

PREVALENCE AND DISTRIBUTION OF CARIES IN THE PRIMARY DENTITION IN A COSMOPOLITAN SAUDI POPULATION

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أجريت هذه الدراسة الميدانية لبيان مدى انتشار تسوس الأسنان بين الأطفال قاطني مدينة جدة. لقد تم فحص (٣٧٢٥) طفلاً تتراوح أعمارهم بين ٦ - ١٢ عاماً لدراسة مدى انتشار تسوس الأسنان والتهابات اللثة. فيما يخص تسوس الأسنان تم فحص (٣٣١٨) طفلاً تتراوح أعمارهم بين ٦ - ١٤ عاماً من طلاب ستة مدارس ابتدائية من جهات مختلفة في مدينة جدة لضمان دقة العينة العشوائية. في هذه الدراسة تم استخدام الطريقة التي توصي بها منظمة الصحة العالمية (١٩٧٧ / ١٩٧٨م) بخصوص تقويم درجة تسوس الأسنان اللبنية والدائمة. أظهرت النتائج مدى انتشار نخر الأسنان لدى الأطفال بأعمار مختلفة وباستخدام طريقة (dmft) تبين أن الأطفال بين ٦ - ١٣ عاماً كانت نسبة انتشار النخر ١٦, ٢٪، في حين تراوحت بين ٥٪ لدى الأطفال في سن ١٤ عاماً و٦, ٨٣٪ لأطفال بلغت أعمارهم ٦ أعوام. من مجموع عدد الأسنان المصابة بالتسوس أو المفقودة أو المعالجة بالحشوات بلغت النسب في الرحي اللبنية الثانية ٢١, ٩٪، ٤١, ٩٧٪، ٦٥, ٥٪، في حين بلغت النسب ٣١, ٣١٪، ٤٠, ٥٠٪، ٣٣, ٩٦٪ في الرحي اللبنية الأولى. أظهرت هذه الدراسة تشابه نسب النخر بين الفكين العلوي والسفلي في حين زادت نسب الأسنان المعالجة بالفك السفلي عنها بالفك العلوي. تؤكد هذه الدراسة الدراسات السابقة التي بينت وجود تشابه بين نسب النخر في الناحيتين اليمنى واليسرى ويعزى هذا التشابه إلى عوامل عدة منها الوراثة، والشكلية، التركيبية، البكتيرية، والبيئية لكل نوع من الأسنان في كل قوس سني. من جهة أخرى لا تؤكد الدراسة الدراسات السابقة بخصوص وجود تشابه في نسب النخر لكل سن في القوس السني الواحد فقط بل تمتد لتشمل الأسنان في أجزاء الأقواس السنية. إن نتائج هذه الدراسة تبين أن الكثير من أسنان الأطفال المصابة بالتسوس لا تتم معالجتها بل إزالتها بواسطة القلع، إما بسبب ميل أطباء الأسنان عامة إلى قلع الأسنان اللبنية أو إلى أن تسوس هذه الأسنان قد وصل إلى طور متقدم يصعب معها معالجتها.

الخلاصة والتوصيات

يميل الباحثون في هذه الدراسة إلى الرأي القائل: إن خفض نسب التسوس وخصوصاً في أسنان الأطفال ذوي العمر ٦ - ٩ سنوات يتم من خلال خطة وقائية طويلة المدى تشمل التوعية الصحية السنية بين التجمعات

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السكانية والمدارس ، وللنظام الغذائي أهمية في تحسين مستوى صحة الفم والأسنان واستخدام مادة الفلور بأشكالها المتعددة سواء على المستوى الشخصي أو العام .

An epidemiological survey on dental caries was carried out to determine its prevalence and intraoral distribution pattern in Saudi children residing in Jeddah. A total of 3,318 children, aged 6-14 years, were examined from different geographical areas of the city. The results of this study showed that the mean dmft in this population was 2.16. The age-group 6-9 years showed the highest prevalence with the primary molars, especially the second primary molars, being mostly affected. There was intra- and inter-arch similarity in the susceptibility of each tooth type to decay. A larger proportion of mandibular primary molars examined were treated compared to the maxillary primary molars. The need for dental, educational and treatment program in schools is stressed.

Introduction

One of the major causes of tooth morbidity in man is dental caries. Previous investigations on the prevalence of dental caries in various parts of the Kingdom of Saudi Arabia showed that while the prevalence and incidence are still low as compared to some industrialized countries, there is a gradual increase in its prevalence among the children.¹²

Many studies have also shown that the various tooth types and surfaces showed variable vulnerability to dental caries.³⁴ Such site variability has been linked to many factors which include: (a) tooth anatomical configuration, e.g. pit and fissures, (b) the volume of saliva, and (c) the type of bacterial ecology at the sites.^{5,7}

Many of the earlier studies, with the exception of one,² on dental caries in Saudi Arabia dealt mainly with the prevalence of the disease in different communities in the Kingdom but did not investigate the distribution of the disease.¹⁸ Such information is useful in determining the most vulnerable tooth to decay and, hence, assist in designing the best cost-effective method of preventing the disease.

