

Dental Caries and Salivary Streptococcus Mutans in Relation to Primary and Permanent Dentition

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Abstract

Background : Streptococcus mutans has been implicated as a principle microbial agent in the pathogenesis of dental caries. The aim of this study was to compare caries experience and salivary Streptococcus mutans count among groups of children having primary dentition and adults having permanent dentition.

Materials and Methods: The sample consisted of 100 children with an age of 4 – 5 years old and 100 adults with an age of 21 – 22 years old in Baghdad city. Dental caries was examined for the whole dentition and bacteriological analysis was done for the salivary sample to estimate the count of Streptococcus mutans in saliva.

Results: Caries experience of adults was significantly higher than that of children while salivary S.mutans count was significantly higher among children than the adults. Positive correlation of S. mutans with decayed surface was stronger than that with (dmfs/DMFS) for both children and adults.

Conclusion : S. mutans count was significantly higher among children than adults and caries experience of permanent teeth was significantly higher than that of primary teeth.

Keywords : Streptococcus mutans ,caries, primary and permanent teeth .

Introduction

Man , like all mammals has two sets of teeth the first set is called the primary teeth which begins to appear in the oral cavity at a mean age of 6 months , and the second one is called the permanent teeth which begins to appear at 6 years of age ⁽¹⁾

Children who have little caries in primary dentition are also likely to have little caries in the permanent

dentition ⁽²⁾. Therefore the dental condition of deciduous teeth may be reflected in the permanent teeth.

Streptococcus mutans has been considered as one of the prime etiologic agents of dental caries , this microorganism indicates a high caries risk when present in a high number in the saliva , which apparently reflects one of the variables involved in the development of caries lesion ⁽³⁾

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Materials and Methods

The present investigation comprised a randomized sample of 200 subjects in Baghdad city, those subjects were composed of two groups:

- 1 – The first group consisted of 100 kindergarten children (58 males and 42 females) aged 4 – 5 years and having primary teeth only.
- 2 – The second group consisted of 100 dental students (51 males and 49 females) aged 21 – 22 years and having permanent teeth.

The subjects examined were with no history of any systemic disease and not under medication therapy.

Clinical Examination:

The teeth were examined with mirror and explorer under artificial light using the criteria by Jackson for diagnosis of dental caries⁽⁴⁾. Examination concerning dmfs (for primary teeth) and DMFS (for permanent teeth) were calculated.

Bacteriological Analysis:

Paraffin stimulated saliva was collected for 2 minutes from each subject. Tenfold serial dilutions of saliva were obtained by sequentially pipetting 0.1 ml of the suspension into 0.9 ml of sterile normal saline through four sterile screw capped vials then 0.1 ml of inoculum was taken from 10^{-3} and 10^{-4} salivary dilutions and inoculated on the surface of Mitis Salivarius agar media which is selective for *S. mutans*. The agar plates were incubated anaerobically in gas pak jars for 48 hours at 37 °C. Identification of *S. mutans* on the media was made by colonial morphology which is of a highly convex surface, light blue in color and of frosted glass appearance⁽⁵⁾. Gram's stain was used to eliminate any doubt of the presence of species other than streptococci. Lastly fermentation of

mannitol and sorbitol test were carried out.

Enumeration of *S. mutans* colonies on the surface of agar plates was carried out by the naked eye and the number multiplied by the dilution factor to express the salivary level of the microorganism in term of the logarithmic mean concentration of the colony forming unit per milliliter saliva (cfu / ml).

S. mutans counts were divided into four levels in this study, very low ($\leq 10^3$), low (10^4), moderate (10^5) and high ($\geq 10^6$) cfu / ml saliva.

Results

Table (1) demonstrates that caries experience was significantly higher in adults than in children ($t = - 5.43$, $P < 0.005$). The dmfs / DMFS components for the whole sample was shown in table (2) the mean DS for the total adults was significantly lower than the mean ds for the total children ($t = 3.08$, $P < 0.005$), while the means MS and FS for adults were significantly higher than that for children. This means that the ds component constitutes the major part of the dmfs value for children, while the FS component constitutes the major part of the DMFS value for adults.

