

Iron indices in oral submucous fibrosis and Leukoplakia vs deleterious habits

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Abstract

It is a key element in the metabolism of almost all living organisms. In humans, iron is an essential component of hundreds of proteins and enzymes. Ferritin is a protein in the body that binds to iron. It is found in the liver, spleen, skeletal muscles, and bone marrow. Only a small amount of ferritin is found in the blood. The amount of ferritin in the blood shows how much iron is stored in the body. Iron moves through the blood attached to a protein called transferrin. Total iron binding capacity (Total Iron Binding Capacity) is the test to assess the iron carrying capacity of transferrin.

Objective: The role of serum iron in Oral Submucous Fibrosis is well established by many researchers. This study probes into the role of serum iron, ferritin as well as TIBC in the pathogenesis and treatment planning of OSMF and Leukoplakia.

Materials and Method: The study group comprised of total 50 subjects. 25 cases with OSMF and leukoplakia were & 25 patients with the normal mucosa but with deleterious habits were taken as controls.

Results: The iron, ferritin and total iron binding capacity showed altered values in OSMF & Leukoplakia and also the iron indices were altered with the habit index.

Keywords: Chewers, Ferritin, Iron, Leukoplakia, Oral Submucous Fibrosis, Transferrin.

Introduction

India has one of the highest incidences of oral cancer in the world.⁽¹⁾ The development of cancer is a multistep process arising from pre-existing potentially malignant lesions. Leukoplakia and Oral submucous fibrosis are the most common potentially malignant disorders of oral cavity, occurring with varying prevalence in different countries.^(2,3)

Severe iron deficiency leads to immune compromise, which in turn may cause cancer.⁽⁴⁾

Ferritin is the major storage protein for iron. It is present in virtually all cells where it sequesters iron in a soluble form providing accessible reserves for synthesis of iron containing compounds such as hemoglobin.

Total iron-binding capacity (TIBC) measures the blood's capacity to bind iron with transferrin.⁽⁵⁾

A reduced level of serum iron and an elevated TIBC are required for a diagnosis of iron deficiency, whereas an increased proportion of saturation is suggestive of iron overload.⁽⁶⁾ Iron is most commonly associated with the oxygen carrying function of hemeiron, and is more concerned with the effect of low iron which leads to anemia, decreased oxygen carrying capacity of blood and related diseases.⁽⁷⁾

Materials and Method

The study group comprised of total 50 subjects. 25 cases with OSMF and leukoplakia were taken from the daily OPD of People's College of Dental Sciences, Bhopal. 25 patients with the normal mucosa but with deleterious habits were taken as controls.

Inclusion Criteria

1. Patients with Grade II & Grade III OSMF were given preference to Grade I.

2. In cases of leukoplakia, homogenous patches were included.

Exclusion Criteria

1. Patients with systemic diseases were not included in the study.
2. Patients with any other autoimmune mucosal lesion were excluded.

A detailed history of the daily frequency, age at starting and duration of tobacco and alcohol habits were collected.

Laboratory Investigations: The pretreatment serum iron and total iron binding capacity (TIBC) were measured in a semiautomatic analyser (Miles India) by the bathophenanthroline method using readymade kits. Radioimmunoassay was used to measure serum ferritin. The normal values as obtained from Das was: Serum iron: 60-160 ug/100 ml; Serum TIBC: 280-400 ug/100 ml and Serum ferritin- 12-300 ng/ml. The mean of each value was calculated. For serum iron, the mean was 125ug/100ml, for TIBC it was 325 ug/100ml and for serum ferritin it was 135 ng/ml.

Patients were grouped according to their habits i.e. chewer's, smokers, smoker's+chewer's and alcohol+tobacco and the s.iron, s.ferritin and TIBC values were compared.

Statistical Analysis:

- Results obtained were compared by calculating the mean and standard deviation.
- Pearson's Chi square test to obtain correlation between the variables.
- To obtain significance between serum iron, ferritin and TIBC, Mann Whitney U test and Wilcoxon test were used.

Results

Among 25 cases, 88% (22) were males and 12% (03) were females. Among 25 controls, 84% (21) were males and 16% (04) were females.

