

Original Research

Salivary zinc levels in oral leukoplakia patients

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ABSTRACT:

Background: This study was conducted to assess salivary zinc concentrations in oral leukoplakia patients. **Material and methods:** In total, 100 people were recruited for this study. The subjects were separated into two groups: group I (control) and group II (leukoplakia). Inductively coupled mass spectrometry (ICP- MS) was used to measure zinc levels in the saliva of 50 patients with oral leukoplakia. The results were compared to 50 age and gender matched control volunteers. **Results:** In healthy individuals and patients with oral leukoplakia, the mean salivary Zn levels were 56.12 g/dL and 13.69 g/dL, respectively. Salivary Zn levels in the leukoplakia group were significantly lower ($P = 0.001$) than in the control group. **Conclusions:** Saliva can be utilized as a potential diagnostic technique to assess zinc levels in pre-malignant oral cavity lesions.

Keywords: zinc, leukoplakia, saliva.

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INTRODUCTION

In 1978, oral leukoplakia has been defined by the World Health Organization (WHO) as: 'A white patch or plaque that cannot be characterized clinically or pathologically as any other disease'.¹ In an explanatory note it has been explicitly stated that the term leukoplakia is unrelated to the absence or presence of epithelial dysplasia. In a monograph by the WHO, published in 1997, the phrase: 'any other definable disease' was replaced by 'any other definable lesion'.² No justification has been provided for this change.

Decrease in contents of Copper (Cu) and Zinc (Zn) in the blood of patients with head and neck cancer.^{3,4} Most of the molecules that are found in the body fluids like blood and urine are also found in the saliva, although in lesser concentration thus making saliva an important diagnostic tool.⁵

So, this study was conducted to assess the concentrations of zinc in saliva of premalignant and lesions of oral cavity.

MATERIAL AND METHODS

The study population consisted of 100 patients divided into two groups. Group I contained 50 healthy volunteers, while Group II included 50 subjects with oral leukoplakia. This analysis covered only cases that had been histopathologically validated and clinically determined to be free of systemic illnesses. Individuals in the control group were free of any oral illnesses. Questionnaires were used to assess each subject's nutritional status. Before saliva was collected, the subjects were instructed to refrain from eating, drinking, or rinsing for an hour and to immediately rinse with deionized water. Each person was instructed to collect saliva in their mouths for two minutes before spitting into sterile plastic vials. The entire unstimulated saliva was collected for six minutes using this procedure. The samples were centrifuged for five minutes at 3,000 rpm and 4 °C. This procedure yields a spit sample that is much less viscous and free of large particles, allowing for a far more accurate and repeatable inspection. In 10 mL/L nitric acid, each sample was multiplied by five, and the trace elements were detected using inductively coupled mass spectrometry (ICP- MS). The data were

given in grams per liter (g/L) or parts per billion (ppb). The student's independent t-test and one-way analysis of variance (ANOVA) were employed in the statistical analysis to compare the means in the two independent groups and the two study groups, respectively.

RESULTS

In healthy individuals and patients with oral leukoplakia, the mean salivary Zn levels were 56.12 g/dL and 13.69 g/dL, respectively. Salivary Zn levels in the leukoplakia group were significantly lower ($P = 0.001$) than in the control group. The age and sex distribution of all the subjects in the present study is presented below.

Table 1: salivary zinc levels in leukoplakia group and control group.

Groups	Mean	P value
Group I(control)	56.12 µg/dL	$P < 0.01$ (significant)
Group II	13.69 µg/Dl	$P < 0.01$ (significant)

When compared to healthy controls, people with leukoplakia had significantly lower mean salivary zinc levels. Salivary zinc levels were shown to be lower in people with leukoplakia.

DISCUSSION

Hence, this study was conducted to assess the copper concentrations in the unstimulated whole saliva of normal as well as premalignant lesions of the oral cavity.

Leukoplakia is a common, potentially premalignant lesion described as a predominant white lesion of the oral mucosa which cannot be defined as any other known lesion.⁶ The malignant transformation rates of oral leukoplakia have been reported from 1 to 17% with highest transformation rate for the lesions on floor of the mouth, soft palate and tongue.^{7,8} Along with HIV and Epstein-Barr viral infections, there are many etiological factors for leukoplakia; risk is much higher in smokers and users of smokeless tobacco than in people who do not use tobacco products of any kind. Betel nut chewers in Asia are also at high risk. Some preliminary studies found that people who drink alcohol are more likely to have leukoplakia compared to nondrinkers.^{9,10} Along with all these factors, many epidemiological studies indicate the strong association of low dietary fruits intake with the development of leukoplakia.^{11,12}

In the present study, a significant reduction in the salivary zinc levels was seen in the leukoplakia group when compared to normal control group.

