



## PREVALENCE OF SINGLE, DOUBLE, OR MIXED INFECTIONS WITH COMMON INTESTINAL HELMINTHS AMONG THE PEDIATRIC AGE GROUP OF THE TEA GARDEN WORKERS

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### ABSTRACT

Intestinal helminthic infections in children are common in tea gardens of Assam due to poor economic conditions, ignorance due to illiteracy, overcrowding and unhygienic living conditions in the residential colonies. A total of 100 stool samples were collected and tested microscopically for the ova of intestinal helminths. Single infection was more prevalent with *Ascaris lumbricoides* (57.1%) followed by *Trichuris trichura* (12.9%) and *Ancylostoma duodenale* (5.7%). In case of double infection the prevalence was high (15.7%) in (*Ascaris lumbricoides* and *Trichuris trichura*) infection. It was more than double infection caused by (*Ascaris lumbricoides* and *Ancylostoma duodenale*), which was 7.1%. *Ascaris lumbricoides* was found to be commonest ova in all category of infection. The maximum number of helminthic infection was seen in the age group of ≤ 1- 6 years (76.4%). It was followed by the age group of 7- 12 years (65.8%) and in the last age group of 13- 18 years it was 42.8%. The infection rate was decreasing with age. Out of 61 samples from male 42 (68.8%) and from 39 samples of female 24 (71.8%) were positive for helminthic ova. Maximum number of helminthic ova was seen in children of illiterate mothers (75%), followed by L.P school passed mothers (69%) and H.S and above passed mothers (45.5%).

Thus the study shows burden of common helminthic infections among pediatric age group of tea garden workers which needs appropriate preventive and control measures.

**KEYWORDS :** Helminthic infections, Tea garden workers, *Ascaris lumbricoides*, *Trichuris trichura*, *Ancylostoma duodenale*

### Introduction:

Intestinal parasitic infection is one of the most common public health problems in the developing countries. Despite recent advances in epidemiological understanding of parasite population behavior and cost effective control strategies, the proportion of parasite populations in developing countries has remained virtually unchanged over the past 50 years. Although the resources for control of such infections are available but are still very limited.<sup>[1]</sup> Most of the infections are endemic and widely distributed throughout poor and socio-economically deprived communities in the tropics and subtropics. Tea garden community is one such vulnerable population. Environmental, socio-economic, demographic and health related behavior is known to influence the transmission and distribution of parasitic infection. They are transmitted by eggs present in human feces which in turn contaminate soil in areas where sanitation is poor. The main species that infect people are the roundworm (*Ascaris lumbricoides*), the whipworm (*Trichuris trichura*) and hookworm (*Necator americanus* and *Ancylostoma duodenale*).

More than 1.5 billion people or 24% of the world's population are infected with parasitic infection worldwide with greatest number occurring in sub-Saharan Africa, the America, China and East Asia.<sup>[2]</sup> Over 270 million preschool-age children and 600 million school age children live in areas where these parasites are intensively transmitted and are in need of treatment and preventive intervention.

Tea garden population constitutes approximately 1/5<sup>th</sup> of Assam's population. Poor economic conditions, ignorance due to illiteracy, overcrowded and unhygienic living conditions in the residential colonies make tea garden population vulnerable to various communicable diseases and malnutrition.<sup>[3]</sup> Parasitic infection occurs in children who play in contaminated soil, then put their hands in their mouth without washing them, by ingestion of contaminated water and food as well as by walking barefoot on the contaminated soil. No direct person-to-person transmission is seen whereas morbidity is directly related to number of worms harboured. Infestation may be asymptomatic although it can cause intestinal manifestations, general malaise and weakness, impaired physical and cognitive development and malnourishment.

Thus the current study was carried out to see the prevalence of single, double, or mixed intestinal helminthic infections and to explore the possible sociodemographic risk factors related to the intestinal helminthic infections.

### Materials and Methods:

A cross sectional observational study was conducted among pediatric age group of tea garden workers attending pediatrics department of Jorhat Medical College and Hospital from 1<sup>st</sup> of July to 1<sup>st</sup> of September 2016. Approval of the Institutional Ethical Committee of Jorhat Medical College and Hospital was taken initially to carry the study. Random sampling was done to collect the desired 100 stool samples. Information regarding age, sex and residence were obtained using a pre-designed and pre-tested proforma. Informed consent was taken from all the participants and their guardian before collection of data. Confidentiality was strictly maintained.

