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A Study of Prevalence of Intestinal Parasites and Associated Risk Factors Among the Tea Estates Workers of Ilam District, Eastern Region of Nepal

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ABSTRACT

Introduction: Intestinal parasitosis is endemic in least developed and developing countries including Nepal and is responsible for different types of morbidity and mortality. **Objectives:** To measure the prevalence of intestinal parasitic infestation and to identify risk factors associated with parasitic infestation among the tea garden workers in Ilam district of Nepal. **Materials and Methods:** A Community based cross-sectional study was conducted among tea garden workers in Ilam district of Nepal. Out of 4 tea estates in Ilam District, 2 tea estates (Ilam Municipality and Kanyam) were selected randomly. Out of total 150 tea workers (30 in Ilam Municipality and 120 in Kanyam), 98 workers participated in the study. 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 parasitic infestation. **Results:** Overall prevalence of intestinal parasitic infestation among the tea garden workers was 40.8 percent. Around 18.4% of the study population was found to be infested with helminthes and 22.4% of the study population was protozoa infected. Hookworm species was found higher (10.2%) in comparison to other worms i.e. Ascaris lumbricoides (5.1%), Trichuris trichuria (2%) and Hymenolepsis nana (1%). Regarding protozoal infestation, Giardia Lamblia was seen higher (12.2%) followed by Entamoeba histolytica (10.2%). Dalit in ethnicity, stream as a source of drinking water at home, not treat water before drinking, not using soap before meal and after defecation, not having latrine, not wearing sandals, unhygienic nail and clothes cleanliness, habit of nail biting and thumb sucking were found to be significant relationship in the causation of intestinal parasitic infestation. **Conclusions:** parasitic infestations are important public health problem, it is necessary to develop effective prevention and control strategies including health education and environmental hygiene.

INTRODUCTION

Intestinal parasitosis continues to be one of the major causes of public health problems in the world, particularly in developing countries. According to WHO estimate, 3.5 billion people in the globe are affected while 450 million are ill as a result of intestinal parasitic infections, the majority being children.[1] Reportedly, nearly 10% of the world's population is suffer from amoebiasis.[2] Ascaris lumbricoides, hookworm and T. trichiura have been estimated to infect 250 million, 151 million and 45 million people, respectively accounting for thousands of deaths.[2]

Nepal is a landlocked and least developed country located in South Asia. Intestinal parasitosis still constitutes one of the major public health problems (both morbidity and mortality) in Nepal.[3] The reported prevalence varies considerably approaching nearly one hundred percent in some areas.[4] Intestinal worm infection alone ranks fourth in "top-ten-diseases" in Nepal[5] and attributing to low socio-economic, educational and poor hygienic status of the people.[3,6]

Poverty, lack of awareness, poor environmental hygiene like failure to practice proper hand washing after defecation, unsafe drinking water and use of improper toilets and impoverished health services are some of the reasons that are not totally eradicated from most of the parts of our country.[7,8] Socio-economic and cultural factors and lack of adequate basic sanitation have caused the children of Nepal vulnerable to intestinal parasitic infections.[8] Hence the present study was carried out to measure the prevalence of intestinal parasitic infestation and to identify risk factors associated with parasitic infestation among the tea garden workers in Ilam district of Nepal.

METHODOLOGY

A Community based cross-sectional study was conducted from 13th December 2015 to 27th December 2015 in tea garden workers in Ilam district of Nepal. This was a two weeks study to fulfill epidemiological management carried out by students of MBBS 3rd year Batch 2013 of B. P. Koirala Institute of Health Sciences, Dharan, Nepal. This research was based on random selection of the study area Ilam District. Four tea estates under Nepal Tea Development Cooperation (NTDC) at Ilam District are Ilam Municipality, Kanyam, Soktim and Chilimkot. Out of 4 tea estates of Ilam District, 2 tea estates (Ilam Municipality and Kanyam) were selected

randomly. Out of total 150 tea workers (30 in Ilam Municipality and 120 in Kanyam), 98 workers participated in the study.

