# DETERMINATION OF IRON STATUS IN A RURAL POPULATION IN SRI LANKA : PREVALENCE OF ANAEMIA AND ORAL *MANIFESTATIONS*

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## ABSTRACT

The study was carried out using a randomly selected individuals from ten Grama Sevaka divisions of Kadugannawa M O H division. A total of 339 patients were used in this study and a detailed questionnaire was administered to record socioeconomic and clinical data of the subjects. Intravenous blood was drawn to assess haemoglobin level, packed cell volume and the blood picture. The data analysis was done using a programme called EPI INFO Version 5.

A total of 190 females and 149 of males were screened and their mean ages 49.2 + / - 14.1 and 46.5+ / - 15.6 years respectively. Only 2.7% of the patients were pure vegetarian and more than 85% of the patients consumed either fish, dry fish or chicken. However, around 50% of the group did not consume beef.

Only 8.3% of the patients gave a history of bleeding from the gastrointestinal tract, however, nearly 14% patients had menorrhgia. Almost 50% of the study group had symptoms associated with anaemia. This high figure cannot be attributed purely to anaemia because some of these symptoms were common to anaemia as well as other disorders. e.g. angina. In contrast only 14% of the patients had signs of anaemia and females formed a higher percentage(78%) of this group compared to males(22%). Atrophy of the tongue was the commonest clinical abnormality(15%) followed by angular cheilitis(6.2%) and abnormalities like koilonychia and brittle nails were rare among the patients.

Nearly 35.6% of the patients had a haemoglobin level less than 12 g/dl. however, when the cut-off point was lowered to 11 g/dl, the percentage of patients above this value rose to 81.9%. Even at this level nearly 20% of the population were anaemic which is a significant portion of the population and this data demonstrate the value of routine screening for anaemia in populations.

## Introduction

Iron deficiency anaemia is the commonest trace metal deficiency observed in both developing and developed countries in the World. This disorder is a serious public health problem in Asian countries including Sri Lanka ( WHO, 1965, Seneviratna, 1974 ). Nadiger (1980) quoted from various reports suggest a prevalence rate of anaemia from 10% in adult men to 80% in pregnant women. Loss of blood either due to hook worm infestations or due to other causes e.g. mennorhagia, haemorrhoids, are the commonest causes of iron deficiency anaemia (Wintrobe, 1961 ).

According to the natural history of Iron deficiency 3 stages can be identified: the first stage, iron depletion or storage deficiency is manifested by depletion of tissue ferritin and haemosiderin including a parallel deficiency of plasma ferritin, the second stage, the transport iron deficiency reflecting a low plasma iron level and a rise in the total iron binding capacity along with a reduction of percentage transferrin saturation, final stage, the erythropoietic iron deficiency

causing a reduction of haemoglobin concentration along with morphological abnormalities of red cells.

In the present study we assessed the terminal or final stage of iron deficiency in order to determine the prevalence of anaemia in a randomly selected rural population in Sri Lanka and to determine the oral lesions associated with this condition.

## Materials and Methods

Kadugannawa MOH area which comprised of 95 grama sevaka divisions was selected to carry out the study. Ten grama sevaka areas were selected randomly to do the screening. Using house holders list five males and five females were selected randomly for the following age strata : 15-24, 25-34, 35-44, 45-54, 55-64, 65-74 giving a total of 600 subjects for the study.

A questionnaire was administered to obtain socio-economic and dietary data. It also included questions to determine whether the patient had signs and symptoms of anaemia and history of bleeding disorders. The questionnaire was designed and the data was analysed using Epi Info version 5 programme developed by Centre For Disease Control, Atlanta, Georgia, USA.

### Haematological Assessment

Five millilitres of intravenous blood was withdrawn from each patient and the following investigations were carried out.

1.    Blood Picture
2.    Haemoglobin ( Cyanemethaemoglobin method )

## Results

Of the 600 patients only 339 subjects turned up for examination. The mean age of the females were 46.5 +/- 15.6 years and males 49.2 +/- 14.1 years ( Table 1 ).

**Table 1. Age and Sex distribution of the population**

| Sex | Number | Mean | Age Std. Devt. | Min | Max |
|-----|--------|------|----------------|-----|-----|
| F | 190 | 46.5 | 15.6 | 15 | 87 |
| M | 149 | 49.2 | 14.1 | 22 | 77 |

For the purpose of definition of anaemia a haemoglobin level below 12g/ dl was taken and using this criteria, the prevalence of anaemia for the population was found to be 35%. However, if the cut off point of haemoglobin was lowered to 11g/ dl, still 20% of the population was anaemic.

