

Salivary IgA and Total Protein among Children with Caries and Caries Free Groups, Correlating to Their Mothers

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Abstract: *Background:* Among the oral diseases, dental caries is the most common chronic disease of mankind. It affects all people regardless of their gender and age. Studies showed a positive relationship between mother and child caries experience, suggesting that this is a good predictor of caries risk in children. This study was aimed to evaluate the salivary immunoglobulinA, and total protein in caries free children and children with caries in relation to their mothers. *Materials and Methods:* The present study included sixty healthy children who divided into two groups, 30 children caries free and 30 children with caries. Stimulated saliva was collected from all children and their mothers. The salivary samples were then analyzed for salivary immunoglobulin and total protein levels. The data was then statistically analyzed using SPSS version 10. *Results:* Salivary immunoglobulin levels increased significantly in caries free children. The results also showed that, the salivary total protein was higher in children with caries group. *Conclusions:* Within the limitation of this study, and with regard to mother-child relationships, this study concludes that, the total protein in saliva, and immunoglobulin levels play a major role in the caries experience.

Keywords: children with caries, caries free, salivary mother-child relationships.

1. Introduction

Oral health is a determining factor for quality of life and personal development, and according to the World Health Organization (WHO), political, social, economic, cultural, environmental, behavioral and biological factors may improve or impair oral health⁽¹⁾.

In the etiological context of caries disease, bacterial infection is necessary but it is not the sole factor contributing to its development^(2,3), since occurrence and severity of caries in a population result from an interaction with the causing elements⁽⁴⁾. Dental caries in childhood is strongly related to the mother, who not only is a transmitter of bacteria but also the model of habits, values and attitudes for her child⁽⁵⁾.

Social changes ultimately lead to changes within the family. Increasingly, women are considered as the reference person in the family. In this scenario, the mother assumes a central role in the formation, transmission, and environmental conservation and social development of other family members, especially her children. It is therefore likely that the health of both the mother and child are similar or are linked to social determinants, given that they live in the same social status⁽⁶⁾.

Both genetic and environmental factors influence dental caries and because of genetic differences, certain environmental factors tend to be more cariogenic for some people than others⁽⁷⁾. However, data published about correlation between salivary immunoglobulin and total protein with dental caries especially in children, are contradictory⁽⁸⁻¹¹⁾.

The concentration of salivary immunoglobulin may change depending on salivary flow rate, hormonal factors, emotional states, physical activity, etc⁽¹²⁾ and their control is impossible in any study. Saliva is one of the most important protective body fluids but it still remains the least understood. Though numerous studies in the past have attempted to relate certain aspects of salivary output and composition to caries susceptibility in children, however, predominantly these studies looked at either the physicochemical properties of saliva (flow rate, pH) or specific components of saliva with an antimicrobial activity, such as salivary immunoglobulin⁽¹³⁻¹⁵⁾.

It has been agreed that genetic factors associated with the phenotypic expression of salivary immunoglobulin and total protein in mixed saliva can contribute to the evaluation of dental caries risk in children and hence early prevention of this widespread disease. Thus, the exploration of these inherited markers for dental caries is very important⁽¹⁶⁾. It has been claimed that the imbalances in levels of immunoglobulin in saliva and certain protein with physicochemical properties may play an important role in the onset and development dental caries⁽¹⁷⁾. Hence, evaluation of those factors in saliva that may increase the risk of individuals to dental caries, can pave way to make recommendations that will cater specifically to needs of an individual. This study was conducted with an aim to have a comparative evaluation among caries-free children and children with dental caries from the age group of 4 and 5 years and their mothers, in terms of the stimulated human whole salivary total protein and salivary immunoglobulin (IgA) levels.

2. Materials and Methods

Sixty preschool children aged 4-5 years old, and their mothers (60 mothers, were selected for saliva sample, during attending with their children), took part in this study. Stimulated saliva samples were collected from the children and their mothers. The children were selected from a group of children attending the Department of Pedodontics and Preventive Dentistry, College of Dentistry, University of Baghdad.

The aim and details of the experiments were explained, and the informed consent was obtained from parents prior to the beginning of the research procedures. Sample collection was started at the end of April 2015 till the end of May 2015. A total of 60 children were divided equally into two groups:

Group I – Children with dental caries.