Ethical clearance was taken by Institutional Review Committee of B P Koirala Institute of Health Sciences, Dharan, Nepal. Written permission was taken from each in charge of Nepal Tea Development Cooperation (NTDC) at Ilam Municipality, Kanyam, and participants. Tea garden workers of both sexes, aged 18 years and above, having working experience of minimum 6 months and those who gave written consent were 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 15 workers was 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 intestinal parasites. First, we used low power lens and afterwards the high power lens. Then we observed ova of different intestinal parasites.[9] The confidentiality and privacy of the study was maintained; name of the individuals or participating group was not disclose after the study.

All interviewed questionnaires were indexed and kept on file. Data was entered in Microsoft Excel and converted into SPSS (Statistical Package for Social Science) 11.5 version for statistical analysis. The prevalence was calculated, Chi-square test was used to measure the association between risk factors and parasitic infestation. The confidence level was set at 5% in which probability of occurrence by chance is significant if $P < 0.05$ with 95% Confidence Interval.

RESULTS

Table No. 1: Distribution of parasitic infestation among study population

Intestinal parasites	**Frequency**	**Percent**
Positive	40	40.8
Helminths	18	18.4
Protozoa	22	22.4
Negative	58	59.2
Total	98	100.0
Name of parasites		
Hookworm	10	10.2
Ascaris lumbricoides	5	5.1
Trichuris Trichuria	2	2.0
Hymenolepsis nana	1	1.0
Entamoeba histolytica	10	10.2
Giardia Lamblia	12	12.2
Total	**40**	**40.8**

Table 1 shows 40.8% of the study population were infested with intestinal parasites. Protozoa was seen more among the study population than helminths. Hookworm was seen highest among the Helminth infestation and Giardia lamblia was seen higher than Entamoeba histolytica among protozoans.

Table No. 2: Association between sociodemographic characteristics with parasitic infestation

Characteristics	Parasite Positive	Parasite Negative	Total	P-Value
Age				
18-40 years	21 (45.7)	25 (54.3)	46	
41-60 years	16 (35.6)	29 (64.4)	45	0.615
>60 years	3 (42.9)	4 (57.1)	7	
Gender				
Male	8 (34.8)	15 (65.2)	23	0.501
Female	32 (42.7)	43 (57.3)	75	
Religion				
Hindu	29 (39.7)	44 (60.3)	73	0.707
Others (Muslim, Buddhist, Christian)	11 (44.0)	14 (56.0)	25	
Ethnicity				
Brahmin/Chhetri	6 (16.7)	30 (83.3)	36	
Janajati	10 (31.2)	22 (68.8)	32	<0.001
Dalit	24 (80.0)	6 (20.0)	30	
Education				
Illiterate	27 (45.8)	32 (54.2)	59	
Below SLC	11 (34.4)	21 (65.6)	32	0.453
SLC & above SLC	2 (28.6)	5 (71.4)	7	
Total	**40 (40.8)**	**58 (59.2)**	**98**	

SLC: School leaving certificate

The prevalence of parasitic infestation was seen higher in female than male but the difference was not significant. The respondents from Dalit were found significantly higher parasite positive than other ethnic groups. The parasitic infestation was higher among study population who was illiterate than below School leaving certificate (SLC), and SLC pass and above but the difference was not significant (Table 2).

Table No. 3: Association between personal hygiene and food habit with parasitic infestation

