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Original Research

Evaluation of copper and zinc in Oral submucous fibrosis patients

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ABSTRACT

Background: Oral submucous fibrosis (OSMF) is a common chronic debilitating disease of the oral cavity. The present study was conducted to assess zinc and copper level in OSMF patients. **Materials & Methods:** The present study was conducted on 30 patients of OSMF of both genders. The diagnosis of OSMF was made based on history, clinical and laboratory examination. Equal number of control was included as control. Blood samples were obtained for assessment of serum copper and zinc levels by standardized methods. **Results:** The mean copper level in group I was 224.4 µg/dL and in group II was 125.8 µg/dL. The difference was significant (P< 0.05). The mean copper level in group I was 52.8 µg/dL and in group II was 81.7 µg/dL. The difference was significant (P< 0.05). **Conclusion:** Author observed significant increase in serum copper level and decrease in zinc level in patients with OSMF as compared to control.

Key words: Copper, OSMF, Zinc

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INTRODUCTION

Oral submucous fibrosis (OSMF) is a common chronic debilitating disease of the oral cavity. The potentially malignant nature of OSMF was first described by Paymaster, who observed the onset of slow-growing squamous cell carcinoma in one third of such patients. Oral submucous fibrosis (OSMF) is a precancerous condition and shows a significant tendency to develop frank cancer. OSMF is a chronic, insidious and debilitating, high-risk, precancerous condition affecting patients.¹

The initial presentation of OSF is inflammation. Inflammation is followed by hypovascularity and fibrosis visible as blanching of the oral mucosa with a marble-like appearance. Blanching may be localized, diffuse, or reticular. In some cases, small vesicles may develop that rupture and form erosions.² In the later advanced stage of OSF, a fibrous band that restricts mouth opening (trismus) is characteristic. It causes further problems in oral hygiene, speech, mastication, and possibly swallowing. Development of fibrous bands in the lip leads to thickening and rubbery appearance. It becomes difficult to retract or evert the lips, which transform into an elliptical shape.³

OSMF is considered as Asian version of sideropenic dysphagia, where chronic copper and zinc deficiency leads to mucosal susceptibility to irritants such as chillies and areca nut products. Trace elements or micronutrients are chemical elements required in minute amounts. Copper has diverse roles in biological electron transport and oxygen transportation. Zinc is found in nearly 100 specific enzymes and serves as structural ion source in transcription factors.⁴ The present study was conducted to assess zinc and copper level in OSMF patients.

MATERIALS & METHODS

The present study was conducted in the department of Oral Medicine & Radiology. It comprised of 30 patients of OSMF of both genders. The diagnosis of OSMF was made based on history, clinical and laboratory examination. Equal number of control was included as control. All were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

General information such as name, age, etc. was recorded. Blood samples were obtained for assessment of serum copper and zinc levels by standardized methods. Results thus obtained were

subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 60		
Group	Group I (Cases)	Group II (Control)
Number	30	30

Table I shows that both group I and II had equal number of patients ie 30 each.

Table II Assessment of serum copper level in both groups

Groups	Group I	Group II	P value
Mean	224.4	125.8	0.01

Table II shows that mean copper level in group I was 224.4 µg/dL and in group II was 125.8 µg/dL. The difference was significant (P< 0.05).

