Analysis of Iron Indices in Oral Cancer and Oral Submucous Fibrosis

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Abstract

Background: Iron is one of the most abundant metals in the body and chronic iron deficiency also considered to cause OSMF as it leads to mucosal susceptibility to irritant substances like areca nut products and chilies.

Aims & objective: The aim and objective of study is to evaluate the levels of Serum Iron, Total Iron Binding Capacity (TIBC) and Serum Ferritin in patients of OSCC and OSMF and to compare them with that of a control group.

Materials and Methods: The study size was of 75 patients out of which 25 were allotted to group I -Oral squamous cell carcinoma, 25 cases to group II - Oral submucous fibrosis and 25 cases (Control).

Results: The result of the present study revealed that abnormalities in iron metabolism are present in a large number of our patients.The Probability of "t" in tracing of elements in OSCC between males and females in Group1, Group 2 and Group 3 are following: Serum Iron is 0. 1298, 0.000056, 0.15432, TIBC is 0. 0458, 0.000345, 0.000 and Serum Ferritin is 0.000245, 0. 23415, 0.000 respectively.

Conclusion: The study concluded that only the mean serum iron levels are lower in females compared to males in both the OSMF & OSCC groups.

Keywords: Serum Iron, Total Iron Binding Capacity, Serum Ferritin, OSMF, OSCC.

INTRODUCTION

Iron is one of the most abundant and necessary transition metals in the body. It is most commonly associated with the oxygen carrying function of heme iron, and the medical profession is more concerned with the effect of low iron which leads to anaemia, decreased oxygen carrying capacity of blood and related diseases.1

Oral squamous cell carcinoma (OSCC) is one of the leading causes of death in India. In submucosal fibrosis the hallmark of the disease is it affects most parts of the oral cavity, pharynx and upper third of the oesophagus. Nutritional deficiency mainly of iron and vitamins, is concerned in the aetiology of OSMF.2 Iron is vital for the total integrity and health of epithelia of digestive tract and its involvement to normal enzymatic functions.

OSMF is also considered as an Asian version of sideropenic dysphagia, wherein chronic iron deficiency leads to mucosal susceptibility to irritations, such as chilies and areca nut products.3 In particular serum iron levels are considered as biochemical pointers for nutritional assessment.4 The present study was done to comprehend the association between OSMF and iron indices by estimating the levels of ferritin, total iron binding capacity (TIBC) and Serum iron.

MATERIAL AND METHODS

The study was carried out on out-patients reporting to the Institute of Dental Studies and Technology, Modinagar and the other tertiary cancer care centres at the Department of Oncology, LLRM Medical College, Meerut. The study size was of 75 patients out of which 25 were allotted to group I -Oral squamous cell carcinoma, 25 cases to group II - Oral submucous fibrosis and 25 were in control group.

In this study we used aseptic blood collection from the patients. One of the veins in the antecubital fossa was chosen and made prominent by applying a tourniquet. The blood was drawn using a sterile 2-ml syringe and 21- gauge needle. The collected blood was then transferred to the plain vial for centrifugation in an electric centrifuge after labelling it with the patient details.

The vials were kept in the centrifuge for the separation of the serum for 15 minutes. The separated serum was collected via pipette and put in a test tube. The reagents for serum iron, TIBC and serum ferritin were added to it before putting into the autoanalyzer. The pre-treatment serum iron, serum ferritin and total iron binding capacity (TIBC) were measured in a MiniVidas semiautomatic analyzer.

Biostatistical Analysis

The interrelationship of serum iron, TIBC and ferritin was analysed by cross tabular analysis with the control group. ANOVA-F test and unpaired student t-test were applied to all the three groups amongst both males and females to find the significant analysis.

RESULTS

All the values of serum iron, TIBC and serum ferritin for both males and females in all the three groups, squamous cell carcinoma, oral submucous fibrosis and control group, are expressed as mean + S.D. (Figure 1, 2& 3)

However, unpaired student t-test showed a significant difference for serum ferritin in group I (oral squamous cell carcinoma), serum iron & TIBC in group II (oral submucous fibrosis) and TIBC & serum ferritin in group III (control group) respectively. These differences were at 1% level of significance. (Figure 1, 2 &3)