Bose SC et al¹³ evaluated the plasma levels of antioxidant vitamins, antioxidant mineral zinc, glutathione and total antioxidant status (TAS) in leukoplakia patients. For this cross-sectional study, they selected 23 newly diagnosed oral leukoplakia patients of both sexes within the age group 28–40

years and the same number of age and sex matched healthy individuals without having history of any systemic illness were selected as control group. In both the groups, they measured plasma antioxidant vitamins A, C, E, antioxidant mineral zinc, GSH and TAS. Student's t test was applied and the P value < 0.001 was considered as statistically significant. They observed very low levels of antioxidant vitamins A, C, E, antioxidant mineral zinc and antioxidant metabolite GSH ($P < 0.001$) and at the same time they also observed very poor (TAS) ($P < 0.001$) in leukoplakia patients when compared to patients in control group. The consumption of tobacco or areca quid which contains high copper levels creates an oxidative stress like environment during their metabolism, might play a major role in causation and propagation of oral leukoplakia.

Ayinampudi BK et al¹⁴ 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 to 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.

CONCLUSION

Salivary zinc levels were significantly lower in those with oral leukoplakia compared to those in the control group. Salivary zinc levels in patients with oral leukoplakia have diagnostic value.

REFERENCES

1. Kramer IR, Lucas RB, Pindborg JJ, Sobin LH. Definition of leukoplakia and related lesions: an aid to studies on oral precancer. *Oral Surg Oral Med Oral Pathol.* 1978;46:518–39.
2. Pindborg JJ, Reichart PA, Smith CJ, van der Waal I. World Health Organization International Histological Classification of Tumours. *Histological Typing of Cancer and Precancer of the Oral Mucosa.* Second Edition ed. Berlin, Heidelberg. New York: Springer-Verlag; 1997. pp. 1–85.

3. Vyas RK, Gupta AP, Gupta A, Aeron AK. Serum Copper, zinc, Magnesium and cadmium levels in various human disease. *Indian J Med Res* 1982;76:301-4.
4. Slavkin HC. Protecting the mouth against microbial infections. *J Am Dent Assoc* 1998;129:1025-30.
5. Al rawi NH, Talabani NG. Quantitative analysis of trace elements in saliva of oral cancer patients. *J Coll Dent* 2005;17:32-5.
6. van der Wall, Axell T. Oral leukoplakia: A proposal for uniform reporting. *Oral Oncol.* 2002;38:521-6.
7. Neville BW, Day TA. Oral cancer and precancerous lesions. *CA Cancer J Clin.* 2002;52:195-21.
8. Zhang L, Cheung KJ, Jr, Lam WL, Cheng X, Poh C, Priddy R. Increased genetic damage in oral Leukoplakia from high risk sites: Potential impact on staging and clinical management. *Cancer.* 2001;91:2148-55.
9. Gupta PC. Epidemiologic study of the association between alcohol habits and oral Leukoplakia. *Community Dent Oral Epidemiol.* 1984;12:47-50.
10. Macigo FG, Mwaniki DL, Guthua SW. Influence of dose and cessation of kuraiku, cigarettes and alcohol use on the risk of developing oral leukoplakia. *Eur J Oral Sci.* 1996;104:498-502.
11. Gupta PC, Hebert JR, Bhonsle RB, Sinor PN, Mehta H, Mehta FS. Dietary factors in oral leukoplakia and submucous fibrosis in a population based case control study in Gujarat, India. *Oral Dis.* 1998;4:200-6.
12. Cianfriglia F, Manieri A, Di Gregoria DA, Di Iorio AM. Retinol dietary intake and oral leukoplakia development. *J Exp Clin Cancer Res.* 1998;17:331-6.
13. Bose SC, Singh M, Vyas P, Singh M. Plasma zinc antioxidant vitamins, glutathione levels and total antioxidant activity in oral leukoplakia. *Dent Res J (Isfahan).* 2012 Mar;9(2):158-61.
14. Ayinampudi BK, Narsimhan M. Salivary copper and zinc levels in oral pre-malignant and malignant lesions. *J Oral Maxillofac Pathol.* 2012 May;16(2):178-82.