The objectives of this study were not only to determine the prevalence of dental caries at different ages in children but also to examine the intraoral distribution of the disease, as well as the caries experience of each tooth type.

Materials and Methods

Subject Selection

This report is a part of a much larger study on the oral health status of children in the cosmopolitan

cities of the Kingdom of Saudi Arabia. This study was conducted in Jeddah which is one of the most cosmopolitan cities. The reason for this choice is that in developing countries where dental caries is low but on the increase, the cosmopolitan cities represent areas where such increase is easily noticeable and, thus, susceptible factors are simply identified.

Oral Conditions Assessed

A total of 3,725 children, aged 6-16 years, residing in Jeddah were examined for the prevalence of periodontal disease and dental caries. This paper reports on the dental caries aspect of the study in children, aged 6-16 years, representing 3,318 of the total population of children examined. The children who participated in this study were selected from six primary schools in four geographical areas (north, south, east and west) of Jeddah to ensure randomness. The parents of the students were informed about the purpose of this study and permissions for inclusion of their children were obtained. Caries in the primary and permanent teeth of the children was recorded according to the criteria described by WHO Oral Health Survey's Basic Oral Health Assessment Methods.⁹ Briefly, the children were examined in a classroom setting with a mirror and a probe under natural and adequate illumination. All examinations were carried out by one of the authors over several months. At the beginning of the study an intra-examiner calibration was carried out by examining a cohort of 20 students at one week apart. The concordance of the results of the two examinations was 95%. A tooth was recorded as sound if it shows no evidence of treated or

untreated clinical caries. It was recorded as carious when it presented a lesion in a pit or fissure or on a free smooth tooth surface has a detectable softened floor, an undermined enamel, a temporary filling, or permanently filled. Teeth were considered filled when one or more permanent restorations were present. A tooth with a crown placed because of previous decay was also recorded as filled. A tooth was designated missing if the tooth was not present at an age when normal exfoliation would not be a sufficient explanation for its absence. All data were coded and descriptive statistics were used for analysis.

Results

Overall Prevalence of Dental Caries

The results of the present study showed that the overall prevalence of dental caries (dmf) of the primary teeth in children, aged 6-13 years, in Jeddah was 2.16 (Table 1). However, when individual age-groups were examined independently, the prevalence varied greatly from 0.05 in the 14-year-olds to 6.83 in the 6-year-olds. There was a gradual decline in prevalence with increase in age. The greatest decline occurs around the age 8-11 years (Table 1).

Intraoral Distribution

Results showed that each tooth type experiences almost identical caries susceptibility with its

antimeres, not only in the same arch but also in all quadrants. However, the lower posterior teeth were treated more frequently than the upper posterior teeth as evidenced by the greater numbers of these teeth that were missing and filled [Figs. 2-4].

All primary second molars in all quadrants accounted for 51.21% of the total number of decayed teeth, 41.97% of the total number of missing teeth due to caries, and 62.50% of the total numbers of filled teeth (Table 2).

The primary first molar on the other hand accounted for 31.31% of the total number of decayed teeth, 40.05% of the total number of missing teeth and 33.96% of the total number of

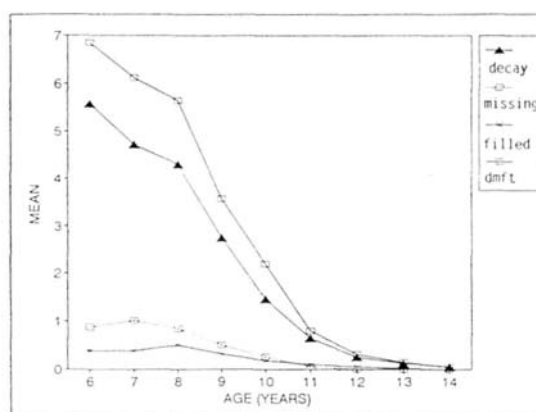


Figure 1. Mean value of teeth that are decayed, missing and filled at different age-groups.

Table 1. Proportion of children with decayed, missing and filled teeth and the mean dmft by age.

