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## RESEARCH ARTICLE

### PRESENCE OF BOTH ANAEMIA AND EOSINOPHILIA IN THE EARLY STAGE OF HOOKWORM INFECTION IN OUR STUDY – AN EXTREMELY IMPORTANT FINDING

\*Govindarajalu Ganesan

Department of General Surgery, Indira Gandhi Medical College and Research Institute, Puducherry-605009

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#### ABSTRACT

**Objective:** Many studies have shown the presence of anaemia in hookworm infection. Many studies have also shown the presence of eosinophilia in hookworm infection. But so far detailed study was not done to know about the occurrence of both anaemia and eosinophilia in patients with early stage of hookworm infection found while doing upper gastro-intestinal endoscopy. Hence a detailed study was done to know about the occurrence of both anaemia and eosinophilia in patients with early stage of hookworm infection found while doing upper gastro-intestinal endoscopy.

**Methods:** A study of 1137 patients who had undergone upper gastro-intestinal endoscopy for a period of four years and eight months from May 2009 to December 2013 was carried out. In each of these 1137 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 hookworm in duodenum, investigations were done to know about the presence or absence of anaemia and the presence or absence of eosinophilia. The results were found as given below.

**Results:** Out of these 1137 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, 9 patients had anaemia and 6 of these 9 patients were found to have mild anaemia indicating early stage of hookworm infection. Out of these 6 patients with mild anaemia in early stage of hookworm infection, 4 patients also had eosinophilia.

**Conclusion:** Four patients with mild anaemia in the early stage of hookworm infection also had eosinophilia. Hence in addition to mild anaemia in the early stage of hookworm infection eosinophilia is another important indicator of hookworm infection.

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#### INTRODUCTION

Many studies have shown the presence of anaemia in hookworm infection (1 to 5, 7 to 9, 11, 13, 14, 22, 24). Many studies have also shown the presence of eosinophilia in hookworm infection (10 to 23). But so far detailed study was not done to know about the occurrence of both anaemia and eosinophilia in patients with early stage of hookworm infection found while doing upper gastro-intestinal endoscopy. Hence a detailed study was done to know about the occurrence of both anaemia and eosinophilia in patients with early stage of 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 1137 patients who had undergone

upper gastro-intestinal endoscopy for a period of four years and eight months from May 2009 to December 2013 was carried out. In each of these 1137 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 or absence of anaemia and the presence or absence of eosinophilia. Anaemia is defined as haemoglobin < 12g/dl or 12g% in women and haemoglobin < 13g/dl or 13g% in men. Mild anaemia is taken as haemoglobin 10 to 12g/dl or g%, moderate anaemia is taken as haemoglobin 7 to 10g/dl or g% and severe anaemia is taken as haemoglobin < 7g/dl or g%. Eosinophilia is defined as eosinophils > or = 500 cells/cu.mm (17). Severe eosinophilia is defined as eosinophils > 1000 cells/cu.mm (6). The results were found as given below.

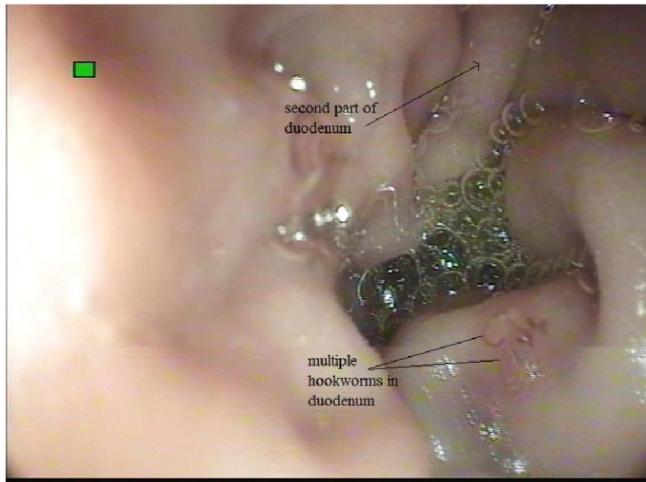
#### RESULTS

1. Out of these 1137 patients, 14 patients found to have hookworms in duodenum while doing upper gastro-intestinal endoscopy were taken into consideration for our study.

\*Corresponding author: Govindarajalu Ganesan

Department of General Surgery, Indira Gandhi Medical College and Research Institute, Puducherry-605009

2. Out of these 14 patients with hookworms in duodenum, 9 patients had anaemia and 6 of these 9 patients were found to have mild anaemia indicating early stage of hookworm infection.
3. Out of these 6 patients with mild anaemia in the early stage of hookworm infection, 4 patients also had eosinophilia.



**Fig. 1. Multiple hookworms in duodenum in a patient with mild anaemia (haemoglobin 11.7 g %) and with severe eosinophilia (absolute eosinophil count – 1248 cells/cu.mm)**



**Fig. 2. Single hookworm in duodenum in a patient with its bent head and S-shaped appearance with mild anaemia (haemoglobin 11.7 g %) and with eosinophilia (absolute eosinophil count – 870 cells/cu.mm)**

## DISCUSSION

### Mild anaemia with eosinophilia in the early stage of hookworm infection [4 patients]

1. Out of the 4 patients with mild anaemia with eosinophilia in the early stage of hookworm infection in our study, one patient had mild anaemia (haemoglobin 11.2 g %) and also had mild eosinophilia (absolute eosinophil count- 500 cells/cu.mm).
2. Another patient had mild anaemia (haemoglobin 10.4 g %) and also had mild eosinophilia (absolute eosinophil count – 500 cells/cu.mm).
3. The third patient had mild anaemia (haemoglobin 11.7 g %) and also had severe eosinophilia (absolute eosinophil count – 1248 cells/cu.mm).
4. Multiple hookworms in duodenum with mild anaemia (haemoglobin 11.7 g %) and severe eosinophilia [absolute eosinophil count – 1248 cells/cu.mm] seen in this patient is shown in Fig 1.
5. The fourth patient had mild anaemia (haemoglobin 11.7 g %) and also had eosinophilia (absolute eosinophil count – 870 cells/cu.mm).
6. Single hookworm in duodenum with mild anaemia (haemoglobin 11.7 g %) and eosinophilia [absolute eosinophil count - 870 cells/cu.mm] seen in this patient is shown in Fig. 2.
7. The hookworm in duodenum is identified by its bent head which looks like a hook (Fig. 2) and by its S-shaped appearance (4) (Fig. 2).
8. Hence mild anaemia is an important indicator of early stage of hookworm infection.
9. Eosinophilia is another important indicator of hookworm infection as seen in our study.
10. Hence upper gastro-intestinal endoscopy should always be done in all patients with eosinophilia even when there is mild anaemia to confirm the presence of hookworms in tropical and subtropical countries.

## Conclusion

- Four patients with mild anaemia in the early stage of hookworm infection also had eosinophilia in our study.
- Mild anaemia is an important indicator of early stage of hookworm infection.
- In addition to mild anaemia in the early stage of hookworm infection eosinophilia is another important indicator of hookworm infection as seen in our study.
- Hence upper gastro-intestinal endoscopy should always be done in all patients with eosinophilia even when there is mild anaemia to confirm the presence of hookworms in tropical and subtropical countries.

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