EOSINOPHILIA AS AN IMPORTANT INDICATOR OF HOOKWORM INFECTION WHEN STOOL EXAMINATION IS NEGATIVE FOR HOOKWORM OVA

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ABSTRACT
Objective: A detailed study was done to highlight the importance of eosinophilia as an important indicator of hookworm infection when stool examination is negative for hookworm ova. Methods: A study of 1307 patients who had undergone upper gastro-intestinal endoscopy for a period of 5 years and one month from May 2009 to May 2014 was carried out. In each of these 1307 patients, the first and second part of duodenum were carefully examined to find out the presence of hookworms. In all the patients found to have hookworms in duodenum, investigations were done to know about the presence of eosinophilia and severe eosinophilia. The results were found as given below. Results: Out of these 1307 patients, 14 patients found to have hookworms in duodenum while doing upper gastro-intestinal endoscopy were taken into consideration for our study. Out of these 14 patients with hookworms in duodenum, severe eosinophilia was found in 4 patients. Out of these 4 patients with severe eosinophilia, stool examination was done for hookworm ova in one patient with severe eosinophilia. But stool examination was negative for hookworm ova in this patient with severe eosinophila. In the other patients with severe eosinophilia, stool examination could not be done. Conclusion: Hence, even in patients with severe eosinophilia with hookworm infection stool examination can be negative for hookworm ova. Hence upper gastro intestinal endoscopy should be done to confirm the presence of hookworms in all patients with severe eosinophilia since stool examination can be negative for hookworm ova in such patients.

KEYWORDS: eosinophilia, severe eosinophilia, hookworm infection, upper gastro-intestinal endoscopy.

INTRODUCTION
Eosinophilia occurs very commonly in hookworm infection. Hence a detailed study was done to highlight the importance of eosinophilia as an important indicator of hookworm infection when stool examination is negative for hookworm ova.

MATERIALS AND METHODS
This study was conducted in the department of general surgery, Aarupadai Veedu Medical College and Hospital, Puducherry. A study of 1307 patients who had undergone upper gastro-intestinal endoscopy for a period of 5 years and one month from May 2009 to May 2014 was carried out. In each of these 1307 patients, the first and second part of duodenum were carefully examined to find out the presence of hookworms. In all the patients found to have hookworms in duodenum, investigations were done to know about the presence of eosinophilia and severe eosinophilia. Eosinophilia is defined as eosinophils or = 500 cells/cu.mm. Severe eosinophilia is defined as eosinophils > 1000 cells/cu.mm. The results were found as given below.

RESULTS
1. Out of these 1307 patients, 14 patients found to have hookworms in duodenum while doing upper gastrointestinal endoscopy were taken into consideration for our study.
2. Out of these 14 patients with hookworms in duodenum, as many as 10 patients with hookworms in duodenum were found to have absolute eosinophil count > or = 500 cells/cu.mm or eosinophilia[71%].
3. 4 out of 10 patients with eosinophilia(40%) had absolute eosinophil count > 1000 cells/cu.mm or severe eosinophilia.
4. Out of these 4 patients with severe eosinophilia, stool examination was done for hookworm ova in one patient with severe eosinophilia. But stool examination was negative for hookworm ova in this patient with severe eosinophilia. In the other patients with severe eosinophilia, stool examination could not be done.
5. Multiple hookworms in duodenum with severe eosinophilia (absolute eosinophil count - 1100cells/cu.mm) but with negative stool examination for hookworm ova is shown in Fig 1, 2.
Hookworms are one of the most prevalent parasites of humans in developing countries. They cause little mortality, heavy infections can cause iron-deficiency anaemia, growth retardation and low birth weight. Hookworms are most prevalent in South America, sub-Saharan Africa and East Asia; however, up until the second half of the 20th century, they were also common in the southern states of USA, Europe and Australia, where they still affect some remote aboriginal communities. The two major anthropophilic hookworm species are Necator americanus and Ancylostoma duodenale. Many parasites spread through the fecal contamination of food and water. This type of infection occurs most frequently in areas with inadequate sanitation and education. Certain parasites, such as hookworms (Necator americanus and Ancylostoma duodenale) are common species of soil-transmitted helminthes, and infection can cause significant nutritional deficiencies, delayed physical and cognitive development during childhood and reduced productivity in adults.

Eosinophils are bone marrow-derived leukocytes whose development and terminal differentiation are under the control of several cytokines (IL-3, GM-CSF and IL-5), with IL-5 being the cytokine that is primarily responsible for eosinophilopoiesis. Eosinophils and neutrophils share a common morphology but the eosinophils are a little larger than the neutrophils and measure 12-17 μm in diameter. They usually have two nuclear lobes and the cytoplasm has distinctive spherical orange granules. The underlying cytoplasm which is usually obscured by granules is pale pink. The major function of eosinophil as a cytotoxic cell is against helminthic infections. Eosinophils can kill a wide variety of helminthic worms especially in their larval stages, by depositing cationic proteins on the surface of the parasite. Conventionally eosinophils have been considered as an end-stage cells involved in host protection against parasites. The circulating life span of eosinophil is 6-12 hrs before it migrates to tissue but unlike the neutrophils it can recirculate and have a much longer life.

An increase in the peripheral blood eosinophils has long been recognized as a characteristic feature of helminth infection, consumption of medications, allergic disorders, and autoimmune and malignant diseases. However, parasitic infection is the major cause of eosinophilia in developing countries. It is widely accepted that helminths and their antigens induce the T helper cell type 2 (Th 2) response, resulting in the production of interleukin (IL)-4, IL-5 and consequently the development of strong immunoglobulin E (IgE), eosinophil and mast cell responses. The eosinophils release large amounts of potent mediators, such as major basic protein, eosinophil cationic protein, eosinophil peroxidase, and eosinophil neurotoxin, all of which may directly damage tissues in addition to damaging the infectous worms. Perhaps the increase in peripheral blood eosinophils in infected patients reflects the control of the infection but is not in itself sufficient to eliminate the parasite.

Zawawy et al. show that the helminthic cause of eosinophilia of only 9 from 53 patients can be diagnosed with the stool examination. With the immunoelectrophoresis for tissue parasite antigen, the helminthic cause can be identified up to 37 cases, because some of them do not pass ova into the stool. Hence even in patients with severe eosinophilia with hookworm infection stool examination can be negative for hookworm ova.
CONCLUSION
1. Severe eosinophilia occurs in significant number of patients with hookworm infection as seen in our study.
2. But even in patients with severe eosinophilia with hookworm infection stool examination can be negative for hookworm ova.
3. Hence severe eosinophilia is an important indicator of hookworm infection especially when stool examination is negative for hookworm ova.
4. Hence upper gastro intestinal endoscopy should be done to confirm the presence of hookworms in all patients with severe eosinophilia since stool examination can be negative for hookworm ova in such patients.

ACKNOWLEDGEMENT
The author acknowledges the immense help received from the scholars whose articles are cited and included in references of this manuscript. The author is also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

REFERENCES