

## Oral health status of primary dentition among 551 children aged 6 to 8 years in Jazan, Saudi Arabia

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يشتمل هذا البحث على دراسة الحالة الصحية للأسنان اللبنية لدى 551 تلميذاً وتلميذة حيث تم فحصهم فيما يخص تفرش الأسنان، الحالة الصحية للفم، نخر الأسنان ومدى الاحتياج للتدخل العلاجي، وقد تم تسجيل نخر الأسنان طبقاً لمعايير منظمة الصحة العالمية. أما الحالة الصحية للفم فقد تم تسجيلها طبقاً للمقياس المبسط للحالة الصحية للفم. وقد حللت النتائج لدراسة تأثير العمر والجنس على المتغيرات الأخرى. وقد أوضحت النتائج أن الحالة الصحية للفم لدى الإناث أسوأ منها عند الذكور. أما فيما يخص النخر فقد لوحظ ارتفاع نسبه لدى الأطفال من سكان المدن (4,67) مقارنة مع سكان الضواحي (3,16). كما أوضحت النتائج أن نخر الأسنان كان هو العامل الأبرز من ضمن المتغيرات الملاحظة وأن نسبة الأطفال الحاليين من نخر الأسنان تقل بتقدم العمر. ويمكن القول أن نتائج هذه الدراسة تؤكد على أهمية وجود برنامج صحي وقائي للأطفال بين سن السادسة والثامنة من العمر.

A cross-sectional study of 551 primary school children was conducted to assess their oral health status in the primary dentition. The participants were examined regarding their frequency of brushing, oral hygiene status, caries experience and treatment needs. Caries was diagnosed according to the World Health Organization (WHO) criteria. The Simplified Oral Hygiene Index (OHI-S) was used to assess oral health status. A logistic regression analysis was utilized to detect the relative effects of gender and/or age on oral hygiene. It was found that there was a significant gender effect ( $p = 0.007$ ) with males having worse oral hygiene than females. No age effect was detected ( $p = 0.600$ ). A difference in caries experience was found between rural and urban areas. The mean dft for rural subjects was 3.16 compared to a mean of 4.67 for the urban subjects. When analyzing the relative contribution of the different components of the scores, the dt component was found to be the major contributor to the total score. It was found also that the proportion of caries-free children declined with increasing age in both male and female groups. The results indicated a need for oral health promotion and preventive program for children aged 6 - 8 years old.

### Introduction

In many industrialized countries, a gradual decrease in caries prevalence has been reported among children and adolescents.<sup>1,2</sup> There is a general agreement that the widespread use of fluoride in toothpaste was the main reason for the decline in caries.<sup>3</sup> Changes in sugar consumption, preventive dental treatment and improvements in oral hygiene care are other possible reasons for the decline of caries prevalence in those countries.<sup>4</sup>

Contrary to what is observed in many western societies, data from developing countries indicated that the caries prevalence among children is rising.<sup>5</sup> In Saudi Arabia, few studies<sup>6,7</sup> reported different prevalence data on dental caries in pre-school children. Salem and Holm<sup>6</sup> reported that the mean dmft in pre-school children aged 3 to 5 years in Jazan is 1.2 with 33% of children having one or more decayed teeth. However, other studies reported a higher caries prevalence. Al Khateeb et al<sup>7</sup> in their studies in three cities in Saudi Arabia reported a dmft of 5.0 in Rabagh area. Their results of caries experience

were comparable to the caries experience of pre-school children reported in the Riyadh area by Al Mohammadi.<sup>9</sup> The aim of the present study was to assess the oral health status in primary dentition of Jazan children aged 6- 8 years.

### Materials and Methods

A cross-sectional study of a subpopulation of the Kingdom of Saudi Arabia, specifically Saudi children aged 6 to 8 years old was conducted. The subjects of the study were from the urban and rural areas of Jazan. Jazan province is in the southwestern part of the Kingdom of Saudi Arabia. Its population represents 6% of the Saudi population. Most of the people live in scattered communities. The three biggest communities are Jazan, Abu Arish and Sabia. Abu Arish has been selected for the site of this study.

