

## Study of Salivary IgA in Different Types of Dental Caries

Dr. Shreya Nigoskar<sup>1</sup>, Haresingh Makwane<sup>2\*</sup>, Meena Varma<sup>3</sup>

<sup>1</sup>Dept. of Biochemistry, Index Medical College Hospital & Research Centre, Indore, Madhya Pradesh, India

<sup>2,3</sup>Dept. of Medicine, Sri Aurobindo Institute of Medical Sciences, Indore, Madhya Pradesh, India

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\*Corresponding author

Haresingh Makwane

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**Abstract:** Dental caries being a bacterial disease accelerates the immune apparatus of the body and as a result antibodies {salivary and serum} can be found out. The major immunoglobulin in serum, is found only in low levels in salivary secretions but highest in serum where the main function Ig A is to eliminate salivary mutans or may interfere with its cariogenic activity. In contrast salivary IgA antibodies prevent streptococcus mutans from adhering to tooth surface which prevents dental caries and to activate humoral and cellular components elicited by systemic immunization. Salivary IgA levels were measured in different types of (660) Dental caries patients and compared with (140) healthy controls. It was observed that there was a significant rise in salivary IgA level and progressively higher values were obtained as the dental caries advanced the different types of dental caries studied were Initial caries, Deep caries, multiple deep caries, & Caries with pulp involvement. This study of salivary IgA may be useful in assessment and identification of severity of Dental caries.

**Keywords:** Salivary IgA, Initial caries, Deep caries, multiple deep caries, & Caries with pulp involvement.

### INTRODUCTION

Dental caries is the microbiological disease of calcified tissues of tooth characterized by demineralization of inorganic portion & destruction of organic substance of tooth. It is most prevalent chronic disease effecting human race [1]. W.D Miller [2] proposed that Dental decay is a chemico parasitic process consisting of two stages that is decalcification of enamel followed by dissolution of softened residue.

WSRO says that Dental caries occurs when acid producing bacteria (especially mutants of streptococcus & lactobacilli species) dominate the sticky coating (plaque) on surface of tooth. These bacteria convert fermentable carbohydrates such as glucose fructose sucrose & cooked starches in to lactic acid thus making plaque acidic. The acid plaque causes demineralization of tooth enamel & underlined dentine. This eventually leads to loss of tooth structure and further bacterial invasion. The key factors in development of dental caries are the host i.e. tooth surface & saliva, plaque bacteria & diet. (Especially fermentable carbohydrates). Plaque bacteriae include Streptococcus mutans & Lactobacillus acidophilus [3].

Streptococcus mutans are important in caries initiation while lactobacilli are implicated in the progression of caries especially in the advancing front of caries. Dental caries being a bacterial disease accelerates the immune system of the body and as a result antibodies (salivary & serum) can be found out and the immunity to the disease may also be produced either through salivary or serum antibodies. Caries is a local disease and therefore it was thought that the

chances of developing immunity through serum antibodies are less.

Thus the possible mechanism for protection against dental caries can be salivary IgA antibodies which may prevent streptococcus mutans from adhering to the tooth surface, which prevents dental caries. According to Claman H.N [4]-The Serum & salivary immunoglobulin pools are under separate regulation, so this study is quite helpful to know about the relation between dental caries and salivary pool of immunoglobulins.

Challembe S.J. [5] supported the concept that IgA may contribute to caries immunity in men. Study of salivary IgA was carried out with following aims-

- To assess the most possible role of salivary IgA against Dental caries.
- To know the possible mechanism of anticaries activity of immunoglobulins.

## MATERIALS & METHODS

The material of study was as follows-

- Saliva was obtained from 660 untreated clinically evident dental caries patients, including the patients with Initial caries, Deep caries. Multiple deep caries & Caries with pulp involvement & periapical abscess.
- The saliva was also obtained from 140 normal healthy individuals or the control groups
- Under aseptic conditions the saliva of patients and controls was taken in sterilized test tubes and then it was frozen until the procedure started.

