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Research Article

PREVALENCE OF INTESTINAL PARASITIC INFECTION AMONG CHILDREN UNDER FIVE YEARS OF AGE WITH SPECIAL REFERENCE TO MALNUTRITION IN BULANDSHAHR

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Abstract

Introduction: Intestinal parasitic diseases constitute a global health burden causing clinical morbidity in millions of people, many of these are children under five years of age in developing countries. The aim of the present study was to determine the prevalence of intestinal parasitic infection with special reference to malnutrition under five years of age in district Bulandshahr, Uttar Pradesh.

Material and Methods: The study population consists of children under five years of age groups of both sexes. Chi square test was applied to study the association between prevalence of intestinal parasites and the protein energy malnutrition, stunting and wasting. Odds ratio and 95% confidence interval of values were also used. $p < 0.05$ was considered as significant.

Results: The prevalence of intestinal parasites was significantly higher in the children with severe protein energy malnutrition (χ^2=7.0936, *d.f.*=2, p=0.02882), stunting (χ^2=4.0443, *d.f.*=1, p=0.0443) and wasting (χ^2=5.6497, *d.f.*=1, p=0.0175) as compared to children with mild protein energy malnutrition, non-stunting and non-wasting category.

Conclusions: This study shows that intestinal parasitic infections are prevalent in the study area and require immediate control and preventive measures. Educating the population about the spread of intestinal parasitic infections and promoting good health and hygiene practices of children for the prevention from intestinal parasitic infections.

Key words: Intestinal parasites, malnutrition, risk factors, Bulandshahr

1. Introduction

Intestinal parasite infection is a common infectious disease responsible for a number of health problems that impede physical growth and development in children. Children under the age of five years are most susceptible to infection due to malnutrition and immature immunity (1). Intestinal parasitic infections and malnutrition in under-five years children are of significant public health concern in low and middle-income countries and contribute significantly to childhood morbidity and disability (2). Intestinal parasitic infections cause loss of appetite, anaemia and weight loss in patients. Common intestinal parasitic infections are *Entamoeba histolytica, Ascaris lumbricoides, Ancylostoma duodenale* and *Taenia solium*, are the most common parasitic infections in developing countries.

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Therefore, it is necessary to observe the problem and tackle it in the awareness of public health. The aim of the present study was to determine the relationship between prevalence of intestinal parasitic infection and nutritional status of children under five years of age in district Bulandshahr.

MATERIALS AND METHODS:

This cross-sectional study was conducted from December 2021 to January 2024 to determine the relationship between prevalence of intestinal parasitic infection and nutritional status in children under five years of age in district Bulandshahr**,** Uttar Pradesh. Informed consent was obtained from all parents. Confidentiality was ensured by keeping participants identity confidential. To execute the study conveniently, clinical symptoms and sign of intestinal parasitic infection like abdomen pain, constipation, diarrhoea, more than two stool passing in a day and offensive stool were considered as primary diagnostic tools to enhance the value of estimation**.**

Participants with the above clinical features were considered eligible for the present study and all those eligible patients who were available to provide stool samples were included in the study. Personal

visits were made to every participant to collect the baseline data regarding socio-demographic factors using a structured questionnaire. Age, height and weight, of participants were incorporated in the study for risk factor analysis. A clean, labelled, wide mouthed screw capped plastic container was given to parents of participants for stool sample collection and were asked to provide one sample on the next morning (large teaspoon amount of solid stool or 10 ml of liquid stool) in the container given to them. The collected stool samples were transported to the laboratory on the same day and examined using direct (saline/iodine wet mount) and concentration (floatation/sedimentation) microscopic techniques. The slides were covered with coverslips and examined under low power (10X) and the doubtful structures were confirmed with 40X magnification (3&4).

Standard anthropometric measurements were used to assess the nutritional status of all children. The weight of the children was recorded accurately using an electronic weighing scale having a sensitivity of up to 0.01 kg. The accuracy of the weighing scale was checked regularly and corrected before individual weight measurement. For children less than 2 years of age, lying height was measured in an infantometer. For children above 2 years of age, standing height was measured with a measuring tape against a wall to the nearest 1 mm. Mid-arm circumference was measured by placing a measuring tape firmly without compressing the tissues around the left upper arm at a point halfway between the tip of the olecranon process and the tip of the acromion.

The nutritional status of the participants was further assessed by Chi Square test and to detect the presence of malnutrition and its extent, the 50th percentile of the National Center for Health Statistics (NCHS) growth chart was used as the normal standard. Three parameters were taken namely weight for age (WFA), height for age (HFA), and weight for height (WFH). To grade malnutrition, the method advocated by the Indian Academy of Paediatrics was taken into account, wherein the parameter WFA was taken. Children whose WFA was more than 80% of the norm were considered normal and excluded from the study, while WFA of 71% to 80%, 61% to 70%, and ≤60% were considered as mild, moderate, and severe protein energy malnutrition (PEM) grades, respectively. Chi square test (χ^2 test) of statistical significance was applied to study the association between prevalence of intestinal parasites and the demographic factors. Odds ratio (OR) and 95% confidence interval (95%CI) of values were also used. P value < 0.05 was considered as significant.