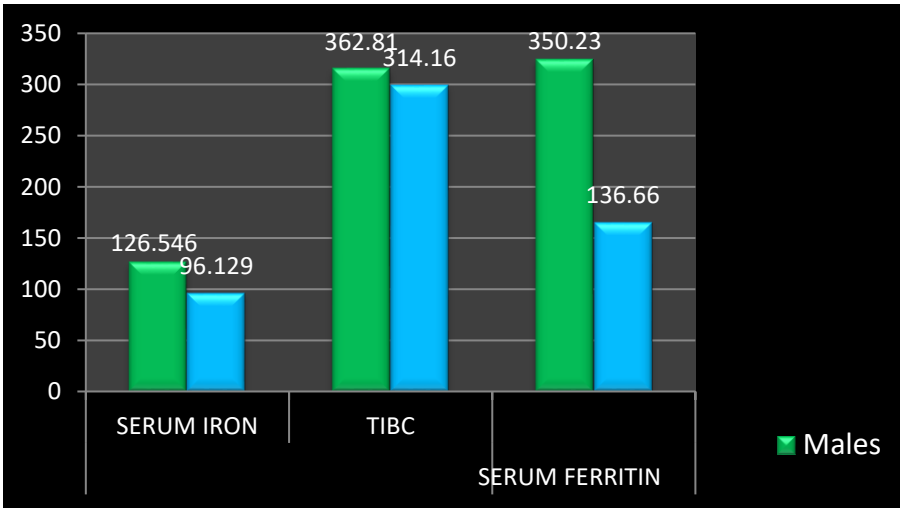

Figure 1: Bar chart showing Mean values of Tracing Elements in Oral Squamous Cell Carcinoma b/w males and females

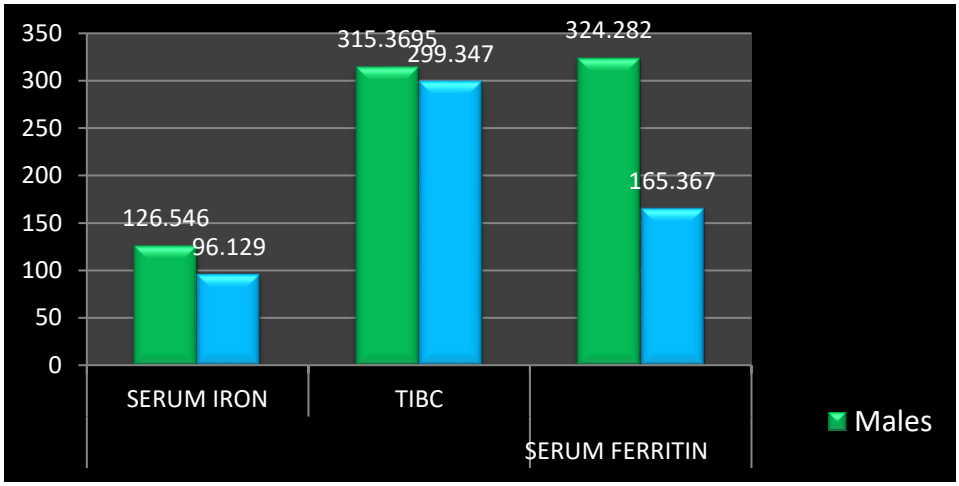

Figure 2: Bar chart showing Mean values of Tracing Elements in Oral Submucous Fibrosis b/w males and females

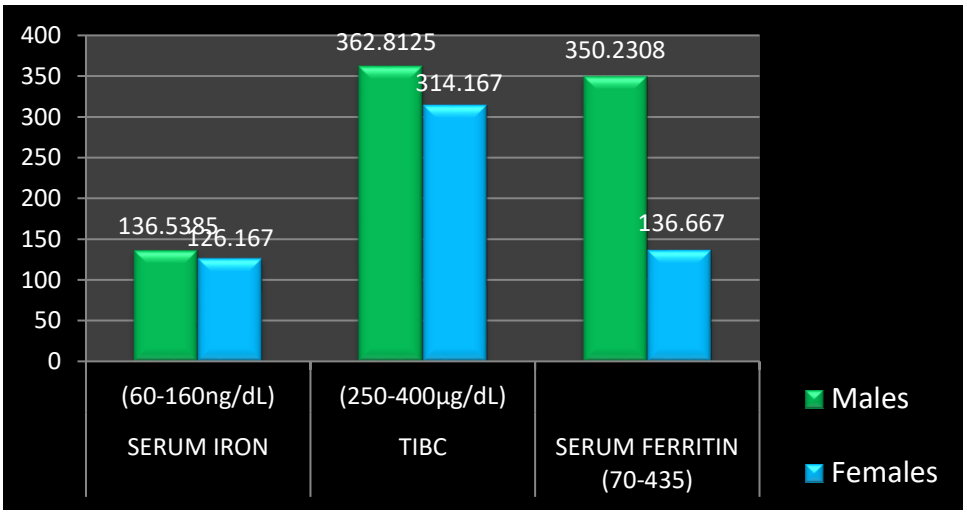

Figure 3: Bar chart showing Mean values of Tracing Elements in control group b/w males and females