Almost 50% of the subjects had symptoms of anaemia, however, only 14% had signs of anaemia. The most consistent oral manifestation of anaemia was atrophy of the tongue (15%)

followed by angular cheilitis (6% ). Clinical features like glossitis, stomatitis and koilonychia was extremely rare in the anaemic subjects.

## Discussion

Prevalence of anaemia, as defined by those who had haemoglobin level below 12g/dl, was 35% and when the cut off point was lowered to 11g/dl, still 20% of the population was anaemic. This degree of anaemia is comparable with similar studies carried out in Asian countries ( WHO 1965). It is important to identify these subjects in screening programmes of this nature and initiate therapy having arrived at diagnosis for specific causes for anaemia.

Higher percentage of patients had symptoms ( 50%) compared to signs ( 14%). This cannot be attributed purely to anaemia because some of the symptoms of anaemia share with other disorders. e.g. angina, old age, etc. Of the 14% who had signs of anaemia, majority were women ( 78%) . This could explain on the basis that women are more vulnerable to develop anaemia due to high iron demand situations they are subjected to e.g. pregnancy, lactation or to conditions like mennorhagia.

The most consistent sign was atrophy of the tongue, followed by angular cheilitis in our population which is consistent with an earlier case control study reported by the author (Ranasinghe, 1977,1983a). Although clinical features like glossitis and stomatitis are common among iron deficient patients in western countries ( Stafford, 1965) these are extremely rare in Sri Lanka and in East African countries ( Jacobs, 1965). Atrophy of the oral epithelium may make this tissue more vulnerable to malignant transformation in the presence of carcinogens and co-carcinogens in betel quid or tobacco smoke, if patients indulge in such practices which are common in Sri Lanka.

In addition abnormalities of intermediary metabolism ( Ranasinghe et al 1985, 1989,) cell proliferation ( Ranasinghe, et al, 1987) and cell differentiation ( Ranasinghe, 1984) have been observed in oral epithelia of the experimental animals ( Ranasinghe et al, 1983b). Considering these evidence one tends to speculate a possible relationship between iron deficiency anaemia and oral cancer which is common in many Asian countries including Sri Lanka and this hypothesis is yet to be tested.

## Conclusions

Present work clearly demonstrates that atrophy of the tongue and angular cheilitis is a common feature in iron deficiency anaemia in our population, and clinicians should look for this simple clinical sign during routine examination of the mouth.

## References

Jacobs, A 1965 Epithelial changes in anaemic East Africans. B.M.J. I., 1711-1712.

Nadiger, H. 1980 Iron deficiency anaemia. Br. J. Nut, 43, 45-57.

Ranasinghe, A.W. 1977 Oral Mucosal changes in iron deficiency anaemia, M.Med.Sc. Thesis, University of Peradeniya, Sri Lanka.

Ranasinghe, A.W., Warnakulasuriya, K.A.A.S., Tennekoon, G.E., Seneviratna, B. 1983a Oral mucosal changes in iron deficiency anaemia. Oral Surg. 55, 29-32.

Ranasinghe, A.W., Johnson, N.W., Rountree R. 1983b Experimental iron deficiency anaemia in hamsters. Laboratory Animals 17, 210-212.

Ranasinghe, A.W., 1984 Effects of experimental iron deficiency on hamster cheek pouch epithelium. Ph. D. Thesis, University of London.

Ranasinghe, A.W., Johnson N.W., Williams R.A.D, Scragg, M.A 1985 Effects of iron deficiency on respiration of hamster cheek pouch. Arch. Oral Biol, 30, 651-654.

Ranasinghe, A.W., Johnson, N.W., Scragg, M.A. 1987 Iron deficiency depresses cell proliferation in hamster cheek pouch epithelium. Cell Tissue Kinet, 20, 403-412.

Ranasinghe, A.W., Johnson, N.W., Scragg, M.A, Williams, R.A.D. 1989 Effects of iron deficiency on cytochromes of mitochondria isolated from hamster cheek pouch epithelium J Oral Pathol., 11, 39-43.

Seneviratna, B. 1974 Some problems in the management of anaemia in tea estate workers in Sri Lanka. J Trop. Med. Hyg., 77, 177-81.

Stafford, J.L., 1965 Blood disorders in relation to dentistry. Ann. Royal Coll Surg. 36, 280-95.

WHO 1965 Nutritional anaemias. WHO Tech Rep Ser. No. 405.

Winntrobe, M.M. 1961 Clinical Haematology, 5th Ed. Kimpton London.