

Prevalence of Early Childhood Caries and its Risk Factors in 6-60 months old Children in Quchan

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ABSTRACT

Introduction: Despite advances in the oral health of children in recent decades, early childhood caries (ECC) continues to pose a serious threat to child welfare. The purpose of this study was to determine prevalence and severity of ECC in 6-60 month old children in relation to socioeconomic factors, feeding practices and oral health behaviors in Quchan.

Materials and Methods: This cross-sectional study included almost all children enrolled in Quchan's day care centers; 232 six to sixty months children were examined. Social and behavioral information were obtained from parents through a self-administered questionnaire. ECC and severe ECC (S-ECC) were diagnosed based on NIDCR and WHO recommendations.

Results: The prevalence of ECC and S-ECC were 59% and 25%, respectively. The overall mean of d2mfs (with cavitated carious surface lesions) and d2psmfs (with cavitated and non-cavitated carious surface lesions) were 2.1 ± 4.45 and 3.80 ± 5.34 , respectively. The variables significantly associated with ECC or S-ECC were socioeconomic status, frequency of bottle-feeding, snacking frequency, probable age of starting tooth brushing, person responsible for child's oral health care and eruption age of the first tooth.

Conclusion: This study demonstrated that the prevalence of ECC was high among of preschool children in the city of Quchan. It is recommended to increase knowledge of parents about proper feeding habits and oral health practices, and also preschool children accessibility to dental services.

Key words: Early childhood caries, Epidemiology.

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Introduction

Early childhood caries is the term recommended by control and prevention diseases center to describe a unique pattern of caries lesions in infants, toddlers and preschool children. This term now covers the previously used terms baby-bottle tooth decay and nursing caries that describes a form of rampant caries of the primary dentition caused by prolonged use of bottle milk or other liquids including carbohydrates. Contrary to this belief, the new term acknowledges the multifactorial causes of the disease¹. Clinically, the decay is first found in the maxillary primary incisor as white spots along the gingival margin. Later, it spreads to the maxillary molars, mandibular molars and rarely the mandibular incisors^{1,2}. The demineralized lesions

(white spots) may become frank lesions or caries within 6-12 months. Undetected and thus unchecked ECC may cause severe problems for the child including considerable pain and disturbed eating and talking. The disease is also a serious threat to the health of other primary teeth and subsequently to the health of the permanent dentition. It is difficult to determine the exact prevalence of ECC in this age group. Preschool children with ECC are less available for dental examination than older children. In addition, those children who are examined may not necessarily represent the general population of this age and also infants are difficult to examine. Many studies on ECC have been conducted to identify the etiology, prevalence,

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risk factors and treatment of this disease over the past 40 years¹. The prevalence has been variously reported from 1 to 70%³. Some investigators detected significant relationships between ECC with feeding practices, snacking habits, oral hygiene status, socioeconomic background, education level, awareness of parents and so on but some other studies did not show such relationships⁴⁻⁸. In fact, because caries has multifactorial nature, combination of the predisposing factors should be considered for identifying infants with an increased risk of the disease. The purpose of this study was to determine: 1) the prevalence and severity of ECC in preschool children in the city of Quchan, 2) the impact of socioeconomic, feeding practices and oral health behaviors on ECC.

Materials and Methods

Study population: This investigation was a cross-sectional study conducted in Quchan during January-March 2002. Quchan is a city located in north-eastern Iran and occupies an area of 5644 square kilometers. It has a population of approximately 240,000 people. Therefore, the small size of this city let us examine almost all children enrolled in its day care centers, of course those with their parents' consents. The drinking water supplies have a natural fluoride level of 0.8 mg/l. This study was carried out on the sample of 232 children [105 boys and 127 girls] aged 6-60 months. To collect data, observation and a questionnaire were used. Prior to the dental examination, we coordinated with the managers and staff of the day care centers to make appointments for the children. An invitation letter was sent to each parent to come to the day care center on the examination day. On the appointed day, after cleaning the teeth with sterile gauze, dental examination was conducted using natural but indirect light and a mirror and a probe. All examinations were conducted with the patient in the supine position. While the dentist was examining the children, their parents filled out the questionnaires. No radiographs were taken. All the records were performed by the same examiner. Aseptic techniques were adopted for each child. Approval to conduct the study was obtained from the local research ethics committee. Statistical analysis was done using the SPSS version 11.5. ANOVA and chi-square tests were used for analyzing the data. Statistical significance was set up at $\alpha = 0.05$.

Indices: Early childhood caries were diagnosed based on WHO and NIDCR (National Institute of Dental and Cranio-facial Research) definition criteria. ECC was defined as the presence of dental caries in any surface of at least one tooth in the primary dentition in children younger than 3 years of age. Any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC) in this age group. From age 3 to 5, 1 or more cavitated, missing (due to caries) or filled smooth surface in primary maxillary anterior teeth constitutes S-ECC. Two types of indices were considered: tooth-based (dmft group) and surface-based (dmfs group). Both of them had two subgroups: one was limited to cavitated lesions (d_2mft and d_2mfs) and the other included non-cavitated lesions (d_2psmft and d_2psmfs). Each tooth surface was placed into one of these categories: sound, non-cavitated lesions in the pit and fissures (p), decalcified lesions in smooth surfaces (s), cavitated lesions (d2), filled (f) and missing (m) ones due to caries. The second and third categories were called d_1 ⁹.

Results

Prevalence of ECC: The prevalence of ECC in children with cavitated lesions was 37%, which increased to 59% when non-cavitated lesions were included. 25% of the children were diagnosed with S-ECC (Figure 1). The prevalence of ECC and S-ECC increased with age. Prevalence of ECC by sextants was the highest in the molars. Considering only cavitated lesions, the prevalence was 28%, but it increased to 55% by adding non-cavitated lesions. The lowest percentage of ECC prevalence was seen in the lower anterior region (Figure 2).