The serum iron levels were lower in both group I (Oral Squamous Cell Carcinoma) and group II (Oral Submucous Fibrosis) as compared to the control group (Graph 4). The graphs are shown below-

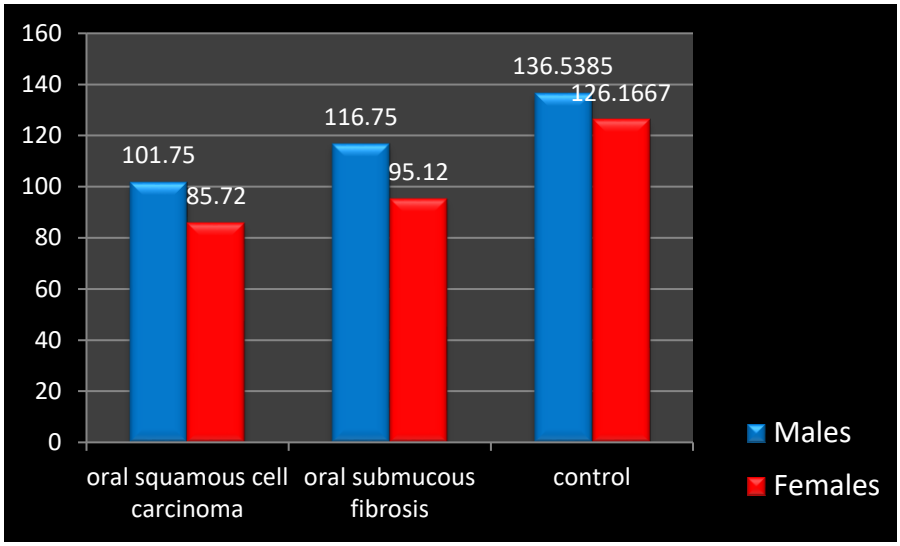

Figure 4: The Bar chart of average values of Serum Iron level (60-160 ng/dl) in males & females for 3 groups

One way ANOVA-F test was applied to test the significant difference amongst the three groups in both males and females for each variable. The test showed no statistical difference amongst the groups for TIBC and serum ferritin at 1% level of significance (Figure 5 & 6)-

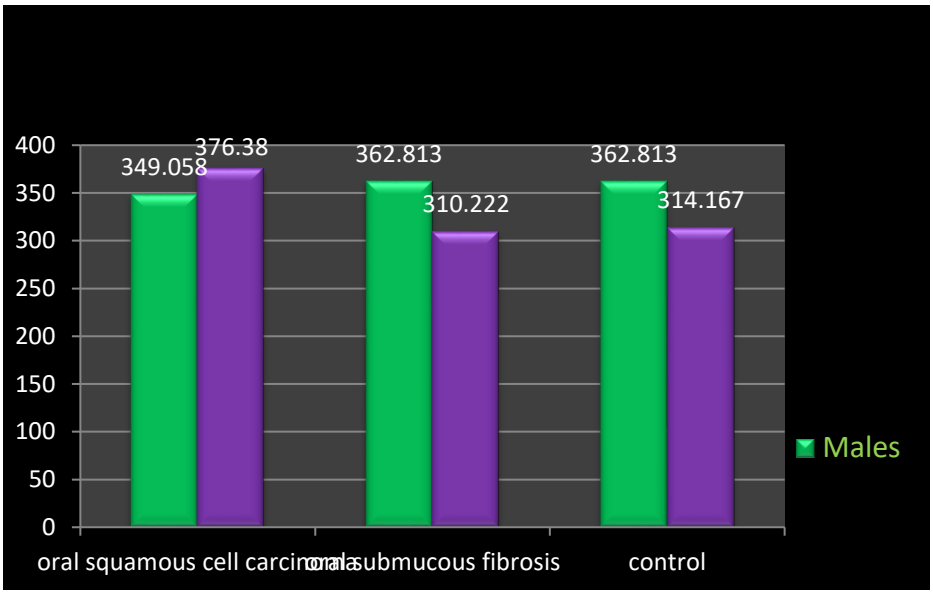

Figure 5: The Bar chart of average values of TIBC (250-400 µg/dl) in males & females for 3 groups

