

Caries in primary school children: Prevalence, severity and pattern in Al-Ahsa, Saudi Arabia

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ان الاهداف الرئيسيه لهذه الدراسه كانت لتحديد مدى انتشار وحطوره واشكال نخر الأسنان لدى اطفال المرحلة الابتدائيه بمنطقه الأحساء بالمملكه العربيه السعوديه .
اربعمائه وسبعه وخمسون طفلا قد تم اختيارهم وفحصهم هذه الدراسه وأوضحت النتائج أن مدى انتشار نخر الأسنان لدى الأطفال كان ٨٣٪ و٩٠٪ ومتوسط dmft كان ٤.٤٤ .
أيضا الدراسه وحدت أن هناك فرقا في مدى انتشار نخر الأسنان بين الذكور والاناث من الأطفال وكان نخر الأسنان لدى اطفال المدينه اقل منه لدى اطفال المناطق البائيه ، بينما لم يلاحظ وجود علاقته في مدى شدة نخره الأسنان
والحاله الاقتصاديه والاجتماعيه للطفل ، كذلك من النتائج أنه ليس هناك علاقته بين مدى انتشار نخر الأسنان وجنس الطفل والمنطقه والحاله الاقتصاديه والاجتماعيه للطفل .
الرحى الاولى المؤتمنه في الفك السفلي كانت أكثر الاسنان تعرضا للنخر بنسبه ٤٦٪ و٤٦٪ بينما كانت اقل الاسنان تعرضا للتسوس هي التنيه الاولى المؤتمنه للفك السفلي بنسبه ٩٥٪ و٣٠٪ .

The objectives of the study were to determine the caries prevalence, severity and pattern in primary school children of Al-Ahsa, Saudi Arabia. Four hundred and fifty seven randomly selected primary school children were examined for this purpose. The result showed caries prevalence of 82.9% with a mean dmft of 4.45 (S.D. 3.76). The mean dmft difference between male and female children was statistically significant ($p < 0.0001$). The mean dmft of urban children was significantly ($p < 0.0001$) lower than that of their rural counterparts. There was no significant difference in caries severity in terms of socioeconomic status of the children ($p = 0.520$). Similarly, no significant caries prevalence difference was found in terms of gender, area and socioeconomic status. The teeth most affected by caries were mandibular first primary molars (46.6%). The least affected teeth were mandibular primary central incisors (3.95%).

Introduction

There are fewer childhood caries studies in the developing countries when compared with the developed countries.^{1,2,3} The studies in developing countries mostly report a high prevalence of caries in school children. Stephen⁴ in his review of caries in young children worldwide has summarized the prevalence of caries in young children in various parts of the world. It can be noted from his review that studies from majority of the developing countries report a caries prevalence of higher than 50%.

In 1982, the World Health Organization and the International Dental Federation adopted the "Global goals for oral health by the year 2000" policy, which included the expectation that 50% of 6-year-olds should be caries free.⁵ The primary school children caries studies in Saudi Arabia have demonstrated an increasingly lower percentage of caries-free 6-year-olds over the past decade. A survey of caries prevalence in 1988 showed that 40.3% of 6-year-olds in Riyadh were caries free.⁶ Al-Khateeb et al⁷ while comparing dental caries prevalence in communities with different levels of

water fluoride, reported an average of 27% caries free 6-year-olds. In 1991, Al Shammery et al reported on the caries prevalence of Saudi school children in Riyadh area.⁸ Their study showed only 22.3% of the 6-year-olds as caries free with a mean dmft of 4.14 in males and 3.43 in females. Recent results of a survey in Dammam showed a dmft of 6.55 in 6-7-year-old children with 9.1% of children described as caries free.⁹ All these reports indicate an increasing caries prevalence and severity in early school children.

Although data on the prevalence and severity of dental caries in Saudi adults and children have been published recently,^{8,10,11} there is a marked scarcity of such information on children of Al-Ahsa area. The objective of the present study was to determine the prevalence, severity and pattern of caries in early school children of Al-Ahsa area.

Materials and Methods

According to the 1972 census report, the population of 6-7 year old children in Al-Ahsa area was 17,786.¹² At the time of the survey, only a summary report of 1994 census was available.¹³ The report had given only total population of various administrative regions and big cities categorized by gender. Utilizing the 1972 and 1994 information, a population growth rate of 3.07%

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was determined for Al-Ahsa area. The population of 6-7-year-olds was therefore estimated to be 34,593 using the above growth rate.

