: http://dx.doi.org/10.22192/ijcrms.2024.10.06.005

Intestinal Parasitic Infections among the Children of Ganesh Secondary School of Bhaktapur District.

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Abstract

Back ground and objective: Parasites are a major invader of people in developing country like Nepal. It often causes disability and fatal diseases. People are more susceptible to infection of parasitic disease due to the unhygienic management, malnutrition and ignorance about complicated life cycle of parasites. Thus, this study was conducted to find the prevalence of intestinal parasitic infection among children of Sipadol VDC of Bhactapur district in relation to feeding habits, drinking water, personal hygiene and sanitation control parasitic intestinal infection.

Materials and Methods: The sample were collected in sterilized sample collection vial. Immediately potassium dichromate was put in the vials containing stool for the stool preservation. Then the stools were examined by necked eye (for adult worm, mucous, blood and consistency). Unstained Preparation of stool smear then stained by iodine according to requirement, preparations were examined under light microscope.

Result: This Research was carried out during December 2022 to February 2023. Out of 248 children of Ganesh Secondary School of Sipadol VDC, a total of 224 stool samples were collected and examined under microscope. Out of these 75 (33.48%) samples were found positive for the intestinal parasitic infection with single or mixed species of parasite. The intestinal parasites observed during the study were 62% Ascaris, 6.66% Trichuris, 6.66% Hookworm, 1.33% Hymenolepsis, 6.66% Giardia, 10.66% Entamoeba, 2.66% Cyclospora and 2.66% Cryptosporidium. Infection by more than single parasite was 25.53%. The parasitic infections were found generally higher in males (38.46%) in comparisons to females (30.07%). Difference in the prevalence of intestinal parasites in between two sexes was found to be insignificant (x2= 1.708, P> 0.05). The age-wise distribution of parasitic infections was found to be maximum (42.14%) in the age group 10-15 years and minimum 12.50%) in the age group 0-5 years. However, statistically no significant difference was found in infection rate among different age groups of children (x2= 11.168, P> 0.05). Such a remarkable prevalence of intestinal parasitic infections among children of Sipadol VDC were found to be directly associated with unhygienic feeding h abit, lack of knowledge, poor sanitation and poverty.

Conclusion: Intestinal parasites are cosmopolitan in distribution causing serious health problem in society. Poverty, lack of knowledge, illiteracy and conservative thinking cause the parasitic infection in the developing country. Since the school children are the backbone of the nation we need to built up the children with good health and powerful confident to develop our country. So control measures should be undertaken in time.

Keywords: Intestinal parasites, stool sample, Sipadol VDC

Introduction

Good health is the great quality and virtue of an individual. Healthy citizens lead the country in the path of progress, happiness and satisfaction. Although, Nepal is recognized as the country full of natural resources, diversity of flora and fauna, pleasant climatic situation, it is also known as one of the developing country in the world. Parasites are a major invader of people in developing country like Nepal. It often causes disability and fatal diseases. People are more susceptible to infection of parasitic disease due to the management, malnutrition unhygienic and ignorance about complicated life cycle of parasites.

Parasites are those organisms which receive nourishment and shelter from other organisms. They remain closely associated with their hosts biologically and ecologically. Different types of parasites found in our community, such as ectoparasites, endoparasites, accidental parasites, facultative parasites, temporary parasites, permanent parasites, obligatory parasites etc. Among them, endoparasites cause different types of intestinal diseases which are cosmopolitan in distribution posing very serious health problems in the developing countries where diseases, are ignorance and poverty interlocked. Roundworms linked to food borne illness in human include Ascaris, Trichuris, Enterobius. Food borne cestodes like Hymenolepis is also noticeable. Protozoa like Entamoeba, Giardia cause a large number of food borne out breaks each year leading to dysentery like illness that can be fatal. Intestinal parasiticinfectiona are major causes of morbidity and mortality among school aged children of developing countries (1). There is a strong association between giardial infection and under-nutrition of many primary school children (3). It is because of dirty fingers and nails which might play an important role in the transmission of intestinal parasites (2). Bhaktapur district is one of the famous places of Nepal from historical point of view. It is well known for its unique cultures and traditions. Cultures and traditions express originality of citizens but it is not good to follow bad traditional activities which do not allow going in the path of development. If all the citizens living in Bhaktapur district take care about this matter, it can be one of the example districts in the field of development along entire Nepal. Especially people living in village area of Bhaktapur district are troubled by parasitic infections due to their poor health habits. Communicable diseases such as diarrhoea and dysentery influence a very depressing health. These are the major source of death and sickness especially among children and infants in our country. One of the survey conducted in Bhaktapur district on stool test showed 99% positive for the eggs of soil transmitted helminthes (4) A random sample study of patient in Bhaktapur was conducted to ascertain the incidence of roundworm infection (5).

