

Caries prevalence and intra-oral pattern among young children in Ajman.

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Objective: To describe the prevalence and intra-oral pattern of caries among young children in Ajman, UAE. **Methods:** A one-stage cluster sampling was used to randomly select children aged 5 or 6 years old who were enrolled in public or private schools in Ajman. Clinical examinations for dental caries were conducted by a single examiner using WHO criteria. **Results:** The total number of children sampled was 1297, of whom 1036 (79.9%) were dentally examined. The prevalence of caries (defined as dmft >0) in 5- and 6-year-olds was 72.9% (95% CI, 61.8, 83.9) and 80.0% (95% CI, 76.0, 84.4) respectively, with mean dmft scores of 4.0 (sd, 4.1) and 4.9 (sd, 4.3) respectively ($P < 0.05$). The teeth most frequently affected by caries were mandibular second molars (38.6% of those on the left, and 36.9% of those on the right) and the least affected were mandibular central incisors (2.1% and 2.0% respectively). The prevalence of bilateral molar caries (that is, contralateral teeth both affected) was relatively high, being 29.7% for mandibular second molars and 28.3% for mandibular first molars. **Conclusions:** Dental caries prevalence and severity in 5- and 6-year-olds in Ajman were high, with the lower molars and upper central incisors most commonly affected by caries. There is an urgent need for oral health programs targeted at the treatment and prevention of dental caries in these children.

Key words: Caries, children, intra-oral pattern, prevalence, U.A.E.

Introduction

The Emirate of Ajman is part of a larger collection of Emirates known collectively as the United Arab Emirates (UAE). The Emirate of Ajman was selected for this study because, at the time this study was conducted, no information on the oral health of preschool children in that Emirate was available. In fact, only three studies of child oral health had previously been conducted in the Emirates: that by Al-Mughery *et al.* (1991) in the Emirate of Abu Dhabi; that by Al-Hosani and Rugg-Gunn (1998), who looked at Abu Dhabi, Al-Ain and the Western Region; and that by Naqvi *et al.* (1999), who focused on the Al-Ain region only. Those three studies all reported caries estimates which were relatively high by international standards.

In the literature, there is no universal definition for Early Childhood Caries (ECC). This disease has been variously referred to as “early childhood tooth decay”, “nursing caries”, “rampant caries”, “baby bottle tooth decay”, “nursing bottle tooth decay”, “caries of the incisors”, “maxillary anterior caries”, and “severe early childhood caries”. These terms all refer to the condition that focuses on decay specifically in the primary maxillary anterior teeth. However, many studies on pre-school children have reported on dental caries in any tooth (Stecksen-Blicks and Holm, 1995; Thibodeau and O’Sullivan, 1995, Dini *et al.*, 2000). The aim of this study was to describe the prevalence and intra-oral pattern of caries among young children in Ajman, UAE.

Methods

The study was officially approved by the UAE Ministry of Health and the ethics committee of the University of Otago. Before the dental examination, informed consent forms (which had been sent to the parents of selected children) were signed by parents.

Primary schools (kindergartens) were the primary sampling unit. There were a total of 22 schools (16 private and six government) in the Emirate. Half of these schools were selected randomly for inclusion in this study, using a computer program for generation of random numbers, and lists obtained from the Ministry of Education, for Ajman Educational District. A total of 11 primary schools were selected (eight private and three government); all eligible children at each selected school were sampled (one-stage cluster sampling), and were identified according to their date of birth. All schools participated in the study (all of the eligible children in each sampled school were selected). Children whose parents did not consent (and those who were absent at the day of dental examination) were not replaced by substitutes.

The clinical examination involved a systematic, tooth-by-tooth (and surface-by-surface) examination and recording of dental caries status. The dental examinations were carried out using disposable mouth mirrors. The children were examined while sitting on an ordinary chair at the school health clinic. Natural daylight was used for illumination. No radiographs were taken, and no treatment was provided. As recommended by WHO (1997), caries was diagnosed at the cavitation stage only. The rule adopted for missing teeth was that any missing

posterior tooth was considered to have been extracted due to caries. Any missing incisor tooth was considered to have been exfoliated naturally unless (a) no successor was obvious, and (b) definite caries was apparent in adjacent anterior teeth; in this case, it was regarded as having been lost due to caries (Palmer *et al.*, 1984). In the current study, caries prevalence is represented by the percentage of children who have one or more decayed, filled, or missing surface. The severity of caries experience is represented by the mean dmfs and dmft scores.