A recent study⁹ reported a dmft of 6.64 (S.D. 4.43) for 6-7-year-olds of Dammam area. The Dammam area is in the same administrative region as Al-Ahsa area, i.e. the Eastern region. Therefore, the S.D. of 4.43 was used to determine the sample size for Al-Ahsa region. The sample size was calculated as 470 children with confidence interval of 95% and maximum error rate of 0.4 dmft using 'sample size' formula for mean.¹⁴

There were 342 primary schools in Al-Ahsa area in 1997. One hundred and seventy three were boys' schools and 169 were girls' schools. The schools were divided into three socio-economic categories i.e. lower middle, upper middle and high depending upon the location of the school. This was done on the basis of the subjective judgment of the research team members who were the permanent residents of the Al-Ahsa region. Al-Ahsa area has two urban centers i.e. Hofuf and Al-Mubarraz with surrounding rural towns. Fourteen boys' schools and 12 girls' schools were randomly selected for data collection using the proportion of number of schools in each socio-economic categorization. Eighteen children were examined from first grade of each selected schools, except two schools where a lower number of children were examined. This way, a stratified cluster sampling was utilized. In total, 457 first graders were examined for the study.

Two examiners were trained and calibrated by a senior staff member of King Saud University, College of Dentistry. Both primary and permanent teeth were recorded for caries. The WHO criteria were utilized for the diagnosis of caries.¹⁵ The findings were recorded on a chart developed for the study. Each child was examined on a portable dental chair. A fiber-optic light source with interchangeable disposable mirror heads was used for the examination. The probe was used sparingly on doubtful surfaces. In case of any doubt, the tooth was marked sound. No radiographs were taken.

Statistical Package for Social Sciences (SPSS window version 9.0) was utilized to generate frequencies, means, standard deviation and statistical analyses. The t-test and analysis of variance were used to test the mean dmft difference between groups. The Chi-square test was used to test the relationship of gender, area and socioeconomic status with caries prevalence.

Calibration

Inter-examiner reliability

A very high degree of agreement (97.6% for the male examiner and 95.1% for the female examiner) was demonstrated between the reference examiner and two field examiners for decayed, missing and filled teeth by Kappa Method.

Intra-examiner reliability

Ten percent of the sample were re-examined by each examiner. The intra-examiner reliability was very high (98.9% for the male examiner and 94.8% for the female examiner) using Kappa Methods.

Results

Severity & prevalence of dental caries

The sample had 251 boys (54.9%) with mean age of 6.02 (S.D. 0.22) years and 206 girls (45.1%) with mean age of 6.66 (S.D. 0.5) years. Since very few permanent teeth were erupted, only primary caries data are presented. The mean dmft in 457 primary school children examined was 4.45 (S.D. 3.76) with the d component as the major (84.9%) contributor (Table 1). The mean dmft for boys and girls were 5.11 (S.D. 3.99) and 3.64 (S.D. 3.30) respectively (Table 1). The mean dmft difference between the male and female children was statistically significant ($p < 0.0001$).

Three hundred and thirty one (72.4%) children were from the urban areas and 126 (27.6%) were from the rural areas. The mean dmft of the children from urban areas was 4.03 (S.D. 3.50) and that from rural areas was 5.54 (S.D. 4.20) (Table 1). The difference between mean dmft scores of the two areas was statistically significant ($p < 0.0001$).

The children were divided into three groups according to their socio-economic (SE) status, i.e. high, upper middle and lower middle SE groups (Table 1). There was no significant difference of dmft scores between various SE groups ($p = 0.520$).

Out of 457 early school children examined 379 (82.9%) had caries. Among the male children, 215 (85.7%) had caries while 164 (79.6%) female children had caries (Table 2). The difference between the caries prevalence of male and female children was marginally significant ($p = 0.057$).

Among the 331 children from the urban areas, 270 (81.6%) had caries, while the corresponding number was 109 (86.5%) among the 126 children from the rural areas (Table 2). The difference between the caries prevalence of two areas was statistically insignificant ($p = 0.132$).

Table 1. Mean dmft score of primary school children in relation to gender, area of residence and socio-economic status.