Group II – Caries-free children.

The criteria will be as follows:

- Subjects in Group I – those with a dmft score, as WHO diagnostic criteria⁽¹⁸⁾ of at least 5 carious teeth involvement.
- Subjects in Group II – those absolutely free from caries with a dmft score, as per the WHO diagnostic criteria, 1987⁽¹⁸⁾ of 0.

Exclusion criteria

- Patients who are physically and medically compromised.
- Patients who have arrested carious lesions

After oral examination for children, stimulated saliva samples were collected from the children and their mothers, and performed under standard condition following instruction cited by Tenovuo and Lagerlof⁽¹⁹⁾. Immediately after collection of saliva, through five minutes and disappearance of the salivary foam, the salivary samples (for children and their mothers), were centrifuged then the clear supernatants are separated by micropipette and stored in (-20 C) in a deep freeze till the time of chemically analyzed for the detection of salivary immunoglobulin (IgA)⁽²⁰⁾ and total protein by electrophoretic examination.

Total protein was determined by using Kit (SYBRIOFRACE) for analysis salivary total protein, proteins modify spectrum of absorption of the complex pyrogallol red molybdate. Globins together with albumin react. The optical density read at 598nm is proportional to concentration in proteins, the calculation:-

$$O.D. Samle \div O.D. Standard$$

$$\times Standard\ concentration \left(\frac{mg}{dl} \right)$$

The data was then statistically analyzed using SPSS program (version 10). The statistical analyses included:

- 1) Descriptive statistics: means, standard deviations, frequencies and percentages.
- 2) Inferential statistics: independent sample t-test and Pearson's correlation coefficient.

3. Results

This study revealed that the percentage of caries – free and children with caries by gender is seen in table 1. The table

illustrates that females exhibited the high percentage of caries – free (14.2), compared to males, while the opposite was true for the children with caries, the males comprised a higher percentage (15.0) of caries experience than females.

Table 1: Distribution of caries free and children with caries by gender

Groups	Gender	No.	%
Caries free children	M	13	43.33%
	F	17	56.67%
Children with caries	M	18	60.0%
	F	12	40.0%

The highest total protein value was represented in the saliva of the caries active group (50.75 ± 43.96), followed by the caries free group (48.69 ± 35.07). Difference between the two groups was statistically not significant ($p > 0.05$) Table (2). In regard to salivary immunoglobulin (IgA), the same table showed its highest value in the caries free group (66.36 ± 19.85), while children with caries comprised the lower mean value (54.34 ± 14.81), difference between groups was statistically highly significant ($P < 0.05$).

Table 2: Salivary immunoglobulin A and total protein levels (mean and standard deviation) among caries free and children with caries

Variable	Group	Mean	$\pm SD$	Sig.
Total protein	Caries free children	48.69	35.07	0.68
	Children with caries	50.75	43.96	
IgA	Cariesfree children	66.36	19.85	0.000
	Children with caries	54.34	14.81	

Table 3 illustrates the salivary immunoglobulin level (Mean and Standard Deviation) by gender among caries free, caries active children. Males comprised the high mean value with salivary immunoglobulin (56.32 ± 20.28) in the children with caries compared to females (52.51 ± 14.32). The same table revealed that males among caries free group also exhibited more mean value of salivary immunoglobulin (66.62 ± 26.82) compared to females (65.57 ± 22.34).

Table 3: Salivary immunoglobulin A levels (mean and standard deviation) by gender among caries free and children with caries

Group	Subgroup	Salivary Immunoglobulin (mg/dl)	
		Mean	$\pm SD$
Children with caries	Males	56.32	± 20.28
	Females	52.51	± 14.32
	Total	54.18	± 14.81
Caries free children	Males	66.62	± 26.82
	Females	65.57	± 22.34
	Total	66.45	± 19.85

Table 4 illustrates salivary total protein levels (Mean and Standard Deviation) by gender among caries free, children with caries. It is clear that in this table a high mean value of salivary total protein was cited among females with children with caries (39.94 ± 62.47). The males among this group exhibited the lower mean value of salivary total protein (24.20 ± 3.14). In regard to the caries free children, the opposite was true, the males comprised a higher mean value (28.46 ± 3.57) compared to females (24.96 ± 3.93).