Figure (1) presents the occurrence of salivary *S. mutans* in the total sample. Positive occurrence for children was 96% and for adults it was 98%. The mean counts of *S. mutans* was significantly higher among children than adults ($t = 2.18$, $P < 0.05$). Although adult males and females had lower counts of *S. mutans* than children males and females respectively but the differences were not significant, table (3).

Distribution of subjects according to the level of salivary *S. mutans* was demonstrated in table (4). Statistically, highly significant differences were

found concerning the distribution of the levels of *S. mutans* between children and adults. Table (5) shows the mean values of *S. mutans* according children and adults according to severity of caries experience. It has been found that with the increase in the grades of dmfs / DMFS there is an increase in the level of *S. mutans* among both groups.

Positive correlations have been found between *S. mutans* and both dmfs / DMFS and ds / DS among children and adults. It has been found that the correlation of *S. mutans* with ds / DS was stronger than with dmfs / DMFS for both children and adults, table (6).

Discussion

Result of this investigation shows that the mean dmfs index for children was lower than that observed by other studies^(6,7).

Adults in the present study had a mean DMFS approximately the same as that found in previous Iraqi study⁽⁸⁾ and lower than that reported in a study of other country⁽⁹⁾. This difference in the result may be attributed to the absence of radiographic examination in the present study, so one might expect an underestimation because clinical examination alone may fail to detect inter proximal lesions⁽¹⁰⁾.

The mean dmfs for children was found to be significantly lower than the mean DMFS for adults, this comes in consistence with the results of others^(8,11) who reported a mean DMFS among dental students higher than the mean dmfs found by other study⁽⁶⁾ among preschool children. The increased prevalence and severity of dental caries in adults may be attributed to the irreversibility and accumulative nature of the disease^(12,13).

The higher contribution of dmfs index was made of ds component; this

confirms the result of other study⁽¹⁴⁾ which may reflect an unawareness of the importance of the primary teeth or a negative attitude of parent towards dental treatment. The FS component constitutes the major part of the DMFS index in adult this support the finding of other⁽¹⁵⁾ that the number of FS and MS would be increased with age.

In the present study the mean count of salivary *S. mutans* was found to be higher than that reported by other studies^(9,16). The higher count of salivary *S. mutans* in this study might reflect differences in the dietary habits and dental health, as well as to differences in culturing procedure and techniques.

The highest percentage of children had a high level of *S. mutans* ($\geq 10^6$ cfu / ml saliva) while the highest percentage of adults had a moderate level of *S. mutans* (10^5 cfu / ml saliva). However the mean count of salivary *S. mutans* was significantly higher among children than adults, this disagrees with previous studies^(17,18) who reported a higher *S. mutans* count in adults than children. In the present investigation the higher count of salivary *S. mutans* in children may be explained by the fact that the decayed surfaces in primary teeth were significantly higher than those in the permanent teeth in which most of the decayed surfaces were restored and converted to filled surfaces. This confirms the results of other⁽¹⁹⁾ who claimed that the restorative treatment results in a significant reduction of bacterial population including *S. mutans*. Chosack et al⁽²⁰⁾ explained the higher count of *S. mutans* in children to that in primary teeth caries advances move rapidly than in the permanent teeth and because of the lack of treatment or preventive measures that can affect the findings.

Results of this investigation also showed than with increasing severity

of dmfs / DMFS the mean number of *S. mutans* increased in both groups. This has been well documented earlier among children and adults in previous studies^(21, 22).

Significant positive correlations were found in both groups between the level of salivary *S. mutans* and the

number of dmfs / DMFS and ds / DS. The correlation was stronger with ds / DS than with dmfs / DMFS in both groups, this is in accordance with finding of others^(9, 21). This observation could support the concept that *S. mutans* is considered one of the prime etiologic agents of dental caries.

Table (1) : Caries experience (dmfs / DMFS) among children and adults according to sex.

