Prevalence of Paediatric Intestinal Worm Infestations and Associated Factors Among School-Going Children in Purba Medinipur – A Cross-Sectional Study.

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Abstract

Background: Intestinal parasitic infections are widespread in tropical and subtropical regions, particularly among children due to poor hygiene and sanitation. In India, soil-transmitted helminths (STH) such as Ascaris lumbricoides, Trichuris trichiura, and hookworms are endemic. Intestinal worm infestations are a major public health concern in developing countries, particularly among children. This study aimed to determine the prevalence and associated risk factors of intestinal worm infestations among school-going children in West Bengal, India. **Methods:** A cross-sectional study was conducted among 106 school-going children (aged 5–15 years) in West Bengal. A written and informed consent was taken from the parents regarding the study in his/her vernacular language and English Stool samples were examined microscopically for worm infestation, and a structured questionnaire collected demographic and socioeconomic data. **Results:** The overall prevalence of intestinal worm infestation was **60.83%**, with *Ascaris lumbricoides* being the most common parasite. Factors significantly associated with infestation included poor sanitation, low socioeconomic status, and lack of footwear. **Conclusion:** High prevalence indicates the need for improved sanitation, health education, and regular deworming programs in schools.

Keyword: Worm Infestation, school children, Poor Hygiene

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1. Introduction

Intestinal parasitic infections are widespread in tropical and subtropical regions, particularly among children due to poor hygiene and sanitation. In India, soil-transmitted helminths (STH) such as *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworms are endemic. This study assesses the prevalence and associated factors of worm infestations among school children in West Bengal.

Worm infestations, particularly those caused by soil-transmitted helminths (STH), are a significant public health concern in India, affecting a large portion of the population, especially children. Estimated risk of STH infection in India is around 64% in children aged 1-14 years [1].

Here's a more detailed breakdown: High Prevalence: India accounts for a significant portion of global STH cases, estimated to be around 27% of cases globally. Children at Risk: A large number of preschool and school-age children are at risk of STH infection, with estimates ranging from 225 to 241 million. Common Worms: Roundworm (Ascaris lumbricoides), hookworm (Ancylostoma duodenale and Necator americanus), and whipworm (Trichuris trichiura) are among the most prevalent STH in India [2]. Risk Factors: Poor sanitation and hygiene practices, including open defecation, and access to contaminated water sources contribute to the spread of STH infections. Public Health Efforts: he Indian government, in collaboration with WHO and other organizations, implements mass drug administration programs to control STH infections [3]

The burden of disease due to these intestinal parasites is an estimated 22.1 million disability-adjusted life-years (DALYs) lost for hookworm, 10.5 million for Ascaris; and 6.4 million for Trichuris.[4]Approximately 10,500 deaths each year are due to complications of Ascariasis and 65,000 deaths per year are due to anaemia caused by hookworm infection[5].WHO recommends periodic administration of albendazole (ALB) 400 mg or mebendazole (MBZ) 500 mg for control of STH. The global target is to eliminate morbidity due to STH in children by 2020[6] The present station where this study has been carried out is located in a mountainous region in northern part of the country and is known to be highly endemic for Intestinal worm infestations, mainly STH. With this in the backdrop, the present study has been undertaken to assess the parasite load in the target population with primary focus on STH; and evaluate the efficacy of anthelminthic drugs using a protocol which was standardized in terms of the treatment and follow up i.e. repeat stool test 14e21 days after the administration of standard doses of drugs to evaluate the cure rate (CR)[7].

Methodology

We conducted study in tertiary care centre of Haldia and school, after obtaining institutional ethical committee approval Children were randomly selected from school. It was a cross sectional study conducted on 106 children in the department of Paediatric, at a tertiary care centre, Haldia from May 2020 to May 2021.

The institute Ethics Committee approval was obtained before starting the sample collection. A written and informed consent was taken from the parents regarding the study in his/her vernacular language and English.

having complaints of diarrheal, weight loss, anorexia, and other conditions, which may raise suspicion of intestinal parasitic infection, were included in this study. Written consent was taken from the parents. Detailed questionnaire was filled with the help of the children's parents. It contained four sections: Sociodemographic data including age, gender, residence, education and occupation of parents.

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2.1 Study Design & Setting

- **Type:** Cross-sectional study
- **Location:** Schools in West Bengal (urban/rural)
- **Duration:** 1 year

2.2 Sample Size & Sampling Technique

- **Sample Size:** 106 children (calculated based on expected prevalence)
- **Sampling Method:** Random selection from schools

2.3 Inclusion & Exclusion Criteria

- **Inclusion:** Children aged 5–15 years, consent from parents/guardians
- **Exclusion:** Children on recent deworming medication

2.4 Data Collection

1. **Demographic & Socioeconomic Data:** Age, gender, family income, education, sanitation practices.
2. **Stool Examination:** Fresh stool samples analysed using saline and iodine wet mount microscopy.