Relation of serum values with sex: Mean serum iron in men and women were 91.34gm/100ml and 86.6gm/100ml respectively, mean TIBC in men and women were 290gm/100ml and 268 gm/100ml respectively. The mean serum ferritin values in men were 74 ng/ml and in women were 34.9 ng/ml.

Relation of serum values with habits: Tobacco chewers, constituted the major group among those who had the habit i.e. 84% (cases- 67% & controls- 17%). The next was comprised of those who had both the habits of tobacco smoking and chewing i.e. 7.3% (cases-4.8% & controls- 2.5%). The other group was made up only smokers 5% (case- 3.5%, controls-1.5 %). The mean value of frequency and duration of tobacco chewing and smoking was 8-10 times/day since 10 years. Yet another group consisted of people who had the habit of tobacco & alcohol consumption both i.e. 3.7 (cases- 2.1%, controls- 1.6%). Mean value of frequency and duration of alcohol consumption was 1-2 times/day since 10 years. Their mean values are listed in Table 1.

Table 1: Relation of serum values of iron, ferritin & TIBC with Habits

Categories		S.Iron	S.Ferritin	TIBC
Chewers	Cases	76.5	66.5	235.12
	Controls	100.5	63.4	304.2
Smokers+Chewers	Cases	77.6	16	203.6
	Controls	98	24.8	284
Smokers	Cases	131	14	264
	Controls	119	26	287.5
Alcohol+Tobacco	Cases	100	42	272
	Controls	82.5	16.5	274.25

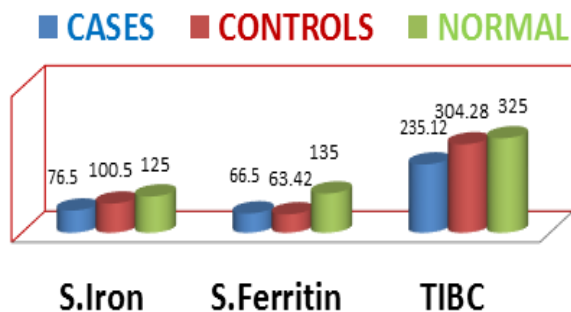


Fig. 1: Relation of serum iron, ferritin & TIBC with Habits (Chewer)

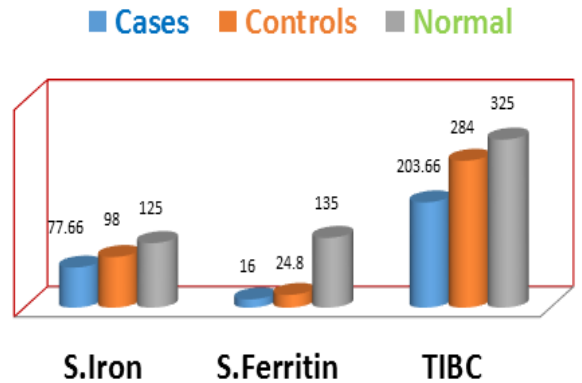


Fig. 2: Relation of serum iron, ferritin & TIBC with Habits (Smokers+Chewers)

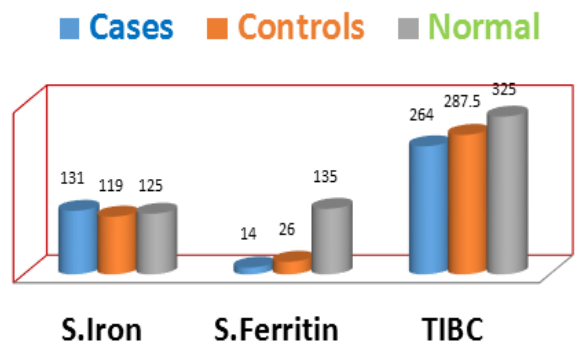


Fig. 3: Relation of serum iron, ferritin & TIBC with Habits (Smokers)

