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Original Research Article

A Study on Prevalence of Intestinal Helminthiasis and their Association with Eosinophil in Adults

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Conflict of interest: Nil

Abstract

Background: Allergy and parasitic infections are common causes of blood eosinophilia. Intestinal helminthiasis remains a major health problem in many developing countries. Eosinophil'sare an effector immune cell against parasites.

Aims and Objective: To assess the prevalence of intestinal helminthes infections and associated factors among adult age group.

Methods And Materials: This case-control study was carried out from August 2024 to July 2025, age ranging from 18 to 45 years old including previously exposed adult person, with peripheral blood eosinophil's greater than 1000 per microliter who referring to OPD of the department of General Medicine and peripheral blood eosinophil's, during the above period for routine examination were included after obtaining the ethical committee clearance of the college.A total of 102 adult males and females, aged between 18-45 years, were enrolled in this study. Samples were chosen by using a simple random method. One hundred and ninety-six samples were collected from adults presented at Shantiniketan Medical College, Bolpur, West Bengal.

Result: The mean age in the case and control groups was 31 ± 2.12. Most of the male were in the case 57 (55.88%) and female 45 (44.11%) groups. By residence, in the case and control groups, 47 (46.07%) and 55 (53.92%) adults lived in urban areas, respectively; whereas the rest living in rural regions. The findings revealed that a significant association was found between gender with the prevalence of helminthic infections ($p<0.01$); considering residence, the statistical analysis showed no significant correlation ($p=0.31$) between residence and the prevalence of helminthic infections; so that helminthic infections were found in 19.2 and 23.1% in adults who live in urban and rural areas, respectively.

Conclusion: The obtained findings revealed the considerable prevalence of intestinal helminths parasites among adults with hyper eosinophilia. The results of the present study also suggest that physicians should pay more attention to worm infections as an important factor for eosinophilia.

Keywords: Helminths, Eosinophil, Prevalence and Parasites.

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Introduction

Eosinophilia is a health condition, which happens when the number of peripheral blood eosinophil's is greater than 450 per microliter, or when the eosinophil's account for more than 7% of the white blood cells [1]. Eosinophilia can be caused by both infectious and non-infectious processes, many of which may be clinically indistinguishable [1]. Eosinophilia may have different causes, from infectious to noninfectious agents including parasitic and fungal infections, Allergies, drug hypersensitivity, autoimmune disorders, toxins, etc. [2].Among the parasitic infections, eosinophilia is caused due to some protozoan (Cryptosporidium parvum, Cystoisospora belli, Giardia lamblia, Entamoeba histolytica, etc) and helminthic (Ascaris lumbricoides, Hymenolepisspp, Trichostrongylusspp,

Strongyloidesstercoralis, hookworms) parasites in human [2-5]. Parasitic diseases in terms of distribution, mortality, and morbidity are among the most important tropical infectious diseases around the world. The prevalence and distribution of different types of intestinal parasites vary from region to region and from country to country, due to differences in the environment and geographical as well as social factors [6, 7].

Therefore, epidemiological studies on the prevalence of intestinal parasitic in different regions and countries is an essential objective for determining the communities and groups at risk and formulating precautionary measures [8, 9].

Prevalence and Associated Factors

- Global Burden: Soil-transmitted helminths (STH) are the most common, impacting about 24% of the population, often associated with poor sanitation.
- Common Parasites: The most prevalent helminths in adults include hookworm, *Ascaris lumbricoides*, *Trichuris trichiura*, and *Strongyloidesstercoralis*.
- Risk Factors: High-risk factors for adults include working in agriculture, inadequate sanitation, walking barefoot, and consumption of unwashed vegetables.

Association with Eosinophil's

Immune Response: Eosinophil's are key effector cells in the host defense against parasitic worms, with numbers rising (eosinophilia) as part of a Th2 immune response.

Diagnostic Value: Eosinophilia is strongly associated with the presence of helminths, serving as a useful, though not exclusive, diagnostic marker.

