



## Original Article

# Epidemiological Study of Parasitic Infestations in Pediatric Population Attending A Tertiary Care Hospital, Northern India

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## ABSTRACT

**Introduction:** *Intestinal parasitic infection is one of the major health problems in several developing countries, including India. Soil transmitted helminth (STH) infections form the most important group of intestinal worms affecting two billion people worldwide, causing considerable morbidity and suffering. About 12% of the global disease burden is observed among children with age ranges from 5 to 14 years in developing countries. This indicates that children are the major risk group for these infections. The present study was undertaken to investigate and update the current situation and study associated demographic and environmental factors in children.*

**Methods:** *A total of 4319 consecutive stool samples were processed using saline and iodine mounts and examined for ova and cyst of parasites as per departmental protocol within a period of 24 months (March 2015-March 2017).*

**Results:** *The overall prevalence of intestinal worm infestation was found to be 5.20%. Maximum percentage of intestinal parasite found in wet mount was of Giardia lamblia (66.7%) and Entamoeba histolytica (25.7%) followed by Ascaris lumbricoides (3.1%), Hymenolepis nana (2.2%), Enterobius vermicularis (1.8%) and Hookworm (0.7%) respectively. The occurrence of intestinal parasitic infections is quite high and intestinal protozoa are common than helminths in our study.*

**Conclusion:** *Our study reveal that the situation of intestinal parasitosis is a matter of concern, especially in children and drastic steps should be taken to minimize the gravity of this malady.*

**Keywords:** *Parasitic infections, STH, Giardiasis.*

## INTRODUCTION

Intestinal parasitic infection is one of the major health problems globally and up to 3.5 billion people are infected and around 450 million people

are ill due to intestinal parasites.<sup>1</sup> They constitute the greatest universal cause of morbidity and mortality. It is estimated that 60% of the world population is infested with enteric parasites. The

WHO estimates that one person in every four harbours parasitic worms.<sup>2</sup> India carries the highest burden of worm infestation and 64 per cent of Indian population less than 14 years of age are at risk of Soil Transmitted Helminths (STH) or worm's infestation.<sup>3</sup> These infections are common in young Indian children, and that the poorer and more disadvantaged these children's home circumstances are, the more likely they are to be infected. STH interferes with nutrients uptake in children, can lead to anaemia, malnourishment and impaired mental and physical development. The situation of under-nutrition and anaemia which is linked to STH ranges from 40-70 % in different population groups across the country. They also pose a serious threat to children's education and productivity later in life.<sup>4</sup>

To combat STH infections, government has adopted a single day strategy called National Deworming Day (NDD). The programme is being implemented through the combined efforts of Department of School Education and Literacy under Ministry of Human Resource and Development, Ministry of Women and Child Development and Ministry of Drinking Water and Sanitation. To assess the exact burden of STH or worms in India, Ministry of Health & Family Welfare has appointed National Centre for Disease Control (NCDC) as a nodal agency to conduct nationwide STH mapping.<sup>3</sup> Unfortunately, there is limited data about current situation of Intestinal parasitic infections in our region. To the best of our knowledge, the available literature dates back to the year 1978 which studied prevalence of Intestinal parasites in pediatric population in the same hospital.<sup>5</sup> Continuous and sustained monitoring of parasitic infections is the need of hour. To assess the prevalence of the situation in the recent years in our area, a similar study of two year duration (2013-15) was done.<sup>6</sup> Against this background, the present study in series was undertaken to investigate and update the current situation and study associated demographic and environmental factors in Jammu city.

## MATERIAL AND METHODS

**Study Area:** The study was carried out at SMGS hospital which is a tertiary care hospital affiliated to Government Medical College Jammu, having referral status from Jammu province.

**Study Population:** Patients of Paediatric age group (0-18 years) attending the OPD and IPD whose stool examination was advised by clinician.

