

**FAECAL OCCULT BLOOD TEST IN INTESTINAL HELMINTHIASIS****ARUNAVA KALI*, S. SRIRANGARAJ AND K.S. SEETHA***Department of Microbiology, Mahatma Gandhi Medical College & Research Institute, Pondicherry.***ABSTRACT**

Enteric helminthic infection is one of the most important public health issues in developing countries. These infections are transmitted by faeco-oral route and cause significant morbidity among patients of all age groups, especially in school age and pre-school age children. The clinical presentation may be vague and non-specific. Frequently, patients with enteric helminthic infection (especially in case of hookworm) have occult lower intestinal bleeding which may be a useful adjunct to parasitic diagnosis. In this study, faecal samples from 716 patients were screened for occult blood and enteric parasites. Out of 716 patients, 6% and 5.16% were positive for faecal occult blood test (FOBT) and enteric helminthes respectively. The sensitivity and specificity of FOBT were 59.50% and 96.90%. The results indicate the need to consider parasitic load and retesting of successive stool samples while interpreting FOBT.

KEYWORDS: Faecal occult blood test; intestinal helminthic infection; soil transmitted helminthiasis

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INTRODUCTION

Intestinal helminthic infections are prevalent worldwide affecting more than 2 billion people.¹ A vast majority of the global disease burden is attributed to developing countries in tropical and subtropical region. Since faeco-oral transmission of the infective forms of these helminthes is closely related to soil, these are also termed as soil transmitted helminthiasis (STH).² Hook worms (*Ancylostoma duodenale*, *Necator americanus*), *Ascaris lumbricoides*, and *Trichuris trichiura* are the most frequently encountered enteric parasites in all age groups accounting for 438.9 million, 819.0 million and 464.6 million infections globally.³ The school age and pre-school age children are particularly at risk of acquiring these infections.¹ Often the clinical presentations of these infections lack specific signs and symptoms and may manifest as stunted growth, malnutrition, vitamin deficiency, iron deficiency anaemia and impaired cognitive development.³ Occult intestinal bleeding is a frequent association with these helminthic infections. Therefore, faecal occult blood test (FOBT) may have adjunctive role in diagnosis of intestinal helminthic infections.⁴ India contributes to a large portion of patients with STH. Although several studies have reported the prevalence of STH in various parts of the country, only a minor number of studies have commented on usefulness of FOBT. Hence, this study was carried out to evaluate the performance of FOBT in intestinal helminthiasis.

METHODOLOGY

1. Study Design

A prospective, cross sectional study was conducted in Department of Microbiology in a tertiary care hospital in south India from February, 2013 to March, 2014.

2. Patients

Stool samples received from both inpatients and outpatient departments for detection of enteric parasites were included in this study. As per the exclusion criteria, patients who are known or found to have carcinoma,

inflammatory (i.e. Ulcerative colitis, Crohn's disease), ulcerative or erosive conditions (i.e. oesophagitis & gastritis) and vascular disorders (i.e. varices, haemangioma) involving gastrointestinal tract (GIT) were excluded from the study.

3. Interventions

Stool samples were screened for intestinal parasites by saline and iodine mount techniques under low and high power objectives of microscope. Faecal occult blood was detected using Haemospot kit (Tulip Group, Goa, India) following manufacturer's instruction. Known positive and negative samples were utilized for quality control. Development of blue colouration at two minutes indicates positive test and presence of at least 5 mg/dl of occult blood in the stool.

4. Statistical Analysis

SPSS statistical software version 17.0 was used for analysis of clinical & laboratory data. Percentage, proportions, sensitivity, specificity and positive and negative predictive values (PPV and NPV) were calculated.

RESULTS

Out of 716 patients, 37 (5.16%) had an intestinal helminthic infection, whereas, 43 (6%) had occult intestinal bleeding. Hook worms (5.16%, n=31) were most common helminth, followed by *Ascaris lumbricoides* (n=2), *Strongyloides stercoralis* (n=2), *Trichuris trichiura* (n=1) and *Hymenolepis nana* (n=1). Six of the 31 patients with *A. duodenale* infection were negative for faecal helminthes on the first occasion and were found positive for *A. duodenale* eggs on examination of second stool sample. Among 58 patients positive for intestinal helminthic and/or faecal occult blood, 38 were males (mean age 32.8 ± 3 years) and 20 females (mean age 33.8 ± 3.4 years). Table 1 shows the result of FOBT and stool microscopy in males, females and in different age groups. The sensitivity, specificity, PPV and NPV of FOBT were 59.5%, 96.9%, 51.1% and 97.7% respectively.