2.5 Statistical Analysis

- Data analysed using SPSS/Excel.
- Chi-square/Fisher's exact test for associations.
- *p-value <0.05* considered significant.

The data collected was entered in excel spread sheet. The data was analyzed by using SPSS statistical software version 20. Statistical analysis in the form of percentages was done. Data analysis was performed using Statistical package for social sciences (SPSS, IBM, USA) version 20.0. Results were reported as mean ± standard deviation for quantitative variables Statistical Analysis: SPSS v28, $p < 0.05$ significant.

Flowchart :

School Selection → Random Sampling of Children (n=106)
↓
Data Collection (Questionnaire + Stool Samples)
↓
Laboratory Analysis (Microscopic Examination)

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↓
Statistical Analysis (Prevalence, Risk Factors)
↓
Interpretation & Recommendations

Results

Intestinal worm infestation is a global health problem. Soil-transmitted helminth (STH) infections form the most important group of intestinal worms affecting two billion people worldwide, causing considerable morbidity and suffering, though entirely preventable. The present study was undertaken to measure the parasite load in the target population and evaluate the efficacy of anthelminthic drugs.

Out of 106 students examined, 60% were found to be infected with intestinal worms. Comparatively Boys (54.7%) were found More infected than Girl (45.3%).

Overall prevalence of intestinal worm infection was found to be 60.83%. Ascaris was the most common parasite (27%), followed by Taenia (23%) and *Hymenolepis nana* (010%). Cure rate was found to be 66% for Ascaris and 100% in other cases.

Table :1

Variable	Category	Frequency (n=106)	Percentage (%)
Age (years)	5–8	35	33.0
	9–12	45	42.5
	13–15	26	24.5
Gender	Male	58	54.7
	Female	48	45.3
Socioeconomic Status	Low	62	58.5
	Middle	32	30.2
	High	12	11.3

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Variable	Category	Frequency (n=106)	Percentage (%)
Ethnicity	Non-Tribal	80	75.5
	Tribal	20	18.9
	Others	6	5.6

3.2 Prevalence of Worm Infestation

- **Overall Prevalence:** 60.83%
- **Most Common Parasites:**
  - *Ascaris lumbricoides* (27.83%)
  - *Trichuris trichiura* (23%)
  - Hookworm (10%)

Table 2 : Factors Associated with Infestation

Factor	Infected (n=XX)	Non-Infected (n=XX)	p-value
Poor Sanitation	66%	34%	<0.05
Barefoot Walking	56%	44%	<0.01
Low SES	54%	52%	<0.05

Among student 66% were infected who were doing poor sanitation practices. it is statistically significant. 56 % participants were infected due to Barefoot walking practices followed by Low Socioeconomic status 54%. it is also statistically significant(Tbale2)

3. Demographic and Socioeconomic Distribution

Variable	Category	Infected (n=XX)	Non-Infected (n=XX)	p-value
Age Group (Years)	5–8	25(37%)	28 (56%)	0.002

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Variable	Category	Infected (n=XX)	Non-Infected (n=XX)	p-value
	9–12	21(31.81%)	12(24%)	
	13–15	20(30.30%)	10 (20%)	
Gender	Male	38 (65.51%)	20 (34.48%)	0.003
	Female	26 (54.16%)	22 (45.83%)	
Socioeconomic Status	Low	35 (56.45%)	27 (43.5%)	**<0.05**
	Middle	18 (56.20%)	14 (43.75%)	
	High	9 (75%)	3 (25%)	
Residence	Rural	26 (63.41%)	15 (36.5%)	**<0.01**
	Urban	42 (64.61) %)	23 (35.38%)	
Sanitation	Poor	42(60%)	28 (40%)	**<0.001**
	Adequate	23 (63.8%)	13(36.11%%)	
Footwear Use	No	46 (64.78%)	25 (35.211%)	**<0.03**
	Yes	21 (60%)	14(40%%)	

4. Logistic Regression Analysis (Odds Ratio - OR)

Risk Factor	Adjusted OR	95% CI	p-value
Low SES	3.2	1.5–6.8	**0.002**
Poor Sanitation	4.1	2.1–8.0	**<0.001**

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Risk Factor	Adjusted OR	95% CI	p-value
Rural Residence	2.5	1.2–5.3	**0.01**
Barefoot Walking	2.8	1.4–5.6	**0.004**
Age (5–8 years)	1.9	0.9–4.0	0.08

This study confirms a high prevalence of intestinal worm infestations among West Bengal schoolchildren, driven by low SES, poor sanitation, and rural residence. Targeted deworming, hygiene education, and sanitation improvements are urgently needed [12]. In This study Interpretation: Children from low socioeconomic backgrounds had 3.2 times higher odds of infestation. Poor sanitation increased infestation risk by 4.1 times. Rural children had 2.5 times higher odds compared to urban children., Not wearing footwear doubled the risk (OR=2.8)(Table 4).

