



Serum Zinc Level in Dental Caries Patients

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ABSTRACT

The aim is to investigate the relationship between caries experience and Zinc concentration in serum. This study was designed to study the effect of Zinc on the susceptibility of teeth to dental caries. The study was designed as a case control study comprising 20 patients with dental caries and 20 patients who were normal healthy individuals. This study was carried out at saveetha dental college, tiruvallur district, Tamilnadu. Dental caries is one of the most prevalent disease and dates back to antiquity. The widely recognized inverse relationship between the prevalence of dental caries and the ingestion of the fluoridated drinking water prompted investigators to look at other trace element. Trace elements either directly or indirectly influence the susceptibility of the teeth to dental caries. Investigations suggested that, some trace elements are cariogenic, mildly cariostatic, and some are strongly cariostatic. Zinc deficiency has been related to certain oral disease, such as taste impairment in human. Other researchers have shown that certain subjects with hypogeusia (loss of taste acuity) exhibited lower Zinc content in serum and parotid saliva. Dietary zinc may be an important trace mineral in the process of post-eruptive mineralisation of the enamel and may reduce the susceptibility of the tooth to caries.

Keywords: dental caries, Serum zinc.

INTRODUCTION

Health is a universal need for all cultural groups. General health cannot be attained or maintained without oral health. The mouth is regarded as the mirror of the body¹. Dental caries is one of the most prevalent disease and dates back to antiquity. The widely recognized inverse relationship between the prevalence of dental caries and the ingestion of the fluoridated drinking water prompted investigators to look at other trace elements². Dental caries is the predominant cause of tooth loss in children and young adults. Although the disease most commonly affects the crown of the tooth, caries of the tooth root is also prevalent, especially in older populations³. The percentage of Zinc can be analyzed in various body fluids such as saliva, plasma, blood as well as in human excreta. Its levels can also be monitored in hair, nails, and so on. A noteworthy link of zinc and copper concentration in sera collected from pediatric population with respect to their age, height, body mass index, and nutritional habits has been acknowledged⁴. Since in vegetarians, protein intake is mostly through pulses and not meat, they have a higher incidence of zinc deficiency⁵. Studies concerning the association between zinc and the cariogenic process were primarily performed on extracted teeth⁶.

Zinc is an essential element for many body functions, including enzyme activity, gene expression, intestinal epithelial regeneration, and a variety of immune mechanisms⁷. The human body contains about 2g of zinc, of which approximately 60% is found in muscle tissue, 30% in bone and 5% in skin⁸. Deficiency of zinc causes several health problems, such as growth retardation, diarrhea, pneumonia, and immune problems⁹. It is

essential for growth and development in humans and has diverse roles, being a critical component of several hundred enzymes and proteins¹⁰. Trace minerals with proper concentrations in the dental tissues also have important roles in the appropriate development of erupting teeth and inhibition of caries¹¹. These elements are known to enter the tooth structure and bacterial plaque, affect the solubility of tooth in acids, and change the mouth's flora¹². As a trace mineral, dietary zinc is also important for the mineralization of the enamel and is known to reduce the susceptibility to dental caries¹³.

MATERIALS AND METHODS

Totally 40 peoples were selected from our college (Saveetha Dental College) out patient department (OPD). 20 healthy individual without any dental caries and systemic illness like diabetes mellitus, hypertension, coronary artery disease, endocrine disorder and 20 individual with dental caries and without systemic illness.

After obtaining proper informed concern from the patients, 3ml of venous blood is collected and centrifuged at 2500 rpm for 15 mins. Then the serum is analysed for the estimation of zinc level by using semi auto analyser (ERBA CHEM 5 plus).

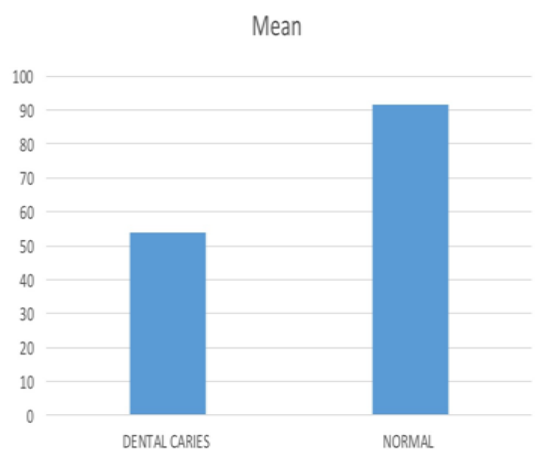
RESULTS

The study group consisted of 40 patients, in which 20 with caries and 20 without caries. The mean serum zinc level was $48.8 \pm 20.3\mu\text{g/dl}$ for patients having dental caries and $95.4 \pm 16.9\mu\text{g/dl}$ for healthy individuals. There was a decrease in serum zinc level in dental caries patients when compared to healthy individuals ($p < 0.001$, highly significant). This is clearly shown in the table 1 and Graph 1.



