

CHANGES IN TOTAL SALIVARY sIgA LEVEL WITH INCREASE IN AGE IN MIXED DENTITION

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ABSTRACT

Background: Immunoglobulin A(IgA) is an important immunoglobulin present in saliva which has an established role in preventing caries. The level of IgA is not constant throughout the ages. It has a positive relation with increase age. **Aim :** the aim of this study is to evaluate the changes in amount of salivary IgA in mixed dentition age group in caries free children. **Materials & Methods :** 30 children including boys and girls aged between 6-14 yrs, with no caries were enrolled for the studies after random selection based on inclusion criteria. The children were divided in three equal groups based on their ages: early Mixed Dentition, Intermediate mixed dentition and late mixed dentition. Unstimulated saliva was collected from them. Enzyme Linked Immunosorbent Assay was performed for the estimation of IgA of the collected saliva samples. **Result :** The data obtained are statistically evaluated using one way ANOVA technique. Result shows that there was a statistically significant difference in IgA level in all the three age groups. Among the three groups highest amount of IgA level found in late mixed dentition group. **Conclusion :** So from the above study it can be concluded that IgA level in saliva increases with increase in age in mixed dentition.

KEY WORDS

IgA, Child, Saliva

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INTRODUCTION

IgA is one of the major immunoglobulins found in the saliva. It has an established role in prevention of dental caries. The amount of secretory salivary IgA depends on many factors.¹ The oral health, immunization history, age, emotional stress along with diurnal variation has its effect on salivary IgA level^{1,2}. Along with other function the main effect of salivary IgA in prevention of dental caries is on mutans streptococci.² Many studies have established the role of this immunoglobulin in preventing the adherence of S. Mutans with the tooth surface³. The amount of IgA present in the salivary secretion is not constant throughout the life. Concentration of serum IgA is 20% of normal adult value at the age of 1 year and rises progressively through childhood and adolescence.⁴ Secretory IgA is undetectable at birth but can be detected by 1 week to 2 months of age in tears, nasopharyngeal secretions and saliva. In infancy, a rapid increase of the salivary IgA level has been demonstrated, usually peaking before 2 months and reaches adult values by age of 4-6 years, according to some authors.^{4,5} A good foundation is always needed for a bright future. And since at the time of eruption of permanent tooth, they are more vulnerable to acid attacks so the role of total salivary IgA in that time is very important to confer protection to the tooth^{1,3}. So the aim of this study is to measure the changes in salivary IgA level in mixed dentition age group from 6 yrs to 14 yrs and to find if there is any correlation present between the age and salivary IgA level.

MATERIAL & METHODS

In this cross-sectional analytical study, 30 children in the age group of 6-14 years were selected with caries index 0 (decayed, missing, filled, extracted tooth) based on the criteria that they should not be immune compromised and having a good quality to expectorate.

Before the beginning of the study a written consent was obtained from the parents or the legal guardian of the children. Children selected for the study were called on a pre fixed day and made to sit comfortably in the dental chair. The children were

accompanied by their parents or legal guardian during the procedure. The procedure included thorough history taking along with intraoral, extra oral and physical examination of the child.

Intraoral examinations were made using dental mirror and explorer under proper illumination. Examination for dental caries was performed according to the World Health Organization criteria and method (1997).

The 30 children were divided into three groups according to the age of the children:

- Group A: Early Mixed Dentition : 6-8 yrs of age consisting of 10 children with caries index 0
- Group B: Intermediate Mixed dentition : 9-11 yrs of age consisting of 10 children with caries index 0
- Group C: Late Mixed Dentition : 11-13 yrs of age consisting of 10 children with caries index 0

Dental examination and saliva sampling were carried out in different days. On the day of saliva collection, the children were asked to perform regular oral hygiene procedure after breakfast (1.5 h before collection) and during this period children were not allowed to eat or drink. Children were seated in dental chairs and 4 cc of unstimulated saliva were collected in special tubes using the method described by Collins and Dawes. All samples were collected between 10 and 11 a.m., and the time spent on each procedure didn't exceed 30 min. The samples are then transported to Laboratory under proper supervision and condition for ELISA test to estimate total salivary

IgA. The ELISA kit from DRG Diagnostica is used for the estimation of salivary IgA.

