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BLANKET ANTIHELMINTHIC THERAPY IN IRON DEFICIENCY ANEMIA; RIGHT OR WRONG?

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ABSTRACT

Iron deficiency anemia is a major health problem in adults. In developing nations empirical antihelminthics is advice in pediatric population with iron deficiency anemia, but the use is just extended to adult population frequently. Aim was to study the occurrence of helminthic infestation in cases of iron deficiency anemia. A descriptive study was done in 74 adult cases of iron deficiency anaemia diagnosed in Victoria hospital/ Bowring and Lady Curzon hospital-BMCRI. Patients fulfilling the inclusion criteria were evaluated with clinical survey for assessing hygienic practices, dietary habits and socioeconomic status, blood smear, iron studies, stool ova/cyst by concentration method and endoscopy. The mean age was 45.8 ± 16.015 years. Median hemoglobin was 7.65g/dl (IQR 2.58). Only 5.4% of the entire patients had helminthic infestation which is statistically insignificant ($p = 0.288$). Nutritional anemia 79.7%, malignancies 6.8% constituted other major causes of anemia. Although 90% of patients wore footwear, among patients with helminthic infestation 80% were walking barefoot ($p = 0.005$). Malignancies causing anemia were mainly found in age group above 60 yrs ($p = 0.003$). No significant association was found between tea/coffee intake and nutritional anemia ($p = 1.0$). This study shows no significant association between iron deficiency anemia and helminthic infestation in adults. Hence treating iron deficiency anaemia in adults with hygienic habits empirically with antihelminthics is questionable.

Keywords: *Adult Iron Deficiency Anemia, Blanket Antihelminthic Therapy*

INTRODUCTION

Anemia is defined as decreased number of red blood cells or insufficient oxygen carrying capacity to meet the physiological needs which vary by age, sex, altitude, smoking, and pregnancy status. Globally, 50% of anemia is attributable to iron deficiency and accounts for approximately 841,000 deaths annually worldwide. Africa and parts of Asia bear 71% of the global mortality burden (Geneva: World Health Organization, 2001). Iron deficiency anaemia reduces the work capacity of individuals, bringing serious economic consequences and obstacles to national development.

Intestinal helminths are among the most common and widespread of human infections, contributing to poor nutritional status, anaemia and impaired growth. Hookworm is considered as the major parasite causing iron deficiency anemia.

Most anaemia control programmes, particularly in the developing world, rely on iron supplementation as the core strategy; and administration of intestinal antihelminthic agents has been proposed as an additional intervention to reduce anaemia (Anjana *et al.*, 2007). A universal blanket treatment with broad-spectrum antihelminthics together with promotion of scholastic and health education and improvements in sanitation is recommended for helminth control in certain communities (Rebecca *et al.*, 2004).

The extensive use of antihelminthics ensures the potential of drug resistance among helminthes (Goodman, 2008).

Especially in the hook worm population with a frequency of 1-2 drug exposure. Various side effects are reported for antihelminthics (Geerts and Gryseels, 2001).

Considering the constraints of resources in a developing country like India, potential drug resistance for antihelminthics and the possible side effects of antihelminthics, a systematic study is required to assess the helminthic infestation as an etiological cause of iron deficiency anaemia in adults and whether the blanket use of antihelminthics is warranted or not.

Research Article

MATERIALS AND METHODS

A cross sectional study was carried out among 74 adult patients iron deficiency anemia were studied in Victoria Hospital/ Bowring and Lady Curzon Hospital-Bangalore Medical College and Research Institute (BMCRI). Anemic patients with history of acute blood loss, chronic diseases, lead exposure, recurrent blood transfusions, myeloproliferative disorders, kidney diseases, malabsorption syndromes and those with history of deworming in past one year are excluded from the study. Iron deficiency anemia is diagnosed on the basis of iron studies with serum ferritin less than 30 microgram/L and serum iron <20 µg/mL, peripheral smear and clinical correlation (WHO, 2011). An interview-administered questionnaire was used to gather information from participants on the demographic factors like age, gender, education and socio economic status by Kuppuswamy index and sanitary conditions, hygiene practices of the participants which assist the assessment of potential factors associated with serum iron status. Anemic patients fulfilling the inclusion criteria were assessed with peripheral smear for blood, OGD scopy, stool for ova and cyst by formalin ether concentration method and clinical survey (WHO, 2011). Consent of those who agreed to participate was taken.