The saliva was then analyzed by standard ELISA technique. The control as well as study group were allowed to take breakfast before 1-2 hours of sampling but after breakfast they were not allowed to take anything through mouth.

## RESULT & DISCUSSION

### Observation - According to Table no. 1 when controls were compared with study group-- IgA salivary

Mean IgA level in saliva in control cases is 18.72mg for males 17.80mg for females & 18.95mg for children per 100ml which is in accordance with Philip march & Michael Martin [6]. As mentioned earlier that we have taken the samples of the patients suffering from different stages of Dental caries.

When the samples were analyzed for level of IgA, It was found that in Initial caries level of salivary IgA was decreased and the least salivary IgA was found in deep caries The mean IgA level in Initial caries for males was found to be 16.66mg, for females it was 15.40mg and for children it was 16.94mg as shown in table No. 1,2 and 3. Similarly in deep caries the mean salivary IgA was decreased to 14.4mg for males, 11.42 for females & 14.96mg in children as shown in table No.1,2&3.

The decrease was in accordance with John E Duburgh Norman. In case of Caries with involvement of pulp the level was significantly higher in males, females & children. The increased values for male's females and children were 22.80, 26.78, and 21.40 respectively. The highest level of salivary IgA was found in periapical abscess in male's females and children. The mean level for males was 28.15, for females 29.79, and for children 28.0. The rise was found to be statistically significant. Our results are in accordance with Everhart *et al.* [7] Challecombe S.J. [8], few reports were given indicating no significant change in lower and higher caries experiences.

According to table no. 7 - our research when males were compared with females it was found that initially females have significantly lower IgA levels but there is increase in IgA levels with advancement of

caries, it was found that the values in the last two stages that is caries in pulp and periapical abscess were significantly more for females than males.

According to table no.-8 -when males were compared with children it was found that the values were significantly higher in initial caries for children than man and as the caries advanced the values of IgA for man was significantly higher than children means the increase in IgA level for males is more than children in caries in pulp and periapical abscess.

In table no. -9- When females were compared with children it was found that in initial caries and deep caries the values of salivary IgA level is significantly lower for females than children but as the caries advanced it was found that the increase in IgA level in females was significantly more than children.

In table no.-4- When initial caries was compared to deep caries, caries in pulp & periapical abscess the results were found to be significant in male's females and children. In table no. -5- When deep caries salivary IgA levels were compared with caries in pulp and periapical abscess again there was found a significant increase in mean IgA levels in caries in pulp and periapical abscess. When caries in pulp mean IgA level was compared to periapical abscess, it was found that there was significant increase in case of periapical abscess in males, females as well as children.

The possible explanation for the findings that in the initial stages that is in initial caries and deep caries the values are significantly lower than normal and with the advancement of caries the values are significantly higher than normal, it may be stated that initial decreased level of IgA level below normal limit provides a chance for flourishing the bacteria inside the mouth and infection occurs first in enamel & then in dentine but as we know that our body has a perfect immune system and any infection in mouth makes the salivary glands to produce saliva composed of higher IgA levels and the natural immune system participates actively by increasing the level of salivary IgA in the person susceptible to caries because saliva continuously bathes the teeth and serum immunoglobulins are not found in gingival fluid. Immune responses cannot be mounted via enamel, the only element in which immune element can reach the organism responsible for dental caries is for them to be liberated in to saliva, the major immunoglobulin in saliva being secretory IgA.

It can be noted from our findings that the females are more prone to be a patient of Dental caries because the levels in initial stages are lower in females and in advanced stages also the increase was quite significant in females. According to our study the sequence of IgA in saliva for males females and children was Initial caries > Deep caries < caries in pulp < periapical abscess.