Characteristics	Parasite Positive	Parasite Negative	Total	P-Value
Source of drinking water at home				
Stream	15 (71.4)	6 (28.6)	21	
well	8 (50.0)	8 (50.0)	16	0.002
Tap	17 (27.9)	44 (72.1)	61	
Water treat before drinking				
Yes	24 (30.8)	54 (69.2)	78	<0.001
No	16 (80.0)	4 (20.0)	20	
Hand wash before meal				
No wash	12 (100.0)	(0.0)	12	
Water only	16 (69.6)	7 (30.4)	23	<0.001
Soap	12 (19.0)	51 (81.0)	63	
Bath				
Regular	5 (26.3)	14 (73.7)	19	0.152
Irregular	35 (44.3)	44 (55.7)	79	
Have latrine				
Yes	18 (24.0)	75 (76.0)	75	<0.001
No	22 (95.7)	1 (4.3)	23	
Hand wash after defecation				
Soap	6 (9.4)	58 (90.6)	64	
Water only	10 (100.0)	0 (0.0)	10	<0.001
Nothing	24 (100.0)	0 (0.0)	24	
Sandal wear				
Yes	24 (29.6)	57 (70.4)	81	<0.001
No	16 (94.1)	1 (5.9)	17	
Skin				
Clean	24 (36.9)	41 (63.1)	65	0.271
Not clean	16 (48.5)	17 (51.5)	33	
Nail				
Cut clean	12 (28.6)	30 (71.4)	42	0.033
Uncut & Unclean	28 (50.0)	28 (50.0)	56	
Clothes				
Clean	22 (33.8)	43 (66.2)	65	0.049
Not clean	18 (54.5)	15 (45.5)	33	
Nail Biting				
Yes	18 (94.7)	1 (5.3)	19	<0.001
No	22 (27.8)	57 (72.2)	79	
Thumb Sucking				
Yes	26 (100.0)	(0.0)	26	<0.001
No	14 (19.4)	58 (80.6)	72	
Food Habit				
Vegetarian	2 (66.7)	1 (33.3)	3	0.355
Non-Vegetarian	38 (40.0)	57 (60.0)	95	
Cooking duration				
< 30 min	10 (71.4)	4 (28.6)	14	0.012
≥ 30 min	30 (35.7)	54 (64.3)	84	
Antihelminthic drugs taken				
Yes	14 (32.6)	29 (67.4)	43	0.141
No	26 (47.3)	29 (52.7)	55	
Total	**40 (40.8)**	**58 (59.2)**	**98**	

Table 3 shows the study population using soap and water before meal and after defecation had significantly lower prevalence of parasitic infestation than those using only water and not using anything (P<0.001). The study population who did not wear sandal and shoes showed significantly higher prevalence of parasitic infestation than those wear sandal (P<0.001). The association was also seen among the unhygienic nail and clothes cleanliness and parasitic infestation (P<0.05). The parasitic infestation was seen higher among study population having the habit of nail biting and thumb sucking (P<0.001).

DISCUSSION

Intestinal parasitic infection is one of the major health problems in developing countries like Nepal. These infections are distributed throughout the World, with high prevalence in low socio-economic communities in the tropic and subtropics. Ameobiasis, ascariasis, trichuriasis and hookworm infections are the most common infections all over the World.[10] The prevalence of intestinal parasites varies in different regions of the world. It is particularly high in poor and developing countries due to use of contaminated drinking water, inadequate sanitary conditions and poor personal hygiene.[11]

The prevalence of parasitic infection was higher **(**40.8%) in our study compared to the studies done by Messaad SA et al in Morocco in 2014 showed the prevalence of parasites (34.5%)[12], Garba DD et al in Nigeria in 2014 (15.8%)[13], Pradhan P et al in rural village in Kathmandu valley in Nepal in 2014 (23.7%)[14], Sah RB et al. in Itahari Municipality, Nepal (18.5%)[15], Tiwari BR et al in Dadeldhura District, Nepal (31.1%)[16] which was lower than our study. In this study, protozoa was seen more among the study population (22.4%) than helminthes (18.4%). The higher rate of infection with protozoa may be attributed to poor sewerage system in the community and the fecal contamination of drinking water. Similarly higher helminthic infection in this study suggests high soil contamination with infective stage of helminthes. These data are similar to that of other study and might be due to rapid, unplanned urbanization, open defecation and lack of health awareness in this geographical area.[17]

This study showed the prevalence of Hookworm species was found higher (10.2%) in comparison to other worms i.e. Ascaris lumbricoides (5.1%), Trichuris trichuria (2%) and Hymenolepsis nana (1%). Regarding protozoal infestation, Giardia Lamblia was seen higher

