

Evaluation the Difference between Adult and Children for Some Salivary Elements

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Abstract: *Background:* Human saliva has been used for a long time to observe the general body health and age related physiological changes of the body. Saliva is considered as a good reflector for many elements in human body. The aim of this study was to evaluate the variation in some salivary elements between adults and children. *Materials and methods:* Unstimulated human saliva was collected from apparently healthy sixty six subjects (adults and children), thirty three from each group. Their saliva was analyzed chemically by Atomic Absorption Spectrophotometer to estimate the concentration of salivary (Ca, Mg, Mn, Cd, Pb, Cr and Ni). *Results:* There is highly significant difference between adults and children for all the salivary elements. However, there are significant increases in concentrations of (Ca, Mg and Cr) among adult, but there are significant decrease in salivary concentration of (Mn, Cd, Pb and Ni) as compared with children's saliva. *Conclusion:* There is significant difference in many salivary elements between adults and children.

Keywords: Unstimulated saliva, salivary elements, Adults and children

1. Introduction

Saliva is very important body fluid that present in the oral cavity. The importance of saliva comes from its different components which is usually having many beneficial function supplying a large physiological needs for the body⁽¹⁾. There are only few studies on composition of saliva of healthy children are exist⁽²⁾. Saliva contains a variety of electrolytes (calcium, magnesium, manganese, sodium, chloride, chrome and nickel and others), some studies have assessed the relationship between many Diseases and those salivary ions and elements⁽³⁾. Salivary analysis has become an important resource for the evaluation of salivary conditions with physiologic effects primarily due to its origin, composition, functions, and interactions with other organ systems. Furthermore, it has a simple and non-invasive collection method, is easy to store, and is low-cost when compared to blood collection. With the addition of modern techniques and chemical instrumentation equipment, there has recently been an observable increase in its use for laboratory investigations, applicable for basic and clinical purposes in dentistry and other medical areas⁽⁴⁾. This study aimed to show if there is any differences between saliva of adults and children in containing some salivary elements.

2. Materials and Methods

Subject of the study

The subject for this study consists of sixty six subjects (adults and children), thirty three from each group. All the subjects were apparently healthy subjects without any systemic diseases. Thirty three primary school children were selected haphazardly for this study in Baghdad city; their age range between (6-8 years). The adult subjects were selected from healthy persons attending teaching hospital of dentistry/ collage of dentistry / university of Baghdad. Their age range between (25-45 years).

Sample collection

Unstimulated salivary sample (5 ml) was taken from the adults and children according to (Fejerskov and Thylstrup,

1994)⁽⁵⁾ criteria: The subject was prevented from eat or drink except water about an hour before collection of saliva. There was one minute as a pre-sampling period is advocated. The time that spends for collection saliva was 10 -15 minutes. The subject should be seated in relaxed position . Any saliva samples that contain blood should be discarded. Sampling time was always between 9-11 A.M. The collected saliva was centrifuged at 4000 rpm for 10 minutes. The centrifuged supernatants were stored frozen at (-20°C) until time of analysis.

Estimation the salivary elements

Estimation the salivary elements were carried out at Poisoning Consultation Center, Medical city. Frozen saliva was allowed to thaw at room temperature before their biochemical analysis. The salivary elements (Calcium, magnesium, manganese, cadmium, lead, chrome and nickel were determined by using Air-acetylene Atomic Absorption Spectrophotometer (AAS).

The principle of AAS measurement is as follow: the sample for analysis is dispersed in a beam of energy from a hallow-cathode lamp and atoms in the ground state absorb the incident energy of certain wave length. The absorption causes a decrease in emerging energy and with suitable instrumentation the decrease could be measured and the metal ions concentration was determined⁽⁶⁾. The concentration level of calcium and magnesium salivary elements was expressed as (mg/ml) unit. While the concentration level of manganese, cadmium, lead, chrome and nickel were measured in µg/ml.

3. Statistical Analysis

Statistical Package for Social Sciences (SPSS version 14) was used to analyze of data for statistical analysis. Descriptive measurement (mean and standard deviation) were used to describe variables. The statistical significance level between the concentrations of elements in each sample. P value equal to or less than (0.05) level of significance was considered to be statistically significant. The confidence limit was accepted at 95%.