Table 1
Comparison of serum sialic acid levels of HNC patients and healthy controls

	Total	Helminth only	Occult blood only	Both positive	Male	Helminth only	Occult blood only	Both positive	Female	Helminth only	Occult blood only	Both positive
5-10 yr	10	1	5	4	8	1	4	3	2	0	1	1
10-20 yr	7	3	2	2	4	0	2	2	3	3	0	0
20-40 yr	21	5	10	6	13	2	7	4	8	3	3	2
40-60 yr	16	4	4	8	10	2	3	5	6	2	1	3
> 60 yr	4	2	0	2	3	2	0	1	1	0	0	1
All ages	58	15	21	22	38	7	16	15	20	8	5	7

DISCUSSION

Occult intestinal bleeding is a non-specific finding which reflects the underlying pathological changes like ulcer, erosion, inflammation, neoplasia, vascular abnormalities involving GIT.⁵ Colorectal carcinoma is an important cause of occult intestinal bleeding in elderly patients and FOBT is commonly employed as a screening test.⁶ In developing countries, intestinal helminthic infections account for most cases of positive FOBT, especially in children. Poor sanitation & hygiene, lack of public awareness, inadequate public health measures to ensure supply of safe water are the main factors responsible for high endemicity of STH in these regions.^{1, 3, 7} As the name suggests, occult bleeding is presence of blood in faeces which is not detectable on gross appearance. While GI blood loss less than 2 ml/day is considered physiological, occult bleeding is pathological and it exceeds 2 ml blood loss per day.⁸ Moreover, chronic occult bleeding >5ml/day *per se* result in iron deficiency anaemia as in case of hook worm infection.^{8, 9} Among the different FOBT, Guaiac-based methods are most widely employed.¹⁰ It is rapid, simple and cost effective. It is based on the peroxidase-like activity of hemoglobin.^{5, 11} Oxygen released from the hydrogen peroxide (in reagent solution) by hemoglobin oxidizes colourless guaiac to coloured quinones.⁵ However, intake of diet rich in heme/hemoglobin (*i.e.* meat, liver), vegetable peroxidases and medicinal iron preparations often leads to false positive results.^{5, 11}

Likewise, dietary reducing substances like Vitamin C in may give rise to false negative test. Heme-porphyrin test spectrophotometrically detects the porphyrin derived from haemoglobin. Hence, it precludes false positive related to vegetable peroxidases, but has the same limitations in associated with non-human haemoglobins.⁵ In contrast, immunochemical tests are unaffected by diet and are superior to both guaiac-based and heme-porphyrin tests with greater sensitivity.⁵ However, higher cost, technical complexity and loss of antigenicity of globin at room temperature limit its use. In this study, most patients with intestinal helminthic and/or faecal occult blood were in 20-60 years age group. Although high prevalence of helminthiasis has been reported among school age and pre-school age children,^{1, 3, 7, 12, 13} here children less than 10 years accounted for only 17.2%. This may be related to the fact that the study design was not community based. Hence, occurrence of helminthiasis in hospital patients may not correctly represent the community scenario. Hook worm was most common (5.16%), followed by *A. lumbricoides*, *S. stercoralis*, *T. trichiura* and *H. nana*. This is in accordance with other studies from South India.¹⁴ Kattula *et al.* reported 6.3%, 1.2% and 0.8% prevalence of hook worms, *A. lumbricoides* and *T. trichiura* in school children.⁷ Prevalence of hook worm was particularly higher in rural areas. In the current study, FOBT had 59.5% sensitivity, 96.9% specificity, 51.1% PPV and 97.7% NPV. FOBT failed to detect 15 patients with GI helminthiasis. This may be related to the species of helminth and a low worm

burden in the patient. Similar observation has been reported in other studies in case of hook worms and *Trichuris*.^{15, 16} On other hand, 21 FOBT positive patients had no intestinal parasite. Stool concentration methods were not used and no special instruction was given to patients to restrict diet before collecting stool samples. Hence, this may reflect false positive result (intake of dietary heme/hemoglobin/ peroxidases), patients with underlying GI pathology or inability to demonstrate parasites in direct microscopy as in case of intermittent shedding and low number of helminth eggs in stool. In a study from Saudi Arabia, Wakid et al. found no significant difference in FOBT positivity among GI helminth infected and non-infected patients.¹⁰ However, another study from Malaysia reported the utility of FOBT in *Trichuris* infected primary school children.¹⁷ Wanachiwanawin *et al.* screened 146 school children in Thailand using both guaiac-based and immunochromatographic-based test and

found that *T. trichiura* worm burden of at least 500 eggs per gram was associated with occult intestinal bleeding.¹⁶ In conclusion, occult intestinal bleeding is a common manifestation of intestinal helminthic infection. FOBT could be utilized as an adjunct to demonstration of parasitic forms in stool. However, selection of proper FOBT method and dietary restriction are crucial factors which should be considered in order to avoid erroneous result.

CONCLUSION

Occult intestinal bleeding is a common manifestation of intestinal helminthic infection. FOBT could be utilized as an adjunct to demonstration of parasitic forms in stool. However, selection of proper FOBT methods and dietary restriction are crucial factors which should be considered in order to avoid erroneous result.

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