Age	Decayed Teeth			Missing Teeth			Filled Teeth			dmft			No. of children
	No.	Mean(SE)	%	No.	Mean(SE)	%	No.	Mean (SE)	%	No.	Mean (SE)	%	
6	362	5.57(0.571)	6.48	57	0.88(0.074)	5.72	25	0.38(0.052)	4.22	444	83(0.696)	6.19	65
7	1285	4.71 (0.237)	22.99	278	1.02(0.055)	28.82	104	0.38(0.021)	17.57	1667	6.11 (0.313)	23.22	273
8	1738	4.30(0.179)	31.09	341	0.84(0.037)	34.24	200	0.50(0.016)	33.78	2279	5.64(0.232)	31.75	404
9	1086	2.75(0.065)	19.43	198	0.50(0.011)	19.88	125	0.21 (0.016)	21.11	1409	3.57(0.086)	19.63	395
10	671	1.46(0.059)	12.00	99	0.26(0.005)	9.94	70	0.20(0.009)	11.82	840	2.20(0.07)	11.70	382
11	243	0.65(0.010)	4.35	18	0.05(0.002)	1.81	36	0.10(0.003)	6.08	297	0.80(0.01)	4.14	372
12	130	0.26(0.002)	2.33	5	0.01 (0.004)	0.50	23	0.05(0.002)	3.89	158	0.31 (0.005)	2.20	505
13	49	0.12(0.002)	0.88	0	0.00(0)	0.00	9	0.02(0.001)	1.52	58	0.14(0.004)	0.81	407
14	26	0.05(0.001)	0.47	0	0.00(0)	0.00	0	0.00(0)	0.00	26	0.05(0.001)	0.36	515
Total Group	5590	1.69	100	996	0.30	100	592	0.18	100	7178	2.16	100	3318

SE = Standard Error

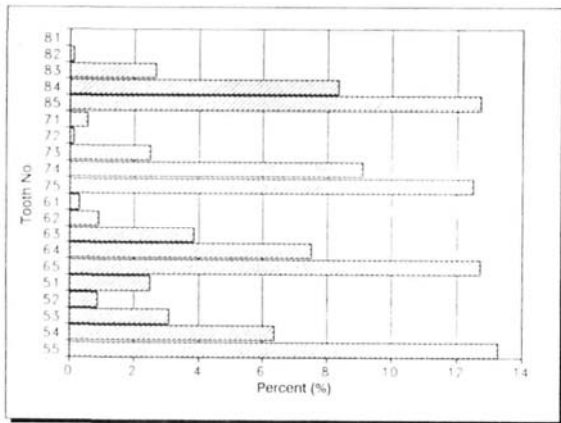


Figure 2. Proportion of each decayed tooth type in children.

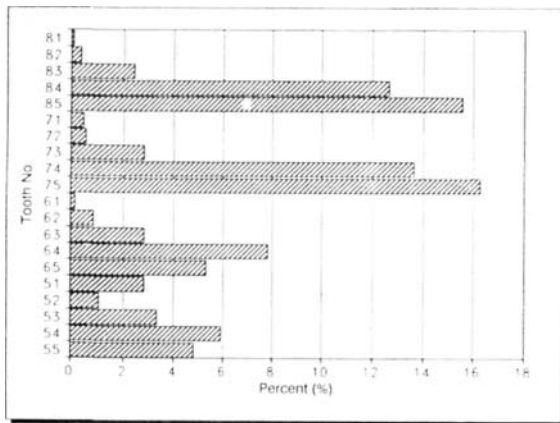


Figure 3. Proportion of each missing tooth type in children.

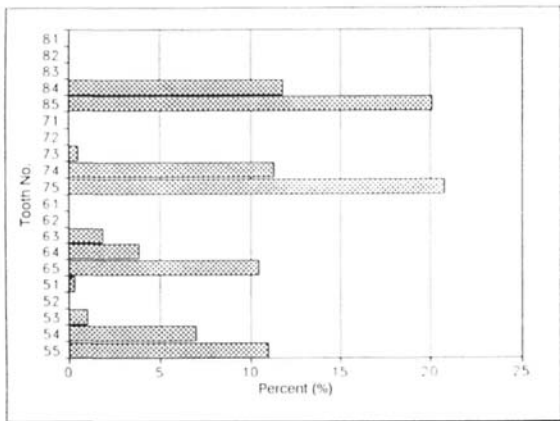


Figure 4. Proportion of each filled tooth type in children.

filled teeth. The canines accounted for 12.1% of decayed, 11.34% of missing and 3.38% of filled

teeth. The primary incisors accounted for values ranging from 2.05 - 3.34% decayed, 3 - 3.61% missing and 0 - 0.34% filled teeth (Table 2).

Table 2. Proportion of decayed, missing and filled teeth.

