



Estimation of hemoglobin, serum iron, total iron-binding capacity and serum ferritin levels in oral submucous fibrosis

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Abstract

Background:the present study was aimed to evaluate Hb, serum iron, total iron-binding capacity (TIBC) and serum ferritin in OSMF patients.

Material and methods:50 cases of OSMF were staged clinically and graded histopathologically to assess the levels of Hb, serum iron, TIBC and serum ferritin and compared with normal subjects. The results were compared using t-test, ANOVA, and Tukeys multiple post hoc procedures.

Results:Out of 50 OSMF patients, according to clinical staging, Stage-I were 15 cases (30%), Stage-II were 25 cases (50%) and Stage-III were 10 cases (20%), and according to histopathological grading, early stage were 15 cases (30%), intermediate stage were 25 cases (50%) and advanced stage were 10 cases (20%).A control group of forty normal sex- and age-matched subjects were also included in the study. Hb, serum iron, TIBC and serum ferritin values were evaluated in both study group and the control group.

Conclusion:The Hb, serum iron and serum ferritin levels in OSMF patients were reduced and TIBC increased as compared with controls and as the clinical stage and histological grade of OSMF advances indicating their role as a reliable biochemical indicator.

Keywords: serum iron, oral submucous fibrosis

Introduction

Oral submucous fibrosis (OSMF) is a chronic, premalignant condition of the oral mucosa which was first described by Schwartz in 1952.[1] The importance of this disease lies in its

inability to open the mouth and the highest malignant transformation rate (7%–13%).[2,3] It is predominantly seen in Southeast Asia and Indian subcontinent with few cases reported from South Africa, Greece and the United Kingdom. The prevalence rate of OSMF in India is about 0.2%–0.5%. [4] Although the etiological factor in the causation of OSMF is believed to be multifactorial, areca nut plays an important role in the disease manifestation.[5,6] Nutritional deficiency, primarily of iron and vitamins, is implicated in the etiology of OSMF. OSMF is also considered as an Asian version of sideropenic dysphagia, wherein chronic iron deficiency leads to mucosal susceptibility to irritants, such as chillies and areca nut products. Hemoglobin (Hb) levels, in particular, serum iron levels, are considered as biochemical indicators for nutritional assessment.[7]

Hence, the present study was aimed to evaluate Hb, serum iron, total iron-binding capacity (TIBC) and serum ferritin in OSMF patients.

Material and methods

The present study was aimed to evaluate Hb, serum iron, total iron-binding capacity (TIBC) and serum ferritin in OSMF patients.

In the present study, 50 patients of OSMF and 50 normal subjects (controls) were included in this study. After obtaining the informed consent from the patients, the history and clinical findings of each patient was recorded. These cases were staged clinically(Stage-I: Mouth opening >45 mm; Stage-II: Restricted mouth opening 20–44 mm; Stage-III: Mouth opening <20 mm),and histopathologically.

After histological confirmation, the patients were recalled, and 5 ml of venous blood was collected of which 1 ml was transferred to vacutainer with ethylenediaminetetraacetic acid (anticoagulant) for Hb analysis immediately by cyanoHb method, and 4 ml was allowed to clot and serum separated from the blood samples by centrifugation for 5 min at 3000 rpm. Serum iron, TIBC and serum ferritin levels were analysed using the Tulip iron and TIBC kit and Bios Microwell ELISA Diagnostic Systems kit and were processed in photocolormeter.

Results

Out of 50 OSMF patients, according to clinical staging, Stage-I were 15 cases (30%), Stage-II were 25 cases (50%) and Stage-III were 10 cases (20%), and according to histopathological grading, early stage were 15 cases (30%), intermediate stage were 25 cases (50%) and advanced stage were 10 cases (20%).A control group of forty normal sex- and age-matched

subjects were also included in the study. Hb, serum iron, TIBC and serum ferritin values were evaluated in both study group and the control group.