RESULTS:

Based on the clinical symptoms and signs of the patients, a total of 106 subjects aged up to 5 years were found eligible for the malnutrition and intestinal parasitic study. Out of the 106 eligible subjects, only 92 were available to give stool samples. Of the 92 participants the level of Protein Energy Malnutrition was mild in 36 (39.1%), moderate in 29 (31.5%) and severe in 30 (29.4%) participants. Out of the above 92 participants, 48 (52.2%) had stunting and remaining 44 (47.8%) did not. Similarly, 50 (54.3%) had wasting while the remaining 42 (45.7%) did not (Table-1, Fig-1).

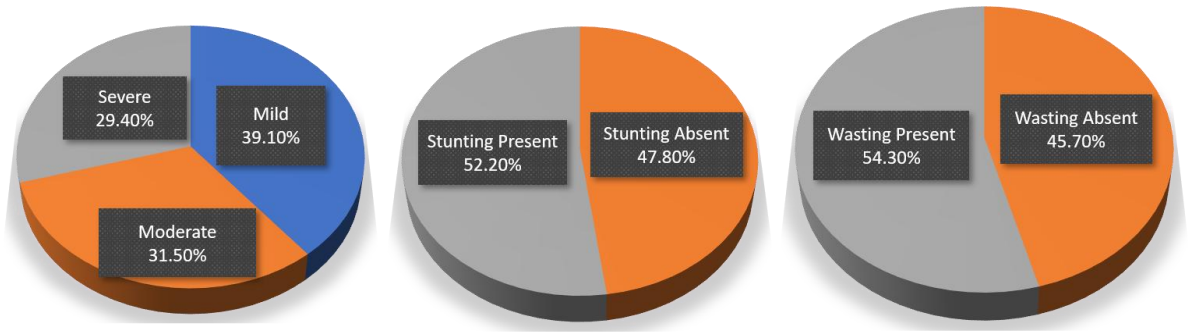
Of the 92 stool samples collected from subjects up to 5 years of age for malnutrition and intestinal parasitic study, 16 (17.4%) participants were found positive for intestinal parasites. Of the 92 stool samples, 8.3% were found positive for intestinal parasites in mild, 13.8% in moderate and 33.3% in severe Protein Energy Malnutrition category respectively. 25% of subjects in the stunting category and only 9.1% in the non-stunting category tested positive for intestinal parasites. Similarly, 26% of subjects in the wasting category and only 7.1% in the non-wasting category tested positive for intestinal parasites (Table-1, Fig-2).

The prevalence of intestinal parasites was significantly higher in severe protein energy malnutrition cases (χ^2=7.0936, *d.f.*=2, p=0.02882), stunting (χ^2=4.0443, *d.f.*=1, p=0.0443) and wasting subjects (χ^2=5.6497, *d.f.*=1, p=0.0175) as compared to mild protein energy malnutrition, non-stunting and non-wasting category (Table-1).

Table -1 Malnutrition

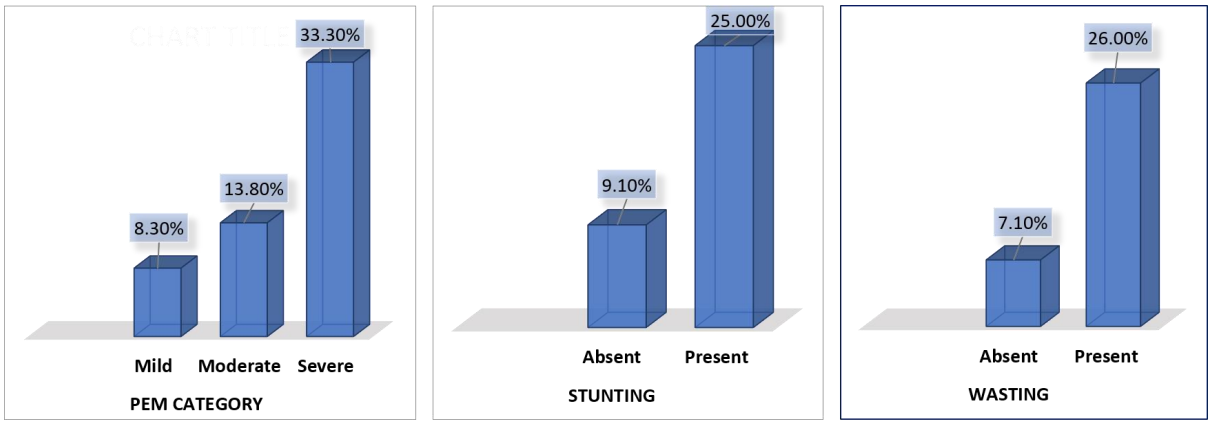
Distribution of participants as per presence and absence of stunting, wasting and different Protein Energy Malnutrition categories.