Tooth	% Total Decay	% Total Missing	% Total Filled
Maxillary primary second molars	25.99	10.14	21.45
Mandibular primary second molars	25.22	31.83	40.88
All primary second molars	51.21	41.97	62.33
Maxillary primary first molars	13.88	13.75	23.14
Mandibular primary first molars	17.43	26.32	3.14
All primary first molars	31.31	40.05	33.96
Maxillary primary canines	6.94	6.12	2.87
Mandibular primary canines	5.16	5.22	0.51
All primary canines	12.1	11.34	3.38
Maxillary primary lateral incisors	0.26	2.00	0.00
Mandibular primary lateral incisors	1.79	1.00	0.00
All primary lateral incisors	2.05	0.70	0.00
Maxillary primary central incisors	2.49	0.70	0.00
Mandibular primary central incisors	0.85	2.91	0.34
All primary central incisors	3.34	3.61	0.34

Treatment Pattern

Although the number of both mandibular and maxillary decayed second primary molars were essentially similar, there were more frequent treatment of the mandibular molars. Similar findings were observed for the first primary molars. However, for the anterior teeth, the maxillary primary canines were treated more frequently than the mandibular primary canines. There was no difference in the proportion of the lateral incisors that were treated in both arches. More mandibular central incisors were treated than maxillary (Table 2).

Discussion

The results of the present study showed that the overall prevalence of dental caries amongst children, aged 6-13 years, in Jeddah is relatively low (dmft- 2.16). This finding is similar to other studies previously reported in the literature.^{1,10}This figure, 2.16 (dmft), however, does not give the true

picture of caries experience of some children within the age-group examined. For example, our results showed that the dmft is much higher for age-group 6-9 ranging from 3.27 - 6.83 [Fig. 1]. This increase shows that this age-group represents a "risk" group for dental caries development. The reason for this increase may include inefficient oral hygiene control, excessive snacking habits and increase plaque index usually accompanying the changing developmental phases of dentition.

A great decline in the dmft was observed in the age-group starting from 8 years and above. This decline could be due to a transient decrease in the number of cariogenic bacteria which has been shown to accompany the transition between late mixed dentition and the development of the permanent dentition.^{11/12} Other suggested reasons are the increase in the salivary IgA immunoglobulin which reaches adulthood around 8 years of age,¹³ and the fact that normal exfoliation of primary teeth occur at this time as well.

The distribution of caries in these children also confirms earlier studies on the bilateral symmetry of caries distribution.¹⁴ This symmetry in caries attack has been ascribed to similarity in the genetic, morphological, structural and ecological features of each tooth type and its antimeres, especially in the same arch.^{5,6,15,16} In this study, however, the similarity was in all quadrants and not confined to the same arch as described before in the literature.

As far as vulnerability of each tooth type to caries is concerned, the second primary molars showed the greatest vulnerability compared to the first primary molars while all primary molars accounted for most of the dmft in all the children. This finding corroborates previous studies² but also showed that more mandibular teeth are treated as evidenced by the number which are missing and filled as a result of dental decay. This may either be a reflection of the fact that most dental practitioners find it easier to treat the lower teeth than the upper and/or that the progression of decay in the mandibular molar teeth may be faster and, therefore, requiring more urgent treatment than it is for the upper. In fact, some studies have shown that more mandibular molar teeth are extracted than maxillary molar teeth due to dental abscess

formation which had resulted from untreated dental caries.^{16,17}

The relative abundance of saliva and its anticariogenic effect to the maxillary molar teeth in contrast to the food packing potential and greater plaque accumulation in the mandibular posterior region may account for the differences in the caries susceptibility between mandibular and maxillary molar teeth.⁶ The cuspids accounted for 12.1% of the total number of decayed teeth, 11.34% of the total number of missing and only 3.38% of all filled teeth. Many of these lesions have been suggested to be developmental enamel defects.

Our results also suggest that treatment needs of these children, as determined by the magnitude of caries prevalence, are high while the treatment met, as determined by the missing and filled teeth, was low. There were also more teeth missing due to extraction compared to the number that are filled. This may either be due to the fact that many practitioners elect to extract primary teeth than trying to salvage them or because many of these teeth were at a stage of total coronal destruction for which extraction was the treatment of choice.

In summary, therefore, this study shows that while the overall caries experience of the children living in Jeddah is low, the 6-9-year-olds age-group experienced a high caries activity, most of which were treated by extraction of the teeth. The deleterious effect of premature loss of primary teeth on the occlusion of the permanent teeth successor is well documented in the literature.^{18,19}

Reduction of this caries level, especially in the high risk age-group, can only be achieved on a long term basis by cost-effective preventive modalities. Such modalities should include public and dental health school programs, change in dietary habits, improvement of oral hygiene practices, and introduction of the use of fluorides in different forms as applicable to the individual patient and community.

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