A convenience sample of 551 school children (298 males and 253 females) aged 6-8 years was selected from primary public schools of Jazan. The sample was not random, but rather selected from schools which agreed to participate.

All subjects were assessed with regard to frequency of brushing, oral hygiene status, caries experience and treatment needs. Frequency of brushing was obtained through interview of

Received 8 June 1999; Revised 26 Sept. 1999;  
Accepted 18 Dec. 1999

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subjects. The Simplified Oral Hygiene Index (OHI-S) as defined by Greene and Vermillion<sup>12</sup> was used to assess oral hygiene status. The subjects in the study were in the mixed dentition stage where it was difficult to ascertain the reasons for missing teeth. Therefore, a modification of def index was used in which the missing teeth were ignored. Dental caries diagnosis was based on WHO criteria.<sup>13</sup> Dental caries was only diagnosed when the lesion had reached cavitations level and radiographs were not used.

Assessment of treatment needs of each subject was recorded according to four categories as follows: 0-no treatment needed, 1-needs treatment but not urgent, 2-needs urgent treatment and 3-needs orthodontics treatment. The urgency of the treatment was based on the presence of abscess, multiple carious lesions and the need for space maintainer.

Natural daylight, mouth mirrors and probes were used for clinical examination. Dental investigation was performed by one examiner and an assistant recorded the findings. Clinical registration training and calibration were conducted at the dental school in Riyadh to standardize the method of dental examination and to test the record form. However, no intra-examiner reliability was performed.

The majority of the data items are of a categorical nature, e.g. gender, age group, oral hygiene score, etc. For this reason, much of the statistical analyses for interrelationships among these items were contingency table analyses in which significance of hypothesized relationships was measured with the chi-square statistics. For the analyses of the derived variables, dft, dt and ft, the multiple regression analysis was used. The significance level was at a p-value of less than 0.05. A logistic regression was used to detect the relative effects of gender and/or age on oral hygiene.

## Results

The distribution of the total sample by age and sex is shown in Table 1. The subjects from the rural area were males and represented 5.6% of the sample. Table 2 shows the frequency of brushing among urban subjects. As can be seen, the percentage of females brushing their teeth is higher than the males. Overall, 79.5% of females reported to brush their teeth compared to 64.7% of males. This difference was statistically significant ( $p = 0.002$ ). With regard to age, no significant

difference was found in the frequency of brushing across the age groups ( $p = 0.284$ ).

**Table 1.** Distribution of subjects by age, sex and urban/rural areas.

Age (years)	Urban		Rural		Total
	Male	Female	Male	Female	
6	116	87	6	0	209
7	52	52	8	0	112
8	99	114	17	0	230
Total	267	253	31	0	551

**Table 2.** Frequency of brushing among urban subjects by age and sex.

Frequency of Brushing	Males				Females				Total Males & Females
	6yr-olds	7yr-olds	8yr-olds	Total	6yr-olds	7yr-olds	8yr-olds	Total	
Three Times	12 10%	8 15%	11 11%	31 12%	21 24%	9 17%	19 17%	49 19%	80 15%
Twice	18 16%	2 4%	18 18%	38 14%	17 20%	10 19%	26 23%	53 21%	91 18%
Once	29 25%	14 27%	15 15%	58 22%	25 29%	15 29%	30 26%	70 28%	128 25%
Irregular	18 16%	11 21%	17 17%	46 17%	9 10%	10 19%	11 10%	30 12%	76 15%
Not used	39 34%	17 33%	38 37%	94 35%	15 17%	8 15%	28 25%	51 20%	145 28%

Male vs. Female  $p=0.002$   
Across ages  $p = 0.284$

The oral hygiene status is shown in Table 3. Due to the small number of subjects with score 0 (one subject) and score 1 (twenty-five subjects) they were combined with score 2 and the total number of subjects were given score >3. It was found that there was a significant gender effect ( $P = 0.007$ ) where males had worse oral hygiene compared to females. No significant age effect was detected ( $P = 0.600$ ). The oral hygiene status for subjects from rural schools was significantly worse than that for subjects from urban schools ( $P = 0.001$ , Fisher's Exact Test).

