Case report

Eosinophilia Can Serve As a Diagnostic Clues For Helminthic Infestations: A Case Series

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ABSTRACT

Human hookworm is a helminth infection caused by the nematode parasites, Necator americanus and Ancylostoma duodenale. Globally, estimated 472 million people are infected with hookworms. Necator americanus is endemic in America, Africa, southern China, and southeast Asian countries. Ancylostoma duodenale is endemic in north Africa, Mediterranean, northern regions of India and China. N. americanus larvae infect humans by transdermal or percutaneous transmission, A. duodenale larvae can penetrate the skin, infect orally, transmammary and transplacental transmission. Assessment of the haemoglobin concentration is the first step for diagnostic purposes. Complete blood counts demonstrate the presence of eosinophilia, is a diagnostic clue for nematode infection. Mebendazole and albendazole are the treatment of choice for hookworms. We present a case series, patients predominant complaints was watery diarrhoea. Evaluation of complete blood count, stool examination and other parameters were analyzed. Patients were given treatment based on clinical history, examination and laboratory investigations. On discharge all patients were symptomatically better, haematological parameters were normal, stool microscopy revealed no ova/egg and cyst and they advised for further follow-up on outpatient basis.

CASE REPORT 1:

A 70 year old female patient, from a lower socioeconomic background admitted in hospital with presenting complaints of abdominal pain, watery diarrhoea since 8 days and fever for 3 days. She did not have other specific systemic illness. Her occupation is farmer. Specifically mention that she used to do work in barefoot. Clinical examination showed pallor and no other significant findings seen. Blood investigations revealed haemoglobin levels of 6.1 gm/dL and elevated eosinophil count of 27.4% indicative of severe anaemia with eosinophilia. The patient stool sample was sent for microscopy and culture to identify the presence of bacteria such as shigella, salmonella, vibrio and ova/egg or cyst by the stool concentration technique. Macroscopically, the stool was watery in consistency. 0.5 unit blood in stool was negative. Stool culture did not yield any organism but wet mount examination showed the presence of hookworm egg. Based on the findings oral mebendazole was given for 3 days twice daily and 2 units of whole blood was transfused. The patient showed significant clinical improvement after the treatment and diarrhoea was stopped. Haemoglobin levels raised to 8.4 gm/dL. Stool examination was repeated showed no ova/egg. The patient was advised to maintain standards in personal hygiene, sanitation and come for further regular follow-up on outpatient basis.

CASE REPORT 2:

22 year old female (gravida 1) was admitted to our hospital with complaints of nausea, watery diarrhoea for past 3 days at 11 weeks of gestation age. General examination showed pallor and no other significant findings seen. Her initial blood investigations revealed haemoglobin levels of 8.3 gm/dL and high eosinophil count of 31% indicative of severe anaemia with eosinophilia. The patient stool sample was sent to performed wet mount showed eggs of hookworm. Other parasitic infection in the blood tests were negative. Factors associated with anaemia during pregnancy such as occupation, gestation age, gravidia, miscarriages, habit of pica, HIV status, source of water, toilet facility, food security were assessed and none was associated with anaemia during pregnancy. She was given iron and folic acid supplementation, deworming to treat anaemia. The patient was advised for regular antenatal visit follow up. On subsequent visit, stool examination and blood investigations was repeated showed no ova/cyst and blood parameters were normal respectively.

CASE REPORT 3:

37 year old male was admitted in casualty due to watery diarrhoea for 11 days. Fever and fatigue had developed after 3 days. Watery diarrhoea frequency had increased from three times per day to 5 times per day. There was no past history of diabetes mellitus, hypertension, heart disease. Severe dehydration was present on the time of admission. He was admitted for further management. Initially fluid resuscitation was started to stabilize the patient. Empirical oral antibiotic was started but still diarrhoea persist. The laboratory examination showed low haemoglobin levels of 5.8