Caries Experience	Gender			Area of residence			Socio-economic status				Total
	Male	Female	p-value	Urban	Rural	p-value	High	Upper middle	Lower middle	p-value	
n	251	206	-	331	126	-	160	175	122		457
Decay (d)	4.48±3.74	2.93±3.03	<0.0001	3.39±3.28	4.82±3.92	<0.0001	3.61±3.48	3.61±3.38	4.26±3.76	0.215	3.78±3.52
Missing (m)	0.49±0.94	0.43±0.81	0.456	0.40±0.81	0.65±1.02	0.013	0.43±0.89	0.48±0.90	0.49±0.86	0.821	0.47±0.88.
Filled (f)	0.13±0.48	0.28±0.86	0.024	0.24±0.75	0.07±0.44	0.003	0.35±0.95	0.18±0.60	0.02±0.13	<0.0001	0.17±0.68
dmft	5.11±3.99	3.64±3.30	<0.0001	4.03±3.50	5.54±4.20	<0.0001	4.39±3.66	4.27±3.68	4.77±4.01	0.520	4.45±3.76

The percentages of children who had caries, from three SE groups, i.e. high, upper middle and lower middle groups were 83.1%, 82.3% and 83.6% respectively (Table 2). There was no significant difference between the three SE groups (p=0.954).

Table 2. Caries prevalence in relation to gender, area of residence and socio-economic status.

		Caries free	Caries present	Total	p-value
Gender	Male	36 (14.3)	215 (85.7)	251	0.057
	Female	42 (20.4)	164 (79.6)	206	
Area of residence	Urban	61 (18.4)	270 (81.6)	331	0.132
	Rural	17 (13.5)	109 (86.5)	126	
Socio-economic status	High	27 (16.9)	133 (83.1)	160	0.954
	Upper middle	31 (17.7)	144 (82.3)	175	
	Lower middle	20 (16.4)	102 (83.6)	122	
Total		78 (17.1)	379 (82.9)	457	

Caries pattern

The caries prevalence was generally higher in the mandibular primary molars than the same teeth in the maxilla (Fig. 1).

Among the mandibular teeth, caries prevalence was highest in primary first molars (46.6%) followed by primary second molars (42.3%) and primary canines (10.4%). The least affected mandibular teeth were primary central incisors (4.0%). Among the maxillary teeth, the prevalence was highest in primary second molars (35.1%) followed by first molars (28.0%) and central incisors (23.4%). The least affected maxillary teeth were primary canines (7.6%).

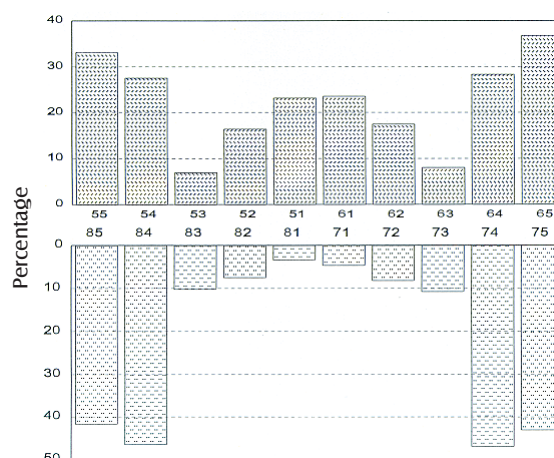


Fig. 1. Caries prevalence by individual teeth.

Discussion

The present study has provided important information about caries status of primary school children in the Al-Ahsa Area. The dmft score was similar to what has been reported in primary school children of Riyadh area⁸ but, lower than their counterparts from Dammam Area.⁹ The decay component was the major component in the dmft score. This indicates a very high percentage of untreated caries. The caries prevalence is also very high and far from the WHO goal of "50% caries-free 6-year-olds by the year 2000."¹⁶

The dmft score and caries prevalence were higher in male children than female children. Similar results were reported by Al-Shammery et al in Riyadh.⁸ The lower caries severity and prevalence in female children could be attributed to cultural factors. The parents in these areas generally tend to give greater attention to hygiene and esthetics of their female children.

The dmft score and caries prevalence were higher in rural area children than those from urban

areas. The higher caries severity and prevalence in rural children could possibly be attributed to lower exposure of these children to preventive dental health education.

There were no significant differences in dmft scores and caries prevalence across various socio-economic groups. The lack of such an association supports the view that caries in this area are related to cultural factors especially those related to dietary habits and oral hygiene practices.

The study has provided useful baseline data for future comparisons. Furthermore, the caries prevalence and severity information would assist in the determination of treatment needs and preventive efforts required in this population. The knowledge of caries pattern would help clinicians in the formulation of appropriate treatment strategies. It could be deduced from the above results and discussion that considerable efforts are required in prevention of dental caries in these children. There is a lot of untreated caries, which needs immediate attention. It is proposed that a school dental service may be initiated in the area. The service could serve dual purpose in the area i.e provision of preventive dental services and restorative care to children. Mobile dental clinics may also be utilized to serve the children in isolated rural areas.

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