Low economic status is not the sole factor for parasitic infection, but also the increased water pollution is one of the major public health issues in Nepal. Diarrhoeal parasitic infections of gastro-intestinal tract are the result of water pollution.

Materials and Methods

Study Area:

"Ganesh Secondary School" lies in Sipadol VDC at ward no. 9. Out of 16 village development committee in Bhaktapur district, Sipadel VIK lies in the southern part of the district.

Introduction of Bhaktapur district:

Bhaktapur lies in Bagmati zone, which is situated in Central Development Region and is surrounded towards north-west by Kathmandu, south-west by Lalitpur and south-east by Kabrepalanchok. It is the smallest district in term of area in Nepal. Even though, it is the smallest district of Nepal, it carries a lot of historical monuments. Among them Changunarayan and Bageshwori are famous temples of Bhaktapur. Nagarkot, from where view of sunrise and sunset can be observed is also located here. So this district is one of the commercial centres for the tourist trade.w

Bhaktapur district has two municipalities and 16 Village Development Committee. It is situated at 27°37' to 27°44' latitude and 8"520" to 85°28 longitude. The total area covered by this district is 119 km² occupying 0.08% of total area of Nepal. It has various climate with the variation of elevation or geographical features. Most of the people are depended on agriculture. So climatic situation plays important role in livelihood of citizens of Bhaktapur.

According to the Central Bureau of Statistics (2005), the total population of Bhaktapur district is 2,25,461; among them 1,14,798 are male and 1,10,663 are female in 41,253 households. Economically, most of the population depend on agriculture where as others are jobbolders and businessmen

Ethnically, Newars occupy the major place in total population of this district, Besides that there are Bramin, Chettri, Magar, Bhote and others. Most of them are Hindus while a fraction of population are found to be follower of Buddhist, Islam, Kirat, Jain, Christian, Sikha, others. "BisketJatra" and "GaiJatra are peculiar festivals celebrated in Bhaktapur.

Introduction of Sipadol VDC:

Sipadol VDC is one of the underdeveloped and rural areas in Bhaktapur district. It is situated 27°37' to 27°40 latitude and 85°26' to 85°27' longitude. The total population of this VDC is 7004, among them 3569 are males and 3435 are females in 1358 total household. The main castes are Newar, Brahmin, Chettri, Magar, Bhote, others. Most of the people are illiterate here. Farming and agricultural labour are livelihood job of these people. Because of illiteracy, unhygienic

living habit, poor socioeconomic condition and conservative thinking, they are suffering from different kinds of parasitic infection.

Out of 9 wards in Sipadol VDC, "Ganesh Secondary School" lies in ward no. 9. This is only one secondary school in 9 no. ward. It is the government school. Some of the students of this school are not capable to buy their educational necessaries. So school has searched the different fund to provide scholarship.

Stool Sampling:

Out of 248 student studying in the school,224 stool samples of children were collected in sterilized sample collection vials with instruction for collection procedure.

The stool sample were collected and also set of prepared questionnaires were asked to the same student population. At first, vials were distributed to all the student and later stool sample were collected from them. Immediately after collection potassium dichromate was put in the vials containing stool for preservation.

Equipment and chemicals

- Compound microscope, glass slide, cover slip, cotton or filter paper, gloves needle, sticks, vials.
- Potassium dichromate, normal saline iodine solution.

