

Evaluation of trace elements in blood of patients with dental caries

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Abstract

Introduction: Trace Elements are minerals present in living tissues in only small amounts; generally less than 20 mg per day. The role of major elements like carbohydrates proteins etc. have been extensively studied in caries. But role of trace elements have not been studied more in caries. In this experiment we evaluated trace elements from blood samples and correlate their values in occurrence with caries.

Aims & Objective: To examine the relationship between trace elements present in blood and occurrence of dental caries.

Material And Method: Blood samples of 10 patients with rampant caries, 10 of caries susceptible and 10 of caries immune patients has been collected from intravenous blood from ante cubital fossa by 21 gauge thin needle with 4ml EDTA bulb. The quantity of trace elements has been detected using ICP-MS inductively coupled plasma mass spectrometry (ThermoFischer scientific analytical technologies, Japan). These quantities obtained of trace elements have been correlate with occurrence of Dental caries.

Result & Observation:

1. The trace elements which are evaluated in present study with their values in three different groups as children with rampant caries, adult caries susceptible , normal caries immune has been shown in table no. 1 with average values.

2. After evaluation of these trace elements, the results obtained appear to be in normal range except in case of Cadmium, Mercury, chromium, Bismuth, Selenium.
3. Even though Cadmium, Chromium, Mercury, Selenium appear in normal range but found in very less quantity & within the group of rampant caries it found very very less in amount and shown in table no. 2.
4. In bismuth it appears to be abnormally less value than the average value.

Discussion: Bismuth is heavy metal similar to lead & arsenic. It is found naturally in very small amount in some foods and its sulfide and oxide compounds are important for use in cosmetics and medicines.

Bi doesn't provide any nutritional benefits directly although it can be of help with gastrointestinal disorders. Consuming too much bismuth leads to dark colored tongue black deposits within the gums.

Bueno *et al.* reported that adding 15 wt.% bismuth oxide to Portland cement provided adequate radiopacity for application as a root-canal filler. A bismuth-doped CPC (calcium phosphate bone cement) for root-canal filling has been developed by introducing bismuth salicylate basic (BSB) into the powder phase of the CPC , with the results showing that the radiopacity and sealing ability of BSB/CPC are superior to those of pure CPC.

We found that the concentrations of Cd, Cr, Hg, Se are lower in carious patients than in those of caries immune. Cr is necessary for normal function of insulin, Se with vitamin E works as antioxidant. The level of these elements in oral fluid might get changed resulting in dental caries.

Conclusion

This study suggests a possible role of Bismuth element in caries development as it appears to be abnormally less value than the average value as 20-50µgm.

Even though Cadmium, Chromium, Mercury, Selenium appear in normal range but found in very less quantity within the group of rampant caries, it is found very less in amount.

The role of which needed to be explored.

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Legends Figure and table



Figure 1: Rampant Caries



Figure 2 : Caries Immune



Figure 3: Blood Collection



Figure 4: ICP - MS

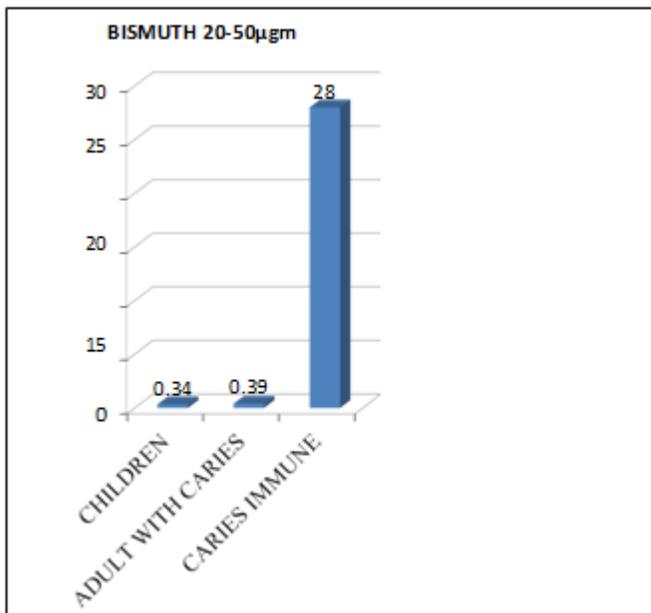
Table 1: Comparison of Different Elements in Various Categories of Dental Caries