Table 1: Independent sample 't' test

	SAMPLE	N	Mean	Std. Deviation	Std. Error Mean	't'
Serum zinc	Normal	20	95.4500	16.94100	3.78812	7.860 p<0.001
	Dental caries	20	48.8800	20.37327	4.55560	

**Graph 1:****DISCUSSION**

Dental caries is a multifactorial disease, where diet plays a crucial role and has a local effect primarily on the integrity of the teeth, pH, and composition of the saliva and plaque¹⁴. The influence of trace elements on the prevalence of dental caries is a debatable subject. However, sufficient evidence has been accumulated to suggest the cariostatic effect of trace elements. Earlier studies suggested a positive correlation between malnutrition, enamel hypoplasia and dental caries¹⁵. Zinc deficiency is largely related to inadequate intake or absorption of zinc from the diet, although excess losses of zinc during diarrhoea may also contribute¹⁶. Normal serum zinc level is 60-120 µg/dl. Red blood cells contain about 10 times higher concentration than that in the serum. Whole blood has about 5 times the serum concentration¹⁷. The relationship between zinc deficiency and oral health, however, still remains unclear. In our study we have found that there is a difference in the serum zinc level among the dental caries patients and the normal patients.

REFERENCES

1. Navneet Grewal, Manpreet Kaur, Status of oral health awareness in indian children as compared to western children. *J Indian soc pedod prev dent.* 25(1), 2007 Mar, 15-9.
2. Babaji I. Shashikiran N. and Reddy S. Comparative evaluation of trace elements and residual bacterial content of different brands of bottled water. *J. Ind Soc Pedo Prev Dent.* 22, 4, 2004, 201-204.
3. Mayoora Balakrishnan,* Robin S. Simmonds,† John R Tagg Dental caries is a preventable infectious disease.
4. Arvanitidou V, Voskaki I, Tripsianis G, Athanasopoulou H, Tsalkidis A, Filippidis S, Schulpis K, Androulakis I. Serum copper and zinc concentrations in healthy children aged 3–14 years in Greece. *Biol Trace Elem Res*, 115, 2007, 1–12.
5. Hunt JR. Bioavailability of iron, zinc, and other trace minerals from vegetarian diets. *Am J Clin Nutr*, 78, 2003, 633S–9.
6. Gierat-Kucharzewska B, Karasinski A. Influence of chosen elements on the dynamics of the cariogenic process. *Biol Trace Elem Res*, 111, 2006, 53-62.
7. US Institute of Medicine. DRI: Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium and Zinc. Washington DC: National Academy Press; 2001.
8. Thomas B, Bishop J. Manual of dietetic practice. 4th ed., 2007, 209–210. Oxford: Blackwell Publishing.
9. Bhutta ZA, Black RE, Brown KH. Prevention of diarrhea and pneumonia by zinc supplementation in children in developing countries: Pooled analysis of randomized controlled trials. Zinc Investigators' Collaborative Group. *J Pediatr*, 135, 1999, 689-97.
10. Hao Q, Maret W. Imbalance between pro-oxidant and pro-antioxidant functions of zinc in disease. *J Alzheimers Dis*, 8, 2005, 161–170.
11. Zahir S, Sarkar S. Study of trace elements in mixed saliva of caries free and caries active children. *J Indian Soc Pedo Prev Dent*, 24, 2006, 27-9.
12. Gunsolley JC. A meta-analysis of six-month studies of antiplaque and antigingivitis agents. *J Am Dent Assoc*, 137, 2006, 1649-57.
13. Gomershtein VA, Maksimovskii IuM. Zinc and caries. *Stomatologiia*, 68, 1989, 52-4.
14. AB Shetty Dental College, Mangalore, India. Serum copper level in dental caries patients: a case control study Pushparaj Shetty, Suchetha kumara
15. Losee FL, Ludwig TG. Trace elements and caries. *J Dent Res*, 49(6), 1970, 1229–35.
16. Gibson RS. Zinc nutrition in developing countries. *Nutrition Research Reviews*, 7, 1994, 151–173.
17. Noonan CW, Kathman SJ, Sarasua SM, White MC. Influence of environmental zinc on the association between environmental and biological measures of lead in children. *J Expo Sci Environ Epidemiol*, 13, 2003, 318–23.

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