

ORIGINAL RESEARCH

Evaluation of salivary copper and zinc levels in oral cancer patients

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ABSTRACT:

Background: The present study was undertaken for assessing the salivary copper and zinc levels in oral cancer patients. **Materials & methods:** 25 oral cancer patients and 25 healthy controls were enrolled. All the patients were recalled in the morning and salivary samples were obtained. All the samples were sent to laboratory where auto-analyser was used for evaluation of salivary copper and zinc levels. All the results were recorded and analysed by SPSS software. **Results:** Mean salivary copper levels among the patients of the oral cancer group and control group was 11.38 ppb and 68.42 ppb respectively. Mean salivary zinc levels among the patients of the oral cancer group and control group was 132.12 ppb and 161.18 ppb respectively. **Conclusion:** Copper and zinc play a definitive role in the pathogenesis of head and neck malignancies.

Key words: Oral cancer, Salivary, Copper, Zinc

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INTRODUCTION

Oral cancer is the most prevalent malignant neoplasms within the head and neck, and accounts for more than 300,000 new cancer cases and 145,000 deaths per year worldwide, with higher rates in developing countries. Reactive oxygen species (ROS) produced by oxidative stress can lead to direct DNA damage, mutation, and carcinogenesis, whereby is generally accepted to be a vital event of development of many types of cancer including oral carcinoma. It was reported that several trace elements may protect against oxidative stress and regulate other biological mechanisms which play important roles in maintaining human health.¹⁻³

The trace elements copper (Cu) and zinc (Zn) are two minor biological constituents that are cofactors for a wide range enzyme, such as Cu-Zn superoxide dismutase and are involved in the destruction of free radicals through the enzyme systems. In addition, Cu takes part in maintaining the integrity of the membrane and cell metabolism. The correlation between serum copper and the stage of the disease has indicated that serum copper might serve as a tumour marker or a tumour antigen, in a previous study.⁴

⁶Hence; under the light of above-mentioned data, the present study was undertaken for assessing the salivary copper and zinc levels in oral cancer patients.

MATERIALS & METHODS

A total of 25 oral cancer patients and 25 healthy controls were enrolled. Only those patients of oral cancer were included in which diagnosis was confirmed on histopathological examination. All the patients were recalled in the morning and salivary samples were obtained. All the samples were sent to laboratory where auto-analyser was used for evaluation of salivary copper and zinc levels. All the results were recorded and analysed by SPSS software. Mann-Whitney U test was used for evaluation of level of significance.

RESULTS

Mean age of the oral cancer and healthy controls was 44.6 years and 46.1 years respectively. Majority proportion of patients of both the study groups were males. Mean salivary copper levels among the patients of the oral cancer group and control group was 11.38 ppb and 68.42 ppb respectively. Mean

salivary zinc levels among the patients of the oral cancer group and control group was 132.12 ppb and 161.18 ppb respectively. While comparing statistically, it was seen that mean salivary copper

Table 1: Comparison of salivary copper and zinc levels

Salivary levels	Oral cancer patients	Healthy controls	p- value
Copper (ppb)	11.38	68.42	0.00 (Significant)
Zinc (ppb)	132.12	161.18	0.01 (Significant)

DISCUSSION

As an essential trace element, zinc plays crucial roles in protein structure, enzymatic activity, and gene regulation. Over 300 enzymes require zinc for their activities, and more than 2,000 transcription factors require zinc for maintenance of structural integrity and DNA binding activity. Thus, zinc metabolism and homeostasis are regulated in a sophisticated manner for normal cellular functions. Both zinc deficiency and zinc excess may contribute to various health problems, including metabolic diseases, endocrine diseases, neurodegenerative diseases, immune deficiencies, cardiovascular diseases, and cancers.⁶⁻¹⁰ Mean age of the oral cancer and healthy controls was 44.6 years and 46.1 years respectively. Majority proportion of patients of both the study groups were males. Mean salivary copper levels among the patients of the oral cancer group and control group was 11.38 ppb and 68.42 ppb respectively. Mean salivary zinc levels among the patients of the oral cancer group and control group was 132.12 ppb and 161.18 ppb respectively. Chen F et al explored the association between serum Cu and Zn levels and oral cancer risk with relatively large-scale samples. Serum Cu and Zn levels of 344 oral cancer patients and 1,122 matched healthy controls in their case-control study were measured by inductively coupled plasma mass spectrometry (ICP-MS). Restricted cubic spline revealed the U-shaped relationship between serum Cu or Zn levels and the risk of oral cancer. Serum deficient or elevated levels of Cu were significantly associated with the risk of oral cancer: The ORs were 1.38 and 2.82, respectively. The positive association of serum low or high levels of Zn with oral cancer risk was also observed: The ORs were 2.72 and 12.41, respectively. Additionally, there were multiplicative interactions between the aforementioned trace elements and smoking. Their study suggested that both serum excess and deficient levels of Cu or Zn were significant correlation with oral cancer risk, which may provide a new insight on the roles of serum Cu and Zn in oral cancer.¹⁰

While comparing statistically, it was seen that mean salivary copper levels and salivary zinc levels among the patients of the oral cancer group was significantly reduced in comparison to healthy controls. Ayinampudi et al, in another study, 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

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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). 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 to 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 premalignant and malignant lesions of oral cavity.¹¹

CONCLUSION

Copper and zinc are involved in the pathogenesis of head and neck malignancies.

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