

RESEARCH ARTICLE

A STUDY ON PREVALENCE OF INTESTINAL PARASITIC INFECTION AMONG SCHOOL GOING CHILDREN IN HAROTI REGION

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ABSTRACT: Introduction: Infection caused by intestinal parasites is still a common health problem with special concern in developing countries; the severest age group affected are children. Studies suggest that even moderate intensity of infection may have adverse effects on growth, anaemia and cognitive function. **Objective:** Aim: This study was conducted to find out the prevalence of intestinal parasitic infection among school going children. **Materials and Method-** A total of 380 children between 5 and 15 years of age participated in the study. Early morning stool specimen was collected for microscopic, macroscopic examination and for concentration techniques. **Results:** Infections were more prevalent in males than in females. The prevalence of intestinal parasitic infection was found to be 52.10%. Prevalence of protozoan parasites was significantly higher i.e. 47.36% and that of helminthic parasites was 4.73%. In our study *Entamoeba histolytica* was the most common protozoan parasite (32.82%), followed by *Blastocystis hominis* (25.75%) and *Giardia intestinalis* (25.25%). Among helminthes, hookworm was the predominant parasite detected (3.53%) followed by *Hymenolepis nana* and *Enterobius vermicularis* (1.01%). Out of the 380 children, 27.27% were found to have mixed infection. 52.10% parasites were detected by formol ether sedimentation technique, (4.73%) helminths floated by saturated salt flotation technique **Conclusion:** Preventive measures such as periodic deworming and health education about nutritional balanced diet, iron supplements, and personal hygiene practices have to be given to both the parents and their children to prevent and reduce disease burden. Health awareness program, personal hygiene, hand washing as well as uses of sanitary latrine and treatment of food to reduce the incidence of parasitic infection should be carried out in these communities

KEYWORD: Intestinal parasites; school children, preventive measures

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INTRODUCTION:

Intestinal parasitic infections are widely prevalent and remain major public health problems in many tropical and subtropical countries in spite of a great development in healthcare. It affects mankind of all ages and both sexes. It creates more concern when children, i.e the future of nation are affected.

The high prevalence of intestinal parasitic infections in developing countries are associated with factors like low literacy rate, poverty, poor hygiene, lack of potable water and climate area. There are still many communities or localities for which epidemiological information is not available.^[1,2]

According to WHO, approximate over 270 million pre-school children and over 600 million of school children are living in parasitic transmitted area and are in need of treatment and prevention. About 241 million children between the ages of 1 and 14 years are at risk of parasitic intestinal worms in India, also known as Soil-Transmitted Helminths (STH)^[3,4]

It can lead to anemia, malnutrition, impaired mental, physical & cognitive development, reduced school participation.

The National Deworming Day is celebrated on 10th February and 10th August, an initiative of Ministry of Health and Family Welfare, Government of India to make every child in the country worm free. This is one of the largest public health programs for preschool and

school-age children between the ages of 1-19 years through the platform of schools and Anganwadi Centers in order to improve their overall health, nutritional status, access to education and quality of life. Only two States namely Rajasthan and Madhya Pradesh have reported less than 20% prevalence and recommended for annual round. All the remaining States/UTs are implementing bi-annual round of deworming.

The commonest parasitic infection are *Ascaris lumbricoides*, Hookworm, *Enterobius vermicularis*, *Trichuris trichiura*, *Entamoeba histolytica*/ *dispar* and *Giardia lamblia*^[5,6]

According to various studies *Giardia lamblia* is found to be the most prevalent protozoan parasites which affect about 200 million people.^[7,8] Amoebiasis is one of the leading causes of death from parasitic diseases worldwide, with its greatest impact on the people of developing countries. According to WHO approximately 50 million people worldwide suffer from invasive amoebic infection each year, resulting in 40- 100 thousand deaths annually^[9].

The high prevalence rate in developing countries is due to crowding and poor sanitation. Moreover, asymptomatic patients constitute 90% of the infected population.^[10] They do not approach the physician and remain carriers of the parasites. Gradually these infections lead to chronicity which may impair physical and mental growth and even school performance of children. It may also cause intestinal obstruction, hepatic and biliary disease, malnutrition, anaemia.

Prevention is always better than cure. It has been estimated that approximately 70% of the disease burden on whole population can be prevented by treating school children alone. Early diagnosis and treatment is the mainstay of the disease control. Stool specimen of school going children should be screened at regular interval to detect these parasites. This will help in preventing the transmission, morbidity and associated complications

MATERIALS AND METHODS:

A prospective study was conducted from October 2017 to September 2018 to determine the prevalence of intestinal parasitic infections among school children between 5 and 15 years of age.