**Table 3.** Oral hygiene status (OHI-S) by age and sex among urban subjects.

OHI-S	Males Age (years)				Females Age (years)				Total Males & Females
	6	7	8	Total	6	7	8	Total	
<3*	33 28%	10 19%	24 25%	67 25%	41 47%	26 50%	49 43%	116 46%	183 35%
3	83 72%	42 81%	75 75%	200 75%	46 53%	26 50%	65 57%	137 54%	337 65%

\* This represents subjects with score 0 (1 subject), score 1 (25 subjects) and score 2.

The dental caries experience findings showed that the mean dft for rural subjects was 3.16 (se = 0.63) compared to a mean of 4.67 (se = 0.22) for the urban subjects. This difference was statistically significant in the two-sample t-test ( $p = 0.024$ ). The caries experience was further analyzed for the urban subjects (Table 4). In testing for any statistically significant difference in dft between males and females, and among the three age groups for the urban subjects, no significances were found ( $p = 0.755$  for gender and  $p = 0.081$  for age). The dt component was the major contributor to the total score in all age groups. In addition, it was found that the proportion of caries-free children is declining with the increase of age in both male and female subjects.

**Table 4.** Percentage of caries-free children, mean dft and its components by age and gender among urban subjects.

Gender	Age	dft		dt		ft		% of Caries-free Subjects
		Mean	SE	Mean	SE	Mean	SE	
Male	6	4.70	0.33	4.61	0.32	0.09	0.04	22
	7	5.44	0.49	5.40	0.48	0.04	0.06	19
	8	4.25	0.35	4.20	0.35	0.05	0.05	18
Female	6	5.25	0.38	5.17	0.37	0.08	0.05	17
	7	4.85	0.49	4.83	0.48	0.02	0.06	13
	8	4.38	0.33	4.22	0.33	0.16	0.04	12
Total		4.73	0.15	4.64	0.15	0.08	0.02	100%

In order to know the influence of OHI-S on caries experience, a model was analyzed in which dft served as a dependent variable and age, sex and OHI-S served as independent variables. Firstly, a model was fit which included all possible two-way interactions (age x gender, age x OHI-S, and gender x OHI-S). All of these two-way interactions were not significant. The model was then fit which only included main effects (Table 5). It was found that OHI-S is very significant and that the other factors are only marginally significant. OHI-S is an independently significant factor for explaining dft, i.e. independent of the effects of age and/or gender. If age is regarded as significant, then the nature of the significance was the difference in dft between the 6 year-olds and 8 year-olds (the latter with lower values of dft). If gender is regarded as significant, the nature of the significance was that females tended to have higher values of dft.

**Table 5.** Logistic regression analyses of OHI-S, age and sex on dft among urban subjects.

Parameter Estimates				
Term	Estimate	Std Error	T Ratio	Prob>t
Intercept	3.5783827	0.308178	11.61	0.0000
Age (7vs6)	0.1240729	0.406704	0.31	0.7604
Age (8vs6)	-0.854076	0.402921	-2.12	0.0345
OHI-S	2.205068	0.317030	6.96	0.0000
Sex	-0.305705	0.152132	-2.01	0.0450

Effect Test					
Source	Nparm	DF	Sum of Squares	F Ratio	Prob>F
Age	2	2	75.51651	3.3308	0.0365
OHI-S	1	1	548.41817	48.3774	0.0000
Sex	1	1	45.77537	4.0380	0.0450

The proportions of all subjects with different types of treatment needs are shown in Table 6. No significant difference in the treatment needs of urban and rural males was found ( $P = 0.226$ ). The results also indicated no significant relationship between treatment needs and age and gender ( $p = 0.367$  and  $p = 0.108$ , respectively). The data showed that the largest proportion of the sample needed treatment, among which 29% required urgent treatment.