ELISA Principle

The h-IgA saliva ELISA test is based on simultaneous binding of human IgA to two antibodies, one monoclonal immobilized on microwell plates, the other, polyclonal conjugates with horseradish peroxidase (HPR). After incubation the bound separation is performed by a simple solid-phase washing and then the substrate solution (TMB) is added. After an appropriate time has elapsed for maximum colour development, the enzyme reaction is stopped and the absorbance is determined.

The sIgA concentration in the sample is calculated based on a series of standard. The colour intensity is proportional to the sIgA concentration in the sample.

RESULTS & OBSERVATION

These groups were used to analyze the amount of total sIgA present in saliva sample. In Group A (early mixed dentition) mean total sIgA calculated was $174.80 \pm 21.94 \mu\text{g/ml}$ (Table 1). Group B (intermediate mixed dentition group) showed a mean total sIgA was $208.40 \pm 30.51 \mu\text{g/ml}$, Group C (late mixed dentition group) presented with total sIgA was $239.20 \pm 23.89 \mu\text{g/ml}$ (Table 1).

TABLE No. 1: Formed dentin bridge thickness (in mm)

Early Mixed Dentition		Intermediate Mixed Dentition		Early Mixed Dentition	
Mean Age	Mean Total salivary IgA level ($\mu\text{g/ml}$)	Mean Age	Mean Total salivary IgA level ($\mu\text{g/ml}$)	Mean Age	Mean Total salivary IgA level ($\mu\text{g/ml}$)
6.8	174.80 ± 21.94	10.2	208.40 ± 30.51	12	239.20 ± 23.89

Table 2 : ANOVA test performed for total sIgA level in different groups

Source	Degrees of freedom	Sum of squares	Mean sum of squares	F-Value	P-Value
Between methods	2	20750	10374.9	15.70	0.000
Within methods	27	17848	661.0		
Total	29	38597			

GroupWise comparison

To compare the average total sIgA level, the mean and standard deviation for the parameter of total sIgA level of each group were tabulated (Table 1). ANOVA of data were performed for the Fisher's 'F' test and 'P' value were calculated for both variables as shown in Table 2. The differences of variances of the respective parameters in the three categories were computed to find whether the difference was significant at probability value equal to 0.05.

From ANOVA (Table 2) values it can be seen that there is statistical differences present between mean values of total sIgA level between three groups ($P < 0.05$). After performing Fisher's individual family error rate at 0.05%, (Figure 2) value between the three groups and comparing the mean values from Table 1 and Figure 1 it can be concluded that highest amount of total sIgA level was found in late mixed dentition period and lowest amount was found in Group A (early mixed dentition period).

DISCUSSION

The immune system exhibits profound age related changes. IgA constitutes the predominant immunoglobulin iso type in secretions of human saliva. Salivary IgA is the first warrior of body's defence mechanism against the invasion of pathogens on any mucosal surface^{1,3,4}. It prevents infections by inhibiting the adherence of pathogens to epithelial and tooth surfaces⁶. It is well documented that with higher concentration of IgA in saliva, the incidence of dental caries was found to significantly reduced, whereas lower IgA concentration in saliva is proportional to increased risk of dental caries, periodontal diseases, and upper respiratory tract infections.⁷ Weemaes et al. have shown that the salivary IgA secretion rate increased during infancy and childhood (1-12 years).¹ Childers et al.(2003) have reported that the levels of IgA increased with age in children (aged 6-12 years, $n = 14$)⁸ Challacombe et al.(1995)⁹ showed that the salivary IgA levels