Statistical Analysis

Statistical analysis was carried out using the SPSS software (Statistical Package for the Social Sciences) programme for windows version 13 (SPSS, Chicago, IL, USA). The normality of numerical variables were assessed using the Kolmogorov-Smirnov Z test. Associations of the categorical variable were assessed by Pearson's Chi-square and Fisher's exact test. The level of statistical significance was set as $p < 0.05$ to explore the strength of the association between iron deficiency anaemia, and the variable of interest.

RESULTS AND DISCUSSION

Results

Characteristics of Study Population

A total of 74 adults with iron deficiency anemia were studied; with regards to age, the mean age was 45.8 ± 16.015 yrs (18-78). The study population constituted 39 females and 35 males.

According to Kuppuswamy's socio economic class stratification 63.5% belonged to lower middle, 35% in the middle and rest in the upper middle class group. Median hemoglobin was 7.65 g/dl (IQR 2.58). Out of the 74 cases under study 79.7% had nutritional anemia, 6.8% had malignancies, 5.4% had helminthic infestation as a cause of anemia.

Although 90% cases used footwear, among patients with helminthic infestation 80% was not using footwear ($p = 0.005$). No significant association was found between tea/coffee intake and nutritional anemia ($p = 1.0$). Severity of anemia and helminthic infestation had no association ($p = 0.346$). Malignancies causing anemia was found in age group above 60 yrs only ($p = 0.003$). Only 5.4% of the entire patient group was found to have ova/cyst of helminths in their stools which is statistically insignificant (p value = 0.288).

Discussion

Anaemia is regarded worldwide as a medical condition deserving sustained public health intervention and still a major public health problem in many developing countries, especially in rural communities. It is estimated that most children and pregnant women in developing and 40.0% in developed countries are iron deficient (Geneva: World Health Organization, 2001). Among anemia, nutritional anemias constitute the major portion. Iron deficiency is considered to contribute to death and disability as a risk factor for maternal and perinatal mortality, and also through its direct contributions to cognitive impairment, decreased work productivity, and death from severe anemia. Global Burden of Disease (GBD) 2010 project of WHO points out iron deficiency as the major risk factor for 22,989 deaths and 1,59,23,200 DALY's (disability adjusted life years) (Stoltzfus, 2003). Major causes of iron deficiency anemias include dietary deficiency, frequent child birth, blood loss, kidney diseases, gastrointestinal surgeries, malignancies, helminthic infestations etc^[8]. In pregnant women and school children, helminthic infestation accounts for the majority of treatable causes of iron deficiency. Helminths commonly

Research Article

implicated in iron deficiency are *A. Duodenale*, *A. lumbricoides*, *T. Trichuris*. Helminthic infestation is particularly common among people with poor socio economic status, poor hygienic habits and low educational background. This fact is well proven by many of the studies (Ngui *et al.*, 2012; Guyatt *et al.*, 2001; Jennifer and Simon, 2010; Baidoo *et al.*, 2010). Majority of the studies were done either in pediatric population or in pregnant women. In developing nations empirical anthelmintics is advice in pediatric population with iron deficiency anemia, but the use is just extended to adult population frequently. Currently India is in a transition state from developing to developed nation, socioeconomic status is improving and literacy rate was 43% in 1981 and in 2011 it became 74.04% (Census of India). In the current scenario, studies which reassess the role of helminthic infestation as an etiological factor for anemia in adults is very few and the present study is meant to assess the correlation in the changing circumstances.