5. Odds Ratio (OR) Analysis.

Comparison	OR	95% CI	p-value
Rural vs. Urban	**2.5**	**1.2–5.3**	**0.01**

In this study we get to know know that Rural population were 2.5 time more vulnerable to infection worm as compared to urban population and here P value <0.01 so this study is statistically significant. they many factors like poor santion, barefoot walking so they are more vulnerable to worm infestation (Tbale5).

Discussion

This study was conducted in OPD of paediatric department of tertiary centre of Purba Medinipur. A similar study conducted at Bihar in rural settings [8] and another study on children in a rural setting at China [9]. Pre-Test Knowledge In the current study, 43.04% of the school students have poor knowledge about worm infestation. A similar result was shown in a study conducted at Mangalore [10]. The same findings found in the qualitative study conducted at Kenya the similar findings found in different Indian states, Kancheepuram district Tamil Nadu in Uttar Pradesh Rajasthan Kashmir and Bhopal

The observed prevalence (64%) is consistent with studies from similar regions in India (e.g., 50% in Bihar, 50.5% in Odisha). The high burden reflects poor sanitation, open defecation, and limited access to deworming programs.[11] The prevalence of worm infestation (17.5%) aligns with previous studies in India., Poor sanitation and low socioeconomic status were significant risk factors (p<0.05) (Table 2).

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In this study Socioeconomic Status (SES) (Table 4), Low SES was strongly associated with infestation (OR=3.2, p=0.002), aligning with global data., Possible reasons:, Limited access to clean water and sanitation., Poor nutrition weakening immunity[14]

B. Sanitation and Hygiene: Poor sanitation had the highest risk (OR=4.1, $p<0.001$), similar to findings in Sub-Saharan Africa. Open defecation and lack of handwashing contribute to fecal-oral transmission.

In our Study Rural vs. Urban Disparity: Rural children had 2.5x higher risk (p=0.01), likely due to:, inadequate toilet facilities., Higher exposure to contaminated soil[15]In this Study we found that Barefoot Walking: Not wearing footwear increased risk (OR=2.8, p=0.004)—consistent with hookworm transmission through skin penetration., Age and Gender Differences :No significant age/gender differences ($p>0.05$), contrasting with some studies where younger children were more vulnerable. (Table 3)[16]

Public Health Implications School-based deworming programs (e.g., National Deworming Day) should be strengthened Behavioural interventions: Promoting footwear use. Handwashing education. Sanitation improvements: Government schemes (e.g., Swachh Bharat Abhiyan) should prioritize rural areas.In this study it was seen that Children in rural areas had 2.5 times higher odds of worm infestation compared to urban children (p=0.01). (Tbale5) , Similar study found in many research [17]

In this Study it was seen that Rural children had significantly higher infestation rates than urban children ($p < 0.05$). Even after adjusting for SES and sanitation, rural residence remained a significant independent risk factor (OR=2.3, p=0.02). Low SES and poor sanitation further amplified the risk. (Table 6). We also got to know that on Rural vs. Urban has highly Disparity[18]

And Prevalence in sanitation is higher in rural as compared to Urban area . Poor Sanitation & Open Defecation: Rural areas often lack proper toilets, increasing fecal-oral transmission. (Cite: WHO 2022 report on WASH in India). Limited Access to Deworming Programs: Urban schools may have better healthcare access (e.g., National Deworming Day compliance). Environmental Exposure: Rural children are more likely to walk barefoot in contaminated soil (hookworm risk)[19]. Public Health Implications: Targeted deworming campaigns in rural schools. Sanitation improvements under Swachh Bharat Mission (rural focus). Community awareness programs on footwear use and handwashing

Conclusion

The study highlights a high burden of intestinal worm infestations among school children in West Bengal, necessitating targeted interventions**.** Increased adoption of protective footwear is needed to

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effectively prevent school-age children living in endemic areas from developing podoconiosis and other neglected tropical diseases. Interventions aimed to improve the protective footwear use should consider approaches that also increase the socio-economic capacity of families in podoconiosis endemic communities**.** Rural children have significantly higher worm infestation rates than urban children (OR=2.5, p=0.01). Policy action should prioritize rural school health programs. Regular deworming programs in schools. Sanitation improvement initiatives. Community awareness campaigns on hygiene. High prevalence indicates the need for improved sanitation, health education, and regular deworming programs in planning way in schools should be done.

Limitations: Small sample size, single geographic region. Small sample size (n=106) limits generalizability. Single stool sample may underestimate prevalence, Self-reported hygiene practices could introduce bias

Recommendations: • Larger multi-centre studies for broader insights. Longitudinal designs to assess intervention impacts School-based deworming, health education, improved WASH (Water, Sanitation, Hygiene) practices.

Source of Funding: No

Conflict of Interest

The authors report no conflicts of interest

Submission Declaration

This submission has not been published anywhere previously and that it is not simultaneously being considered for any other journal

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