4. Results

The results of the data for this study showed in the following tables and figures. The mean concentration with standard deviation of the salivary elements for adults group that measured in this study shown in table 1. While the mean concentration with standard deviation of the salivary elements for children found in table 2. The concentration of Ca in saliva was (4.72 ± 0.29) mg/ml in adults. It is higher than that of children (3.79 ± 0.34) mg/ml. Mg in saliva of adults was (1.00 ± 0.33) mg/ml higher in concentration than Mg in saliva of children (0.57 ± 0.08) mg/ml. While the concentration of Mn in saliva of adults was (0.03 ± 0.01) μ g/ml lower than its concentration in saliva of children (0.08 ± 0.01) μ g/ml. The concentration of salivary cadmium in adults was (0.11 ± 0.02) μ g/ml. It is lower in concentration than salivary cadmium of children (0.20 ± 0.05) μ g/ml. The concentration of lead in saliva of adults was (2.06 ± 0.29) μ g/ml. It is less than concentration in children's saliva which was (5.96 ± 1.03) μ g/ml. The salivary concentration of Cr in adults was (0.32 ± 0.05) μ g/ml higher in concentration than children (0.23 ± 0.05) μ g/ml. Finally the salivary concentration of Ni in adults was (0.21 ± 0.03) μ g/ml but its concentration in saliva of children was (0.62 ± 0.10) μ g/ml. It is obvious from these two tables 1 and 2 the difference in the unit reflect their concentration in saliva. Figure 1 show the mean concentration of salivary calcium and magnesium for the two groups (adults and children) measured in mg/ml. In figure 2 show the mean concentration of salivary elements (manganese, cadmium, lead, chrome and nickel) for the two groups (adults and children) measured in μ g/ml. The significance level between the two studied groups (adults and children) for all the salivary elements that measured in this study shown in table 3 by using paired t-test, the p-value for all groups was less than 0.01 which reflect highly significance difference between them.

5. Discussion

This study takes an idea for comparing the salivary elements between adults and children. All the factors except salivary elements were fixed as time of collection the saliva sample, period of collection, general health of all subjects, and method of collection and so on. All the saliva collected in this study was un-stimulated saliva to avoid the difficulties which may face when collected stimulated saliva especially with children.

The salivary elements that measured were seven elements. Calcium and magnesium were isolated from the rest elements in figure 1 because their high concentration when compared with the rest salivary element and measured in mg/ml. While the concentration level of manganese, cadmium, lead, chrome and nickel were measured in μ g/ml. because these salivary elements considered as trace elements present in saliva.

The first salivary element in this study was calcium. Figure 1 show the concentration of this element in saliva of adults is more than its concentration in children with highly statistical significance (table 3). This result coincide with ⁽⁷⁾. that reveal Salivary calcium concentrations are lower in

children than adults. And this result support the fact of remineralization potential of saliva increases from deciduous dentition to mixed to permanent dentition age groups. The decrease of salivary calcium concentration in childhood may be attributed to the need of the child body to this element. And this is agreed with Wactawski-Wende, 2001 study⁽⁸⁾.

The second salivary element was magnesium and it is also higher in adults in compared with children. The explanation for this fact is Magnesium participates in a number of biochemical reactions that take place in bone metabolism and it is involved in at least 300 enzymatic processes, because the bone metabolism in children more than in adults ; so the exhaustion for this element in the children is greater which lead to decrease its concentration. This agrees with the result of Michael et al. 2010⁽⁹⁾. Also this result very coincide with (Rahul R Deshpande et al., 2011)⁽¹⁰⁾ results. But it in contrast with Aryeh Ben et al. 1990⁽¹¹⁾. In which they found that salivary magnesium concentration does not have significant difference between young and old.

The salivary trace elements in this study were manganese, cadmium, lead, chrome and nickel. The concentration of all these trace elements except chrome was greater in children than in adults. But there is no study similar to this work exactly. Therefore no comparison make with other results.

The study shows the concentration of manganese decrease in saliva from childhood to adolescence. This result agrees but not coincides with the result of Rügauer et al. 1997⁽¹²⁾. In which the manganese levels revealed an age-dependent linear decrease. But the sample in it was plasma or serum.

The variations in this subject are huge. Some studies show no significant difference between adult and children in trace elements. Other studies exhibit age related decrease for these element. This study revealed highly significant difference for all trace elements. This may attributed the nature of diet for children or to the physiological changes which lead to these differences in salivary elements.

6. Conclusion

Human saliva can be considered as a mirror to the physiological changes of the body. Salivary elements are associated closely with age related factor. Other salivary elements and multiple age groups should be taken in the future. So other studies are very necessary.