Examination of Stool Samples:

Firstly, the stools were examined by naked eyes for the worms of helminth parasites (adult worm of Ascaris, Trichuris, hookworm and other intestinal mucous, blood and consistency. flukes) or a part of it (segments of T. solium and T. saginata) as well as mucous, blood and consistency.

Microscopical examination of the stool:

Unstained preparation of stool smear: A portion of stool was taken with the help of stick and emulsified with normal saline on a clean glass

slide and cover slip was placed over it and excess of fluid was removed with the help of filter paper.

Stained preparation of stool smear: Stained preparation was necessary for the identification and the study of the nuclear character. The iodine stained preparation was used for this purpose.

Method of observation: Both stained and unstained preparations were first examined under the low power of microscope under 10X objective. Observation was made starting from one end of the slide to another. Objects were centered and focused under the high power for detailed diagnosis.

To detect the rate of infection caused by any particular parasite, egg counting method was followed. The eggs were counted by microscopic examination under high power. If 1-3 numbers of eggs were observed in a microscopic field, it was denoted by single + (+), which expressed low infection rate of corresponding parasite. Likewise if 4-6 numbers of eggs were observed in a microscopic field, it was denoted by double + (++), which expressed medium infection rate of corresponding parasites. Whereas if above 6 numbers of eggs were observed in a microscopic field, it was denoted by triple + (+++), which

expressed high infection rate of corresponding parasite.

Results

The study was conducted among children of "Ganesh Secondary School" of Sipadol VDC. The school has a total of 248 students from nursery to class ten. The study was performed among 224 school children in two ways:

- I. Data collection on questionnaire regarding sanitary, illiteracy, hygienic condition, sources of water, awareness about parasites etc.
- II. Stool sample collection and examination.

During the process of study, 224 children were interviewed with the help of questionnaire and then their stools were collected and examined.

General Prevalence of Intestinal Parasites of School

Out of 224 students, 75 (33.48%) were found to be infected with one or more types of intestinal parasites. General prevalence of intestinal parasites of school revealed that the students were remarkably infected.

Table 1: General prevalence of intestinal parasites of school.

Name of school	Total no. of samples examined	No. of + ve cases	+ ve %	- ve %
Ganesh Secondary School	224	75	33.48	66.52

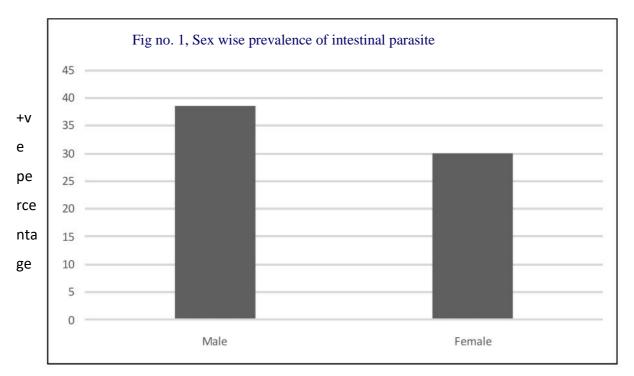
Sex-wise Prevalence

Out of 224 examined stool samples, 91 were of male children and 133 of female children. Out of 91 male stool samples examined, 35 (38.46%) were found to be positive. Likewise out of 133 female stool samples examined, 40 (30.07%) V

were found to be positive for intestinal parasites. Hence, the infection rate was found higher in male children than female (Table 2, Fig 1). Statistically, the difference in sex-wise prevalence of parasites was found insignificant (x2 (chi, squire)=1.708, P>0.05).

Table 2: Sex-wise prevalence of intestinal parasites.

Sex	Total samples examined	+ve cases		-ve cases		
		No.	%	No.	%	
Male	091	35	38.46	056	61.53	
Female	133	40	30.07	093	69.92	
Total	224	75	33.48	149	66.51	



Sex and Caste-wise Distribution of Intestinal Parasites

The analytical study of Table 3 shows that, in Newar community, male children (30.00%) were less infected than female children (39.93%). In Brahmin community, male children (44.44%) were more infected than female children (26.08%). In Chettri community, male children (42.85%) were more infected than female children

(11.53%). In Magar community, male children (71.42%) were more infected than female children (20.00%). In Bhote community, male children (50%) were less infected than female children (66.66%).