The reliability of the dental examining process was assured by using (a) initial calibration with the local research supervisor (MA), and (b) assembling a replicate data-set by examining 97 participants (approximately 10%), the examination and re-examination were separated by at least one day. In the calibration session (where 10 children were examined), the intra-class correlation coefficient for dmfs scores was 1.00. In the replicate data-set, the intra-class correlation coefficient for dmfs was 0.99.

Because schools (rather than individuals) were the primary sampling unit, the data were analyzed using the "survey" commands in Stata (Stata version 9.0). The data from each school were weighted using post-hoc weights to account for the different response rates within each school. Descriptive statistics were generated for the prevalence of any caries, as well as the mean dmft and dmfs. Logistic regression was used to compare the prevalence rates for sex and age. Negative binomial regression was used to compare the dmft and dmfs scores. The alpha level was set at 0.05, and no adjustment was made for multiple testing.

Results

The total number of children approached for this study was 1,297 (from 11 schools). Dental examinations were conducted for 1,036 individuals, giving an overall participation rate of 79.9%. The examined sample comprised 518 males (50.0%) and 518 females (50.0%); 524 (50.6%) of the children were 5-year-olds, and 512 (49.4%) were 6-year-olds. There were 248 (23.9%) 5-year-old and 270 (26.1%) 6-year-old males, and 276 (26.6%) 5-year-old and 242 (23.3%) 6-year-old females.

Just over three-quarters of the sample were cases of caries, and the prevalence was higher among the older children (Table 1). Males and females did not differ in caries prevalence. Two children (0.2%) had caries in all of their teeth. The dmft distribution is shown in Figure 1. On average, decayed teeth made up the bulk of the children's caries experience. Caries severity was greater in the older children and among males. (Table 2)

Data on the pattern of dental caries (the percentage of decayed, missing and filled teeth by tooth type) are presented in Figure 2. Overall caries experience was more prevalent in the upper anterior and the lower posterior teeth. A high proportion of the posterior teeth (upper and lower) and the upper anterior teeth were untreated. No anterior teeth had been restored.

Data on caries experience by tooth type are presented in Figure 2. The teeth most frequently affected by caries were mandibular second molars, and the least affected were mandibular central incisors. The prevalence of bilateral molar caries (that is, contralateral teeth both

affected) was 18.0% for maxillary first molars, 23.2% for maxillary second molars, 28.3% for mandibular first molars and 29.7% for mandibular second molars.

Discussion

This study aimed to describe the prevalence and intra-oral pattern of caries among young children in a population with caries experience which is high by modern standards. Not only were the prevalence and severity of caries high, but the latter was higher among males. The observed caries patterns suggest that routine dental care is not the norm among children in Ajman (UAE).

Before discussing the findings, it is appropriate to examine the weaknesses and strengths of the study. Where the former are concerned, the criteria used for diagnosing dental caries in this study were conservative in nature (incipient or uncavitated lesions were coded as sound) meaning that the caries data reported here are underestimates. Moreover, bitewing radiography was not used, and this might also have ensured that the estimates were somewhat conservative (but ethical and practical considerations precluded its use). Given the alarming level of dental caries already revealed with relatively conservative examination criteria in this study, it is probable that the situation is even more serious. Among the study's strengths are the participation rate, the examination procedures and the analytical approach. At almost 80%, the participation rate is satisfactory by modern standards (Locker, 2000). The examination data were collected by a single, experienced examiner who was working under standardized conditions, with excellent reliability. The diagnosis of dental caries was at the cavitation level in accordance with WHO (1997) criteria, thus enabling comparison of the findings with those from other surveys conducted in the region. Allowing for the complex sampling scheme in the statistical analysis was essential because the study aimed to obtain population-level estimates of caries prevalence (Caplan *et al.*, 1999).

