PREVALENCE OF MUTANS STREPTOCOCCI AND DENTAL CARIES IN PAKISTANI CHILDREN

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ABSTRACT

The caries status of two hundred and eighteen 12 year old school children from four schools of Karachi and Lahore was determined through a WHO pathfinder survey. In addition, the levels of mutans streptococci in the sample were estimated in order to define the proportion of children with high and low mutans levels. A mean DMFT of 1.82 (1 .67-0.03-0.12), for decayed and filled teeth respectively; 42% were caries free. Four mutans streptococci; 22% had mutans class 0, 22% class 1, 31% class 2 and 25% class 3. The mean DMFT was respectively, 1.0+1.23, 0.98 + 1.52,2.03+2.36 and 3.04 + 3.08. The difference was statistically significant. Twenty four children had 5 or more DMF all except two of them, belonging to mutans classes 2 or 3 (JPMA 42: 213,1992).

INTRODUCTION

Dental caries, a multi factorial disease, is caused by bacterial deposits on the tooth surfaces. After intake of fermentable carbohydrates, bacteria in these deposits may lower the local pH to a level where the minerals of enemal and dentin dissolve. Factors which interact in this process, include organic and inorganic components in saliva. Fluoride is another substance which interacts strongly in the caries process and favours remineralization of the affected tooth after the bacterial attack has ceased. The balance between the collective cariogenic factors and the resistance factors of teeth and saliva decides whether cavities will occur on a tooth surface in an individual or in a population. For Pakistan, the present overall balance on a population level seems to be comparatively favourable. A national caries survey[1] shows a mean DMFT level of 1.2 for 12 years old (one of the 'WHO indicator ages) which means that less than two teeth per person were decayed (D), missing (M) or filled (F). This caries level is, according to WHO very low. However, it is easy to understand that the balance is not for all times. The WHO Global Oral Data Base indicates that changes for the worse have occurred in national caries figures following increased sugar and sweets consumption and for the better, after the introduction of effective preventive programmes. The main etiological factors for dental caries should therefore be identified in various communities and countries[2]. For caries, oral hygiene patterns, diet and fluoride have traditionally been the major issues but the mutans streptococci of the viridans group have also been identified as most cariogenic[3-5]. Individuals with higher mutans prevalence usually have about three times more caries than those without or with very low levels of these bacteria[6,7].The aim of the present study was to extend a caries pathfinder survey and determine the prevalence of mutans streptococci and its correlation with dental caries.

MATERIALS AND METHODS

The sample consisted of 220 twelve years old children selected from four schools, two in Karachi and two in Lahore. Two of these schools had earlier participated in the national caries survey. The four

schools were:

St. Joseph School Karachi

This school for girls admits children of high socioeconomic families throughout Karachi.

Aga Khan School, Karachi

The families sending their boys to this school come mainly from lower middle class.

Federal Government Girls School, Lahore

The school has children from low to very low socioeconomic families.

Garrison School, Lahore

A school for boys only. The majority of the children were from low to middle class from mixed geographical areas.

Examinations for caries were performed according to the methods outlined in WHO Oral Health Surveys (3rd ed., Geneva) by four experienced examiners. Microbiology: For estimation of the levels ofmutans streptococci, the "strip mutans" kit was used (Orion Diagnostica, Helsinki, Finland) [8,9]. Prior to the clinical examination, the child chewed paraffin to stimulate saliva and remove bacteria from the teeth. A plastic strip included in the kit was rotated in the mouth and over the tongue. Excess saliva was removed by withdrawing the strip through closed lips of the individuals. The strips were incubated in selective broth for 48 hours. The selectivity is based on a combination of high sucrose and bacteria in the broth together with the ability of the mutans bacteria to adhere to the strip. The number of adherent colonies was compared with a chart supplied by the manufacturer and given a score between 0 and 3, indicating low (_ 10^5 CFU-colony forming units) saliva to very high (_ 10^6 CFU) per ml saliva mutans counts. Two samples were lost due to heavy gas formation from unidentified bacterial species growth. The final group consisted of 218 children. Statistical methods: Anova was used to test the significance of differences among groups. When the analysis of variance rejected the multi sample hypothesis of equal means, multiple comparison test analysis using Scheffe's test was performed. The tests were two-tailed and at a 95% significance level.

RESULTS

The results are presented in Tables I-IV and Figure.

Table I. DMFS and DMFT values for the total sample and for the different schools.