(12.2%) followed by Entamoeba histolytica (10.2%). A study conducted in Egypt showed that the prevalence of intestinal parasitic infections are Entamoeba coli (19.3%), Ascaris lumbricoides (3.8%), Hymenolepis nana (12.5%), Enterobius vermicularis (5.7%) and Giardia lamblia (12.5%).[18] A study conducted in India reported that the predominant parasite detected was Ascaris lumbricoides (54.9%) followed by Trichuris trichiura (32.5%), Taenia saginata (9.1%), Enterobius vermicularis (2.6%) and H. nana (2.1%).[19] A study conducted in Nigeria showed that four different types of helminths were encountered namely (52.4%) Ascaris lumbrioides, (22.2%) hookworm, (19%) Taenia spp. and (6.3%) Schistosoma mansoni.[13] Another study conducted in Zamfara state, Nigeria reported that the common intestinal worms in the area are Ascaris lumbricoides (32.2%), Enterobius vermicularis (21.1%), Trichuris trichiura (20.4%), hookworm (13.8%) and Taenia spp. (12.5%).[20] Another study conducted in Nigeria showed that Ascaris lumbricoides were encountered in 46% of the infected specimens, hookworms in 23%, Trichuris trichiura in 9% and Strongyloides stercoralis in 11%.[21] A study conducted in Amhara region, northwest Ethiopia reported that the most prevalent intestinal parasites were hookworm (71.2%), Entamoeba histolytica/dispar (6.7%) and Strongyloides stercoralis (2.4%).[22] The reason for the difference might be the geography of the place or the socioeconomic condition of the study area and the habit of the study participants in relation to hygienic circumstances.

The prevalence of parasitic infestation was seen higher in age group 18-40 years (45.7%) than more than 60 years (42.9%) and 41-60 years (35.6%) but the difference was not significant. Our study revealed the high infection rate in age group of 18-40 years with G. lamblia most common cause for parasitic infestations followed by E. histolytica, which might be due to high exposure to contaminated environment, unhygienic behavior and lack of sanitation. Outdoor activities and exposure to contaminated water bodies might lead to Giardia transmission. This finding is similar to the studies from different parts of Nepal.[17, 23]

This study showed the prevalence of parasitic infection was higher in girls (42.7%) than in boys (34.8%) but the difference was not significant. A study conducted in Jeddah, KSA showed that the infection in females (48.7%) more than male (47.8%).[24] Another study conducted in Nigeria reported 52.3% of infected females, while 47.7% of males.[25] But a study conducted in Al-Mahweet, Yemen mention that the infection rates were significantly higher among the boys than in the girls.[26] Another study conducted in Nepal reported that the prevalence of intestinal

parasitic infections among boys (28.2%) was higher compared to that of girls (20.2%), but the difference was not statistically significant.[14] There was no significant difference between males and females regarding parasitic infections which is in agreement with the observations made from Nepal and other countries regarding gender independence of parasitic infection.[4,17, 25, 27-30]

The parasitic infestation was higher in workers who was illiterate (45.8%) than below SLC (34.4%) and SLC and above (28.6%) but the difference was not significant. But a study conducted by Okyay et al in Turkey showed the prevalence of intestinal parasites was significantly higher among illiterate than literate.[31]

This study showed the infection rate of parasitic infestation was significantly higher who did not treat water before drinking (80%) than those treat (30.8%). The rate of infection was higher (29.4%) in study subject using untreated water for drinking purpose whereas lower rate (9%) was found those using treated water for drinking purpose.[32] This pattern of infection has also been reported by Wani et al. from India.[33] The reason is that water purification (boiling of water) for drinking purposes kills the microorganisms and prevents transmission of infection. Thus, poor hygiene practices associated with type of water may be probable risk factor for increased parasitic infection.