**OBSERVATION NO 1**

**Study of salivary IgA**

<b>PARTICULARS</b>	
TABLE NO 1 – Showing control/study group males	
TABLE NO 2 - Showing control/study group females	
TABLE NO 3- Showing control/study group children	
TABLE NO 4 – Comparison between caries for males	
TABLE NO 5 - Comparison between caries for females	
TABLE NO 6- Comparison between advancement of caries for children	
TABLE NO 7 – Showing males/ females	
TABLE NO 8- Showing males/children	
TABLE NO 9 – Showing female/children	

**Table-1: showing comparison of level of IgA control and study group for males**

	TYPE OF CARIES	n	-X mg	S.D	Z	P	INFERENCE
CONTROL n= 50 X= 18.72 S.D = 07231	INITIAL CARIES	80	16.66	0.8936	14.54	< 0.05	SIGNIFICANT
	DEEP CARIES	75	14.4	0.8853	30.15	< 0.05	SIGNIFICANT
	PULP	65	22.80	1.3716	20.45	< 0.05	SIGNIFICANT
	PERIAPICAL	40	22.150	0.8336	56.50	< 0.05	SIGNIFICANT

**Table-2: showing comparison of level of ig a control and study group for females**

	TYPE OF CARIES	n	- X mg	S.D	Z	P	INFERENCE
CONTROL n= 50 X= 17.80 S.D = 1.7261	INITIAL CARIES	70	15.40	08580	9.066	< 0.05	HIGHLY SIGNIFICANT
	DEEP CARIES	64	11.4219	09563	23.46	< 0.05	HIGHLY SIGNIFICANT
	PULP	69	26.7826	08723	32.80	< 0.05	HIGHLY SIGNIFICANT
	PERIAPICAL	43	29.79	1.1246	40.19	< 0.05	HIGHLY SIGNIFICANT

**Table-3: showing comparison of level of ig a control and study group for children**

CONTROL	TYPE OF CARIES	n	- X mg	S.D	Z	P	INFERENCE
n= 40 X= 18.95 S.D = 0.7828	INITIAL CARIES	50	16.94	.07398	12.402	< 0.05	HIGHLY SIGNIFICANT
	DEEP CARIES	75	14.96	1.6936	17.240	< 0.05	HIGHLY SIGNIFICANT
	PULP INVOLVED	25	21.40	1.043	10.70	< 0.05	HIGHLY SIGNIFICANT
	PERIAPICAL ABSCESS	4	28.0	08165	21.95	< 0.05	HIGHLY SIGNIFICANT

**Table-4: comparison between types of caries for males**

S.NO	TYPE OF CARIES		n	-X mg	S.D	Z	P	INFERECE
1	INITIAL CARIES n= 80 x = 16.66 S.D = 0.8936	DEEP	75	14.4	0.8853	15.81	< .05	HIGHLY SIGNIFICANT
		PULP	65	22.80	1.3716	31.12	< .005	HIGHLY SIGNIFICANT
2	DEEP CARIES n= 75 x = 14.44 S.D= 0.8653	PERI APICAL	40	28.15	0.8336	69.746	< .005	HIGHLY SIGNIFICANT
		CARIES IN PULP	65	22.80	1.3716	34.91	< .05	HIGHLY SIGNIFICANT
		PERIAPICAL ABSCESS	40	28.15	0.8336	46.96	< .005	HIGHLY SIGNIFICANT
3	CARIES IN PULP n= 65 x = 22.80 S.D= 1.3716	PERIAPICAL ABSCESS	40	28.15	0.8336	24.87	< .05	HIGHLY SIGNIFICANT

**Table-5: Comparison between types of caries for females**

S.NO	TYPE OF CARIES		n	-X mg	S.D	Z	P	INFERECE
1	INITIAL CARIES n= 70 x = 15.40 S.D = 0.8580	DEEP	64	11.4219	0.9563	25.2	< .05	HIGHLY SIGNIFICANT
		PULP	69	26.7826	0.8723	77.52	< .005	HIGHLY SIGNIFICANT
2	DEEP CARIES n= 64 x = 11.4219 S.D= 0.9563	PERI APICAL	43	29.79	1.1246	72.02	< .005	HIGHLY SIGNIFICANT
		CARIES IN PULP	69	26.7826	0.8723	96.55	< .005	HIGHLY SIGNIFICANT
		PERIAPICAL ABSCESS	43	29.79	1.1246	87.88	< .005	HIGHLY SIGNIFICANT
3	CARIES IN PULP n= 69 x = 26.7826 S.D= 0.8723	PERIAPICAL ABSCESS	43	29.79	1.1246	14.962	< .05	HIGHLY SIGNIFICANT