Parasite Load: Increased eosinophil counts (commonly >6% or >cells/L) often correlate with the intensity of the infection, particularly during tissue-migratory phases.

Specific Associations: Infections with Ascaris lumbricoides and Hookworm are frequently linked with high eosinophil counts, sometimes even in the absence of severe symptoms

Aims and Objective: To assess the prevalence of intestinal helminthes infections and associated factors among adult age group.

Material and Methods

Study Design and Patients: This case-control study was carried out from August 2024 to July 2025, age ranging from 18 to 45 years old including previously exposed adult person, with peripheral blood eosinophil's greater than 1000 per microliter who referring to OPD of the department of Medicine and peripheral blood eosinophil's, during the above period for routine examination were included (case group).

The Exclusion Criteria: Subjects who did not agree to sign an informed consent, patients who had taken systemic antibiotics in the last three months, and also immune-compromised individuals. Questionnaire was considered to reach information about the Adult's demographics data and other variables related to helminthic infections, such as age, sex, residence, handwashing habit before eating, and consumption of raw or unwashed vegetables and fruits.

Study Population: A total of 102 adult males and females, aged between 18-45 years, were enrolled in this study. Samples were chosen by using a simple random method and were collected from adults presented at Shantiniketan Medical College, Bolpur, West Bengal.

Exclusion Criteria: Patients who were taking medications that may affect eosinophilia (e.g. penicillins and cephalosporins) or who had received anti-helminthic drugs within three months from the beginning of the study. Also, person known to have a food allergy or asthma were excluded from the study.

Inclusion Criteria: Age 18 to 45 years with both the sexes involved.

Ethical Considerations: This study was approved by the Ethical committee of the college. Also, permission to conduct this study was approved by the Department of internal medicine. Prior samples and data collection, the study objective was clarified to them. Oral consent was obtained to participate in this study.

Sample Collection: Two samples were obtained from each participant: blood and stool specimens. One gram of stool sample was emulsified in 7ml of 10% formalin for fixation. Blood samples were collected by finger prick using disposable lancets. Blood smears were made from capillary blood on a glass slide, left to air dry, and then fixed with absolute methanol.

The samples were collected in such a way that the day before stool sampling, a sterile container along with and applied questionnaire was given to each. The entire selected adult returned the next day to deliver the stool sample. Stool samples (one sample from each adult) were examined macroscopically for color, shape, stool consistency (watery, soft, and

formed), mucus, pus, smell, and presence of blood. All specimens were tested macroscopically for presence of some helminthes. Example- Ascaris, Enterobius, proglottids of Taenia, and adult hookworm by the naked eye or using a hand lens. Finally, the direct smear technique (wet mount) and formol-ether concentration technique and consequently microscopic examination were carried out[10, 11]. It should be mentioned, the adult patients who were diagnosed positive referred to the Medicine OPD to receive suitable orientations and medical treatments.

Examination of Stool Specimens: Stool samples were examined using Hoffman's sedimentation method. Helminthic ova are concentrated by passing the fecal suspension through gauze followed by centrifugation for two minutes at 1000 rpm. The upper liquid phase was discarded using a pipette. Two slides per fecal sample were prepared and read by two investigators.

Examination of blood films

Differential Blood Count: Fixed blood films were stained by Giemsa method. Blood films were washed and left to dry in air. Dried films were then examined microscopically using 40X and 100X objectives. One hundred white blood cells (WBC) were counted to determine the eosinophil percentages in the peripheral blood of each student. Relative Eosinophilia is considered when the count is greater than 5%.

Statistical Analysis: The statistics package used to analyse the data was the Statistical Package for the Social Sciences (SPSS) version 16.0 and the statistics tests used for each analysis is detailed along with the results.