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Table 1: Concentration of salivary elements (Means ± SD) for the adults group

Salivary elements in adults	Mean	Std. Deviation
Ca (mg/ml)	4.72	0.29
Mg (mg/ml)	1.00	0.33
Mn (µg/ml)	0.03	0.01
Cd (µg/ml)	0.11	0.02
Pb (µg/ml)	2.06	0.29
Cr (µg/ml)	0.32	0.05
Ni (µg/ml)	0.21	0.03

Table 2: Concentration of salivary elements (Means ± SD) for the children group

Salivary elements in children	Mean mg/ml	Std. Deviation
Ca (mg/ml)	3.79	0.34
Mg (mg/ml)	0.57	0.08
Mn(µg/ml)	0.08	0.01
Cd (µg/ml)	0.20	0.05
Pb (µg/ml)	5.96	1.03
Cr (µg/ml)	0.23	0.05
Ni (µg/ml)	0.62	0.10

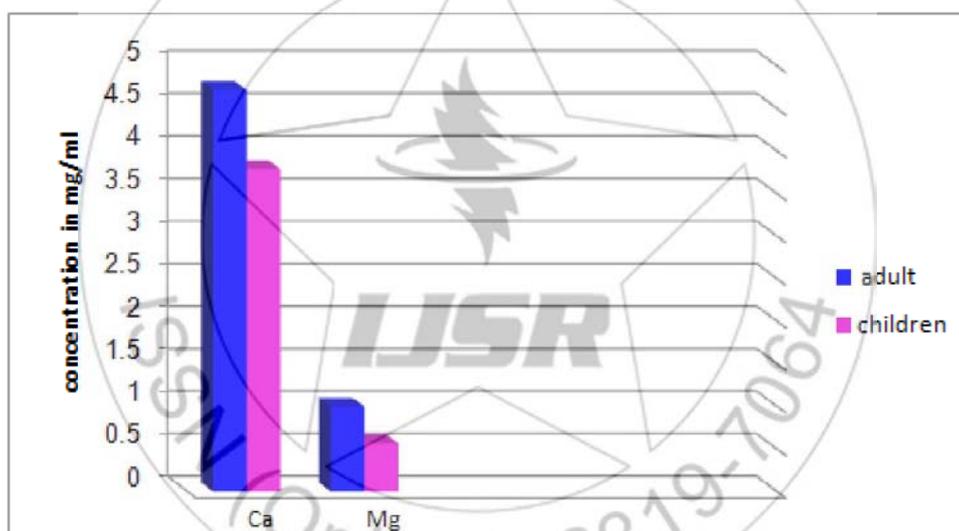


Figure 1: Mean concentration of salivary elements (Ca and Mg) in adults and children groups measured in mg/ml

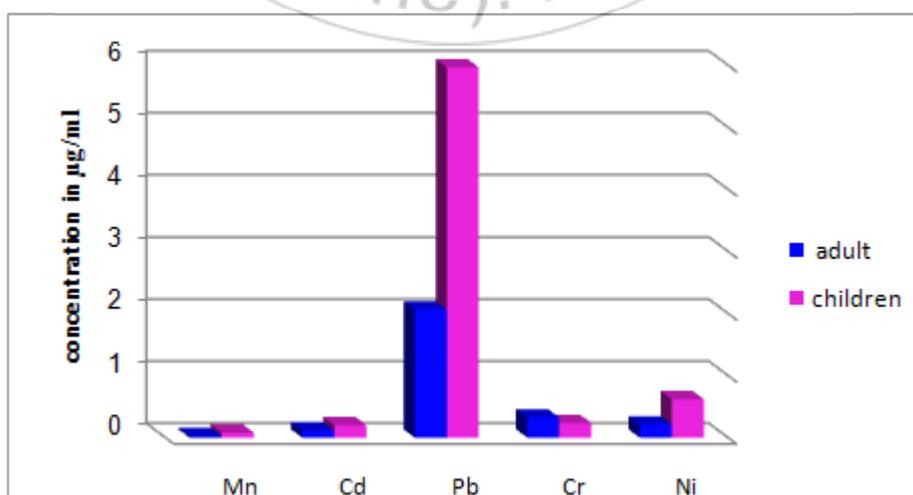


Figure 2: Mean concentration of salivary elements (Mn, Cd, Pb, Cr and Ni) in adults and children groups measured in µg/ml

Table 3: T-test comparison between two study groups (adults and children) for the same salivary elements

Salivary elements	Study groups	t-test	P-value	Sig.
Ca	adult	11.943	0.000	HS
	children			
Mn	adult	-20.365	0.000	HS
	children			
Cd	adult	-9.347	0.000	HS
	children			
Mg	adult	6.893	0.000	HS
	children			
Pb	adult	-20.858	0.000	HS
	children			
Cr	adult	6.714	0.000	HS
	children			
Ni	adult	-22.938	0.000	HS
	children			