Hence in overall, Bhote children (60%) were found more infected than other castes followed by Newar (35.34%), Brahmin (34.14%), Chettri (22.50%) and Magar (42.10%).

Table 3: Sex and Caste-wise distribution of intestinal parasites.

Caste	Ne	ewar	Brah	ımin	Cł	nettri	M	lagar	B	hote
Total	1	16	4	1		40		22		5
	+ ve	cases	+ ve	cases	+ ve	cases	+ v	e cases	+ ve	cases
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	15	30.00	08	44.44	6	42.85	5	71.42	1	50.00
Female	26	39.93	06	26.08	3	11.53	3	20.00	2	66.66
Total	41	35.34	14	34.14	9	22.50	8	42.10	3	60.00

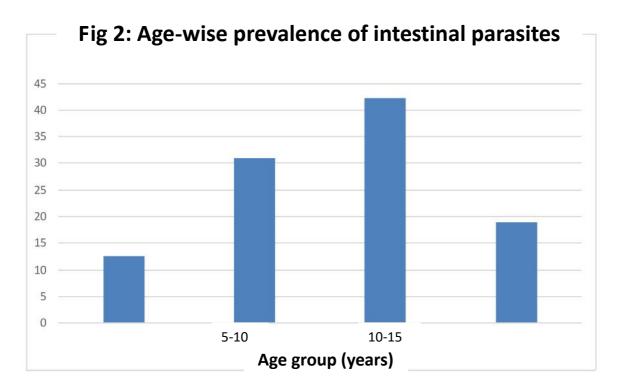
Age group-wise Prevalence

Table 4 and Fig 2 reveal that, the distribution of intestinal parasites was maximum (42.14%) in 10-

15 years age group and minimum (12.50%) in 0-5 years age group. Statistically, no significant difference regarding parasitic infection was found in different age groups (x2=11.168, P>0.05).

Table 4: Age-wise prevalence of intestinal parasites.

		+ve cases		
Age	Observation no.	N0.	%	
0-5	008	01	12.50	
5-10	042	13	30.95	
10-15	121	51	42.14	
Above 15	053	10	18.86	
Total	224	75	33.48	



Intestinal parasites are cosmopolitan in distribution causing serious health

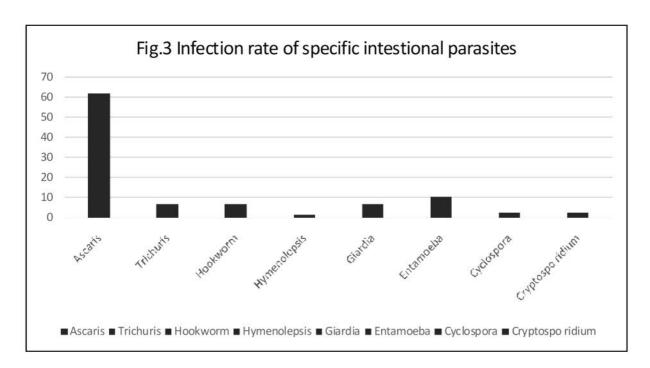
Prevalence of Specific Intestinal Parasites

Table 5 and Fig 7, reveal the infection rate of specific intestinal parasites in 75 infected stool

samples of children were specific. Out of 75 positive samples, 47 were infected with Ascaris, 5 (6.66%) with Trichuris, 5samples (62.00%) (6.66%) with hookworm, 1 (1.33%) with Hymenolepsis, 5 (6.66%) with Giardia, 8 (10.66%) with Entamoeba, 2 (2.66%) with Cyclospora and 2(2.66%) with Cryptosporidium.

Table 5: Infection rate of specific intestinal parasites.

