

## Salivary SIgA and Dental Caries Activity

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This case-control study was conducted to determine the protective role of salivary secretory immunoglobulin A (SIgA) levels in the unstimulated whole saliva of dental caries active (Group I and II) and caries free children (Group III). Thirty children aged 4-8 years were selected. Their DMFT (Decayed Missing Filled teeth for permanent teeth) and/or df-t (decayed, filled teeth for deciduous teeth) scores were determined and the salivary SIgA levels were measured using Immunoturbidometry. SIgA levels of all three groups were in the normal range of 4-30 mg/dL. The SIgA levels for both Group I and II were less than that in Group III ( $P=0.018$  and  $P=0.0013$ , respectively).

**Key words:** *Child, Dental caries, Immunoglobulin A, India.*

Dental caries is a multifactorial disease and one of the major contributing factors is saliva [1]. Secretory immunoglobulin A (SIgA) is the prominent immunoglobulin in whole saliva and is considered to be the main specific defense mechanism in the oral cavity. SIgA helps in prevention of dental caries by inhibition of bacterial adherence, reduction of hydrophobicity, agglutination of bacteria and inactivation of bacterial enzymes and toxins [2-4]. Several studies on the role of SIgA in prevention of dental caries showed contradictory results [5-7]. We compared the SIgA levels in the unstimulated whole saliva of caries free and caries active children to determine the role of SIgA in protection from dental caries.

### METHODS

Thirty children of both sexes, aged 4-8 years were selected randomly, from those who were enrolled. Their DMFT (decayed missing filled teeth for permanent teeth) and/or df-t (decayed, filled teeth for deciduous teeth) scores were determined and were then divided into three groups. Group I: 10 children with DMFT and/or df-t=1-5 (Low caries

activity), Group II: 10 children with DMFT and/or df-t=6-10 (high caries activity), and Group III: 10 caries free children. For the children with mixed dentition, the sum total of DMFT and df-t was considered [8]. The inclusion criteria for subject recruitment were: co-operative behavior, normal growth and development, and good oral hygiene. The exclusion criteria were: congenital or systemic disease, protein energy malnutrition, obesity, dental abscesses, use of antibiotics in the past 7 days, and oral exposure to food in past two hours of sample collection.

After obtaining an informed consent from the parents or guardians, unstimulated whole salivary samples were collected in sterile vials. All the salivary samples were collected between 10-12 AM in order to prevent any differences in the concentration of the saliva due to the circadian rhythm. Children were asked to pool the saliva in the floor of mouth and spit the collected saliva at an interval of 5 minutes. After collection of 0.5mL of salivary sample, it was transported immediately to the laboratory at a temperature of  $-70^{\circ}\text{C}$ .

The estimation of SIgA concentration was done

### WHAT THIS STUDY ADDS?

- Salivary SIgA levels may have a role in protection against dental caries, but do not have a role regarding the severity of the disease.

using immunoturbidometry (SpinReact, SA, Gerona, Spain). The principle of the procedure is that, SIgA antibodies when mixed with salivary samples, it forms insoluble complexes which cause a change in the optical density, and is recorded on a semi automatic analyzer (based on the principle of spectrophotometer). Statistical analysis was performed by using ANOVA test where *P*-values less than 0.05 were considered as statistically significant.

### RESULTS

Mean values, standard deviations and range and statistical significance of the salivary SIgA concentrations for the studied groups are shown in **Table 1**. The total salivary concentration of SIgA was statistically significantly higher in the Group III than that of both the Group I and II.

### DISCUSSION

The infectious nature of dental caries assumes the hypothesis that some form of host immunity can regulate caries activity. If immunity can regulate caries activity then SIgA might give a clear correlation [2]. It has been suggested that salivary SIgA antibodies generated by the mucosal immune system play an important role in the immune response against dental caries [6]. Bagherian, *et al.* [9] found higher levels of SIgA in the saliva of children who were colonized for less than 6 months with *S. mutans* (cariogenic organisms), and had a low DMFT score than those who had harbored *S. mutans* for a longer period of time (24 months) and had a high DMFT score. Hence the participants in our

study were categorized into two groups based on the DMFT and/or df-t score. The levels of SIgA in subjects without any systemic or immunological disease ranges from 4-30 mg/dL [4]. Systemic conditions like protein energy malnutrition, obesity, infections, psychological stress, cigarette smoking affect SIgA levels [10]. As the children in our study group were free of such conditions, levels of SIgA detected in our study were 11-32 mg/dL which lies within this range. But, when a comparison was made for the salivary SIgA levels between all the three groups, the results obtained were on the relatively low end of the normal range of SIgA for caries active (Group I and II) subjects while they were at the relatively high end of the normal range for caries free (Group III) subjects, and the difference of SIgA levels of Group I and II with Group III were statistically significant. In the present study, a significant inverse correlation was found between SIgA and the caries activity, which is in agreement with previous reports [5,6]. Thus, it can be suggested that the secretory immune system provides local immune protection against cariogenic organisms in the oral environment and ultimately prevents dental caries.

In contrast to our study, Thaweboon, *et al.* [2] and deFarias, *et al.* [7] found that the presence of dental caries was associated with an increase of total salivary SIgA. However, Shifa, *et al.* [3] and Koga, *et al.* [11] found no correlation between dental caries and SIgA levels. The contradictory results seen in the literature may be due to different sampling methods, different criteria for patient selection, and different

**TABLE I** SALIVARY SECRETORY IMMUNOGLOBULIN A (SIgA) LEVELS IN CARIES ACTIVE AND CARIES FREE CHILDREN (N=30)

Group	Number of children	Mean SIgA (SD) (mg/dL)	Range SIgA (mg/dL)	<i>P</i> value
I (df-t+-DMFT=1-5)	10	18.66 (4.84)	11.00-25.06	0.55 (Group I and II)
II (df-t+DMFT=6-10)	10	16.63 (3.04)	11.30-21.00	0.001 (Group II and III)
III (DMFT=0)	10	24.36 (4.87)	16.80-32.00	0.018 (Group I and III)

laboratory tests used between the studies [8]. Moreover, the concentration of salivary immunoglobulin may change depending upon the salivary flow rate, hormonal factors, emotional states, and physical activity [12].

The obtained results of this study show that the SIgA levels of the whole unstimulated saliva has some role in protection against dental caries, but regarding the severity of the disease, it does not show any significant results.

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