**Study Period:** Study period was around two years from March 2015 to March 2017.

**Collection and Processing of Specimens:** The patients were provided with dry, wide mouthed clean plastic container for collection of samples. Around 5 grams of solid or 10 ml of liquid stool was collected and were examined within 1-2 hours of collection. Macroscopic examination was done to look for structures like proglottids, scolices, adult tapeworm, round worm or hookworm. The samples were examined microscopically for ova and cysts of parasites using Saline and Iodine mounts on grease-free slides.<sup>7</sup>

## RESULTS

A total of 4319 stool samples were received for routine stool examination. Male patients (n=2863; 66.2%) were more than female patients (n=1456; 33.8%). Male to female ratio was 1.96:1. Maximum incidence was seen in the months of July, August and September whereas months from October to March showed minimum incidence. The incidence started to gain its peak from the month of March and reached to its highest in July. A total of 225 samples were positive which showed that the prevalence of parasitic infections in our study was 5.20% [Table 1]. Among positive cases, proportion of males was higher (158) as compared to that of females (67). Maximum positivity was observed in the months of September (22.2%) and August (13.3%) [Table 2]. Maximum percentage of intestinal parasite found in wet mount was of *Giardia lamblia* and *Entamoeba histolytica* followed by *Ascaris lumbricoides*, *Hymenolepis nana*, *Enterobius vermicularis* and Hookworm respectively.[Table 3]

**Table 1.** Demographic distribution of cases positive for intestinal parasites

S. No	Gender	No. of subjects	No. of positive cases
1	Males	2863 (66.2%)	158 (5.52%)
2	Females	1456 (33.8%)	67 (4.60%)
3	Total	4319	225 (5.20%)

**Table 2.** Seasonal Distribution of cases

S. No	Month	No. of subjects (n=4319)	No. of Positive cases (n=225)
1	January	251	7 (2.7%)
2	February	245	9 (3.6%)
3	March	316	16 (5.0%)
4	April	314	13 (4.1%)
5	May	412	18 (4.3%)
6	June	387	15 (3.8%)
7	July	600	23 (3.8%)
8	August	507	30 (5.9%)
9	September	500	50 (10.0%)
10	October	252	17 (6.7%)
11	November	279	13 (4.6%)
12	December	256	14 (5.4%)

**Table 3.** Percentage distribution of intestinal parasites

S. No.	Parasite	Total No. (%)
1	<i>Giardia lamblia</i>	163 (66.7%)
2	<i>Entamoeba histolytica</i>	45 (25.7%)
3	<i>Ascaris lumbricoides</i>	7 (3.1%)
4	<i>Hymenolepis nana</i>	5 (2.2%)
5	<i>Enterobius vermicularis</i>	4 (1.8%)
6	<i>Anchylostoma duodenale</i>	1 (0.5%)

## DISCUSSION

Intestinal worm infestation is a global health problem and is a matter of serious concern for the third world countries.<sup>8</sup> The prevalence of these diseases depends on environmental, social, and economic factors. Poverty, illiteracy, high population density, proximity with animals, and poor hygiene conditions along with unavailability of safe and portable water attribute to the higher prevalence of intestinal parasites in developing nations. Moreover, certain environmental factors such as pollution, global warming and the tropical hot, and humid weather conditions also contribute to the disease. Consequently, the epidemiological pattern of the parasite varies with geographic location.<sup>2</sup> Estimating the burden of the disease require adequate and regular epidemiological information. Knowledge of the distribution and

extent of Intestinal parasitic infection in a given community is a prerequisite for planning and evaluating intervention program The present study was therefore focussed on determining the epidemiological data of intestinal infections and associated demographic and seasonal factors in our hospital setting.