- **Sample collection:** Children and guardian were given brief information on the disease (cause, manifestations, consequences and diagnosis) prior to stool collection. A stool sample was collected from each enrolled participants in well labeled screw capped plastic container. Specimens were transported to laboratory of Microbiology Department, Jorhat Medical College and Hospital as early as possible. Received specimen in laboratory (Central Clinical Laboratory of Jorhat Medical College) were immediately stored in formalin at 4°C in refrigerator until being examined.
- **Macroscopic examination:** Stool samples were observed macroscopically for colour, odour and consistency of stool and presence of blood and mucus in the stool sample.
- **Microscopic examination:** The specimens were examined microscopically for the presence of eggs of intestinal helminths. All stool specimens were examined by direct saline thin smear, iodine mount and formol-ether concentration method and findings were recorded. Direct saline smear and iodine mount was chosen because of its cheapness, simple and reliable quantities. The time required for this procedure was relatively shorter and it does not require any sophisticated equipments.
- **Statistical analysis:** Data were entered into MS Excel and analyzed using Statistical Package for the Social Sciences (SPSS). Prevalence of disease was estimated in percentage. The proportion of intestinal helminthic infection and determinant factor such as age and sex were analyzed. Chi square test and Z test for proportion were used wherever applicable. A P-value less than 0.05 or less was considered as statistically significant.

### Observation and Results:

A total of 100 stool samples were examined. Single infection was more

prevalent with *Ascaris lumbricoides* (57.1%) followed by *Trichuris trichura* (12.9%) and *Ancylostoma duodenale* (5.7%) which was statistically significant.

In case of double infection the prevalence was high (15.7%) in (*Ascaris lumbricoides* and *Trichuris trichura*) infection. It was more than double infection caused by (*Ascaris lumbricoides* and *Ancylostoma duodenale*), which was 7.1%. Mixed infection with all three helminths (*Ascaris lumbricoides*, *Trichuris trichura* and *Ancylostoma duodenale*) was only 1.4%. *Ascaris lumbricoides* was found to be commonest ova I all category of infection.

**Table I: Prevalence of specific parasite in relation to single, double or mixed infection**

Intestinal helminth	Number of stool samples examined	Positive (%)	P Value
Ova of <i>Ascaris lumbricoides</i> (single)	40	57.1	<0.0001 (significant)
Ova of <i>Trichuris trichura</i> (single)	9	12.9	
Ova of <i>Ancylostoma duodenale</i> (single)	4	5.7	
Ova of <i>Ascaris lumbricoides</i> + <i>Trichuris trichura</i> (double)	11	15.7	
Ova of <i>Ascaris lumbricoides</i> + <i>Ancylostoma duodenale</i> (double)	5	7.1	
Ova of <i>Ascaris lumbricoides</i> + <i>Trichuris trichura</i> + <i>Ancylostoma duodenale</i>	1	1.4	

P value: < 0.0001, significant.

**Table II: Distribution of specific helminthic infection by sociodemographic variables**

Variables	Helminths		Total	P Value
	Positive	Negative		
<b>Age</b>				
≤ 6 years	42 (76.4%)	13 (23.6%)	55	.0285 (not significant)
7-12 years	25 (65.8%)	3 (34.2%)	38	
13-18 years	3 (42.8%)	4 (57.2%)	7	
<b>Gender</b>				
Male	42 (68.8%)	19 (31.2%)	61	0.138 (not significant)
Female	28 (71.8%)	11 (28.2%)	39	
<b>Religion</b>				
Hindu	53 (66.3%)	27 (33.7%)	80	.1726 (not significant)
Others	17 (85%)	3 (15%)	20	
<b>Education of mother</b>				
Illiterate	45 (75%)	15 (25%)	60	.1434 (not significant)
L.P School	20 (69%)	9 (31%)	29	
H.S and above	5 (45.5%)	6 (54.5%)	11	

The maximum number of helminthic infection was seen in the age group of ≤ 1-6 years (76.4%). It was followed by the age group of 7-12 years (65.8%) and in the last age group of 13-18 years it was 42.8%. The infection rate was decreasing with age.

Out of 61 samples from male 42 (68.8%) and from 39 samples of female 24 (71.8%) were positive for helminthic ova which was statistically not significant. Females suffered more than the males.