It was observed that the mean Hb% (15.39), serum iron (81.74) and serum ferritin (196.66) levels were significantly reduced in OSMF patients as compared with controls Hb% (17.34), serum iron (101.58) and serum ferritin (263.87) levels with a statistically significant $P = 0.00001$, and the TIBC (369.8) levels in OSMF patients were significantly increased compared to controls TIBC (245.59) with a statistically significant $P = 0.00001$.

Parameters	OSMF Group Mean value	Control group Mean value	P value
Haemoglobin	15.39	17.34	P <0.05 (significant)
Serum iron	81.74	101.58	
TIBC	369.8	245.59	
Serum ferritin	196.66	263.87	

The mean Hb%, serum iron and serum ferritin levels showed a progressive decrease as the clinical stage of OSMF advances except the mean TIBC levels showed a progressive increase as the clinical stage of OSMF advances. This difference was statistically significant with a $P = 0.00001$ using one-way ANOVA test. In a pairwise comparison of clinical staging done by Tukeys multiple post hoc procedures, statistically significant results were obtained between Stage-I and Stage-II, Stage-I and Stage-III, Stage-II and Stage-III respectively with a statistically significant $*P < 0.05$.

The mean Hb%, serum iron and serum ferritin levels showed a progressive decrease as the histologic grade of OSMF advances except the mean TIBC levels showed a progressive increase as the histologic grade of OSMF advances. This difference was statistically significant with a $P = 0.00001$ using one-way ANOVA test. In a pairwise comparison of histological grading done by Tukeys multiple post hoc procedures, statistically significant results were obtained between early versus intermediate stage, early versus advanced stage and intermediate versus advanced stage respectively with a statistically significant $*P < 0.05$.

Discussion

The overall prevalence of OSMF in India is about 0.5% with a range of 0.2%–1.2% in different regions of the country.[8] Recent epidemiological data indicate that the number of

cases of OSMF has risen rapidly in India due to an upsurge in the popularity of commercially prepared areca nut preparations and an increased uptake of this habit by young people.[9]

The etiology of OSMF is multifactorial but areca nut chewing is the main causative agent. An equally important second aspect which needs to be considered is the preconditioning of the oral mucosa by a prolonged, chronic deficiency of iron and/or Vitamin B-complex, anemia and a genetic predisposition to the disease.[10]

The pathogenesis of OSMF was at first linked with the continuous and prolonged action of mild irritants on the oral mucosa, like tobacco and areca nut. Pungent and spicy foods, alcohol and iron deficiency have also been suggested.[11] OSMF is basically a collagen disorder. Hydroxyproline is an amino acid found in collagen, and the hydroxylation requires iron. The decrease in iron levels may be due to the utilization of iron in fibrosis.[12,13]

According to the review by Rajendran[14] there is a decrease in serum iron and percentage saturation of transferrin and a significant reduction in total serum iron, concluding iron-deficiency anemia appearing to be one of the causes of OSMF. In the study done by Khanna and Karjodkar[15] statistically significant reduction in the serum iron levels in precancer and cancer groups compared to normal was observed. According to the study performed by Apeksha and Sathawane[16] reduced levels of iron in descending order from oral leukoplakia to OSMF and oral squamous cell carcinoma was observed ($P < 0.01$).

In the study performed by Tadakamadla et al.[17] the mean copper and iron level differed significantly between the OSMF patients and controls, with patients exhibiting higher copper and lower iron levels in contrast to controls who presented lower copper ($P < 0.005$) and higher iron levels ($P < 0.01$). The results also showed that there was decrease in serum iron concentration as clinical stage increased ($P < 0.0001$).

In the study conducted by Shetty et al.[18] the serum and salivary iron levels decreased in OSMF patients with the progression of histopathological grading, but this was not significant. Serum and salivary levels showed significant correlation among cases ($r = 0.315$ and $P = 0.011$), but not among controls

Conclusion

The Hb, serum iron and serum ferritin levels in OSMF patients were reduced and TIBC increased as compared with controls and as the clinical stage and histological grade of OSMF advances indicating their role as a reliable biochemical indicator.

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