Characteristics	Parasite positive (%)	Parasite negative	Total	Chi Square value	OR	95% CI
Grade of PEM						
Mild	03 (8.3%)	33	29 (39.1%)	χ^2=7.0936	0.57	0.12-2.77
Moderate	04 (13.8%)	25	33 (31.5%)	*d.f.*=02	0.18	0.04-0.76
Severe	09 (33.3%)	18	30 (29.4%)	p = 0.02882	1.0	
Stunting				χ^2= 4.0443		
Absent	04 (9.1%)	40	44 (47.8%)	*d.f.*=01	0.3	0.09-1.01
Present	12 (25.0%)	36	48 (52.2%)	p = 0.0443	1.0	
Wasting				χ^2= 5.6497		
Absent	03 (7.1%)	39	42 (45.7%)	*d.f.*=01	0.22	0.06-0.83
Present	13 (26.0%)	37	50 (54.3%)	p =0.0175	1.0	
Total	**16 (17.4)**	**76**	**92**			



(a) (b) (c)

Fig-1. (a) Distribution of participants in different PEM category. (b)- Distribution of participants as per stunting present and absent. (c) Distribution of participants as per wasting present and absent.



(a) (b) (c)

Fig-2. (a) Prevalence of Intestinal parasitic positive patients in different PEM category.
(b)- Prevalence of Intestinal parasitic positive patients as per stunting present and absent.
(c) Prevalence of Intestinal parasitic positive patients as per wasting present and absent.

4. DISCUSSION

Intestinal parasitic infection continues a serious public health problem in developing countries like India, Nepal and Pakistan. Some of the morbid conditions attributed to intestinal parasitic infection are malnutrition, growth retardation, anemia and impaired intellectual performance. Impairment of physical and mental development have also been identified as a deleterious effect of helminthic infection (5). There are many published studies on malnutrition and intestinal parasitic infection in the child age group. However, to the best of our knowledge, this is the first study from Bulandshahr district to assess the nutritional status of children under five years of age and to find the correlation of intestinal parasites in them. We found that 17.4% of malnourished children under five years of age had intestinal parasitic infection. This prevalence of intestinal parasitic infection is lower than the 47.2% reported by Deka *et al.* (6) in a cross-sectional study among malnourished children under five years of age conducted in North Eastern India, and 22.7 % in another similar study from northwest Ethiopia. However, this is very similar to 17.5% prevalence of intestinal parasitic infection in malnourished children in Lucknow (7) and 16.6% from Nigeria (8).

The prevalence of intestinal parasites was significantly higher in severe protein energy malnutrition cases (χ^2=7.0936, *d.f.*=2, p=0.02882), stunting (χ^2=4.0443, *d.f.*=1, p=0.0443) and wasting subjects (χ^2=5.6497, *d.f.*=1, p=0.0175) as compared to mild protein energy malnutrition, non-stunting and non-wasting category. In our study, intestinal parasitic infection was found to be significantly higher in children with severe PEM, stunting and wasting. In a systematic review reported that ascariasis is the most

common infection with prevalence observed ranging from 10.77% in Ethiopia to 57.14% in Malaysia and intestinal parasitic infection was significantly associated with stunting, wasting, and underweight and underweight [1]. These findings are very similar to the findings of present study. Looking at the result of the present study, prima facie it seems that malnutrition is directly responsible for intestinal parasitic infection. But many reports suggest that there is no significant correlation between malnutrition and intestinal parasitic infection [6,8,10]. However, in most of the studies, poverty, illiteracy, and unhygienic condition have been significantly correlated with high intestinal parasitic infection as well as malnutrition [11-12]. Keeping all these studies in mind, the conclusion here comes out that poverty, illiteracy, and unhygienic condition are correlated with both malnutrition and intestinal parasitic infection. Hence, in cases of malnutrition, the prevalence of intestinal parasitic infection is found to be higher and sometimes it is also observed to be statistically significant. That is why, in the present study, malnutrition is shown to be statistically correlated with intestinal parasitic infection. Intestinal parasitic prevalence and malnutrition occur together. High prevalence of intestinal infection and malnutrition in children may contribute to the endemicity of intestinal parasitic infection in a particular area. Therefore, future research should be prioritized to generate data at the individual level. Furthermore, intestinal parasitic infection and malnutrition control interventions can be designed to integrate nutrition programs to interrupt the transmission of indigenous intestinal parasitic infection in endemic districts. Therefore, improvement in the quality of life of people, especially cleanliness, can reduce the prevalence of intestinal parasitic infections and malnutrition diseases.

CONCLUSION:

This study shows that intestinal parasitic infections are prevalent in the study area and require immediate control and preventive measures. The prevalence of intestinal parasites was observed high among malnourished under five years children. Educating the population about the spread of intestinal parasitic infections and promoting good hygiene practices with deworming services will have a substantial impact in the prevention of intestinal parasitic infections and malnutrition.

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