

Original Research

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

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ABSTRACT:

Background: 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. The trace elements have been extensively studied in recent years, to assess whether they had any role in the aetiology of cancer. Hence; 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 20 oral cancer patients and 20 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. **Results:** Mean salivary copper levels among the patients of the oral cancer group and control group was 10.36 ppb and 79.64 ppb respectively. Mean salivary zinc levels among the patients of the oral cancer group and control group was 123.52 ppb and 159.42 ppb respectively. 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. **Conclusion:** Copper and zinc are involved in the pathogenesis of head and neck malignancies.

Key words: Oral cancer, Salivary, Copper, Zinc

Received: 5 May, 2021

Accepted: 10 May, 2021

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This article may be cited as: Kumar S. Analysis of salivary copper and zinc levels in oral cancer patients: A case control study. Int J Res Health Allied Sci 2021; 7(3): 51-53.

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.¹⁻⁴

The trace elements have been extensively studied in recent years, to assess whether they had any role in the aetiology of cancer. Magnesium and zinc are the elements which have essential roles in the regulation of the cell growth, division and differentiation. High levels of copper have been observed to protect against a chemical induction of tumours. 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.³⁻⁶ Hence; 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

The present study was conducted with the aim of assessing the salivary copper and zinc levels in oral cancer patients. A total of 20 oral cancer patients and 20 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

A total of 20 patients with oral cancer and 20 healthy controls were enrolled. Mean age of the patients of the oral cancer group and control group was 46.8 years and 48.63 years respectively. 12 patients of the oral cancer group and 11 patients of the control group were males while the remaining were females. Mean salivary copper levels among the patients of the oral cancer group and control group was 10.36 ppb and 79.64 ppb respectively. Mean salivary zinc levels among the patients of the oral cancer group and control group was 123.52 ppb and 159.42 ppb respectively. 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.

Table 1: Comparison of salivary copper and zinc levels

Salivary levels	Oral cancer patients	Healthy controls	p- value
Copper (ppb)	10.36	79.64	0.00 (Significant)
Zinc (ppb)	123.52	159.42	0.01 (Significant)

DISCUSSION

The World Health Organization (WHO) reported oral squamous cell carcinoma (OSCC) as having one of the highest mortality ratios amongst all malignancies. In India OSCC accounts for 50-70% of all cancers. Around 90-95% of oral cancers occur predominantly in alcohol and tobacco users, between the 6th and 7th decades of life. Despite the large amount of research data in cellular and molecular biology and advances in oncology and surgery, the mortality and morbidity rates in OSCC patients remain unchanged.⁷⁻¹⁰ Hence; under the light of above mentioned data, the present study was undertaken for assessing the salivary copper and zinc levels in oral cancer patients.

In the present study, mean age of the patients of the oral cancer group and control group was 46.8 years and 48.63 years respectively. 12 patients of the oral

cancer group and 11 patients of the control group were males while the remaining were females. Mean salivary copper levels among the patients of the oral cancer group and control group was 10.36 ppb and 79.64 ppb respectively. Mean salivary zinc levels among the patients of the oral cancer group and control group was 123.52 ppb and 159.42 ppb respectively. 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 sub mucous 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.¹¹

In the present study, 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. 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. Altered serum trace element levels are documented in malignant cases and they are considered to be good biomarkers for malignancies. The serum copper and Zn levels and the

Cu/Zn ratio in OSMF patients can be considered as the markers which show susceptibility towards cancer.¹²

CONCLUSION

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

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