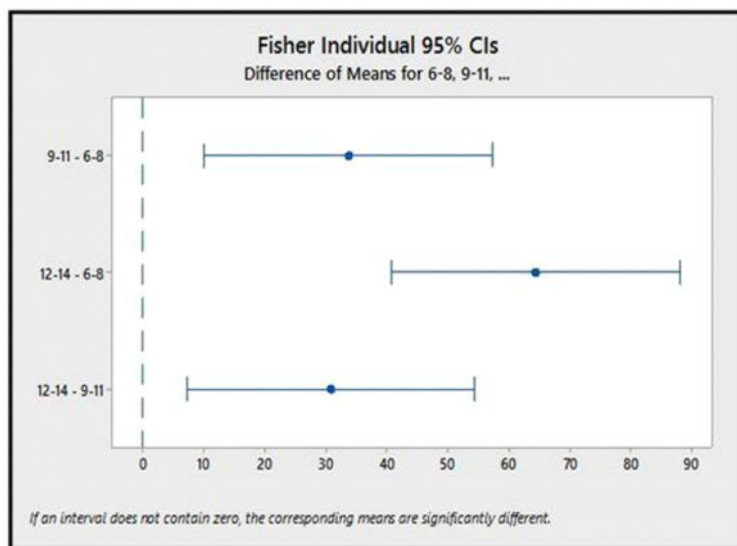


Figure-1 : Fisher's individual family error rate at 0.05%

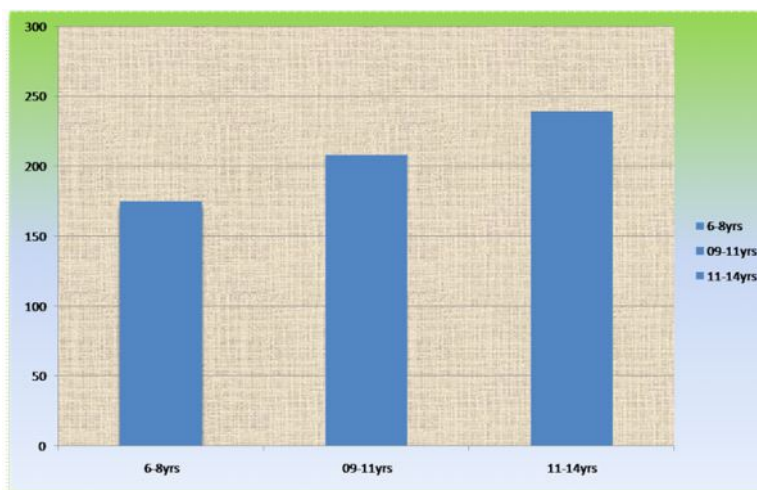


Figure-2 : mean IgA level among three groups

increased with age and reached maximum levels in the oldest study group (>80 years). It has also been reported that secretion of salivary IgA is higher in children of age 1-12 years.⁹ Childers et al. determined the concentrations of IgA in the parotid saliva of healthy children (age 6-12 years) and healthy adults (age 22-51 years) and reported that the levels of IgA increased with age^{3,6}. Researchers have also reported that the salivary IgA was found to be at the maximum in oldest studied individuals (>80 years).¹⁰ In this study we found a steady increase in salivary total IgA level in saliva of this mixed dentition age with lowest amount being found in early mixed dentition whereas highest amount being found in late mixed dentition conferring immunity to the caries. Our result is supported by the study of Weemas et al, (2003)⁴ who also found a steady increase in salivary and serum IgA level. This increase in IgA level can be attributed to the fact that with the increase in age there is more bacterial challenges to the immune system and since in our study all the subjects are caries free so increasing IgA level is giving immunological protection against caries¹¹. The average value of IgA in different age group is also estimated and can be used for quantification between health and disease. However, genetic and environmental differences and differences in oral health may account for the differences in results obtained in this study and those reported by other investigators¹¹.

CONCLUSION

Based on the results of the present study, it can be concluded that age-related alterations of salivary IgA levels occur in healthy subjects in mixed dentition period. A steady increase in salivary IgA level can be noticed from early mixed dentition to beginning of permanent dentition. So considering the protective role of IgA in salivary secretion proper oral hygiene maintenance is very much advisable in the beginning of mixed dentition period.

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