The epidemiology of Intestinal parasites in India is changing nowadays. The present study results showed prevalence of intestinal parasitism to be 5.2% which is more than the rate of parasitism studied by Beena Jad et al in the same area in the year 2015.<sup>6</sup> A slight increase in the prevalence rate may be due to the more number of subjects chosen in the present study. The percentage prevalence in the present study is in accordance with another study in North India by Rajvir Singh et al.<sup>9</sup> In comparison to our study, a very high prevalence rate (46.7%) has been studied by Showkat Ahmed et al in Kashmir wherein it was contributed by conditions like were contaminated public water supply, open defecation and extent and level of maternal education.<sup>10</sup> Many other studies from India have reported varying rates of intestinal parasitic infection such as 12% by Dnyaneshwari Ghadage et al<sup>11</sup>, 24.7% by Shrihari et al<sup>12</sup> and as high as 47.08% by Singh et al.<sup>13</sup> Low prevalence rate in our study is an indication of better awareness of personal hygiene among the population. Moreover, variations may be due to the factors like quality of drinking water supply, sanitation and other environmental conditions. Among all, highest prevalence was seen in *Giardia lamblia* (66.7%) followed by *Entamoeba histolytica* (25.7%). Other parasites included were *Ascaris lumbricoides* (3.1%) and *Hymenolepis nana* (2.2%) and *Enterobius vermicularis* (1.8%). The same pattern of distribution was seen in 2013 in a study done by Rajvir Singh et al.<sup>8</sup> *Giardia lamblia* gets transmitted by faeco-oral route by drinking contaminated water as it is a common environmental contaminant of water supply. The water supply is really an important risk factor for the giardiasis, and several large outbreak of giardiasis have resulted from the contamination of

drinking water supply with the human waste.<sup>14</sup> In another study, *Giardia lamblia* was the most prevalent parasite followed by *Entamoeba histolytica*. These infections are regarded as a serious public health problem as they can cause iron deficiency anemia, malnutrition and other health problems in children.<sup>15</sup> The most common helminth isolated in our study was *Ascaris lumbricoides* and least percentage was that of *Ancylostoma duodenale*. There are many studies revealing round worm infestation as the commonest helminthic one.<sup>2,8, 16</sup> Low percentage of hookworm infestation can be attributed to more use of foot wears among farmers, labourers and other common people in the present days and also gross improvement of sanitation and commendably higher use of sanitary latrines in villages and among people of poor socio-economic status due to vigorous campaigning, financial and technical helps by government bodies in recent years.

The present study showed higher rate of infection in males than females which is in accordance with other studies.<sup>8,17</sup> However, in another study prevalence was more in females which can be explained by the fact that women in some region are also engaged in handling of livestock and in the field work too and thus more exposed to contaminated soil and water, a major predominant factor for infection.<sup>18</sup>

Seasonal studies of human parasitic infections are rarely conducted. Although, our study aimed at analysing factors influencing seasonal trends. However, our seasonal data depicted the highest number of cases in July (10.2%), August (13.3%) and September (22.2%). It has been reported to be maximum during the rainy season because of the availability of favourable conditions for growth of microbes and possibility of opportunistic infection. In a study done by Omar M Amin in 2000,<sup>19</sup> prevalence of parasitic infections was lowest in winter, gradually increased during spring, and reached peaks between July and October which is in accordance with our study. Moreover, our study revealed the peak incidence

of infection in the month of September which correlates with another study done by AS Jaran in 2016.<sup>14</sup> Seasonal variation in prevalence has also been reported in developed and developing countries in temperate and tropical regions.<sup>20,21</sup>

## CONCLUSION

The occurrence of intestinal parasitic infections is quite high and intestinal protozoa are common than helminths in our study. This study emphasizes the need for health education, good sanitation, personal hygiene and safe drinking water. Therefore, recommendation of appropriate steps like raising awareness about control measures, improving the quality of drinking water source and periodic deworming programmes as launched as the first national deworming day this year by the ministry of health and family welfare for school going children should be followed. If the comprehensive set of actions identified is fully implemented, children will have improved health outcomes and be able to achieve their potential to the fullest.