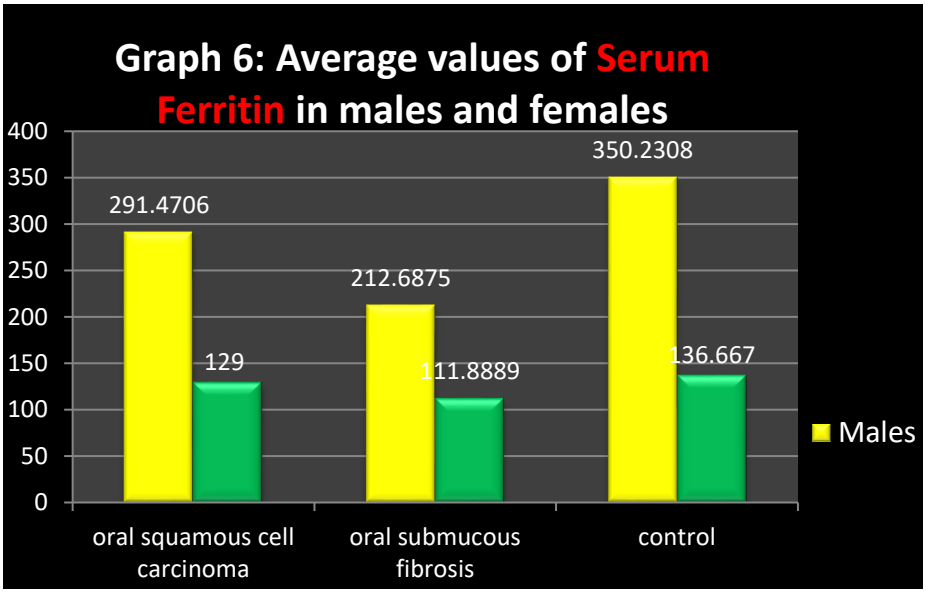

Figure 6: The Bar chart of average values of Serum Ferritin (70-435) in males & females for 3 groups

OSMF and its Relation to Serum Iron

Iron deficiency due to a lack of nutrients can trigger anaemia and alter cell-mediated immunity, which is also a factor in this early pathologic response of lamina.5 The iron deficiency leads to low levels of cytochrome oxidase, consequently leading to epithelial atrophy. An atrophic epithelium makes the oral mucosa susceptible to deep infiltration of the soluble irritants into the connective tissue. Further lack of iron in tissues causes improper vascular channel formation resulting in decreased vascularity.6 This leads to derangement in the inflammatory-reparative response of the lamina propria, resulting in defective healing and scarification. It is evident that a provocatively significant lower level of haemoglobin and serum iron can be accepted in OSMF patients this concludes that as disease progresses, serum iron levels also deplete.7,8

OSCC and its Relation to Serum Iron

Occurrence of iron deficiency is known to present in oral cancer. Iron is recognized to play a crucial role in the development of hepatic fibrosis probably via oxidative stress and lipid peroxidation. Iron is also essential for collagen synthesis by enzymes in hydroxylation of proline and lysine.9 The hydroxylation of proline and lysine is catalyzed by proline hydroxylase and peptidyl lysine hydroxylase respectively. A statistically significant reduction in the serum iron level was noted in the oral cancer group of our study.10

CONCLUSION

The result of the current study revealed that abnormalities in iron metabolism are present in a large number of our patients. The lowered level of iron appears to be the effect of the disease process rather than its cause. It can be suggested that the absence of a normal diet initiates anaemia which is further perpetuated by progression of disease.11

It is possible that the development of OSCC alters the regulation of iron metabolism. A statistically significant reduction in the serum iron level was existing in the oral cancer group in our study.12 Reduction in the serum iron level could be due to malnutrition caused by the tumour burden in cancer patients. In contrast to serum iron, ferritin levels were higher in few cases. High ferritin levels could occur in response to numerous factors including infection, inflammation and chronic disease.13

In our study, only the mean serum iron levels are lower in females compared to males in both the OSMF & OSCC groups. This female preponderance of lower serum iron levels may have occurred because of chronic blood loss due to menstruation or pregnancy, or poor nutritional intake. Iron supplements may be deleterious in some cases of OSMF and OSCC.14 It has to be

ensured as far as possible that no malignancy exists, as it may promote the growth of the transformed cell. Diet may play a crucial role in the causation of both iron deficiency and excess.15

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Nil.

CONFLICTS OF INTEREST

There are no conflicts of interest

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