Graph I Assessment of serum copper level in both groups

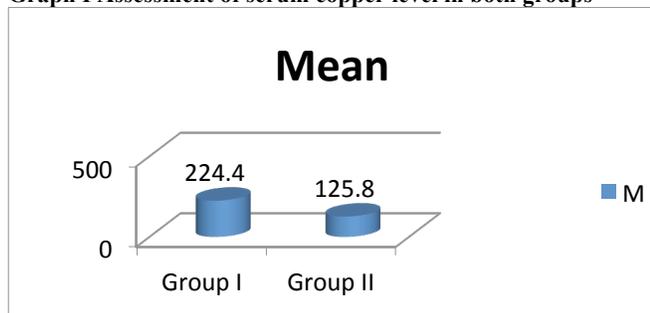
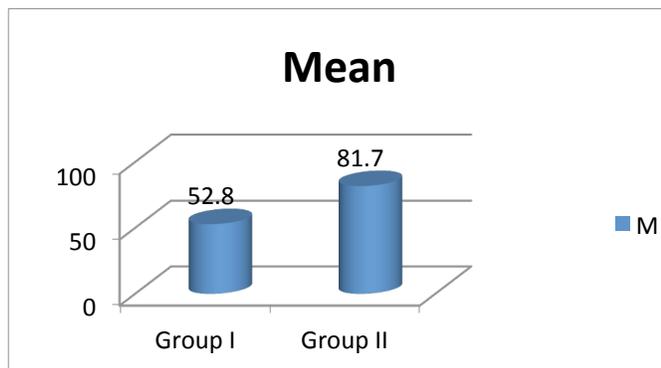


Table III Assessment of serum zinc level in both groups

Groups	Group I	Group II	P value
Mean	52.8	81.7	0.01

Table III shows that mean copper level in group I was 52.8 µg/dL and in group II was 81.7 µg/dL. The difference was significant (P< 0.05).

Graph II Assessment of serum zinc level in both groups



Discussion

Oral submucous fibrosis (OSF) is a potentially malignant disorder that causes fibrosis and inflammation of the oral mucosa. Approximately 600 million persons are betel chewing, with a hot spot throughout the Western Pacific basin and South Asia. This makes betel the fourth most-consumed drug after nicotine, ethanol, and caffeine. Betel is composed of the areca nut (Areca catechu), the fresh leaf of betel pepper (Piper betle), spices, and calcium hydroxide (lime). Pan or paan masala is a quid of piper betel leaf.⁵ It has been observed that Zinc is crucial for the normal functioning of the immune cells, antioxidant defense, wound healing, and stability of biological membranes. Chewing of areca nut generates reactive oxygen species, which can cause damage to the proteins and nucleic acids in the body. Zn induces activation of antioxidant enzyme superoxide dismutase (SOD) which inhibits production of reactive oxygen species.⁶ The present study was conducted to assess zinc and copper level in OSMF patients. We observed that mean copper level in group I was 224.4 µg/dL and in group II was 125.8 µg/dL. The difference was significant (P< 0.05). The mean copper level in group I was 52.8 µg/dL and in group II was 81.7 µg/dL. The difference was significant (P< 0.05). Mewara et al⁷ found that the mean serum copper levels of the study group and control group were 210.84 µg/dL and 120.52 µg/dL respectively. The mean serum copper levels of the study group subjects were found to be significantly higher in comparison to the mean serum copper levels of the control group. The mean serum zinc levels among subjects of the study group and the control group were 56.42 µg/dL and 90.14 µg/dL respectively. The mean serum zinc levels of the study group subjects were found to be significantly lower than the mean serum zinc levels of the control group subjects. Yadav et al⁸ conducted a study on fifty subjects with clinically diagnosed OSMF and fifty controls with no apparent lesions of the oral mucosa and without any areca nut related oral habit. The level of serum zinc was significantly lower among cases compared with controls. However, the serum copper level was significantly higher among cases than controls. Similar results were seen in our study. Nayak et al⁹ found that there was a significant increase in the levels of Cu and a significant decrease in levels of Zn and Fe in OSF patients. The estimation of Zn, Cu, and Fe levels may serve as additional biomarkers in the diagnosis and prognosis of OSF along with the clinical features. An imbalance in the ratio of Zn to Cu has been observed in malignant as well as inflammatory conditions. Dietary Zn interferes with Cu absorption by inducing the synthesis of metallothionein, a protein which sequesters copper, making it unavailable for absorption. Kamath¹⁰ has documented a progressive increase in serum copper levels from Grade I (126 µg/dl) to Grade IV (146 µg/dl) of OSF, with an increase in Cu/Zn ratio with advancement of the disease. Fe has been observed to interfere in the absorption of Cu in the blood.

CONCLUSION

Author observed significant increase in serum copper level and decrease in zinc level in patients with OSMF as compared to control.

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