The mean age group is 45.8 ± 16.015 yrs (18-78), (figure 1) and the group was matched for sex distribution. Median hemoglobin is 7.65g/dl (IQR 2.58). The cut off for anemia (WHO 2008) is 12g/dl in non pregnant females, 11g/dl in pregnant females, and 13g/dl in males >15 yrs. The present group is divided into 3 classes according to severity, severe < 5g/dl, moderate 5-8g/dl, mild > 8g/dl and compared with the rest of the variables. Mild anemia group constituted 44.6% individuals, moderate 43.2% and severe 12.2 %. Socio economic class was divided into 3 according to Kuppuswamy's method, 63.5% belonged to lower middle, 35% in the middle and rest in the upper middle class group. The etiological causes of iron deficiency anemia we found in our patients are mentioned below figure 2. The diagnosis was made with iron studies, peripheral smear, endoscopy, ova/cyst identification in stools with concentration method and clinical correlation.

Distribution of Age

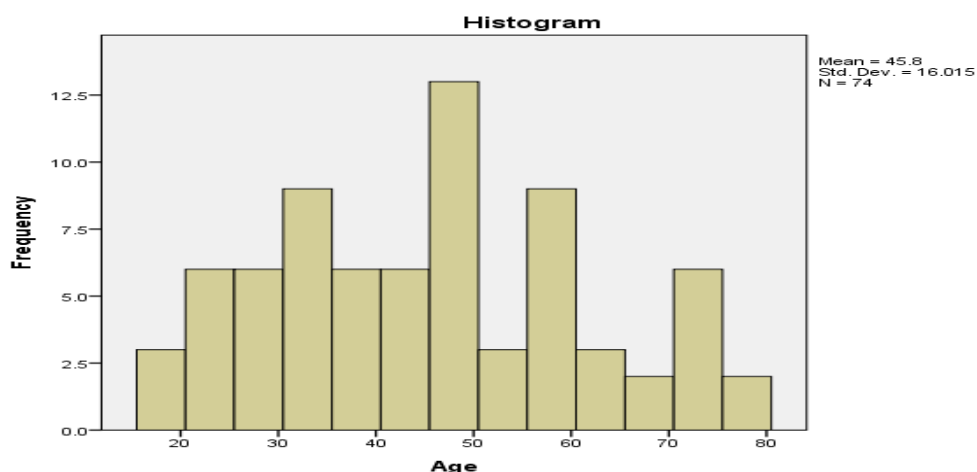


Figure 1: Distribution of etiological factors

On assessment nutritional anemia was found more in females (84%) than in males (74%). No association was found between anemia and socioeconomic class. There is an association between positivity of stool ova/cyst and low socio economic class (p value 0.04) similar to the findings of previous studies (Balcioglu *et al.*, 2007).

Hook worm infestation is found mainly in people walking barefoot. The eggs from the stool hatch out to become rhabditiform larvae, and they mature to filariform larvae which penetrate through the sole of feet (Paniker; Ilechukwu *et al.*, 2010). 90% of patients in our study wore footwear, but 80% of people with helminthic infestation walked barefoot. The present study also confirms the same association (p value 0.005).

Drinking tannin-containing beverages such as tea with meals may contribute to the pathogenesis of iron deficiency if the diet consists largely of vegetable foodstuffs (Disler *et al.*, 1975).

Research Article

The effect on the absorption of non-haem iron was ascribed to the formation of insoluble iron tannate complexes. Even though 90.5% of the patient group had the habit of drinking tea/coffee, the association was found to be poor (p value 1.0).

