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## Original ARTICLE

### Evaluation of salivary copper and zinc levels in oral submucous fibrosis patients: A case-control study

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#### ABSTRACT:

**Background:** Oral submucous fibrosis (OSMF) precancerous condition and is chronic, resistant disease characterized by juxta-epithelial inflammatory reaction and progressive fibrosis of the submucosal tissues. Zinc and copper have been the most extensively studied of the trace elements in patients with malignant disease and these elements in serum has been found to be reliable parameter as a diagnostic and prognostic index in case of craniofacial tumors. Hence; the present study was conducted for estimating the Salivary Trace Elements in OSMF Patients. **Materials & Methods:** A total of 30 patients with histological proven diagnosis of OSMF and 30 subjects (healthy controls) that came for routine dental checkup were enrolled in the present study. Complete demographic details of all the subjects were obtained. A Performa was made and complete habit history of all OSMF patients was obtained. All the patients were recalled in the morning and salivary samples were obtained. All the samples were sent to laboratory for assessment of salivary copper and zinc levels. **Results:** Mean salivary copper levels among the patients of the study group and control group was found to be 0.045 µg/dL and 0.026 µg/dL respectively. Mean salivary zinc levels among the patients of the study group and control group was found to be 0.418 µg/dL and 0.194 µg/dL respectively. Significant results were obtained while comparing the mean salivary copper and zinc levels among the patients of the study group and the control group. **Conclusion:** Copper and zinc are involved in the pathogenesis of the OSMF and hence can be used as a diagnostic maker.

**Key words:** Oral submucous fibrosis, Copper, Zinc

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#### INTRODUCTION

Oral submucous fibrosis (OSMF) precancerous condition and is chronic, resistant disease characterized by juxta-epithelial inflammatory reaction and progressive fibrosis of the submucosal tissues. In 1966, Pindborg defined OSMF as “an insidious chronic disease affecting any part of the oral cavity and sometimes pharynx. It is associated with juxta-epithelial inflammatory reaction followed by fibroelastic changes in the lamina propria layer, along with epithelial atrophy which leads to rigidity of the oral mucosa proceeding to trismus and difficulty in mouth opening.” Other terms used to describe this condition are juxta-

epithelial fibrosis, idiopathic scleroderma of the mouth, idiopathic palatal fibrosis, submucous fibrosis of the palate and pillars, sclerosing stomatitis, and diffuse OSMF.<sup>1,2</sup>

The role of certain trace metals, especially zinc in the pathology of various diseases has been the subject of a number of comprehensive reviews. Zinc and copper have been the most extensively studied of the trace elements in patients with malignant disease and these elements in serum has been found to be reliable parameter as a diagnostic and prognostic index in case of craniofacial tumors. Recent technological advances have made saliva as a tool for the diagnosis of many things; among them are

hormone imbalances, liver function, immunodeficiency and even cancer.<sup>3-6</sup> Hence; the present study was conducted for estimating the Salivary Trace Elements in OSMF Patients.

**MATERIALS & METHODS**

The present study was conducted in the department of oral pathology and it included estimation of Salivary Trace Elements in OSMF Patients. A total of 30 patients with histological proven diagnosis of OSMF and 30 subjects (healthy controls) that came for routine dental checkup were enrolled in the present study. Complete demographic details of all the subjects were obtained. A Performa was made and complete habit history of all OSMF patients was obtained. All the patients were recalled in the morning and salivary samples were obtained. All the samples were sent to laboratory for assessment of salivary copper and zinc levels. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi- square test and Mann Whitney U test were used for evaluation of level of significance. P- value of less than 0.05 was taken as significant.

**RESULTS**

In the present study, mean age of the subjects of the study group and the control group was 38.9 years and 39.1 years respectively. 15 patients of the study group and 13 patients of the control group belonged to the age group of 30 to 50 years. There were 18 males and 12 females in the study group and 17 males and 13 females in the control group.