Caries experience in the sample was high: around three-quarters of the children had experienced dental caries. This estimate is very close to that of Al-Mughery *et al.* (1991), who found that 72% of Abu Dhabi children had had caries. Estimates by Al-Hossani and Rugg-Gunn (1998) were higher: they reported that 94%, 90% and 82% of Abu Dhabi, Al-Ain and Western Region children (respectively) had experienced caries, while Naqvi *et al.* (1999) reported 79% among a similar age group in Al-Ain. The high prevalence of dental caries in young children in the Emirates is clearly of great concern.

Comparison with recent findings from studies in countries neighboring the UAE suggests that caries levels may be similar. In Saudi Arabia, for example, Al-Amoudi *et al.* (1996) found that 74% of Jeddah children aged six years had caries, while a prevalence of 73% (and a mean dmft of 4.8) was reported for a large sample of children in Jeddah (Al-Malik *et al.*, 2001). In Kuwait, 81% of a sample of 4-year-olds was observed to have caries (Vigild *et al.*, 1996). A study conducted by Janson and Fakhouri (1993) in Amman (Jordan) showed that, 72% of the 3-6-year age group had experienced caries. It appears that, overall, caries prevalence is high among young Arab children. This may indicate common deter-

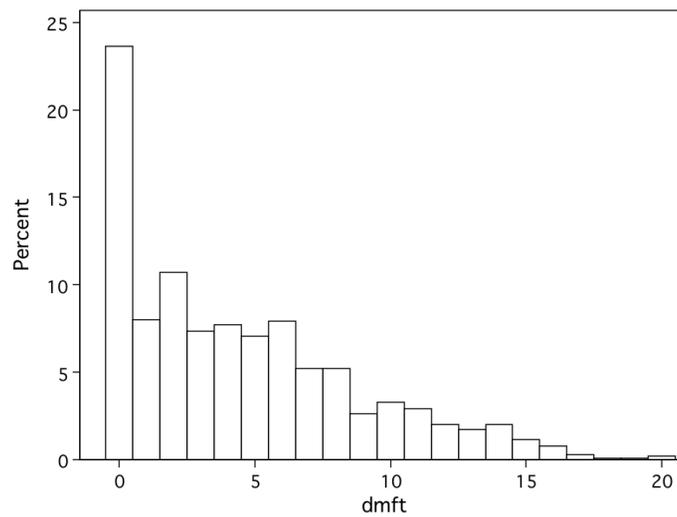


Figure 1. The distribution of dmft scores.

Table 1. Prevalence of caries by age and gender.

	Number with dmft > 0		
	<i>n (%)</i>	<i>Prevalence</i>	<i>95% CI</i>
All children	1036 (100)	76.4	68.9, 83.9
Age			
5 years	524 (50.5)	72.9 ^a	61.8, 83.9
6 years	512 (49.5)	80.0	76.0, 84.0
Gender			
Male	518 (50.0)	76.7 ^b	70.2, 83.2
Female	518 (50.0)	76.1	66.6, 85.7

^ap=0.007

^bp=0.857

Table 2. Mean dmft, dt, mt and ft and dmfs, ds, ms and fs by age and gender (sd. in brackets)

	<i>All children</i>	<i>Age</i>		<i>Gender</i>	
		<i>5 years</i>	<i>6 years</i>	<i>Male</i>	<i>Female</i>
<i>n (%)</i>	1036 (100)	524 (50.0)	512 (49.5)	518 (50.0)	518 (50.0)
<i>dmft</i>	4.5 (3.3)	4.0 (4.1) ^a	4.9 (4.3)	4.7 (4.5) ^b	4.2 (4.0)
<i>dt</i>	4.0 (3.1)	3.6 (3.9)	4.4 (4.2)	4.3 (4.2)	3.8 (3.8)
<i>mt</i>	0.2 (0.5)	0.1 (0.6)	0.2 (0.5)	0.1 (0.5)	0.1 (0.5)
<i>ft</i>	0.3 (0.7)	0.3 (0.8)	0.3 (0.9)	0.3 (0.9)	0.3 (0.9)
<i>dmfs</i>	10.2 (13.0)	9.2 (12.6) ^c	11.3 (13.3)	11.3 (13.6) ^d	9.3 (12.3)
<i>ds</i>	9.3 (12.1)	8.3 (11.6)	10.3 (12.6)	10.2 (12.7)	8.4 (11.4)
<i>ms</i>	0.5 (2.4)	0.4 (2.5)	0.5 (2.3)	0.6 (2.6)	0.4 (2.2)
<i>fs</i>	0.4 (1.4)	0.4 (1.3)	0.5 (1.5)	0.5 (1.5)	0.4 (1.2)