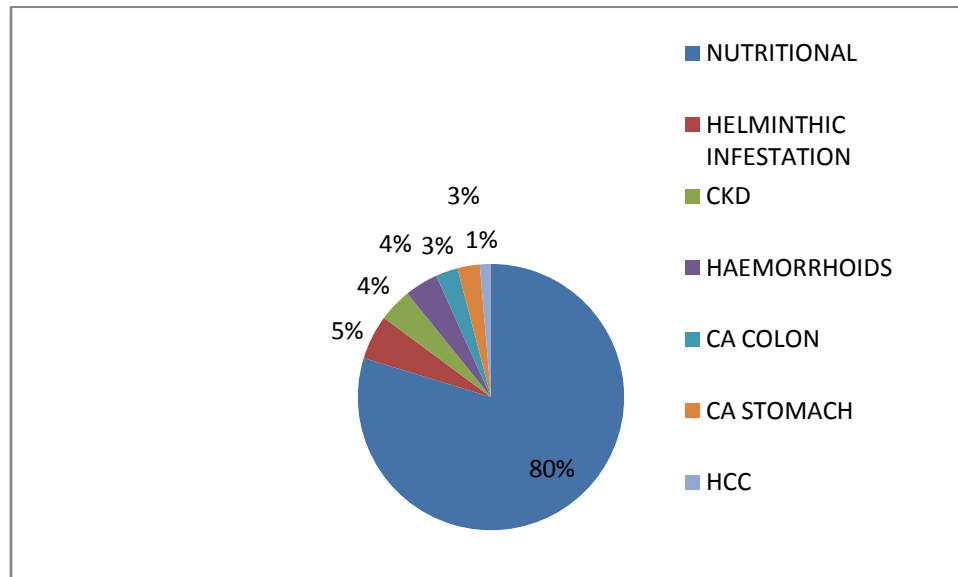


Figure 2

As enumerated above malignancy accounted for 6.8% of iron deficiency anemia in this study. The common cancers causing iron deficiency are colorectal cancers, gastric cancers (Chebbi *et al.*, 2014). Majority of the malignancies in the body can cause anemia, mechanisms proposed are anorexia, malabsorption, persistent inflammation, chronic blood loss etc. 2 patients had carcinoma stomach, carcinoma colon 2, hepatocellular carcinoma 1. Interestingly 80% of the patients with malignancy were above the age of 60 years. (P value 0.003). Hence ruling out malignancy with appropriate investigations like endoscopy is needful in elderly with iron deficiency anemia. All patients were subjected for the stool examination to detect the presence of ova/cyst of helminths. In this study stool for ova/cyst of intestinal helminths were examined using ether concentration method, which is having 90% sensitivity and 100% specificity (Judith and Enrique, 1983; BeBecker *et al.*, 2011). Only 5.4% of cases were positive for helminthic infestation. Ova/cyst of *A. duodenale*, *strongyloides*, and *ascaris* were identified and the most common is *A. Duodenale*. In the present study, which is conducted in BMCRI an apex institute located in the Bangalore city corporation, which serves both rural and urban population of Karnataka, only 5.4% of study population with iron deficiency anemia had helminth infestation. The association between helminth infestation and iron deficiency anemia as tested by Fischers exact test showed a p value of 0.288, and this association is statistically insignificant. In the previous studies done by Anjana *et al.*, (2007), Traub *et al.*, there was significant association between helminthic infestation and iron deficiency anemia (Anjana *et al.*, 2007; Rebecca *et al.*, 2004). Increased awareness about health, improved hygienic practices; overall development of the nation etc would have contributed to the recent change.

Conclusion

Anthelmintics are used empirically for the treatment of iron deficiency anemia. This study shows no significant association between iron deficiency anemia and helminthic infestation in adults. Further studies are required to reassess this recent change in trend. In view of potent side effects of these drugs, emerging anthelmintic resistance, financial burden on the nation for the blanket therapy; the need for empirical use of anthelmintics is questionable in adult population. However the presence of unhygienic practices in a patient with iron deficiency should prompt the physician to look for helminthic infestation, for the judicious use of anthelmintics.