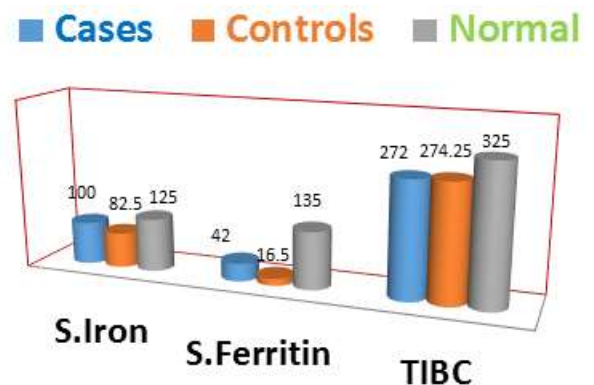


Fig. 4: Relation of serum iron, ferritin & TIBC with Habits (Alcohol+Tobacco)

Relation with lesion: Those with OSMF had low values of serum iron than those with Leukoplakia, serum ferritin was higher in OSMF patients than those with Leukoplakia and TIBC was higher in Leukoplakia patients than OSMF (Table 2).

Table 2: Serum values of iron, ferritin and TIBC in Lesions

	OSMF	Leukoplakia
S.Iron	76.5	90.5
S. Ferritin	54	33.69
TIBC	209.75	262.61

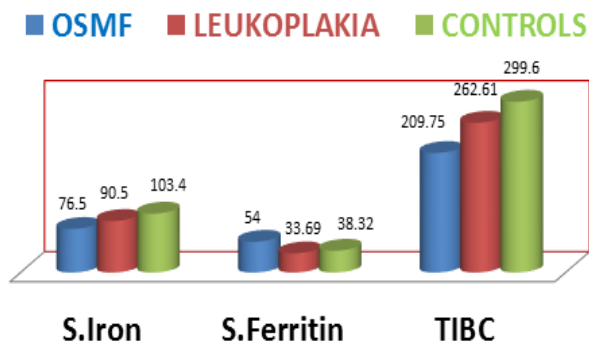


Fig. 5: Level of serum iron, ferritin & TIBC in OSMF & Leukoplakia

Discussion

Oral Submucous Fibrosis, in ancient medicine was described as “Vidari” by Shushruta under mouth and throat diseases in 600 B.C. Schwartz (1952) reported a case of “atropicaidiopathicatropica mucosae oris” occurring in Indians in east Africa. Lal and Joshi (1953) first described this condition in India and termed it as OSMF.^(8,9,10)

According to Pindborg and Sirsat (1996), OSMF is an insidious chronic disease affecting any part of the oral cavity and sometimes the pharynx. Although occasionally preceded by and/or associated with vesicle formation, it is always associated with juxtraepithelial inflammatory reaction followed by fibroelastic changes of lamina propria with epithelial atrophy leading to stiffness of mucosa and causing trismus and inability to eat.^(11,12,13)

The disease is now considered to be the brand of Indian subcontinent with the prevalence rate of 0.2-0.5% in different parts of India,^(14,15,16) highest rate being 0.4% in Kerala.⁽¹⁷⁾ This high prevalence rate is due to boundless use of areca nut and its charismatic low prices.

The etiopathogenesis of OSMF is multifactorial.^(18,19)

Areca nut contains cholinergic muscarinic alkaloids, notably are coline and guvacoline with a wide range of parasympathomimetic effects. Arecoline plays a major role in the pathogenesis of OSMF by causing an abnormal increase in collagen production. Flavonoids catechin and tannins stabilizes the collagen fibres and makes them resistant to degradation by collagenase.^(18,20,21,22)

Other causative agents are- Nutritional deficiency- deficiency of iron, folic acid, pyridoxine and vitamin B12.^(12,23-30) The mean SI value in Saudi males (17.20 umol/L) was significantly higher than in the females (13.3 umol/ L) ($P < 0.05$), and the value was more positively skewed in the males than in females. TIBC in men (63.4 umol/L) & women (74.3 umol/L)

Serum ferritin in men (92.4 ug/ L) & women (21.2 ug/L)⁽³¹⁾ Serum ferritin level was 108.0 +/- 57.8 ng/ml in men and 26.4 +/- 22.7 ng/ml in women, which showed the significant difference between the sexes.⁽³²⁾

Conclusion- This study has hence proven the paradoxical relation of serum iron, ferritin and TIBC in potentially malignant lesions. Instead of blindly prescribing iron supplements the clinician should first evaluate the values thoroughly as their excess or deficiency both has adverse affect on the prognosis of the lesions.

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