Sex	Children		Adults		t- value
	No	Mean±SD	No	Mean±SD	
Male	58	9.78±9.70	51	17.86±12.53	t=-3.79**
Female	42	9.48±9.37	49	17.24±9.33	t=-3.95**
Total	100	9.65±9.52	100	17.56±11.03	t=-3.43**

**P<0.005

Table (2) : dmfs / DMFS component for the total children and adults.

dmfs / DMFS Components	Children Mean ± SD	Adults Mean ± SD	t-value
ds / DS	8.62±8.38	5.70 ±4.33	t=3.08*
ms / MS	0.92±2.72	2.55±4.87	t=-2.90
fs / FS	0.11±0.66	8.96 ±8.22	t=-10.66**

*P<0.5 , **P<0.005

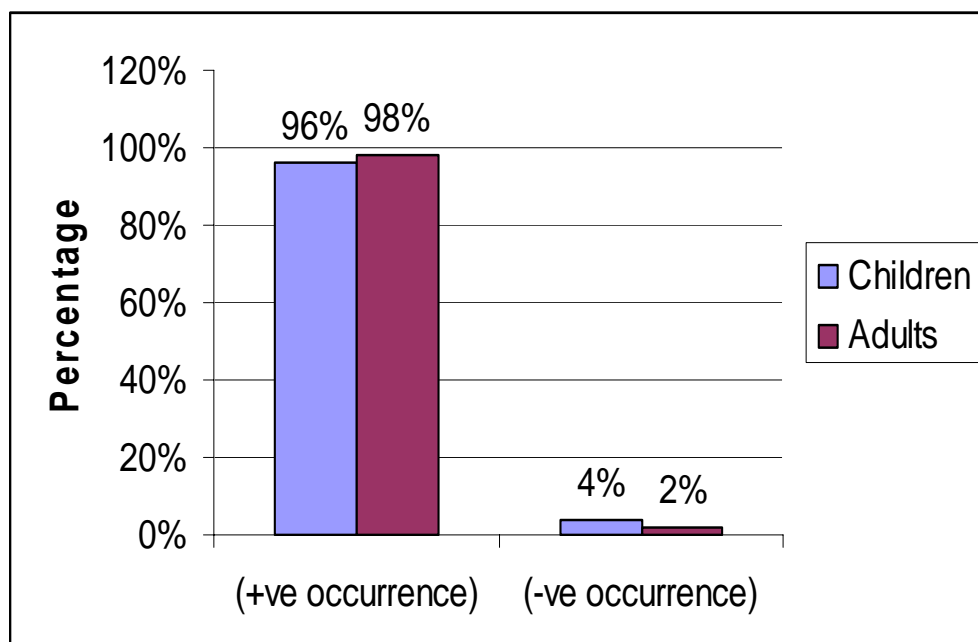


Figure (1): Occurrence of S.mutans in the total sample

Table (3) : Salivary mean counts of *S. mutans* among children and adults According to sex.

Sex	Children		Adults		t- value
	No	S. mutans Mean*±SD	No	S. mutans Mean*±SD	
Male	58	13.66±16.34	51	9.64±14.77	N.S
Female	42	12.51±11.22	49	8.22±11.28	N.S
Total	100	13.18±14.36	100	8.94±13.13	t=-2.18**

*The value expressed at level of 10^5 cfu / ml saliva.

**P<0.05

Table (4) : Frequency distribution of the salivary levels of *S. mutans*

S. mutans levels	Children		Adults	
	No.	%	No.	%
$\leq 10^3$	8	8	8	8
10^4	1	1	24	24
10^5	45	45	41	41
$\geq 10^6$	46	46	27	27

$X^2 = 26.29$ d.f = 3

P<0.005

Table (5) : Severity of caries experience (dmfs / DMFS) in relation to the *S. mutans* among children and adults

dmfs / DMFS Grades	Children		Adults		Sig.
	No	S. mutans Mean±SD	No	S. mutans Mean±SD	
0	12	4.51±5.29	4	0.06±0.04	N.S
1-5	31	13.33±12.45	8	6.73±17.50	N.S
6-10	24	12.88±16.35	13	4.44±5.75	t=1.75*
>10	33	16.42±15.87	75	10.43±13.63	t=1.98

P<0.05

Table (6) : Correlation coefficient between *S. mutans* and caries experience

Caries experience	Children			Adults		
	r	t	p	r	t	p
dmfs / DMFS	0.22	2.23	< 0.01	0.21	2.12	< 0.05
ds / DS	0.28	2.88	< 0.01	0.46	5.12	< 0.005

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