Parasites	Tota	al infected	No. of infected male	No. of infected female	
	No	%			
Ascaris	47	62.00	23	28	
Trichuris	05	06.66	03	02	
Hookworm	05	06.66	03	02	
Hymenolepsis	01	01.33	01	00	
Giardia	05	06.66	02	03	
Entamoeba	08	10.66	03	05	
Cyclospora	2	2.66	2	0	
Cryptosporidium	2	2.66	1	1	
Total	75	100	35	40	



Parasitic Infection Pattern (Concurrent Infection) Among Children

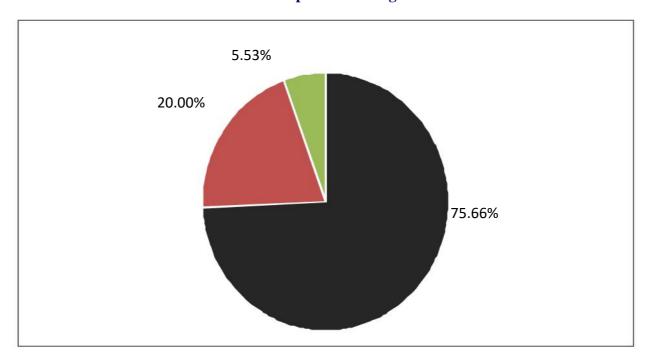
The stool infection with single parasite was more than double and triple parasites in a single patient. Out of 75 positive cases, 56 children were infected with single species of parasite, 15 were infected by double species of parasites and 4 were

infected by triple species of parasites. Regarding double infections, maximum infections were of Ascaris+Trichuris, Ascaris+Hookworm, and Giardia+Entamoeba. In triple combination, Giardia+Entamoeba+Ascaris, Giardia+Cyclospora+ Ascaris and Ascaris+ Trichuris+Cyclospora were found.

Table 6: Parasitic infection pattern among infected children.

Parasitic infection	Total infected cases		
	No	%	
Single infection	56	74.66%	
Double infection	15	20.00%	
Triple infection	04	05.53%	
	75	100%	

Fig 4: Diagrammatic representation of parasitic infection pattern among children



Discussion and Conclusion

Intestinal parasites are cosmopolitan in distribution causing serious health problem in society. Poverty, lack of knowledge, illiteracy and conservative thinking cause the parasitic infection in the developing country. Prevalence is higher in the economically deprived regions of the world especially in the developing countries (6)

Analysis of surveillance data showed that out of 224 children of Sipadol VDC, 75 (33.48%) were harboring different kinds of intestinal parasites. The remarkable prevalence was found in this rural area because of poor environmental sanitation, low-grade personal hygiene, low education and poor socio-economic conditions which favours the transmission of parasites. Comparable prevalence of parasites, 72.4%(7) and 76.4% (8),

were reported from school children of sub-urban area in Kathmandu valley and from a remote area in Accham district in Far- western region respectively.

Present findings indicate that there were not significant difference in prevalence of parasites in between two sexes (x2=1.708, P>0.05). It is because of equal possibilities of transmission of parasites among them due to over dispersal of parasites in all the communities. This finding is also supported (9).

The prevalence rate of helminthes was higher than protozoans. Soil transmitted helminthes parasite *A. lumbricoides* had the highest (62%) prevalence among the intestinal parasites. It is in agreement with the report published (1), according to which infections by soil transmitted helminthes has been

increasingly recognized as an important public health problem, particularly in developing countries. Out of 75 positive cases there were 56 (74.66%) having single infection, 15 (20%) double infection and 4 (5.53%) triple infection.

The most common double infection was (Ascaris+ Hookworm). (Ascaris+ Giardia+ Entamoeba) was found remarkably in triple infection. This also showed that Ascaris was highly influenced among children. So this finding also coincides with the report presented by (10), according to which the annual rate of the positivity for soil transmitted helminthiasis (i.e. *A. lumbricoides*) had the highest prevalence rate than others (i.e. *T. trichiura* and Hookworm).