	Surfaces				Teeth				
	D	M	F	DMFS	D	M	F	DMFT	Number
Total sample	2.12	0.14	0.20	2.46	1.67	0.03	0.12	1.82	218
Karachi:									
St. Joseph (G)	1.16	0.4	0.68	2.24	0.86	0.08	0.44	1.38	50
Aga Khan (B)	1.46	0.2	0.1	1.76	0.92	0.04	0.04	1.00	50
Lahore:									
FG Girl School	2.95	-	0.05	3.00	2.41	-	0.03	2.44	58
Garrison (B)	2.70	-	0.02	2.72	2.23	-	0.02	2.25	60

Table II. Distribution of children according to DMFT for the total sample.

DMFT	Count	Percent
0	91	41.7
1	38	17.04
2	29	13.03
3	10	4.59
4	26	11.93
5	8	3.67
6	5	2.29
7	2	0.92
8	6	2.75
9	1	0.46
10	0	0
11	1	0.46
12	0	0
13	0	0
14	1	0.46

Table III. Percent distribution of children in different strip mutans classes and the corresponding DMFT values.

	Percent				DMFT				
	Strip mutans				Strip mutans				
	0	1	2	3	0	1	2	3	Number
Total sample	*22	22	31	25	1.0	0.98	2.03	3.04	218
Karachi:									
St. Joseph (G)	14	14	42	30	1.0	0.43	1.52	1.8	50
Aga Khan (B)	14	36	36	14	1.29	0.28	0.83	3.0	50
Lahore:									
FG Girl School	34	21	28	17	1.05	2.08	3.63	3.80	58
Garrison (B)	25	18	20	37	0.8	1.28	2.58	3.55	60

B = boys school; G = girl school

*Value indicates that 22 percent of the total sample belonged to strip mutans class O, etc.

Table IV. Frequency distribution of children for different DMFT - strip mutan class combinations.

DMFT	Strip mutans/class 0	1	2	3	Total
0	*22	28	27	14	91
1-2	21	13	18	15	67
3-4	6	5	12	13	36
>5	0	2	10	12	24
Total	49	48	67	54	218

P<0.001.

*Figures represent number of children.