This study showed the infection rate of parasitic infestation was significantly higher (95.7%) who using toilet regularly than not using (24%). Same trend was seen in study conducted by Raja'a YA et al in Yemen.[34] Also, the higher frequency of infection recorded among study population may be attributed to the improper usage, poor quality hygiene of the toilet an unacceptably higher numbers of persons per toilet (overcrowding).[34]

In this study, the infection rate of parasitic infestation among handwashing with soap and water after defecation was very low (9.4%) but all the participants was parasite positive who did not using soap or anything. No hand wash with soap after toilets was found to be a significant risk factor in the study group.[35] High prevalence of intestinal parasitic infections in the present study may be due to intake of contaminated water, poor hygiene and poor sanitary conditions.

Regular wearing of sandal or shoes had a significantly lower prevalence of parasitic infections (29.6%) than those did not wear sandal or shoes (94.1%). Detection of parasitic infestation might be related to bare footwork in the farm, contaminated with infective stage of parasites.[36-40]

Literature reported that the prevalence of intestinal parasitic infections is one of the most accurate indicators of socioeconomic and environmental conditions of a population and may be associated with several determinant factors, such as personal hygiene, adequate sanitation, water treatment, fecal pollution of water and foods.[41]

Limitations of this study: Firstly, we conducted single stool examination for detection of intestinal protozoan infections, which could have underestimated the prevalence, as optimal laboratory diagnosis of intestinal parasitic infections requires the examination of at least three stool specimens collected over several days.[42] Secondly, it was planned to conduct stool sample testing within 2 h of collection; however, due to logistic constraints, it was delayed at times from 3 to 6 h as a result of which we could not detect the invasive intestinal parasites.

CONCLUSION

The overall prevalence of intestinal parasitic infestation was high among the tea garden workers in Ilam district of Nepal. Hookworm was seen highest among the Helminthic infestation and Giardia lamblia was seen higher than Entamoeba histolytica among protozoans. Risk factors like Dalit in ethnicity, stream as a source of drinking water at home, not treat water before drinking, not using soap before meal and after defecation, not having latrine, not wearing sandals, unhygienic nail and clothes cleanliness, habit of nail biting and thumb sucking were found to be significant relationship in the causation of intestinal parasitic infestation. Present findings indicated that intestinal parasitosis in Nepal still remains a challenge despite nationwide deworming program together with vitamin A and suggests an effective implementation of sanitation and safe drinking water programs together with basic hygienic practice among the tea garden workers in these areas.