^ap=0.032

^bp=0.017

^cp=0.086

^dp=0.013

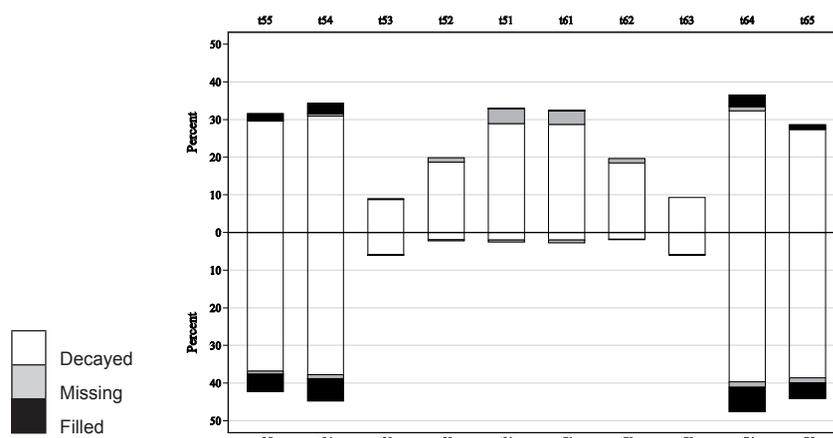


Figure 2. Percentage distribution of decayed, missing and filled teeth present by tooth type.

minants of disease in countries with similar cultures. The 7.1 dmft reported by Al-Hosani and Rugg-Gunn (1998) is identical to that reported for 5-year-olds in Riyadh, Saudi Arabia (Paul and Maktabi, 1997). While caries levels among children in the current study were comparable with those from other Arab countries (Al-Malik *et al.*, 2001; Sayegh *et al.*, 2002), they were still far short of the WHO goal of having 50% of all five- and six-year-olds caries-free by the year 2000 (WHO, 1984).

Not surprisingly, caries experience was greater among older children in the current study, suggesting that caries activity was continuing in these children between ages 5 and 6 (although the cross-sectional design of the current study precludes making a definitive statement on this). This is consistent with other studies conducted in various countries (Segovia-Villanueva *et al.*, 2006; Ferro *et al.*, 2006; Sayegh *et al.*, 2002; Chu *et al.*, 1999; Hattab *et al.*, 1999; Douglass *et al.*, 2001).

The current study's finding that caries severity was lower among females than males is in line with the findings of Al-Khateeb *et al.* (1990), Janson and Fakhouri (1993), Hamdan and Rock (1993), Al-Hosani and Rugg-Gunn (1998), and Maciel *et al.* (2001). All of these Arab studies have found that, overall, girls have slightly lower caries experience in the primary dentition. This may be related to the traditional practice of over-indulging sons in Arabic culture. Further support for these findings comes from a study in Jeddah (Saudi Arabia) which showed that males had higher dental caries scores than females (Gandeh and Milaat, 2000).

The current study showed the occurrence of caries in both anterior and posterior teeth in the great majority of children. Based on the current study's findings, a clear need exists in the UAE to consider the training of other categories of dental personnel (apart from dental surgeons). These include dental therapists, dental hygienists and dental educators, all of whom have a particular role to play in the prevention and control of dental caries. The challenge in the UAE is to develop a more positive collaboration between members of the dental team so that a wide range of skills available within the dental sector is effectively utilized to benefit all members of the community.

It is important to note that the UAE is a country with a diverse mix of nationalities, religions, languages, and origins. Caries among preschool children is determined by a complex interplay of social, familial, community, government, and work policies, and work is needed to promote changes at all of these levels. Health-promoting approaches recognize that health is linked to social and economic conditions outside the control of the individual. Individuals and their environment both have a role to play in determining health. The current study's findings indicate the importance of monitoring the dental health of Ajman's children and have implications for the planning of dental health services for these areas.

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