In the present study, mean salivary copper levels among the patients of the study group and control group was found to be 0.045 µg/dL and 0.026 µg/dL respectively. Mean salivary zinc

levels among the patients of the study group and control group was found to be 0.418 µg/dL and 0.194 µg/dL respectively. Significant results were obtained while comparing the mean salivary copper and zinc levels among the patients of the study group and the control group.

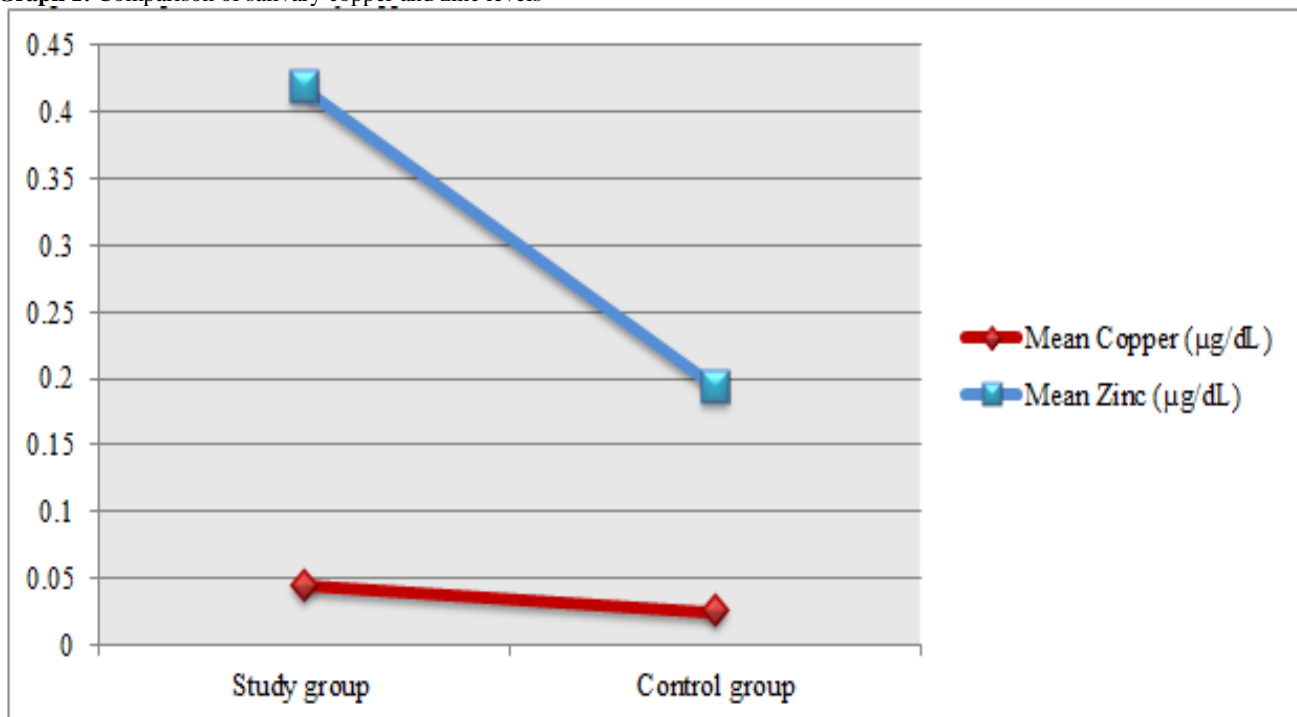
**Table 1:** Demographic data

Parameter		Study group	Control group
Age group (years)	Less than 30	5	6
	30 to 50	15	13
	More than 50	10	11
Gender	Males	18	17
	Females	12	13

**Table 2:** Comparison of salivary copper and zinc levels

Salivary levels	Study group	Control group	p- value
Mean Copper (µg/dL)	0.045	0.026	0.00 (Significant)
Mean Zinc (µg/dL)	0.418	0.194	0.00 (Significant)