## REFERENCES

1. Tamirat Hailegebriel. Prevalence of intestinal parasitic infections and associated risk factors among students at Dona Berber primary school, Bahir Dar, Ethiopia. Hailegebriel BMC Infectious Diseases. 2017;17:1-8
2. Bhattacharya Rituparna, P Bhattacharya, U K Paul, A Banyopadhyay. Prevalence of intestinal parasites in a Tertiary Care Hospital in Rural Bihar. International Journal of scientific study. 2017;4(12):89-93
3. National Deworming Day. World's largest deworming programme. <http://pib.nic.in/newsite/printrelease.aspx?relid=158380>. Accessed on 23-06-2017
4. John Philip Ackers. Intestinal parasites in Indian children: A continuing burden. Trop Parasitol. 2011;1(2):50-51
5. Suraj Gupte, Mohinder Pal, C.L. Gupta, R.R Joshi. Prevalence of Intestinal

- Parasitic Infestations among children attending hospital. *Indian J. Paediatr*;1978:45
6. Beena Jad, Sandeep Dogra, Bella Mahajan. Significant decrease in prevalence of intestinal parasites among patients seeking treatment in a tertiary care hospital in Jammu: a changing trend. *International Journal of current Microbiology and applied sciences*.2015;4(11):659-664
  7. K.D Chatterjee. *Parasitology, protozoology and Helminthology* (CBS Publishers and Distributors Pvt Ltd, New Delhi, India, 2009) 260-265
  8. Brig Hemant Kumar, Capt Kalpana Jain, Maj Rahul Jain. A study of prevalence of intestinal worm infestation and efficacy of anthelmintic drugs. *Medical Journal Armed Forces India*. 2014;144-148
  9. Rajvir Singh et al. Prevalence of Intestinal Parasitic Infections in a tertiary care hospital in Northern India: Five year retrospective study. *International Journal of current Microbiology and Applied Sciences*. 2013;2(10):112-117
  10. Showkat WA, Ahmad F, Showkat A, Ahmed Z, Ahmed P. Prevalence of Intestinal Parasites and Associated Risk Factors among Schoolchildren in Srinagar City, Kashmir, India 2007;93(6):1541-1543
  11. Dnyaneshwari Ghadage et al. Pattern of Intestinal Parasitic Infections in patients visiting to rural Tertiary care teaching hospital in Pune. *Asian Journal of Biomedical and Pharmaceutical Sciences*.2014;4(34):51-53
  12. Shrihari N, Kumudani TSD, Mariraj J and Krishna S. The prevalence of intestinal parasitic infections in a tertiary care hospital- a retrospective study. *J Pharma Biomed Sci*. 2011;12(13):1-3
  13. Singh P, Gupta ML, Thakur TS and Vaidya NK. Intestinal parasitism in Himachal Pradesh. *Ind. J. Med. Res*. 1991;45:201-04
  14. Swapna Kotian, Munesh Sharma, Deepak Juyal, Neelam Sharma. Intestinal parasitic infection-intensity, prevalence and associated risk factors, a study in the general population from the Uttarakhand hills. *International Journal of Medicine and public health*. 2014;4:422-425
  15. Jaran AS. Prevalence and seasonal variation of human intestinal parasites in patients attending hospital with abdominal symptoms in northern Jordan. *EMJH*. 2016;22(10):756-760
  16. Panda S, Rao UD, Ramasankaran K. Prevalence of intestinal parasitic infections among school children rural area of Vizianagaram. *IOSR J Pharma Biol Sci*. 2012;3:42-45
  17. Parameshwarappa KD, Chandrakanth C and Sunil B. The prevalence of intestinal parasitic infestations and the evaluation of different concentration techniques of the stool examination. *J Clin. Diag. Res*. 2012;6:1188-1191
  18. Omar M Amin. Seasonal Prevalence of Intestinal parasites in the United States during 2000. *Am. J. Trop. Med. Hyg*.2002;66(6):799-803
  19. Jayalakshmi S, Dharanidevi S. The prevalence of Intestinal Infections in a tertiary care hospital in Southern India- A retrospective study. *International journal of current Microbiology and Applied Sciences*. 2016;5(10):718-723
  20. Prieto PA, Finley RL, Munchal PK et al. Burden of self-reported acute gastrointestinal illness in Cuba. *J. Health Popul. Nutr*. 2009;27(3):345-357
  21. Jagai JS, Griggiths JK, Krishen PK, Webb P, Naumova EN. Seasonal patterns of gastrointestinal illness and streamflow along the Ohio river. *Int. J. Environ. Res. Public Health*. 2012;9:1771-1790