

Original Research

Analysis of salivary copper and zinc levels in oral cancer patients: A case control study

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ABSTRACT:

Background: The current study was conducted to measure the salivary copper and zinc levels in patients with oral cancer. **Materials & methods:** Fifty people with oral cancer and fifty healthy people served as study participants. Histological confirmation of a diagnosis of oral cancer was required for inclusion in the trial. Each patient who returned the following morning had a saliva sample obtained from them. Saliva samples were sent to a facility where their metal concentrations were analyzed automatically. Each result was recorded and analyzed using SPSS. **Results:** Fifty people with oral cancer and fifty healthy people served as controls. Median age was 41.3 years in the oral cancer group and 46.8 years in the non-cancer group. The average levels of copper in the saliva of patients with oral cancer and those without the disease were 20.12 ppb and 74.56 ppb, respectively. The median zinc levels in the saliva of those with oral cancer and healthy controls were 129.63 ppb and 159.11 ppb, respectively. Through statistical analysis, it was found that the median levels of zinc and copper in the saliva of people with oral cancer were significantly lower than those of healthy controls. **Conclusion:** Copper and zinc are involved in the pathogenesis of head and neck malignancies.

Key words: Oral cancer, Salivary, Copper, Zinc

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INTRODUCTION

Cancer of the oral cavity is one of the most common malignancies, especially in developing countries, but also in the developed world.^{1,2} Squamous cell carcinoma (SCC) is the most common histology and the main etiological factors are tobacco and alcohol use.³ Although early diagnosis is relatively easy, presentation with advanced disease is not uncommon. The standard of care is primary surgical resection with or without postoperative adjuvant therapy. Improvements in surgical techniques combined with the routine use of postoperative radiation or chemoradiation therapy have resulted in improved survival statistics over the past decade.⁴ Successful treatment of patients with oral cancer is predicated on multidisciplinary treatment strategies to maximize oncologic control and minimize impact of therapy on form and function.

Trace elements are required in small concentrations as essential components of biological enzyme systems or

structural portions of biologically active constituents.⁵ Many metabolic disorders, oral precancerous conditions and oral cancer are accompanied by alterations in the concentration of one or more trace elements like copper, iron, zinc, magnesium, etc., in some body fluids, especially blood serum or plasma.⁶ Hence, the current study was conducted to measure the salivary copper and zinc levels in patients with oral cancer.

MATERIALS & METHODS

Fifty people with oral cancer and fifty healthy people served as study participants. Histological confirmation of a diagnosis of oral cancer was required for inclusion in the trial. Each patient who returned the following morning had a saliva sample obtained from them. Saliva samples were sent to a facility where their metal concentrations were analyzed automatically. Each result was recorded and analyzed using SPSS.

RESULTS

Table 1: Comparison of salivary copper and zinc levels

Salivary levels	Oral cancer patients	Healthy controls	p- value
Copper (ppb)	20.12	74.56	0.01 (Significant)
Zinc (ppb)	129.63	159.11	0.01 (Significant)

Fifty people with oral cancer and fifty healthy people served as controls. Median age was 41.3 years in the oral cancer group and 46.8 years in the non-cancer group. The average levels of copper in the saliva of patients with oral cancer and those without the disease were 20.12 ppb and 74.56 ppb, respectively. The median zinc levels in the saliva of those with oral cancer and healthy controls were 129.63 ppb and 159.11 ppb, respectively. Through statistical analysis, it was found that the median levels of zinc and copper in the saliva of people with oral cancer were significantly lower than those of healthy controls.

DISCUSSION

India has one of the highest incidences of oral cancer in the world. The development of cancer is a multistep process arising from pre-existing potentially malignant lesions. Oral leukoplakia (OL) is the most common precancer representing 85% of such lesions. Alcohol, viruses, genetic mechanisms, candida and chronic irritation have modifying effects in the etiology of oral cancer.^{7,8} Trace elements are regarded as versatile anti-cancer agents that regulate various biological mechanisms. Many researchers have observed association between trace elements and cancer mortality. Decrease in contents of Copper (Cu) and Zinc (Zn) in the blood of patients with head and neck cancer.

In this study, fifty people with oral cancer and fifty healthy people served as controls. Median age was 41.3 years in the oral cancer group and 46.8 years in the non-cancer group. The average levels of copper in the saliva of patients with oral cancer and those without the disease were 20.12 ppb and 74.56 ppb, respectively. The median zinc levels in the saliva of those with oral cancer and healthy controls were 129.63 ppb and 159.11 ppb, respectively. Through statistical analysis, it was found that the median levels of zinc and copper in the saliva of people with oral cancer were significantly lower than those of healthy controls.

Amit kumar et al⁹ suggested that zinc deficiency impair protective mechanism designed to protect against DNA damage, enhance susceptibility to DNA damaging agents and ultimately increased risk of cancer.

Chen F et al¹⁰ aimed to preliminarily explore 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 this 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 (95% CI: 1.01-1.89) and 2.82 (95% CI: 1.60-4.98), respectively. The positive association of serum low or high levels of Zn with oral cancer risk was also observed: The ORs were 2.72 (95% CI: 1.60-4.62) and 12.41 (95% CI: 9.09-16.93), respectively. Additionally, there were multiplicative interactions between the aforementioned trace elements and smoking. This preliminary 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.

CONCLUSION

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

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