

**ANAEMIA & PARASITISM: DO THEY GO HAND IN HAND?****VINAY KHANNA<sup>1\*</sup>, KRITI TILAK<sup>1</sup>, RUCHEE KHANNA<sup>2</sup>  
AND CHIRANJAY MUKHOPADHYAY<sup>1</sup>**<sup>1</sup>*Department of Microbiology, Kasturba Medical College, Manipal University, Manipal, Karnataka, India*<sup>2</sup>*Department of Pathology, Kasturba Medical College, Manipal University, Manipal, Karnataka, India***ABSTRACT**

Anaemia is considered as the chief cause of iron deficiency in the body which is the most prevalent nutritional deficiency throughout the world. Anaemia accounts for significant morbidity particularly in underdeveloped countries. Parasitic infestations are among the leading health problems in resource poor countries due to poor hygienic conditions. In the present study we aim to analyse association between anaemia and parasitism. We found that the leading parasites causing blood loss and hence resulting in anaemia are hookworm, whipworm, *Giardia lamblia* and *Blastocystis hominis*. We therefore conclude a positive association between parasitism and anaemia.

**KEYWORDS:** Anaemia, Parasitic diseases,

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## INTRODUCTION

Parasitic infestations are among the leading public health problems in underdeveloped and developing countries, mainly because of low socioeconomic status and poor sanitation conditions prevalent in several regions of these countries<sup>1</sup>. According to Rocha (2004), poor hygiene conditions and measures for public health education in combination with low socioeconomic status are factors responsible for increasing prevalence of parasitic diseases and anaemia in this population. In India, intestinal parasites are common, especially among children and the main consequences are: chronic diarrhoea, poor absorption of nutrients, anaemia, low attention span and learning disabilities. Anaemia is a blood related disease caused by the decrease of haemoglobin. It is considered as the leading cause of iron deficiency in the body, the most prevalent nutritional deficiency in the whole world. Screening for iron deficiency anaemia accompanying parasitic infestation is done by determination of haemoglobin. Although some studies could not establish a correlation between parasites and anaemia<sup>1</sup>, other authors have reported the presence of intestinal parasites associated with

appearance of anaemia<sup>2</sup>, and also with deteriorating nutritional status, especially in children<sup>1</sup>. Other authors observed a 26% reduction in cases of anaemia in children treated with anti-helminths<sup>3</sup>. It is estimated that nearly half of the world's children under the age of four years, in developing countries, are affected by anaemia.

## AIMS AND OBJECTIVES

The aim of the present study was to examine the relationships of haemoglobin (Hb) concentration and anaemia with common parasitic infections, including malaria, hookworm, *Ascaris lumbricoides* and *Trichuris trichiura*.

## MATERIALS AND METHODS

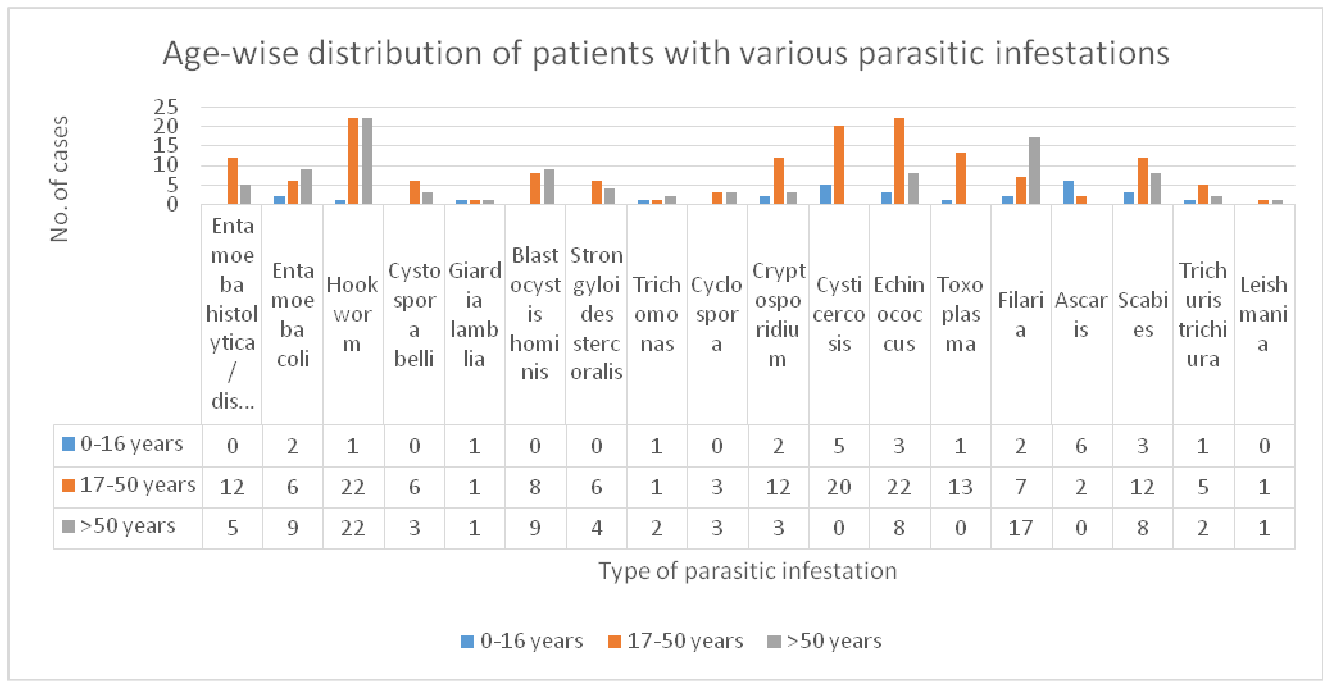
A total of 625 cases attending tertiary care center, diagnosed with various parasitic infestations, over a period of 5 years, were screened for low haemoglobin concentration. Haemoglobin concentration  $\leq 10$  mg% was taken into account. The data was analyzed using 16.0 spss software.