Out of 100 samples 80 were from Hindu families of which 53 (66.3%) were positive for helminthic ova. 20 samples were from other religions, of which 85% was positive.

Out of 100 samples, maximum number of helminthic ova was seen in children of illiterate mothers (75%), followed by L.P school passed mothers (69%) and H.S and above passed mothers (45.5%).

#### Discussion:

This study assessed the prevalence of intestinal helminthic infection in single, double and mixed infection rate was found similar and comparable with that of other studies.<sup>[4], [5], [6], [7]</sup> In the present study total

single infection found was 75.72% followed by double infection of 22.9% with only one case of infection with three helminths. Single infection was more prevalent for AL (57.1%) while TT (12.9%) and AD (5.7%) were less as compared to other studies.<sup>[8], [9]</sup> Double infection of AL-TT was most frequent with study subjects which is in accordance with another study in Bangladesh where it was found to be 18.61%<sup>[9]</sup> This result suggest that there might be faeco-oral transmission of both the parasites through contaminated food and water along with dirty hands. However relatively fewer occurrence of AD can be linked to agricultural profession and prevalence increases with age.<sup>[4]</sup>

The prevalence of helminthic infection was seen higher in female (71.8%) than male (68.8%) in the present study. Another study carried out by Walana *et al* in Ghana revealed that the infection was significantly more among male (55.5%) than female (30.8%).<sup>[10]</sup> Study by Nkengazong L *et al* in South West Cameroon also found that females were more affected than males.<sup>[4]</sup> Whereas a study in tea garden population of Assam showed equal distribution among male (65.6%) and female (65.1%) in 2006.<sup>[3]</sup> A study from Bangladesh also showed equal prevalence among male (26.1%) and female (21.3%)<sup>[9]</sup> Conversely, study by Rebecca *et al* in 2004 showed more prevalence among female (42.0%) than male (33.9%)<sup>[11]</sup> This may be due to female child have more soil contact during helping their mother in household works. In the present study the prevalence of intestinal infection was found high in the age group of ≤ 1-6 years (76.4%) followed by 7-12 years (65.8%) and 13-18 years (42.8%). With increasing age there is decrease in prevalence of infection among children. Study by Sultana *et al* revealed prevalence of 48.95% in 2-6 years of age.<sup>[9]</sup> On the contrary study by Rebecca *et al* showed high prevalence among 16-20 years (54%) followed by 3-5 years (50%).<sup>[11]</sup> Study from Cachet district of Assam showed high prevalence in the age group of 10-20 years.<sup>[11]</sup> Similar results were also obtained from a study in South Cameroon, where 60% prevalence was found for AL and 70% prevalence was found for TT in 6-10 years of age.<sup>[4]</sup> While in South India 66% prevalence was found in the age group above 10 years.<sup>[8]</sup>

The prevalence of helminthic ova was found more among Hindu families which was 66.3% in the present study. On the other hand, a study by Sah *et al* in Nepal found 20.5% of prevalence of helminthic ova among Hindu families.<sup>[12]</sup> In the present study, the prevalence of helminthic ova was found to be 75% among illiterate mothers. A study among school children in South India showed 34.4% prevalence of helminthic ova among illiterate mothers.<sup>[8]</sup> Another study done in Ilam district of Nepal found prevalence of helminthic ova among illiterate mothers to be 22.0%.<sup>[12]</sup> This wide variations might have many factors. Factors predisposing to infections include unhealthy cultural practices and ignorance for proper hygiene. Also playing of children in dirty and filthy environment, swimming in natural water bodies, geophagic habit of children and working of women in contaminated tea garden facilitate the transmission of parasite. Treatment with anti helminthic drug might contribute to low prevalence of infection in older age group as it reduces the transmissibility of the parasite by reducing the worm load and shedding of eggs.

#### Conclusion:

Analyzing the results it can be concluded that intestinal helminthiasis in the study area was very high and pose an important public health problem. This high prevalence of infection is linked with poor quality of life. Identification of high risk pockets and locally relevant risk factors could provide vital clues to the transmission of helminths in the tea garden community. Proper health and sanitation education, periodic chemotherapy with anti-helminthic drug, cooperation with school, various organizations and tea garden community should be prioritized as the effective helminth infection prevention and control measures.

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