



A Detailed Study of Severity of Eosinophilia and its Relation with Number of Hookworms in Duodenum in Patients with Hookworm Infection Found While Doing Endoscopy

KEYWORDS

presence or absence of eosinophilia, severe eosinophilia, hookworm infection, upper gastro-intestinal endoscopy.

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ABSTRACT *Objective: Eosinophilia occurs very commonly in hookworm infection. Hence a detailed study was done to know about the severity of eosinophilia and its relation with number of hookworms in duodenum in patients with hookworm infection found while doing upper gastro intestinal endoscopy.*

Methods: A study of 1259 patients who had undergone upper gastro-intestinal endoscopy for a period of 5 years from May 2009 to April 2014 was carried out. In each of these 1259 patients, the first and second part of duodenum were carefully examined to find out the presence of single or multiple hookworms. In all the patients found to have hookworms in duodenum, investigations were done to know about the presence or absence of eosinophilia and the presence of severe eosinophilia. The results were found as given below.

Results: Out of these 1259 patients, 14 patients found to have hookworms in duodenum were taken into consideration for our study. Out of these 14 patients, as many as 10 patients with hookworms in duodenum were found to have eosinophilia [71%]. Severe eosinophilia was found in 4 out of 10 patients with eosinophilia (40%). The remaining 6 out of 10 patients had only mild eosinophilia. But 4 patients with hookworms in duodenum did not have any eosinophilia. All the 4 patients with severe eosinophilia are associated with multiple hookworms in duodenum. But majority of the patients without eosinophilia and with mild eosinophilia are associated with only single hookworm in duodenum.

Conclusion: Hence, majority of the patients without eosinophilia and with mild eosinophilia are associated with only single hookworm in duodenum. But all the 4 patients with severe eosinophilia are associated with multiple hookworms in duodenum. Hence, severity of eosinophilia is directly proportional to the number of hookworms in duodenum.

Introduction:

Eosinophilia occurs very commonly in hookworm infection (1 to 13). Hence a detailed study was done to know about the severity of eosinophilia and its relation with number of hookworms in duodenum in patients with hookworm infection found while doing upper gastro intestinal endoscopy.

Materials and Methods:

This study was conducted in the department of general surgery, Aarupadai Veedu Medical College and Hospital, Puducherry. A study of 1259 patients who had undergone upper gastro-intestinal endoscopy for a period of 5 years from May 2009 to April 2014 was carried out in Aarupadai Veedu Medical College and Hospital, Puducherry. In each of these 1259 patients, the first and second part of duodenum were carefully examined to find out the presence of single or multiple hookworms. In all the patients found to have hookworms in duodenum, investigations were done to know about the presence or absence of eosinophilia and the presence of severe eosinophilia. Eosinophilia is defined as eosinophils $> \text{or} = 500 \text{ cells/cu.mm}$ (14). Severe eosinophilia is defined as eosinophils $> 1000 \text{ cells/cu.mm}$ (4). Absolute eosinophil count between 500 cells/cu.mm and 1000 cells/cu.mm is taken as mild eosinophilia. The results about the severity of eosinophilia and its relation with number of hookworms in duodenum were found as given below.

Results:

1. Out of these 1259 patients, 14 patients found to have hookworms in duodenum while doing upper gastro-intestinal endoscopy were taken into consideration for our study.
2. Out of these 14 patients with hookworms in duode-

num, as many as 10 patients with hookworms in duodenum were found to have absolute eosinophil count $> \text{or} = 500 \text{ cells/cu.mm}$ or eosinophilia [71%].

3. 4 out of 10 patients with eosinophilia had absolute eosinophil count $> 1000 \text{ cells/cu.mm}$ or severe eosinophilia.
4. The remaining 6 out of 10 patients with eosinophilia had absolute eosinophil count between 500 cells/cu.mm and 1000 cells/cu.mm or mild eosinophilia.
5. But 4 patients with hookworms in duodenum did not have any eosinophilia.
6. 3 out of 4 patients (75%) without eosinophilia had only single hookworm in duodenum.
7. 5 out of 6 patients (84%) with mild eosinophilia had only single hookworm in duodenum.
8. But all the 4 patients (100%) with severe eosinophilia had multiple hookworms in duodenum.

Discussion:

1. Absence of eosinophilia and its relation with number of hookworms in duodenum - Make all the highlighted letters bold. 1. Absence of eosinophilia and its relation with number of hookworms in duodenum

3 out of 4 patients (75%) without eosinophilia had only single hookworm in duodenum.

Single hookworm in duodenum without eosinophilia [absolute eosinophil count - 364 cells/cu.mm] seen in a patient in our study is shown in Fig 1. The hookworm in duodenum is identified by its bent head which looks like a hook and S-shaped appearance (15). (Fig 1).

Hence majority of the patients with absence of eosinophilia (75%) had only single hookworm in duodenum .

2. Mild eosinophilia and its relation with number of hookworms in duodenum

5 out of 6 patients (84%) with mild eosinophilia (absolute eosinophil count between 500 cells/cu.mm and 1000 cells/cu.mm)had only single hookworm in duodenum .

a. Single hookworm in duodenum with mild eosinophilia [absolute eosinophil count - 858cells/cu.mm] seen in a patient in our study is shown in fig 2. The hookworm in duodenum is identified by its bent head which looks like a hook (Fig 2) .

b. Single hookworm in duodenum with eosinophilia [absolute eosinophil count - 870cells /cu.mm] seen in a patient in our study is shown in fig 3. The hookworm in duodenum is identified by its bent head which looks like a hook (Fig 3) . Hence majority of the patients with mild eosinophilia (84%) had only single hookworm in duodenum .