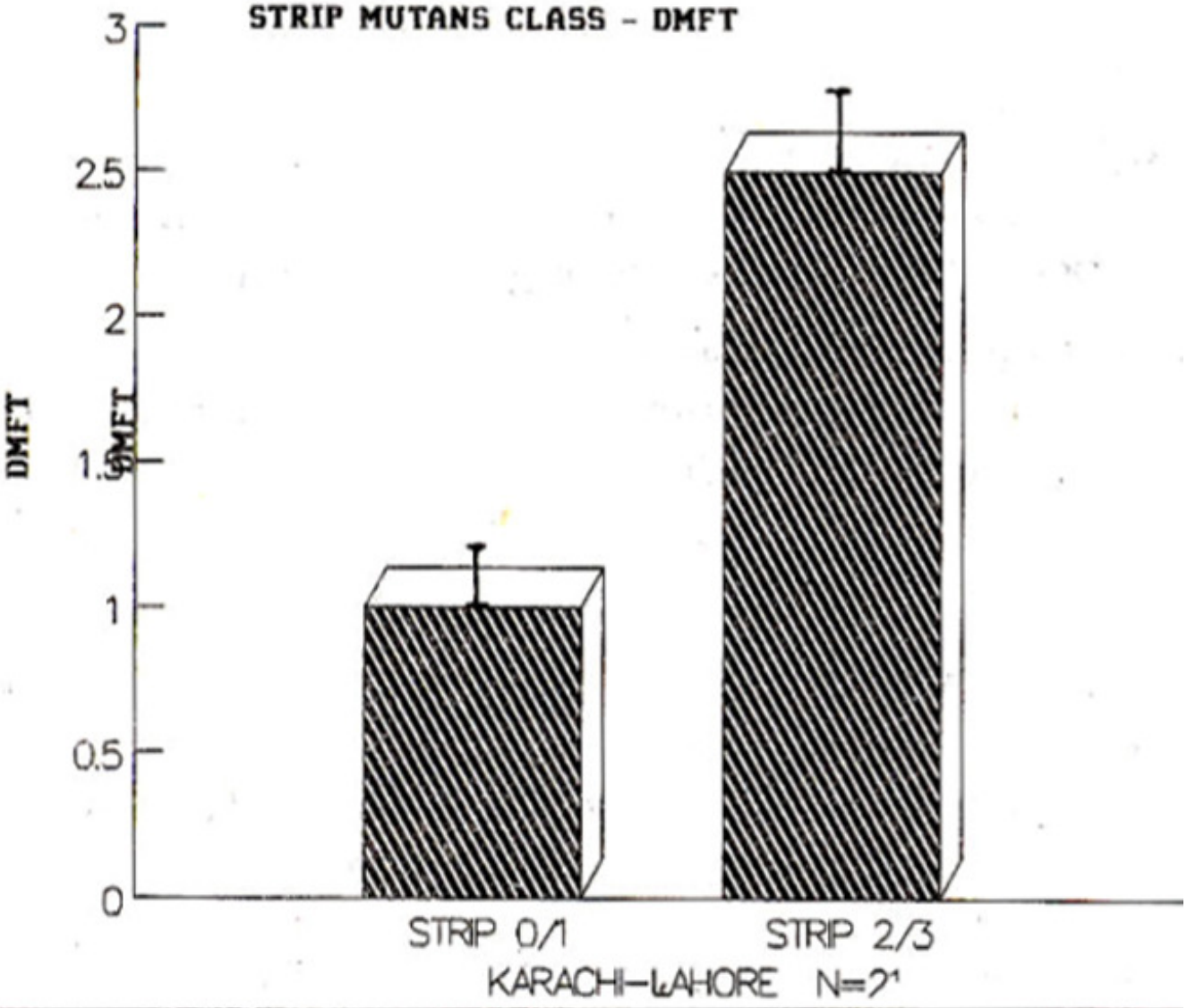

Figure. DMFT values in relation to strip mutans class for the total material. Standard Error indicated. Strip mutans class - DMFT.

The mean DMFT for the total sample was 1.82 ±2Y35 (standard deviation) with 67- 0.003-0.12 for

decayed, missing and filled teeth respectively. DMFS was 2.46 (Table I). Children in Karachi had lower DMF values compared to Lahore children. Almost all fillings recorded were found among children of St. Joseph School in Karachi (Table I). Of the total samples, 91 children (41.7%) were caries free (Table II). Twenty four (9.1%) children had 5 or more DMFT. Highest recorded caries score was 14 DMF teeth.

For mutans streptococci, 22% of children had mutans class 0, 22% class 1, 31% class 2 and 25% class 3 (Table III). The mean ± was 10± 1.22, 0.98± 1.52, 2.03 ± 2.36 and 3.03 ± 3.07 respectively. The differences were statistically significant (p = 0. 0001, mutans classes 0 and 1 = class3). Table IV shows frequency distribution of DMFT in relation to mutans classes. Of the children with 5 or more DMFT, all except two had mutans classes 2 or 3.

DISCUSSION

The caries levels found in the present study of Karachi confirm findings of the national caries survey conducted in 1988[1]. In that survey, a mean DMFT of 1.07 was recorded and two Karachi schools had 1.38 and 1.0 respectively. For Lahore, the values were higher as national survey had only 1.11 DMFT for the urban sample in Punjab. However, the mean values from all schools were still low according to WHO terminology. Nevertheless it is apparent that both preventive and restorative services are needed for the children, as very few fillings were recorded and in fact, practically all fillings had been done on children from one school in Karachi. In the total sample, 363 teeth needed restorations (13 of them already had fillings) and 27 teeth had filings without new caries. For comparing mutans streptococci levels for different countries, it is necessary that the same methodologies are being used as different methods differ in sensitivity to detect the micro- organisms and the scales may have been set differently[10-12]. The “strip mutans” method enluates mutans streptococci in saliva which reflects the number of teeth colonized by these bacteria, the main habital for mutans streptococci[13-15]. A high saliva count (strip class 3) indicates that 80-90 percent of the tooth surfaces are colonized by bacteria, while a low count (strip class 1) or lower means that some 10 percent or less of the surfaces are carrying mutans streptococci[15,16]. In the age group of 12 years,the proportion of populations having very low levels of mutans (strip class 0) may vary from 7 to 30 percent and high counts (strip class 3) 10 to 50%[6,17-20]. Thus, for the total sample, the values for Pakistan fall with these ranges. For most countries studied so far, the group with high mutans counts has had about three times more caries than the group with low mutans counts. When discussing the relationship between mutans and caries, it is important to consider the multifactorial background of this disease. It can be expected that an individual with high mutans levels and a high sucrose intake develops more caries than a person with only one of these unfavourable factors. If, however, the caries challenge is met by effective prevention, the individual may be caries free inspite of mutans streptococci and even sucrose intake. That means that in a survey, all different combinations mutans caries can be found. A person “without” mutans streptococci (strip class 0) may have caries. Some tooth surfaces may carry the bacteria but not to the extent that they are present in the saliva sample. The individual may have used antibiotics which temporarily suppress the mutans streptococci or the resistance may be so low, or the sucrose intake so high that other bacteria may cause caries lesion. As biochemical and clinical evidences point to a strong cariogenic potential of the mutans streptococci, a correlation should be found in a sample like the one presented in this study. Such a significant correlation was demonstrated in the total sample (Table III and Figure). Children with scores 2 or 3 had actually 2.5 times more caries than those with score 0. Because of the positive relationship between the high mutans count and caries this method can be used to identify the population at a higher risk to develop the disease.

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