Total 380 children were evaluated. Stool were collected in a leak proof, dry wide mouth plastic container with the identification number.

The specimens were processed as follows

1. Gross examination of all the stool specimens were performed with respect to color, consistency,

presence of blood, mucus, adult worms and segments.

2. Microscopic examination was carried out using physiological saline and iodine.
3. Concentration techniques were performed on all the stool specimens, namely, saturated sodium chloride floatation technique and formal ether sedimentation technique.

Inclusion criteria:

School children between 5 and 15 years of age

Exclusion criteria:

1. Parents not giving consent for enrolment
2. Children on antiparasitic treatment in the past 15 days

OBSERVATION:

223(58.68%) were male children and 157(41.31%) were female children. Male to female ratio was 1.42: 1 with a slight male preponderance. Majority of the children i.e.338 (88.94%) were in the age group of 5-10 years. (Table-1)

Table 1- Age and gender distribution of children (n=380)

Age (Years)	Male (%)	Female (%)	Total (%)
5-10	197 (51.84)	141 (37.10)	338 (88.94)
11-15	26 (06.84)	16 (4.21)	42 (11.05)
TOTAL	223 (58.68)	157 (41.31)	380 (100)

Parasites were detected in 125 (63.45%) male children and 57 female children (40.42%) in the age group of 5 -10 years and 15(57.69%) male children and 1(6.25%) female child in the age group of 11-15 years. Parasitic prevalence was more common in the age group of 5-10 years (53.84 %) and in male children (62.78%). (Table-2).

Parasitic prevalence in asymptomatic children was 46.80% where as in symptomatic children was

60.68%. (Table-3). Entamoeba histolytica was the predominant parasite i.e. 16.54% followed by Blastocystis hominis 15.31% and Giardia lamblia 5.10% in asymptomatic children whereas Giardia lamblia was the most common among symptomatic. (Table-4a,4b,5)

Table 2. Prevalence of intestinal parasites with respect to age and gender of children

Age in Years	Male	Parasites detected (%)	Female	Parasites detected (%)	Total parasites detected (%)
5-10	197	125(63.45)	141	57(40.42)	182(53.84)
11-15	26	15(57.69)	16	1(6.25)	16(38.09)
Total	223	140(62.78)	157	58(36.94)	198(52.10)

Table 3- Prevalence of intestinal parasitic infection among asymptomatic and symptomatic children (n=380)

Total asymptomatic children	No of parasites detected (%)	Total symptomatic children	No of parasites detected (%)
235	110(46.80)	145	88(60.68)

Table 4a-Prevalence of intestinal parasites detected in asymptomatic children (n=380)

Parasites	No of parasites detected (%)
Entamoeba histolytica	38(16.54)
Blastocystis hominis	36(15.31)
Giardia lamblia	12(5.10)
Entamoeba coli	12(5.10)
Hookworm	5(2.12)
Trichuris trichura	3(1.27)
Ascaris lumbricoides	2(0.85)
Hymenolepis nana	2(0.85)
Total	110(46.80)

Table 4b-Prevalence of intestinal parasites detected in symptomatic children (n=380)

Parasite	No of parasites detected (%)
Giardia lamblia	39(26.89)
Entamoeba Histolytica	29(20)
Blastocystis hominis	14(9.65)
Entamoeba coli	2(1.37)
Hookworm	2(1.37)
Strongyloides stercoralis	1(0.68)
Hymenolepis nana	1(0.68)
Total	88(60.68)

Table 5- Prevalence of intestinal parasites in school going children (n=380)

Protozoan parasites	No of Parasites (%)	Helminthic parasites	No of Parasites (%)
Entamoeba histolytica	65(32.82)	Hookworm	7(03.53)
Blastocystis hominis	51(25.75)	Hymenolepis nana	3(01.51)
Giardia lamblia	50(25.25)	Trichuris trichiura	3(01.51)
Entamoeba coli	14(7.07)	Enterobius vermicularis	2(01.01)
-	-	Ascaris lumbricoides	2(01.01)
-	-	Strongyloides stercoralis	1(0.50)
Total	180(47.36)	Total	18(4.73)
Overall Total		198(52.10)	

Parasites were detected in 198 specimens (52.10%). Prevalence of protozoan parasites was significantly higher i.e.47.36% and that of helminthic parasites was 4.73%.