## RESULTS

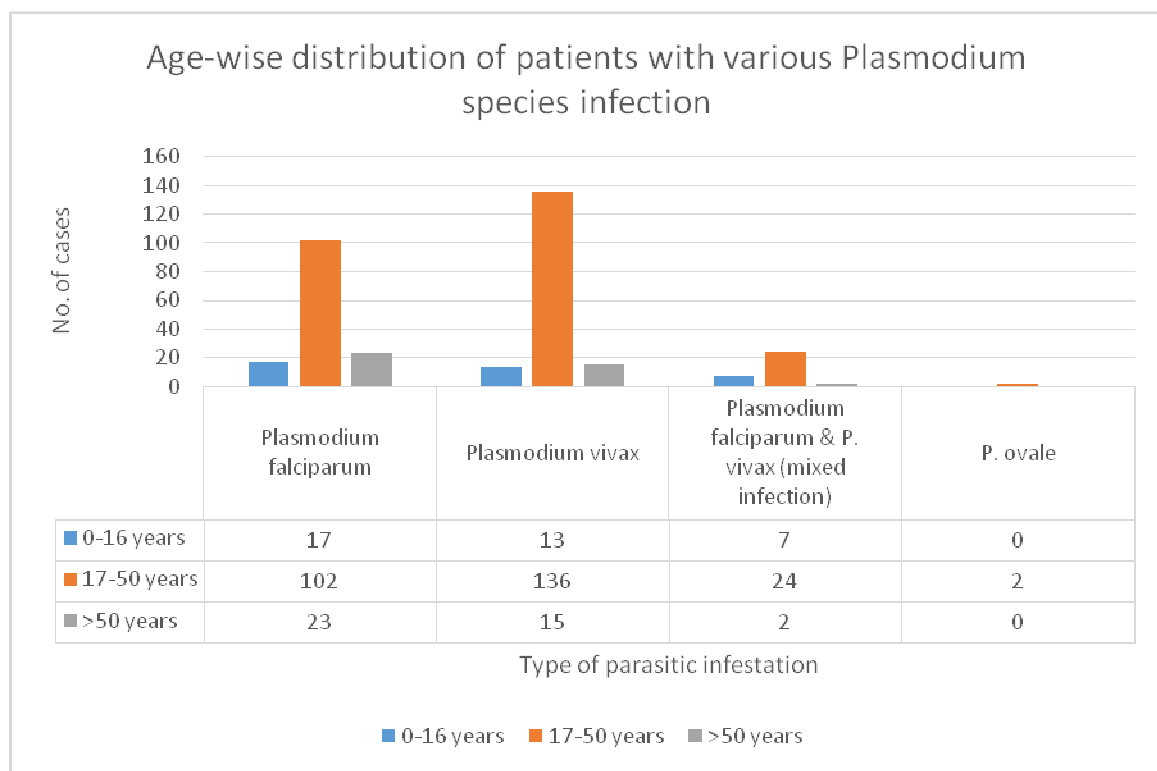
**Table 1**  
***Age wise distribution of patients with various parasitic infestations presenting with anaemia***