**Table 6.** Number and percentage of all subjects with different types of treatment needs.

Treatment Needs	n	Percent
No treatment needed	94	17
Treatment not urgent	283	51
Urgent treatment*	160	29
Orthodontic treatment	14	3
Total	551	100%

\* This was based on the presence of abscess, multiple carious lesions and the need for space maintainer.

### Discussion

This cross-sectional study was carried out to assess oral health status in the primary dentition. The results cannot be generalized for all children in these age groups since the sample was a convenience sample of children aged 6-8 years old attending school in Jazan area. Subjects in the sample showed a mean dft of 4.3 (SE = 0.15), this level of dental caries experiences found in this age group is considered moderate according to WHO classification.<sup>13</sup> The study also showed that the amount of restorative care delivered was very limited and most carious teeth remained untreated. These results are comparable to what has been observed in other studies conducted in Riyadh area.<sup>79</sup> Al Mohammadi et al<sup>9</sup> in his study of caries prevalence among Saudi boys in Riyadh reported a dmft of 5.0 (SD = 3.6) for boys aged 6 years old. Furthermore, the study indicated that most of the carious lesions were untreated. However, the results of caries experience in this study were higher than those reported by Salem and Holem<sup>6</sup> for 3 to 5 years old Saudi boys and girls. Their studies conducted in the Jazan area, indicated a lower deft of 1.2 (SD = 0.8) for pre-school children aged 5-6 years old. The difference observed could be the result of methodological variations between the two studies. However, if one takes into consideration the time factor between the two studies, the difference observed in caries experiences could reflect a real increase in caries prevalence in the Jazan region between 1990 and 1997. This finding would be in agreement with WHO observation regarding the increase in dental caries in developing countries.<sup>514</sup>

Possible explanation about the increase of caries prevalence in Jazan area could be related to factors affecting sugar consumption, oral hygiene habits and limited preventive measures undertaken in this area. Data concerning the frequency of sugar consumption in Jazan area are not available. However, regarding oral hygiene, results showed that 68% of the subjects in this study tended not to brush regularly and 65% has poor oral hygiene with OHI-S score of 3, indicating poor hygiene habits.

This study has identified the amount of unmet needs for dental care by showing that 83% of the sample needed treatment, among which 29% needed urgent type of treatment. These results are in agreement with other studies<sup>7-9</sup> conducted in Saudi Arabia showing the limited restorative

care delivered and the untreated caries for primary teeth.

The percentage of caries-free children in this study was found to be low compared to other studies conducted in different regions of Saudi Arabia and some other countries in the Middle East.<sup>6</sup> In 1990, the percentage of caries-free children in Jazan region was reported to be 96% compared to 22% in the present study. Many studies<sup>1517</sup> have indicated that children who experienced caries in the primary dentition may be considered at greatest risk to experience caries in permanent dentition because the habits and behavior among both children and their caretakers that contribute to caries in the primary dentition are thought to foster caries of the permanent dentition. Studies of this type provide the opportunities to investigate the relevance of preventive measures for the future development of oral health services in the area. The present findings suggested that effort to develop caries intervention for children with primary dentition might have considerable effect in reducing the need for future dental treatment.

It could be concluded from this study that preventive and curative services need to be increased for children. It is also clear that repeated cross-sectional studies such as the present one are useful for showing population disease trends. Continuous monitoring of dental caries experience among children is very important. However, monitoring of changes in the risk factors such as sugar consumption is even more important in order to plan for effective dental preventive programs.

Regarding preventive measures, King Saud University, Dental School and the Ministry of Health are involved in a rather extensive effort in oral health education aimed at increasing dental awareness among school children. The main component of this dental educational message is effective oral hygiene and sugar consumption control. However, with the present level of dental caries, a preventive approach relying only on oral health education may not be effective, unless other preventive approaches are implemented, such as the promotion of the use of fluoride in drinking water where necessary. Such preventive measure is not offered in Saudi Arabia. Therefore, one may speculate that without appropriate preventive measures, the caries prevalence will increase dramatically in the coming years. Development of appropriate information systems for this purpose is an important step for the

management of oral health services. This task is faced with the challenge of organizing necessary health promotive and preventive services in an efficient way and identifying the children who need curative services.

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