Element	Children Rampant Caries	Adult Caries Susceptible	Normal Caries immune	Average Value
ARSENIC	2.9	3.4	3.4	<5 µg/l
CADMIUM	0.0064	0.97	1.23	<1.5 µg/l
MERCURY	0.03	0.8	0.84	<5 µg/l
LEAD	39.52	36.79	54.06	<150 µg/l
CHROMIUM	0.05	0.4	0.51	<30 µg/l
BARIUM	3.56	2.59	2.36	<30 µg/l
COBALT	0.35	0.12	0.12	<4 µg/l
CAESIUM	1.63	1.45	1.52	<5 µg/l
THALLIUM	0.03	0.01	0.02	<1 µg/l
URANIUM	0.04	0.02	0.02	<1 µg/l
STRONTIUM	12.03	12.48	12.54	8-38 µg/l
ANTIMONY	1.51	1.51	1.54	<3.5 µg/l
TIN	0.25	0.26	0.29	<2 µg/l
MOLYBDEN	0.83	0.86	0.83	0.70-4.0 µg/l
UM SILVER	1.32	1.23	1.23	<4 µg/l
VANADIUM	0.25	0.29	0.25	<0.8 µg/l
BERYLLIUM	0.53	0.53	0.53	<4 µg/l
BISMUTH	0.34	0.39	28	20-50 µg/l
SELENIUM	82.69	191.83	211.68	60-340 µg/l
ALUMINIUM	14.35	11.13	11.15	<30 µg/l
MANGANES	13.6	14.69	15.24	7.10-20 µg/l
E NICKEL	1.24	1.25	1.26	<15 <15 µg/l

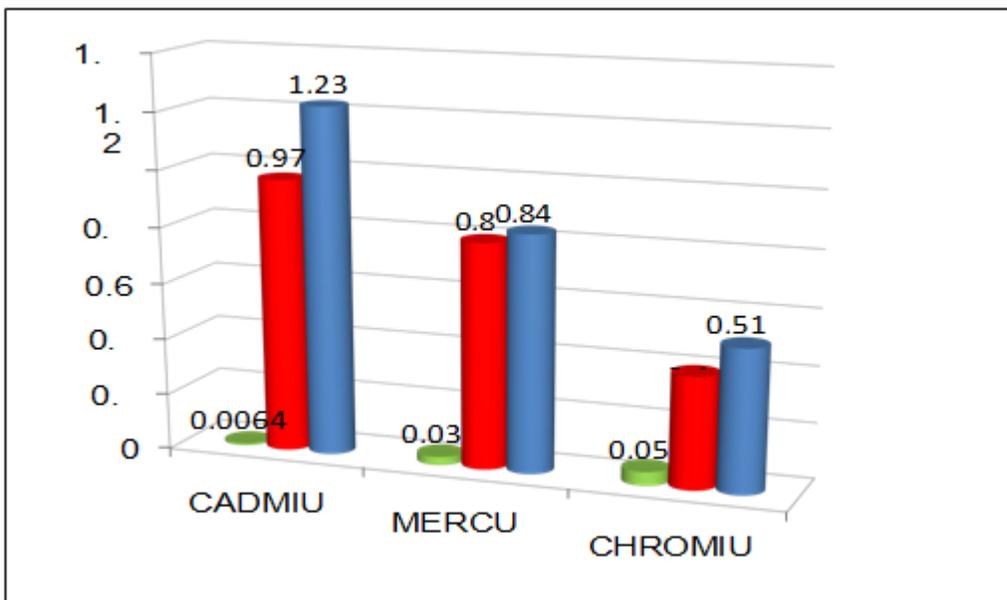
Table 2: Levels of Different Elements in Various Types of Dental Caries

Element	Children Rampant Caries	Adult Caries Susceptible	Normal Caries Immune	Average Values
CADMIUM	0.0064	0.97	1.23	<1.5µg/l
MERCURY	0.03	0.8	0.84	<5 µg/l
CHROMIU	0.05	0.4	0.51	<30µg/l
M BISMUTH	0.34	0.39	28	20-
SELENIUM	82.69	191.83	211.68	50µg/l 60-340 µg/l

Graph 1: Comparison of Bismuth Compound among All Varieties of Dental Caries



Graph 2: Comparison of Different Compounds among Children, Adult Caries and Susceptible Adult



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