Similarly, Entamoeba had the highest prevalence rate (10.66%) than Giardia (6.66%), Cyclospora (2.66%) and Cryptosporidium (2.66%) among entire protozoan. It may be due to utilization of drinking water from open streams, river and well, contaminated with high percentage of feaces, garbage due to wind or rain water. Water supply is contaminated through seepage into water pipes from sewage in cities and the open source of water (i.e. well, ponds, springs, rivers) are polluted from the contact of waste disposal deposits in rural areas of Nepal. Supporting this fact, present study also showed the highest prevalence (45.26%) of intestinal parasites in tap water consuming children and minimum in underground water consumers due to the phenomenon of natural filtration. Significantly, no difference was found among the different drinking water resource user in prevalence of parasite (x2-15.16, P>0.05). Although more studies are needed to determine the direct link between parasitic infection and other sources, the present study showed that drinking water and unsystematic defecation place are possible sources of infection in Bhaktapur district. Defecation near the water streams, wells and khola also serve to contaminate the water resource responsible for parasitic infection. Drinking direct water accelerates the infection due to maximum chance of contamination and transmission (11).

The present prevalence of parasites was found highest (42.14%) as a whole in the age group 10-15 years, which is similar with the report given (12), according to which intestinal parasites were more common among children <15 years than in adults >15 years. The prevalence rate of intestinal parasites was higher (44.44%) in the students of class 6 than the other classes and minimum (21.42%) in the students of class 10. This kind of infection distribution is due to the carelessness, playing in dirty places and haphazard feeding habits. Till class 5, they receive proper cared from their parents, so infection rate was found unnoticeable in those classes. After class 7, the students were somewhat responsible towards their health and duties themselves. Thus the higher prevalence among younger children appeared to be associated with their less hygienic habit, lack of awareness about personal cleanliness and most active age.

Present study indicates that there was no significant difference in prevalence of parasites in different age groups (x2-11.168, P>0.05). Because all age groups can acquire the disease, the highest attack rate occurs among children older than 18 months. There is no apparent immunity to infection and re-infection can occur in all ages (13).

Among the different ethnic castes, Bhote had the highest prevalence (60%) followed by other castes like Newar (35.34%), Brahmin (34.14%), Chettri (22.50%) and Magar (42.10%). The prevalence was significantly related to economic status, education, housing conditions, drinking water and their personal hygiene which is supported by De Silva et al., (1996). Lesser the monthly earnings, significantly higher the prevalence of parasites was found. People with low economic status are able to spend less money for food and safe drinking water that may lead to malnutrition with respective increase of parasitic infections which are supported (3 & 14) and Cutting (1988).

Significantly higher prevalence was found among those people who were careless about personal prophylaxis, who had no toilets in their home and following unhygienic feeding habits. Congested housing conditions and insufficient sanitary facilities may also help in transmission of parasites, which is supported (15).

The highest prevalence (57.14%) was found in those children whose parents are service holder. This may be due to lack of time to take care of their children. At the certain time, they have to reach in offices and while returning back they feel tired, so they can't give time to their child in spite of their desire. Minimum infection was found in those children whose parents are carpenter. This may be due to proper care of child from parents since this work can be done sitting inside the home. So difference in prevalence of intestinal parasites of the children according to their parent's occupation was significant (x2-23.06, P<0.05).

Since the school children are the backbone of the nation we need to built up the children with good health and powerful confident to develop our country. So control measures should be undertaken in time, otherwise the situation might be aggravated and beyond our reach. It may be assumed that similar situation might be prevailing in other places of our country, which are yet to be investigated.

Acknowledgement

We are thankful to Department of Microbiology Janaki Medical College and Hospital (Jmcth) Janakpur, Nepal for all the during this research.

Funding

Author's: Collection of data and analysis, reviewed, literature writing of the first draft of manuscript, referencing and final revision SNM, RRKY. Supervision of final approval of manuscript- BZ. All the authors the read the final version of manuscript and approved for publication.

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How to cite this article:

Rawet Ranjan Kumar, Surya Narayan Mahaseth. (2024). Intestinal Parasitic Infections among the Children of Ganesh Secondary School of Bhaktapur District. Int. J. Curr. Res. Med. Sci. 10(6): 30-40. DOI: http://dx.doi.org/10.22192/ijcrms.2024.10.06.005