Haemoglobin (in mg%)		
Age (in years)	<10	>10
0-16	20	46
17-50	91	334
>50	38	96

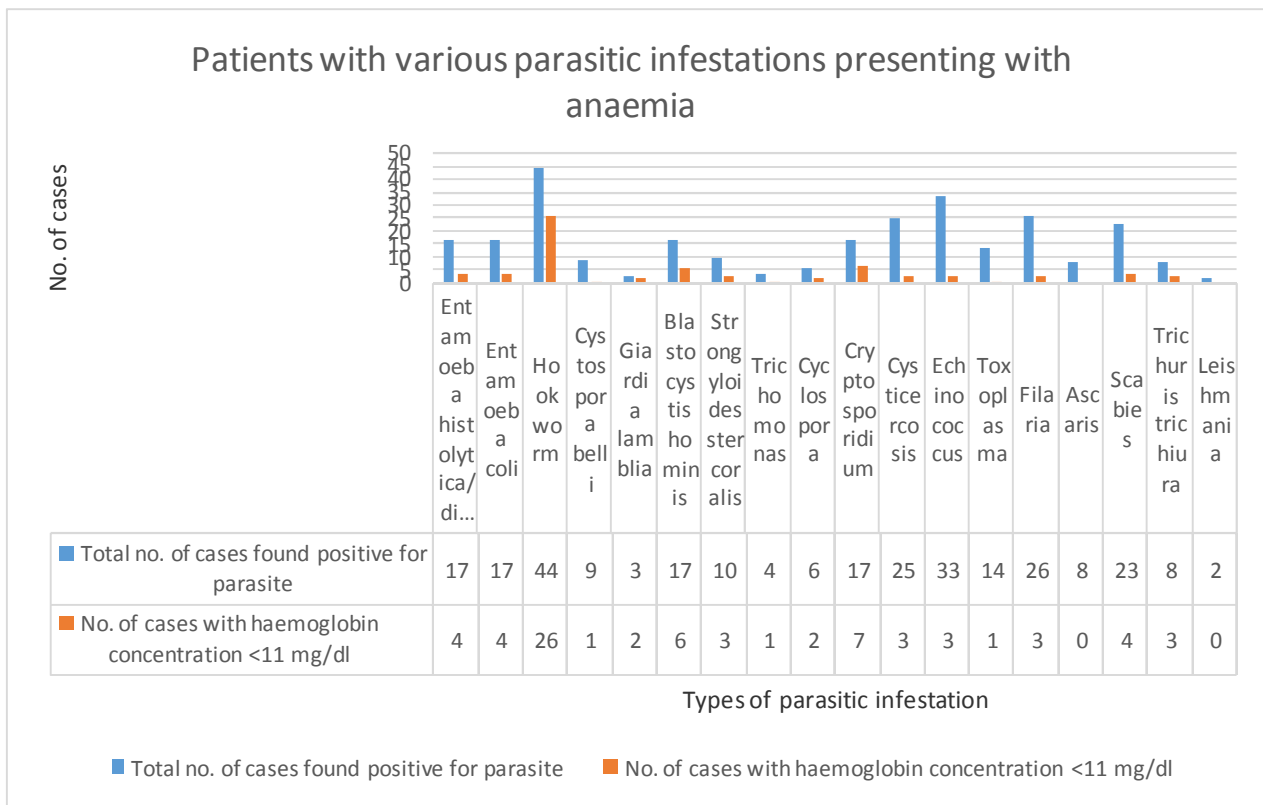
**Figure 1**  
**Age-wise distribution of patients with various parasitic infestations. (n=625)**