Tables 5 and 6 demonstrate the correlations in salivary immunoglobulin and total protein levels among caries free and children with caries with their mothers.

Concerning salivary immunoglobulin, this investigation revealed that with the both gender, a strong statistically highly significant correlations were recorded with their mothers among caries active group ($p<0.001$).

Table 4: Salivary total protein levels (mean and standard deviation) by gender among caries free and children with caries

Group	Subgroups	Salivary total protein (mg/dl)	
		Mean	$\pm SD$
Children with caries	Males	24.20	± 3.14
	Females	39.94	± 62.47
	Total	60.61	± 43.96
Caries free Children	Males	28.46	± 3.57
	Females	24.96	± 3.93
	Total	59.50	± 35.07

The same table demonstrates strong negative statistically highly significant correlations among caries free group and their mothers for both male and females.

Concerning salivary total protein, the opposite was recorded, the table shows statistically no significant correlations in total protein levels were seen in the saliva among males and females for the children with caries and caries free groups with their mothers ($P >0.05$).

Table 5: Correlation coefficients of salivary immunoglobulin levels among caries free and children with caries with their mothers

Group		r	P
Males X Mothers	Caries free	-0.921	0.000
	Caries active	0.945	0.000
Females X Mothers	Caries free	-0.943	0.000
	Caries active	0.523	0.000

Table 6: Correlation coefficients of salivary total protein levels among caries free and children with caries with their mothers

Group		r	P
Males X Mothers	Caries free	0.007	0.965
	Caries active	-0.065	0.678
Females X Mothers	Caries free	0.036	0.806
	Caries active	0.062	0.678

4. Discussion

Both genetic and environmental factors influence dental caries especially among preschool children and because of genetic differences, certain environmental factors tend to be more cariogenic for some people than others⁽²¹⁾.

The dental needs of expectant mothers are often considered to be a minor problem by the prenatal staff. This fact is related to the socioeconomic status, being even more concerning among low-income populations with a low level of instruction⁽²²⁾. It is generally accepted that *S. mutans* is the primary causative agent of dental caries in human beings

^(23,24). Secretory IgA inhibits the attachment and adherence of oral bacteria to the epithelial and tooth surfaces. Hence, the present study was aimed at assessing the relationship of salivary immunoglobulin-A with dental caries.

In the present investigation, caries free group presented higher mean value of salivary sIgA and their mothers compared to the children with dental caries. This result could be attributed that, the high mean value of salivary immunoglobulin level of their mothers may play a protective role for their child. Also maternal attitudes are likely to modify behaviors and thus, play an important part in the uptake of favorable dental health practices⁽⁵⁾. Similarly, a study of Fadel et al.⁽²⁵⁾ found less caries in children whose parents had a better attitude toward dentistry and good oral health.

However, other study⁽²⁶⁾ showed that the better the mother's oral health the less plaque her child had. The opposite was true among children with dental caries and their mothers, a low IgA mean value was found in saliva of children with dental caries and their mothers compared to the caries free children. Several studies suggest salivary *mutans streptococci* in mothers as the major source for the maternal transmission of *mutans streptococci*^(27,28). The study of dental caries among children and in relation to their mothers, is important not only for the resulting deterioration in the quality of life of young children, but also because dental caries in the preschool age is one of the best predictors of caries in the permanent dentition⁽²⁹⁾. The concentration of salivary immunoglobulin may change depending on salivary flow rate, hormonal factors, emotional states, physical activity, etc⁽²⁸⁾ and their control is impossible in any study.

In this study, the total proteins level increased in individuals among children with caries compared to caries free group; however, there was no significant difference between the two groups. This study agrees with Preethi et al⁽²⁹⁾ who found that the total proteins level in saliva was increased in the group among children with caries compared to the caries free, which is in line with the findings of this research.

Other explanation in relation to these findings, it could be, a larger number of cariogenic microorganisms that metabolize carbohydrates would be present in the children with caries group than in the caries-free group, and possibly, there would also be a larger concentration of salivary total proteins, which act as anti-microbial agents⁽³⁰⁾, therefore, a high mean value found in saliva of caries active children compared to the caries free group. However, the results of these investigations failed to record any significant correlation between the children and their mothers.

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