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REFERENCES

1. WHO. World Health Report 2000: Conquering Suffering Enriching Humanity. Geneva; 2000. http://www.who.int/whr/2000/en/. (Accessed 23 January 2021)
2. WHO. World Health Report 1997: Conquering Suffering Enriching Humanity. Geneva; 1997. http://apps.who.int/bookorders/MDIbookPDF/Book/12401997.pdf. (Accessed 23 January 2021)
3. Rai SK. Parasitic Diseases in Nepal. Federation of Asian Parasitology, Japan 2004; 305-18.
4. Rai SK, Matsumura T, Ono K. Intestinal parasitoses in an "unknown disease outbreak" hit rural hilly area in western Nepal. Nepal Med Coll J 2001; 2: 61-4.
5. Fact sheet of Ministry of Health and Population. Government of Nepal MoHP 2008. http://www.mohp.gov.np/index.php/publication-1/policy. (Accessed 23 January 2021)
6. Rai SK, Nakanishi M, Upadhya MP. Effect of intestinal helminth infection on some nutritional parameters among rural villagers in Nepal. Kobe J Med Sci (Japan) 1998; 44: 91-8.
7. Estevez EG, Levine JA, Warren J. Intestinal parasites in a remote village in Nepal. J Clin Microbiol 1983; 17: 160-1.
8. Gyawali N, Amatya R, Nepal PH**.** Intestinal parasitosis in school going children of Dharan Municipality, Nepal. Trop Gastroenterol 2009; 30 (3):145-7.
9. Godkar PB, Godkar DP. Microscopic examination of stool specimen. Text Book of Medical Laboratory Technology. 2nd ed. Mumbai: Bhalani Publishing House; 2003. P. 937-52**.**
10. Montressor A, Crompton DWT, Hall A, Bundy DAP, Savioli L. Guidelines for evaluation of soil transmitted Helminthiasis and schistosoiasis at community level Geneva; world Health organization WHO/CTC/SIP/98. http://whqlibdoc. who. int/ hq/ 1998/WHO_CTD_SIP_98.1.pdf. (Accessed 23 January 2021)
11. Wadood AU, Bari A, Rhman AU, Qasin KF. Frequency of intestinal parasite infestation in children hospital, Quetta, Pakistan. J Medical Res 2005; 44: 87-8.
12. Messaad SA, Laboudi M, Moumni M, Sarhane B, Belghyti D, El Kharrim KH. Children intestinal parasites related to socioeconomic factors in Salé hospital, Morocco. Int J Innov Appl Stud 2014; 8 (2): 833-840.
13. Garba DD, Jatau ED, Inabo HI, Thomas HZ. Prevalence of intestinal helminths among primary schoolchildren in Chikun and Kaduna south local Government areas of Kaduna state, Nigeria. J Med Res 2014; 2 (2): 6-11.
14. Pradhan P, Bhandary S, Shakya PR, Acharya T, Shrestha A. Prevalence of intestinal parasitic infections among public schoolchildren in a rural village of Kathmandu valley. Nepal Med Coll J 2014; 16 (1): 50-53.
15. Sah RB, Paudel IS, Baral R, Poudel P, Jha N, Pokharel PK. A study of prevalence of intestinal protozoan infection and associated risk factors among the school children of Itahari, eastern region of Nepal. J Chitwan Med Coll 2013; 3 (3): 32-36.
16. Tiwari BR, Chaudhary R, Adhikari N, Jayaswal SK, Poudel TP, Rijal KR. Prevalence of Intestinal Parasitic Infections among School Children of Dadeldhura District, Nepal. JHAS 2013; 3 (1): 14-16.
17. Shakya B, Bhargava D, Shrestha S, Rijal BP. Intestional parasitosis. J Inst Med (Nepal) 2009; 31: 13-6.
18. Ibrahium FAA. Prevalence and predisposing factors regarding intestinal parasitic infections among rural primary school pupils at Minia Governorate, Egypt. J Public Health Afr 2011; 2 (29): 123-126.
19. Lone R, Syed K, Lone A. Recent patterns and risk factors of intestinal helminths infection among schoolchildren in Kashmir, India. IMedPub J 2011; 2 (3):1-4.
20. Shehu MM, Kabiru A, Abubakar U, Muhammad UK. Prevalence of intestinal helminth infections among schoolchildren in relation to occupation of parents and toilets facilities in Maru L. G. A. Zamfara state. J Biol Agric Healthcare 2013; 3 (19): 87-90.
21. Emeka LI. Prevalence of intestinal helminthic infection among schoolchildren in rural and semi urban communities in Nigeria. IOSR J Dent Med Sci 2013; 6 (5): 61-66.

