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Original Research

Assessment of salivary copper levels in oral submucous fibrosis patients

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ABSTRACT:

Background: Oral submucous fibrosis (OSMF) is a well-recognised-potentially malignant condition of the oral cavity associated with areca nut chewing. Hence; the present study was undertaken for assessing the salivary copper levels in OSMF patients. **Materials & methods:** A total of 30 OSMF patients and 30 age and gender matched healthy controls were included in the present study. Complete demographic details of all the patients were obtained. Salivary samples were obtained from all the patients in vials and were sent to laboratory where salivary copper levels were analysed using auto-analyser. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. **Results:** Mean salivary copper levels among the patients of the OSMF group and the control group was 0.0421 µg/ml and 0.0178 µg/ml respectively. On analysing statistically, it was found that mean salivary copper levels of the patients of the OSMF group were significantly higher in comparison to the patients of the control group. **Conclusion:** Copper plays a definitive role in the etio-pathogenesis of OSMF.

Key words: Copper, Oral submucous fibrosis

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INTRODUCTION

Oral submucous fibrosis (OSMF) has been described as "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 a juxta-epithelial inflammatory reaction followed by a fibro-elastic change of the lamina propria, with epithelial atrophy leading to stiffness of the oral mucosa and causing trismus and inability to eat."[1]

Substantial ECM remodeling and exuberant collagen formation in OSMF has been compared with an excessive scar tissue formation in healing wounds. Fibroblasts are the principal cells involved in wound healing and tissue repair. It is a well-recognised-potentially malignant condition of the oral cavity associated with areca nut chewing. Areca nut has been shown to have a high copper content compared to other commonly eaten nuts, and chewing areca nut for 5-30 min significantly increases soluble copper in whole mouth fluids.[2-4]

This rise in OSMF in India has been attributed to the increased consumption of Gutkha, of which areca nut is the main ingredient, along with detectable levels of trace elements like copper, zinc, iron and magnesium.[5, 6]

Hence; the present study was undertaken for assessing the salivary copper levels in OSMF patients.

MATERIALS & METHODS

The present study was conducted with the aim of assessing the salivary copper levels in OSMF patients. A total of 30 OSMF patients and 30 age and gender matched healthy controls were included in the present study. Complete demographic details of all the patients were obtained. A self-framed questionnaire was given to all the patients for obtaining the detailed habit history. Exclusion criteria for the present study included:

- Patients with history of any other systemic illness,
- Patients with any known drug allergy,

- Patients with presence of any salivary gland pathology,
- Patients who didn't gave informed consent for the study

Salivary samples were obtained from all the patients in vials and were sent to laboratory where salivary copper levels were analysed using auto-analyser. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi- square test and Mann-Whitney U test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

In the present study, among the OSMF group, 18 patients, 4 patients and 3 patients belonged to the age group of 40 to 55 years, more than 55 years and less than 40 years respectively. Among the control group, 16 patients, 5 patients and 4 patients belonged to the age group of 40 to 55 years, more than 55 years and less than 40 years respectively. There were 17 males and 8 females in the OSMF group and were 15 males and 10 females in control group respectively.

In the present study, mean salivary copper levels among the patients of the OSMF group and the control group was 0.0421 µg/ml and 0.0178 µg/ml respectively. On analysing statistically, it was found that mean salivary copper levels of the patients of the OSMF group were significantly higher in comparison to the patients of the control group.