Research Article

REFERENCE

- Anjana Gulani, Jitender Nagpal, Clive Osmond and Sachdev HPS (2007).** Effect of administration of intestinal anthelmintic drugs on haemoglobin: systematic review of randomized controlled trials. *BMJ*, published 13 April 2007.
- Baidoo SE, Tay SCK and Obiri-Danso KHH (2010).** Abruquah Intestinal helminth infection and anemia during pregnancy: A community based study in Ghana. *Journal of Bacteriology Research* **2**(2) 9-13.
- Balcioğlu IC, Kurt O, Limoncu ME, Dinç G, Gümüş M, Kilimcioglu AA, Kayran E and Ozbilgin A (2007).** Rural life, lower socioeconomic status and parasitic infections. *Parasitology International* **56**(2) 129-33.
- BeBecker SL, Lohourignon LK, Speich B, Rinaldi L, Knopp S, N'goran EK, Cringoli G and Utzinger J (2011).** Comparison of the Flotal-400 dual technique and the formalin-ether concentration technique for diagnosis of human intestinal protozoan infection. *Journal of Clinical Microbiology* **49**(6) 2183-90.
- Census of India. Literacy rate 1981
- Census of India. Literacy rate 2011
- Chebbi W, Arfa S, Zantour B and Sfar MH (2014).** Iron deficiency anemia in people aged 65 years and older: a cohort study of 102 patients. *Revue Médicale de Bruxelles* **35**(5) 405-10.
- Disler PB, Lynch SR, Charlton RW, Torrance JD, Bothwell TH, Walker RB and Fatima M (1975).** The effect of tea on iron absorption. *Gut* **16** 193-200.
- Geerts S and Gryseels B (2001).** Anthelmintic resistance in human helminths: a Review. *Tropical Medicine and International Health* **6**(11) 915-921.
- Geneva: World Health Organization (2001).** World Health Organization. *Iron Deficiency Anemia: Assessment, Prevention and Control* 167–190.
- Goodman (2008).** *Gilman's Manual of Pharmacology and Therapeutics* 695 to 706.
- Guyatt HL, Brooker S, Kihamia CM, Hall A and Bundy DA (2001).** Evaluation of efficacy of school-based anthelmintic treatments against anaemia in children in the United Republic of Tanzania. *Bulletin of World Health Organization* **79**(8) 695-703.
- Harrisons Principles of Internal Medicine 18th Edition. pages 846 to 851
- Ilechukwu GC, Ilechukwu CG, Ozumba AN, Ojinnaka NC, Ibe BC and Onwasigwe CN (2010).** Some behavioural risk factors for intestinal helminthiasis in nursery and primary school children in Enugu, south eastern Nigeria. *Nigerian Journal of Clinical Practice* **13**(3) 288-93.
- Jennifer L Smith and Simon Brooker (2010).** Impact of hookworm infection and deworming on anaemia in non-pregnant populations: a systematic review. *Tropical Medicine & International Health* **15**(7) 776-95.
- Judith A Levine and Enrique G Estevez (1983).** Method for Concentration of Parasites from Small Amounts of Feces. *Journal of Clinical Microbiology* **18**(4) 786-8.
- Ngui R, Lim YAL, Chong Kin L, Sek Chuen C and Jaffar S (2012).** Association between Anaemia, Iron Deficiency Anaemia, Neglected Parasitic Infections and Socioeconomic Factors in Rural Children of West Malaysia, edited by de Silva N. *PLoS Neglected Tropical Diseases* **6**(3) e1550.
- Paniker CKJ (No Date).** *Textbook of Medical Parasitology*, 6th edition 221 to 232.
- Rebecca J Traub, Ian D Robertson, Peter Irwin, Norbert Mencke and Andrew Thompson RC (2004).** The prevalence, intensities and risk factors associated with geohelminth infection in tea-growing communities of Assam, India. *Tropical Medicine and International Health* **9**(6) 688-701.
- Stoltzfus RJ (2003).** Iron deficiency: global prevalence and consequences. *Food and Nutrition Bulletin* **24**(4 Suppl) S99-103.
- WHO (2011).** *Vitamin and Mineral Nutrition Information System* 1-5.