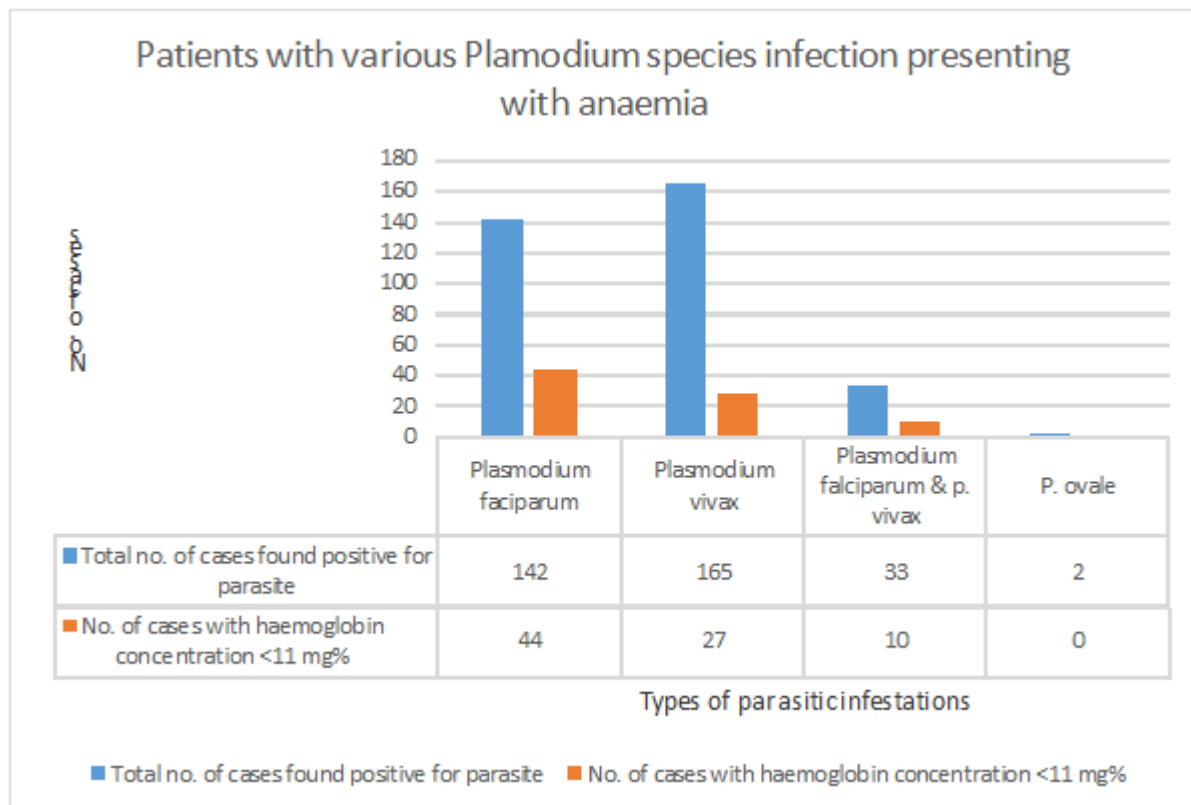
**Figure 2**  
**Age-wise distribution of patients with various Plasmodium species infection (n=625)**



**Figure 3**  
**Relationship between positive cases of parasitic infestation with anaemia (n=625)**



**Figure 4**  
**Relationship between positive cases of various Plasmodium species infection with anaemia (n=625)**



## DISCUSSION

Figure 1 and figure 2 clearly show that age-group 17-50 years is the most commonly affected age-group as far as parasitic infestations are concerned. These data have to be better investigated, since, in literature parasitic infestations are more commonly associated with children. Figure 3 and figure 4 show that the leading parasites causing blood loss in man and resulting in direct iron-deficiency anaemia include hookworm infection (*Necator americanus* and *Ancylostoma duodenale*); whipworm infection (*Trichuris trichiura*); *Giardia lamblia* and *Blastocystis hominis* infection. Radioisotope studies with chromium 51-tagged red blood cells have shown that patients with heavy hookworm infection can lose up to 250 ml of blood, daily, and up to 29 mg of iron in the gastrointestinal tract, thus leading to direct iron-deficiency anaemia<sup>4</sup>. Workers from South America and East Africa have made known that each *Necator americanus* worm can cause a daily blood loss of 0.03 ml, which implies that patients infected with approximately 1,000 worms can lose up to 30 ml of blood daily. Work from London and Egypt has shown that the Old World hookworm, *Ancylostoma duodenale*, can cause a daily blood loss of 0.2 ml which is approximately 10 times more than the American hookworm, *Necator americanus*. Layrisse and his colleagues, using <sup>51</sup>Cr-

tagged red cells, measured the blood loss caused by *T. trichiura* in heavily infected children and showed that the daily blood loss can reach up to 8.6 ml. These workers concluded that infection of over 800 parasites can lead to anaemia<sup>5</sup>. It has been shown by <sup>51</sup>Cr and body surface counting of radioactivity that the large spleen in chronic schistosomiasis, leishmaniasis, and malaria, can destroy the red blood cells and lead to anaemia secondary to hypersplenism. Malabsorption syndrome leading to poor absorption of essential nutrients may occur in patients heavily infected with hookworms, *Strongyloides stercoralis* and *Giardia lamblia*. Destruction of red blood cells leading to a haemolytic anaemia has been shown to occur in malaria, and vitamin B<sub>12</sub> megaloblastic anaemia has been demonstrated to occur in patients infected with the intestinal fish worm, *Diphyllobothrium latum*<sup>6</sup>.

## CONCLUSION

The present study revealed that the leading parasites causing blood loss and hence resulting in anaemia are hookworm, whipworm, *Giardia lamblia* and *Blastocystis hominis*. It is therefore concluded that a positive association exists between parasitism and anaemia.

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