Table 1: Age and gender wise distribution of patients

Parameter		OSMF patients	Controls
Age group (years)	Less than 40	3	4
	40 to 55	18	16
	More than 55	4	5
Gender	Males	17	15
	Females	8	10

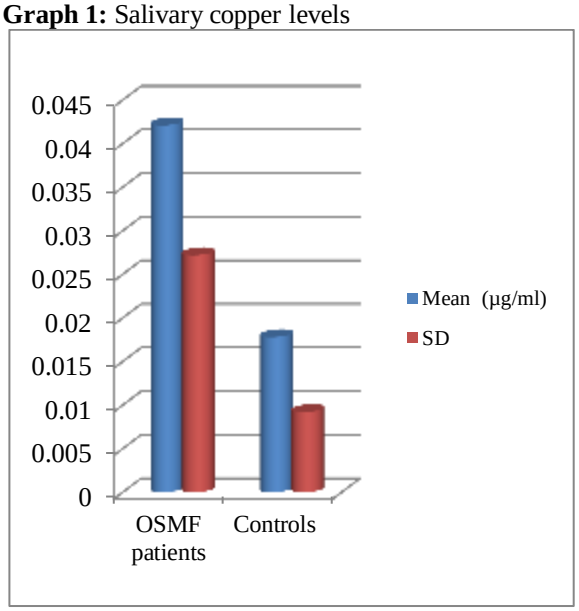
Table 2: Comparison of salivary copper levels

Salivary copper levels	OSMF patients	Controls
Mean (µg/ml)	0.0421	0.0178
SD	0.0272	0.0092
U value	235.2	
p- value	0.0030 (Significant)	

DISCUSSION

OSMF is a potentially malignant disorder (WHO, 2017) that causes fibrosis and inflammation of the oral mucosa. This condition is more prevalent in South and Southeast Asia, particularly India, with fewer cases reported in Europe and North America. As is the norm with other disease afflictions, wide ranges of investigations have been carried out in the condition to identify the causation and pathogenesis. Biochemical investigations of blood, serum, and tissues have been the earliest form of interventions. Such investigations have largely helped to localize parameters that predispose to the development of the condition, modify its behavior and prognosticate on its malignant transformation potential.[5- 8] Hence; the present study was undertaken for assessing the salivary copper levels in OSMF patients.

Graph 1: Salivary copper levels



In the present study, among the OSMF group, 18 patients, 4 patients and 3 patients belonged to the age group of 40 to 55 years, more than 55 years and less than 40 years respectively. Among the control group, 16 patients, 5 patients and 4 patients belonged to the age group of 40 to 55 years, more than 55 years and less than 40 years respectively. There were 17 males and 8 females in the OSMF group and were 15 males and 10 females in control group respectively. 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.[9]

In the present study, mean salivary copper levels among the patients of the OSMF group and the control group was 0.0421 µg/ml and 0.0178 µg/ml respectively. On analysing statistically, it was found that mean salivary copper levels of the patients of the OSMF group were significantly higher in comparison to the patients of the control group. Mohammed F et al estimated the copper levels in saliva of patients

with oral submucous fibrosis (OSF) and different areca nut products and its correlation with different histological grades of OSF. The study comprised 60 individuals, 30 OSF patients and 30 non-OSF individuals. Unstimulated whole saliva was collected, and copper analysis was performed using colorimetric method. The commercial areca nut products used by the patients were acquired and subjected to copper analysis through the atomic absorption spectrophotometer method. Oral biopsies were performed for OSF patients for histopathological correlation. The mean salivary copper level was 27.023 µg/dl in OSF patients when compared with 8.393 µg/dl in non-OSF individuals ($P < 0.005$). The mean copper content in different areca nut products was 13.313 ppm ($P < 0.005$). Comparison of copper content in different areca nut products with salivary copper levels of OSF patients showed negative correlation ($P < 0.853$). Comparison of salivary copper levels between different histological grades of OSF yielded a statistically significant association between grades I and III ($P < 0.005$) and grades II and III OSF ($P < 0.019$). Comparison of copper content in areca nut products and different histological grades of OSF yielded weak negative statistical correlation ($r = -0.116$). Despite high copper content in areca nut products, the observations yielded a negative correlation with different histological grades of OSF.[10]

CONCLUSION

From the above results, the authors conclude that copper plays a definitive role in the etio-pathogenesis of OSMF. Hence; further studies are recommended.

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