**Graph 1:** Comparison of salivary copper and zinc levels



## DISCUSSION

OSMF is a chronic disease that produces scars, tissue fibrosis, and precancerous lesions. It frequently occurs in the buccal mucosa. Pathological characteristics include chronic inflammation, excessive collagen deposition in the connective tissues below the oral mucosal epithelium, local inflammation in the lamina propria or deep connective tissues, and degenerative changes in the muscles. OSF patients experience a severe burning sensation in the mouth after ingesting spicy foods. Other symptoms of OSF include dry mouth, pain, taste disorders, restricted tongue mobility, trismus, dysphagia, and altered tone. This disease contributes significantly to mortality because of its high malignant transformation rate (1.5–15%). The incidence of OSMF differs with ethnicity and region and is closely associated with diet, habits, and culture.<sup>7-10</sup> Hence; the present study was conducted for estimating the Salivary Trace Elements in OSMF Patients

In the present study, mean age of the subjects of the study group and the control group was 38.9 years and 39.1 years respectively. 15 patients of the study group and 13 patients of the control group belonged to the age group of 30 to 50 years. There were 18 males and 12 females in the study group and 17 males and 13 females in the control group. Ayinampudi BK et al evaluated the levels of copper and zinc and copper/zinc ratio in saliva of premalignant and malignant lesions of oral cavity, because of the anatomical proximity of the saliva to both premalignant and malignant oral neoplasms. The levels of copper and zinc were estimated in the saliva of 5 patients with oral submucous fibrosis, 5 patients with oral leukoplakia, 5 patients with oral lichen planus and 10 patients with oral squamous cell carcinoma of oral cavity using inductively coupled mass spectrometry (ICP- MS). The values were compared with 6 normal age and sex matched control subjects. There was significant difference of the mean salivary copper and zinc levels of premalignant and malignant lesions when compared to the normal controls. In oral cancer patients there was significant difference in the copper levels according the histodifferentiation in squamous cell carcinoma. Within the premalignant group the copper levels were more in the oral submucous fibrosis when compared to the leukoplakia and lichen planus. Copper zinc ratio decreased in premalignant and malignant group when compared to the normal group. Saliva may be used as a potential diagnostic tool, which can be efficiently employed to evaluate the copper and zinc levels in pre malignant and malignant lesions of oral cavity.<sup>10</sup>

In the present study, mean salivary copper levels among the patients of the study group and control group was found to be 0.045 µg/dL and 0.026 µg/dL respectively. Mean salivary zinc levels among the patients of the study group and control group was found to be 0.418 µg/dL and 0.194 µg/dL respectively. Significant results were obtained while comparing the mean salivary copper and zinc levels among the patients of the study group and the control group. Shetty SR et al evaluated the levels of copper, zinc and iron in saliva of patients with oral leukoplakia, oral submucous fibrosis and oral squamous cell carcinoma. There was a highly significant increase in the level of salivary copper in oral submucous fibrosis patients when compared to controls (P = 0.001). Salivary copper levels were also elevated in oral leukoplakia and oral cancer patients (P = 0.01). There was a significant decrease in the salivary zinc

levels in all three study groups when compared to controls (P = 0.001). A highly significant reduction in salivary iron levels was noticed oral submucous fibrosis group. The copper to zinc ratio significantly increased in all the study groups when compared to controls. Results suggested that salivary copper zinc and iron could be used as biomarkers for oral precancer and cancer.<sup>11</sup> Kode MA et al compared the levels of the trace elements in patients with gutkha eating habits with or without oral submucous fibrosis and in healthy patients. A total of 75 patients were included in this study and they were divided into three groups; the individuals with a history of gutkha intake with OSMF, the individuals with a history of gutkha intake without OSMF and apparently healthy individuals without OSMF and without any habits. Blood and saliva was collected and they were subjected for analysis by using atomic absorption spectrometry and a differential pulse anodic stripping voltmeter. There was a significant difference in the serum Mg and Fe levels between the patients with habits and the normal healthy individuals. A significant difference was observed in the serum zinc levels in the patients with habits with and without OSMF.<sup>12</sup>

## CONCLUSION

From the above results, the authors conclude that copper and zinc are involved in the pathogenesis of the OSMF and hence can be used as a diagnostic maker. However; further studies are recommended.

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