**Table-6: Comparison between types of caries for females**

S.NO	TYPE OF CARIES		n	- X mg	S.D	Z	P	INFERENCE
1	INITIAL CARIES n= 50 x = 16.94 S.D = 0.7398	DEEP	75	14.96	1.6936	8.928	< .05	HIGHLY SIGNIFICANT
		PULP	25	21.40	1.043	21.25	< .05	HIGHLY SIGNIFICANT
	DEEP CARIES n= 75 x = 14.96 S.D= 1.6936	PERI APICAL	04	28.0	0.8165	28.30	< .05	HIGHLY SIGNIFICANT
		CARIES IN PULP	25	21.40	1.043	25.52	< .05	HIGHLY SIGNIFICANT
3	CARIES IN PULP n= 25 x = 21.40 S.D= 1.043	PERIAPICAL ABSCESS	04	28.0	0.8165	7.38	< .05	HIGHLY SIGNIFICANT
		PERIAPICAL ABSCESS	04	28.0	0.8165	15.32	< .05	HIGHLY SIGNIFICANT

**Table-7: showing comparison between males and females in all 4 stages of caries**

S.NO	TYPE OF CARIES	n		-X mg		S.D		Z	P	INFERENCE
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE			
1	INITIAL CARIES	80	70	16.66	15.40	.8936	0.8580	8.712	< 0.05	HIGHLY SIGNIFICANT
2	DEEP CARIES	75	64	14.44	11.42	.8853	0.9563	18.94	< 0.05	HIGHLY SIGNIFICANT
3	CARIES IN PULP	65	69	22.80	26.78	1.3716	0.8723	20.06	< 0.05	HIGHLY SIGNIFICANT
4	PERIAPICAL ABSCESS	40	43	28.15	29.79	.08336	1.1246	7.58	< 0.05	HIGHLY SIGNIFICANT

**Table-8: Males/females**

S.N O	TYPE OF CARIES	n		-X mg		S.D		Z	P	INFERENCE
		MAL E	CHILDR EN	MALE	CHIL DRE N	MALE	CHILD REN			
1	INITIAL CARIES	80	50	16.66	16.94	.8936	0.7398	1.936	< 0.05	HIGHLY SIGNIFICANT
2	DEEP CARIES	75	75	14.44	14.96	.8853	1.6936	2.43	< 0.05	HIGHLY SIGNIFICANT
3	CARIES IN PULP	65	25	22.80	21.40	1.3716	1.043	5.2	< 0.05	HIGHLY SIGNIFICANT
4	PERIAPICAL ABSCESS	40	04	28.15	28.00	.08336	0.8165	0.413	< 0.05	HIGHLY SIGNIFICANT

Table-9: females/ children

S. N O	TYPE OF CARIES	n		-X mg		S.D		Z	P	INFERENCE
		FEMALE	CHILDREN	FEMALE	CHILDREN	FEMALE	CHILDREN			
										HIGHLY SIGNIFICANT
1	INITIAL CARIES	70	50	15.40	16.94	.8580	0.7398	10.50	< 0.05	HIGHLY SIGNIFICANT
2	DEEP CARIES	64	75	11.4219	14.96	0.9563	1.6936	15.43	< 0.05	HIGHLY SIGNIFICANT
3	CARIES IN PULP	69	25	21.40	21.40	0.8723	1.043	23.05	< 0.05	HIGHLY SIGNIFICANT
4	PERIAPICAL ABSCESS	43	04	29.79	28.00	1.1246	0.8165	3.11	< 0.05	HIGHLY SIGNIFICANT

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