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Hookworm infection are most common in tropical countries and highest prevalence was seen in Sub Saharan Africa, Asia, Latin America and the Caribbean regions. In India, Ancylostoma duodenale is more prevalent and it is associated with severe anaemia and heavy parasitic load. Severity of infection is directly proportion to the increase with age. Agricultural areas provide favourable conditions for survival and transmission of hookworms infection depends on temperature, moisture, soil. However, parasitic infection is the major cause of eosinophilia in developing countries. Therefore, clinicians should consider as a differential diagnosis for anaemia while it is seen in worm infection [1]. Hookworm infections are coincides with a marked rise in peripheral blood eosinophils count. Loefller's syndrome with low-grade fever may precede abdominal symptoms in few cases but some are asymptomatic in the pre-patent period. Marked eosinophilia occur and diminishes at the patency period. Following treatment, eosinophil counts become normal in 2-3 months [2]. Helminths and its antigens induce the T helper cell type 2 response which results in the release of interleukin (IL)-4, IL-5 and production of immunoglobulin E (IgE), eosinophil and mast cell responses. The eosinophils play a major role in releasing the powerful mediators such as major basic protein, eosinophil cationic protein, eosinophil peroxidase, and eosinophil neurotoxin, they directly damage host tissues as well as infectious worms. Eosinophilia reflects the control of the infection but alone not sufficient to remove the parasite[3]. Though involves both cellular and antibody-mediated immune response, eosinophils aimed the larval stage of the parasite results in increased levels of circulating immunoglobulin E (IgE) through all stages of the hookworm infection. According to WHO, grade 0 anemia (normal) 12.5 to 16 g/dL in male and 12.1 to 15.1 g/dL in female. Grade 1 anemia (mild) 10 – 12 g/dL, grade 2 anemia (moderate) 8 to 10 g/dL and grade 3 anemia (severe) less than 7.9 g/dL hemoglobin concentration respectively. So, individual with parasitic infection associated with eosinophilia status over a long period of time is essential. However, confounding factors are present at any period of time, large scale studies would contribute for understanding the correlation between anaemia and eosinophilia in parasitic infection [4]. In reproductive state hookworm infection was associated with higher eosinophil counts. Hookworm infection prevalence is high in pregnant state. Hookworm infected women in first, second, and third trimester showed eosinophil counts 12%, 1%, and 15% higher than uninfected women respectively[5]. Hookworm-pinworm co-infections have been reported rarely. Parasitic infections cause on malnutrition, anaemia, cognitive impairment and more prone to infections. Risk factors include low socioeconomic status, poor personal hygiene, poor sanitation, low education rates, host immunity to these infections. Dual infections common in developing country due to migration from rural to urban population. However, a co-infection of hookworm with Enterobius vermicularis coinfection so far not reviewed in literature. An effective treatment for co-infection includes both short-term and long-term therapy like sanitation improvement and access to potable drinking water [6]. A parasitic infection cause significant eosinophilia but absence of eosinophilia does not rule out parasite infection. In addition parasitic infection, fungal infection, HIV, allergy, neoplasms may also induce eosinophilia [7]. Hookworm species transmit the infections primarily through different routes, N americanus via skin penetration, Ancylostoma via oral intake of third-stage larvae and transmammary route [8]. Complications include iron deficiency anemia, cutaneous larvae migrans, eosinophilic pneumonia and rarely it is gastrointestinal bleeding [9]. Hookworm infection cause morbidity than mortality. In pregnancy, hookworm infection risk is higher and it has effect on both the mother and fetus. Reinfection occur following the hookworm treatment. In high endemic regions, moderate reinfection rates occur which require repeated drug treatment. Post-treatment reinfection rate was 25% for hookworms seen in children during the follow-up [10]

Discussion:

Hookworm infection is diagnosed as early as possible based on the evaluation of epidemiology, clinical history, and stool microscopic examination, blood investigations. Patients present with non-specific symptoms or anemia. Management is either by single-dose albendazole or multi-dose mebendazole. Endemic areas with non-specific symptoms or anemia. Management is either by single-dose albendazole or multi-dose mebendazole. Endemic areas require mass treatment. Health education and sanitation are the essential tools for preventing the disease. The vaccine is not available currently but under ongoing research and development. Clinician should suspect parasitic infection when eosinophilia associated with anemia because of the prevention of morbidity and its complications.

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References