Among protozoan parasites, Entamoeba histolytica was the predominant parasite, detected in 65(32.82%) children, followed by Blastocystis hominis 25.75%, Giardia lamblia 25.25%, Entamoeba coli (7.07%). Among helminthes,

hookworms were the predominant parasite detected in 7(3.53%) followed by Hymenolepis nana and Enterobius vermicularis (1.01%). 54 children (27.27%) were found to have mixed infection. Infection by two parasites was seen in 42(21.21%) and by three parasites was seen in 12(6.06%) (Table-6)

Table 6- Prevalence of mixed parasitic infections among school going children (n=380)

Parasites detected	No of parasite (%)
Blastocystis hominis + Giardia lamblia	21(5.52)
Entamoeba histolytica +Blastocystis hominis + Giardia lamblia	12(3.15)
Entamoeba histolytica +Giardia lamblia	9(2.36)
Entamoeba histolytica +Blastocystis hominis	7(1.84)
Entamoeba histolytica + Entamoeba coli	5(1.31)
Total	54(27.27)

52.10% parasites were detected by formol ether sedimentation technique. 18(4.73%) helminthes floated by saturated salt flotation technique. (Table-7)

Table 7- Distribution of parasites with relation to various techniques

Methods	Parasites detected (%)
Iodine and saline mount	186(48.94)
Saturated salt flotation technique	18(4.73)
Formol ether sedimentation technique	198(52.10)

DISCUSSION:

Intestinal parasitic infection is one of the most prevalent public health problems among primary

school children especially in developing countries like India. This high prevalence may be due to poor personal hygiene in those who do not follow adequate hand washing practices before taking food and/or after going to toilets, poor sanitation like contaminated water, uncooked or cross-contamination of food with the faeces of an infected individual or animal, illiteracy, poor socioeconomic condition and other factors. [11]

In this study, the prevalence of parasitic infection among school children was found to be 52.10%. In India, there was a wide variation in the prevalence of intestinal parasitic infection. The prevalence was found to be as low as 11.4% in a study conducted by Kotian *et al.* in Uttarakhand, 23.4% in a study conducted by Mareeswaran *et al.* in Tamil Nadu [12,13] and as high as 75%, 90.6%, 97.4%, by Patel *et al.*, Hedge and Patel, Kang *et al.* respectively [14-16]. These variations may have been due to the heterogeneity in the sociodemographic characteristics of the study participants and between the various study locations.

Our finding was found to be almost similar to studies done by Wani *et al.*, Shegal *et al.* and Rao *et al.*, where the prevalence among school children was found to be 46.7%, 42.8% and 59.5%, respectively [17-19].

Prevalence of intestinal parasites among male children (62.78%) of both the age groups is significantly higher than that of females (52.10%). Singh *et al.*, Ibrahim *et al.* reported similar results in their studies [20,21]. The low prevalence of intestinal parasites in females may be due to various reasons. Females are not allowed to attend school due to social, religious and economic reasons and are more involved in indoor activities and household work. The outdoor environment, i.e. playing fields, is a common place of male children. Most of the children are forced to defecate in the open due to lack of toilet facilities and therefore, contamination of soil in these areas would constitute a significant risk for parasite transmission.

Overall prevalence of intestinal parasites in the age group of 5-10 years (53.84%) of both the sexes is

significantly higher than the age group of 11-15 years (38.09%). This is similar to the findings of Brar and Singh [22], Chowdhary and Schiller, Belinelo *et al.*, Chaudhary *et al.*, Rayan *et al.* [23-26]

The high incidence of these pathogens in the lower age group is probably associated with the lack of awareness pertaining to hygiene and sanitation, both of which can be expected to provide maximum chances of protozoan and helminthic exposure in contaminated surroundings

In the present study we encountered high prevalence of intestinal protozoan parasitic infection [47.36%] when compare to helminthic infections [4.73%.]

Protozoa transmit via feco-oral route through contamination of food and water. The water supply is really an important risk factor for protozoan infections. The ingestion of contaminated water is a common problem in India due to lower quality of water and faulty sewage lines. More protozoan parasitic infection in the present setting could be due to unhygienic practices like not washing of hands, drinking unsafe water, eating uncooked and uncovered food and poor sanitary conditions.

In our study *Entamoeba histolytica* was the most common protozoan parasite (32.82%), followed by *Blastocystis hominis* (25.75%) and *Giardia intestinalis* (25.25%).

Amoebiasis and giardiasis still remain leading causes of diarrhoea. Most of the infection is asymptomatic. Amebiasis can cause both intestinal and extraintestinal disease spread. These intestinal parasites exhaust nutrients from children they infect, thus retarding their physical development.