22. Workneh T, Esmael A, Ayichiluhm M. Prevalence of intestinal parasitic infections and associated factors among Debre Elias primary schoolschildren, East Gojjam zone, Amhara region, North West Ethiopia. J Bacteriol Parasitol 2014; 15 (1): 1-5.
23. Ishiyama S, Rai SK, Ono K, Uga S. Small scale study on intestinal parasitosis in a remote hilly village in Nepal. Nepal Med Coll J. 2003; 5: 28-30.
24. Al-Malki JS. Factors associated with high prevalence of Entamaeba histolytica/ dispar infection among children in Jeddah, KSA. Am Euras J Agric Environ Sci 2014; 14 (1): 50-56.
25. Simon-Oke IA, Afolabi OJ, Afolabi TG. The prevalence of soil-transmitted helminthes among school children in Ifedore local Government area of Ondo state, Nigeria. Eur J Biol Med Sci Res 2014; 2 (1): 17-22.
26. Raja'a YA, Assiragi HM, Abu Luhom AA, Mohammed ABS, Albahr MH, Ashaddadi MA, Al Muflihi ARN. Schistosomes infection rate in relation to environmental factors in schoolchildren. Saudi Med J 2000; 21 (7): 635-638.
27. Rai SK, Bajracharya K, Budhathoki S et al. Status of intestinal parasitosis at TU Teaching Hospital. J Inst Med (Nepal) 1995; 17:134-42.
28. Rai CK, Shrestha A, Shah RDP, Rai SK. Study of intestinal parasitosis among patients visiting health care centre in Kathmandu valley. J Nepal Assoc Med Lab Sci 2007; 8: 33-6.
29. Bansal D, Sehgal R, Bhatti HS et al. Intestinal parasites and intra familial incidence in a low socio-economic area of Chandigarh (North India). Nepal Med Coll J 2004; 6: 28-31.
30. Rai K, Sherchand JB, Bhatta DR. Study of enteropathogens and its predisposing factors in astroenteritis suspected children attending Kanti children Hospital, Kathmandu, Nepal. J Nepal Assoc Med Lab Sci 2004; 6: 48-53.
31. Okyay P, Ertug S, Gultekin B, Onen Ortho, Beser E. Intestinal parasites prevalence and related factors in school children, a western city sample-Turkey. BMC Public Health 2004; 64:1474-79.
32. Shrestha S, Laluwa S, Ranamagar B, Thapa P, Pradhan M, Adhikari N, Shrestha UT. Intestinal parasitosis among school going children in Bhaktapur, Nepal. International Journal of Medicine & Biomedical sciences 2016; 1 (2):1-6.
33. Wani SA, Ahmad F, Zargar SA, Ahmad Z, Ahmad P, Tak H. Prevalence of intestinal parasites and associated risk factors among school children in Srinagar City, Kashmir, India. J Parasitol 2007; 93 (6): 1541-43.
34. Raja'a YA, Sulaiman SM, Mubarak JS, El-Bakri MM, Al-Adimi WH, El-Nabihi MT, et al. Some aspects in the control of schistosomosis and soiltransmitted helminthosis in Yemeni children. Saudi Med J 2001; 22 (5): 428-432.
35. Ashok R, Suguneswari G, Satish K, Kesavaram V. Prevalence of Intestinal Parasitic Infection in School Going Children in Amalapuram, Andhra Pradesh, India. Shiraz E-Med J 2013; 14 (4): e16652.
36. Baragundi MC, Sonth SB, Solabannwar S, Patil CS, The Prevalence of parasitic infections in patients attending tertiary care Hospital, National Journal of Basic Medical Sciences. 2011; 2 (1): 31-34.
37. Norhayati M, Fatmah MS, Yusof S, Edariah AB. Intestinal parasitic infections in Man: A review. Med J Malaysia 2003; 58 (2): 296-305.
38. Bdir S, Adwan G. Prevalence of intestinal parasitic infections in Jenin Governorate, Palestine: a 10 years retrospective study. Asian Pacific Journal of Tropical Medicine 2010: 745-47.
39. Tariq MM, Zahid FB, Frequency and pattern of intestinal parasitic infestation in upper Neelum Valley. Pakistan Armed Forces Medical Journal 2006; 4:1-5.
40. Deorukhkar S, Katiyar R, Saini S, Siddiqui AV. The Prevalence of intestinal parasitic infections in HIV infected patients in a rural tertiary care Hospital of Western Maharashtra. Journal of Clinical and Diagnostic Research 2011; 5 (2): 210-12.
41. Quinn A. Diarrhea likelihood in Ghanaian children: A Study of the Association between Diarrhea and Water and Sanitation Infrastructure. Master thesis of Public Policy in the Georgetown Institute 2009: 74.
42. Rashid MK, Joshi M, Joshi HS, Fatemi K. Prevalence of Intestinal Parasites among School Going Children in Bareilly District. NJIRM 2011; 2 (1): 35-37.