Result

Participants in this cross-control survey, a total of 102adults including males and females with hyper eosinophiliawere included in this study and referred to evaluate the prevalence of helminthic parasites and also the associated risk factors among them. The mean age in the case and control groups was 31 ± 2.12. Most of the male were in the case 57 (55.88%) and female 45(44.11%) groups. By residence, in the case and control groups, 47 (46.07%) and 55 (53.92%) adults lived in urban areas, respectively; whereas the rest living in rural regions.

Among the adults in the case and control groups, 97(87.3%) and 94 (83.74%) had hand washing before eating, respectively; while the rest of them did not do it. In terms of consumed unwashed fruits and vegetables, in the case and control groups, 43 (37.4%) and 39 (35.8%) adults had consumed unwashed fruits and vegetables, respectively; while other adults did not consume unwashed fruits and vegetables. Prevalence of Helminthic infections Out of 102 adults sexes with eosinophilia (case group), the helminthic infection was found in 28(24.7%) adults; whereas from 102 healthy adults in the control group helminthic infection was found in 11 (9.8%) adults, indicating the significant difference ($p<0.001$) in the prevalence of helminthic infection among adults in the case and control groups. The most common helminths were Enterobiusvermicularis (8%), Hymenolepis nana (4.0%), and Trichostrongylus sp. (2.2%), respectively. No significant association was observed in the prevalence of helminthic infections in adult group with age-related groups ($p=0.325$) among the case and control groups. The findings revealed that a significant association was found between gender with the prevalence of helminthic infections ($p<0.01$); considering residence, the statistical analysis showed no significant correlation ($p=0.31$) between residence and the prevalence of helminthic infections; so that helminthic infections were found in 19.2 and 23.1% in adults who live in urban and rural areas, respectively. In the case of hand washing, the obtained results demonstrated no significant association between hand washing or not and the prevalence of helminthic infections ($p=0.16$); whereas 20 (20.2%) and 3 (23.1%) adult with the hand washing or not were found positive for helminthic, respectively. Based on the statistical analysis, there is a significant relationship between the consumption of unwashed fruits/vegetables or not and the prevalence of helminthic infections ($p<0.001$); so that, among adult, who consumed unwashed fruits/vegetables or not 29.3% and 15.5% were found positive for helminthic infections, respectively.

Discussion

In spite the vast scientific advances that have led to a reduction in the incidence and mortality of parasitic diseases in recent decades, parasitic infections are still one of the major health and social problems in most developing countries [13]. In the world, more than 2 billion people are infected with soil-transmitted helminth infections, of which nearly 450 million are diagnosed with a clinical and symptomatic condition [12, 13]. Of the 51 million deaths in the world, 39 million deaths are attributable to developing countries, and according to the statistics of 16 million deaths that occur annually in developing countries associated with infectious and parasitic diseases [13-16]. During the onset of many diseases such as allergies, asthma, rheumatic

diseases, malignancies, immunodeficiency, or either gastrointestinal or parasitic infection, including soil-transmitted infection, the level of peripheral blood eosinophil's may increase significantly [17, 18]. The present investigation was designed to evaluate the prevalence of the intestinal helminthic parasites among adults with hyper eosinophilia and healthy adult. The obtained findings revealed that out of 102 adults with eosinophilia in the case group, helminthic infections were found in 23 (20.5%) adults; whereas from 102 healthy adults in the control group, helminthic infections were found in 12 (10.7%) adults; indicating the significant difference ($p<0.001$) in the prevalence of helminthic infection among adults in the case and control groups. The most common helminths are Enterobiusvermicularis (8%), Hymenolepis nana (4.0%), and Trichostrongylus sp. (2.2%), respectively. On the other hand, we found Strongyloidesstercoralis, Trichuris trichiura, and Ascaris lumbricoides in the case group; however, none of these parasites were seen in the control group.

Conclusion

The obtained findings revealed the considerable prevalence of intestinal helminths parasites among adults with hyper eosinophilia. The results of the present study also suggest that physicians should pay more attention to worm infections as an important factor for eosinophilia.

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