They destroy tissues and organs, cause abdominal pain, diarrhoea, intestinal obstruction, anaemia, ulcers and other health problems. Giardiasis if left untreated or undiagnosed may lead to malabsorption and chronicity, extra-intestinal manifestations, growth and cognitive deficiencies and post-infectious irritable bowel syndrome. [27]

Blastocystis hominis for a long time was considered as a non-pathogenic parasite. Of late, there are numerous reports in literature mentioning this parasite as a pathogen. This infection is widely

distributed all over the world with a high prevalence in the tropics and subtropics regions. Its prevalence may exceed 50% in developing countries and reach 20% in industrialized countries. Transmission of *Blastocystis* is suggested to be by the fecal-oral route via contaminated water or food, with sources being both humans and animals.^[28]

Among helminthic infection Hook worm eggs were seen in 7 children indicating its prevalence to be 3.53%. *Strongyloides stercoralis* larvae were reported only in one child (0.50%) who was 14 years of age. This patient did not have any history of immunosuppression and must have acquired the infection by walking bare feet in contaminated soil. The low prevalence in the present study could be attributed to the practice of shoe wearing.

We found *Hymenolepis nana* and *Trichuris trichiura* only in 3 samples each giving a very low prevalence, 1.51% in the present study. *Trichuris trichiura* infection range from mild to severe. It causes dysentery, growth impairment and rectal prolapsed in heavy worm infestation. *Hymenolepis nana* is mostly asymptomatic. Symptomatic patients may experience weight loss, nausea, diarrhoea and abdominal discomfort.^[29]

The prevalence of *Enterobius vermicularis* of the present study was very low, i.e., 1.01%. Recovery increases when anal swabs or cellulose tapes are used for the diagnosis as eggs are rarely found in stool. Scraping of the anal area yields more accurate result.^[30]

Eggs of *Ascaris lumbricoides* were seen in 2 children with its overall percentage of 1.01%. Our result is comparable to those of Chowdhury and Schiller (1.9%) (24). However, much higher prevalence rates have been reported by Shaikh et al (14.76%), Elkin (60.3%), Chatterjee and Mukhopadhyay (40.14%)^[31-33]

Low prevalence rates of ascariasis in our study can be attributed to certain environmental factors. Larvae of *Ascaris* develop only in moist soil, the high temperature does not allow the egg of parasite to survive in dry soil. Roads are cemented due to industrialization and urbanization so even if there is

open air defecation, there is less chances of faecal contaminated soil and transmission of this soil transmitted nematode.

27.27% were found to have mixed infections. The most common infection by 2 parasites was *Blastocystis hominis* and *Giardia lamblia* which accounted for 21 cases (5.52%).

Infections with 3 parasites accounted for 12 cases, i.e., 6.06% which were due to *Blastocystis hominis*, *Giardia lamblia* and *Entamoeba histolytica*. On inquiry, it was noted that all these children lived in very poor hygienic conditions.

Faecal concentration is a routine procedure as a part of the complete examination for intestinal parasites. It allows the detection of small numbers of parasites that may be missed by using only a direct wet preparation. The present study could detect intestinal parasites in 12 more samples by sedimentation technique which was negative by routine wet preparation. This clearly explains the advantage of using it. If one technique is to be selected for routine use, the sedimentation procedure is recommended over floatation technique as the former being the easier to perform, least subject to technical error and more specific.

These results are comparable to Vinayak and Sehgal who reported that the formol ether sedimentation detected 62 (31%) samples positive for helminthic ova and protozoan cysts, as compared to 42 (21%) positive by direct saline and iodine mounts. Similar finding was reported by Saxena and Mahmoud and Biswas et al.^[34-37]

Therefore, the local health officers and other governmental and non-governmental organizations need to give attention to this serious problem. The implementation of national program for early detection of intestinal parasites infection especially in asymptomatic children is necessary. This necessitates the need to create awareness regarding personal and environmental hygiene of adequate hand washing practices before and after using toilets, by preventing open defecation, encouraging the use of footwear and sanitary latrine, washing fruits and vegetables in safe and clean water and eating

properly cooked food. The national deworming day is an attempt taken by government of india to make the children worm free.

The purpose of parasite detection is not limited to curing disease in an infected individual, but it is also crucial in the prevention and spread of diseases. Therefore, the deworming should be done routinely as part of primary healthcare services along with measures to eradicate the reservoir of infection in the community

CONCLUSION:

Judging by the rates of parasitic infection in many studies of school children, it seems that prevention and control measures should be implemented both in the schools and at the community level.

The various measures like improvement in sanitation, access to health services, and appropriate available health infrastructure are also important factors for decreasing the prevalence of parasitic infections. Measures such as health education to school children as well as parents about the various personal and environmental hygienic practices like proper hand washing waste disposal, and eating a balanced nutritional diet should be provided.

These measures will help in bringing down the prevalence of intestinal parasitic infection which could directly improve the overall health and wellbeing of both the individual and the community. The local health office and other governmental and non-governmental organizations need to give attention to this serious problem of parasitic infections of school children. Therefore, implementation of national program for early detection of intestinal parasites infection especially in asymptomatic children should be mandatory.

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