3. Severe eosinophilia and its relation with number of hookworms in duodenum

But all the 4 patients with severe eosinophilia had multiple hookworms in duodenum.

- a. Multiple hookworms in duodenum seen in a patient with severe eosinophilia(absolute eosinophil count - 1100cells/cu.mm) is shown in fig 4.
- b. Multiple hookworms in duodenum seen in a patient with severe eosinophilia[absolute eosinophil count - 1248cells/cu.mm]] is shown in fig 5.

Hence all the patients(100 %)with severe eosinophilia had multiple hookworms in duodenum.

Conclusion:

1. 3 out of 4 patients without eosinophilia had only single hookworm in duodenum .
2. 5 out of 6 patients with mild eosinophilia had only single hookworm in duodenum .
3. But all the 4 patients with severe eosinophilia had multiple hookworms in duodenum.
4. Hence, multiple hookworms in duodenum produces severe eosinophilia with absolute eosinophil count>1000 cells/cu.mm.
5. But majority of the patients without eosinophilia and with mild eosinophilia are associated with only single hookworm in duodenum.
6. Hence, severity of eosinophilia is directly proportional to the number of hookworms in duodenum.

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Fig 1: Single hookworm in duodenum with its bent

head like a hook and S-shaped appearance in the patient without eosinophilia [absolute eosinophil count - - 364cells/cu.mm]



Fig 2: Single hookworm in duodenum with its bent head in a patient with mild eosinophilia [absolute eosinophil count - 858cells/cu.mm]



Fig 3: Single hookworm in duodenum in a patient with mild eosinophilia [absolute eosinophil count - 870cells/cu.mm]



Fig 4: Multiple hookworms in duodenum in a patient with severe eosinophilia (absolute eosinophil count - 1100cells/cu.mm)



Fig 5: Multiple hookworms in duodenum in a patient with severe eosinophilia [absolute eosinophil count - 1248cells/cu.mm]

References

1. Kato T, Kamoi R, Iida M, Kihara T. Endoscopic diagnosis of hookworm disease of the duodenum. *J Clin Gastroenterol.* 1997 Mar;24(2):100-102
2. Anjum Saeed, Huma Arshad Cheema, Arshad Alvi, Hassan Suleman. Hookworm infestation in children presenting with malena -case series. *Pak J Med Res Oct - Dec 2008;47(4) :98-100*
3. Verboeket SO1, van den Berk GE, Arends JE, van Dam AP, Peringa J, Jansen RR. Hookworm with hypereosinophilia: atypical presentation of a typical disease. *J Travel Med.* 2013 Jul-Aug;20(4):265-7
4. Heukelbach J, Poggensee G, Winter B, Wilcke T, Kerr-Pontes LR, Feldmeier H. Leukocytosis and blood eosinophilia in a polyparasitised population in north-eastern Brazil. *Trans R Soc Trop Med Hyg.* 2006 Jan;100(1):32-40. Epub 2005 Sep 23.
5. Nutman TB, Ottesen EA, Ieng S, Samuels J, Kimball E, Lutkoski M, Zierdt WS, Gam A, Neva FA. Eosinophilia in Southeast Asian refugees: evaluation at a referral center. *J Infect Dis.* 1987 Feb;155(2):309-
6. Tritteerapapab S, Nuchprayoon I. Eosinophilia, anemia and parasitism in a rural region of northwest Thailand. *Southeast Asian J Trop Med Public Health.* 1998 Sep;29(3):584-90.
7. Lawn SD1, Grant AD, Wright SG. Case reports: acute hookworm infection: an unusual cause of profuse watery diarrhoea in returned travellers. *Trans R Soc Trop Med Hyg.* 2003 Jul-Aug;97(4):414-5.
8. Wang CH, Lee SC, Huang SS, Chang LC. Hookworm infection in a healthy adult that manifested as severe eosinophilia and diarrhea. *J Microbiol Immunol Infect.* 2011 Dec;44(6):484-7. Epub 2011 May 23.
9. Yan SL, Chu YC. Hookworm infestation of the small intestine. *Endoscopy* 2007; 39: E162±163 .
10. Lee VJ1, Ong A, Lee NG, Lee WT, Fong KL, Lim PL. Hookworm infections in Singaporean soldiers after jungle training in Brunei Darussalam. *Trans R Soc Trop Med Hyg.* 2007 Dec;101(12):1214-8. Epub 2007 Oct 4.
11. Kucik CJ, Martin GL, Sortor BV. Common intestinal parasites. *Am Fam Physician.* 2004 Mar 1;69(5):1161-8
12. Mawhorter SD. Eosinophilia caused by parasites. *Pediatr Ann.* 1994 Aug;23(8):405, 409-13.
13. Li ZS1, Liao Z, Ye P, Wu RP. Dancing hookworm in the small bowel detected by capsule endoscopy: a synthesized video. *Endoscopy.* 2007 Feb;39 Suppl 1:E97. Epub 2007 Apr 18.
14. Meltzer E, Percik R, Shatzkes J, Sidi Y, Schwartz E. Eosinophilia among returning travelers: a practical approach. *Am J Trop Med Hyg.* 2008 May;78(5):702-9.
15. Cedrón-Cheng H, Ortiz C. Hookworm Infestation Diagnosed by Capsule Endoscopy. *J Gastroint Dig Syst* 2011 S1:003. doi: 10.4172/2161-069X.S1-003