Severity of ECC: The overall dmfs was 2.1 ± 4.45 , which increased to 3.86 ± 5.34 when non-cavitated lesions were included. The major component of d_2psmfs index was cavitated lesions (d_2), followed by non-cavitated lesions in the pit and fissures (P). None of children had filled or missing teeth due to decay. Mean d_2mft and d_2psmfs increased with age significantly ($P < 0.05$) (Table 1).

The effect of risk factors on dental caries status: Among 20 factors studied, a statistically significant relationship was detected only between 6 factors and caries prevalence (Table 2). There were no statistically significant relationships between the caries prevalence and the following risk factors:

the style of feeding in the first and second year, frequency of breast feeding, putting child to bed with bottle, adding sugar or other cariogenic agents to bottle, the concept of child's teeth affected by sleeping with bottle, frequency of tooth brushing,

having a dental visit so far or not, using fluoride supplement, parents' awareness of importance of primary teeth, tasting child's food, blowing on child's food to cool it off and kissing child's lip.

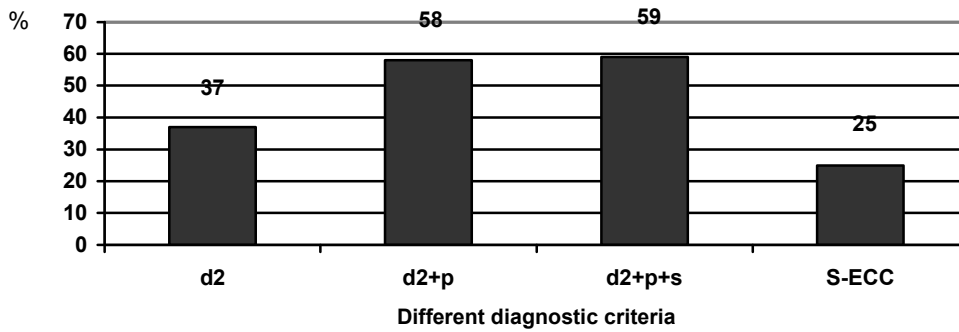


Figure 1. Prevalences of ECC & S-ECC using different diagnostic criteria.

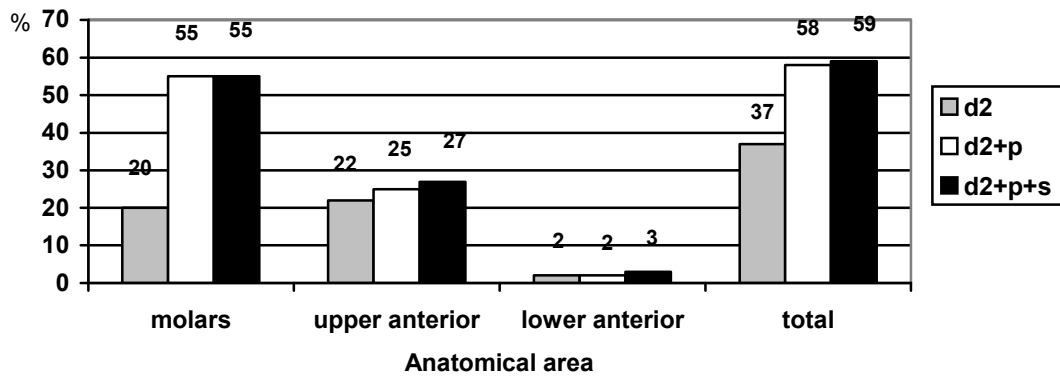


Figure 2. ECC prevalence by sextants using three diagnostic criteria in children 6-60 months.

Table 1. Mean number of decayed (d₂), missing (m), filled (f), and non-cavitated lesions in p & fs (p) and Smooth (s) surfaces

$\frac{d_2}{\text{Mean} \pm \text{SD}}$	m	f	$\frac{d_2mfs}{\text{Mean} \pm \text{SD}}$	$\frac{p}{\text{Mean} \pm \text{SD}}$	$\frac{s}{\text{Mean} \pm \text{SD}}$	$\frac{d_2psmfs}{\text{Mean} \pm \text{SD}}$
2.1 ± 4.4	0	0	2.1 ± 4.45	1.63 ± 2.05	0.13 ± 0.53	3.86 ± 5.34

Table 2. Risk factors and caries prevalence among children aged 6-60 months.

Variable	Status	Caries prevalence (%)				P- value
		N	ECC	P	S-ECC	
Socioeconomic	Low	78	82.0	0.00*	42.7	0.0008*
	Moderate	10	20.3		7.9	
	High	41	80.1		22.2	
Frequency of Bottle –feeding	No bottle	105	61.9	0.26	22.8	0.02*
	Sometimes	70	57.1		18.6	
	Always	24	75.0		50.0	
	Mostly night	21	47.6		28.6	
Snacking frequency	No interest	36	36.1	0.009*	8.3	0.0466*
	One a day	51	54.9		19.6	
	Twice a day	35	71.4		28.6	
	Thrice a day	3	66.7		33.3	
	Upon demand	104	67.3		32.7	
Start tooth brushing (age)	2<month <12	30	40.0	0.006*	13.3	0.19
	12month	20	65.0		15.0	
	18month	21	57.1		19.0	
	24month	28	64.2		28.6	
	>24month	70	78.6		32.8	
Person responsible for child oral hy- giene	Child	97	77.3	0.001*	27.8	0.94
	parent	66	53.0		27.2	
Eruption of first tooth (age)	<6months	35	65.7	0.022*	34.3	0.017*
	6-9months	136	63.2		27.2	
	>9months	56	42.8		10.7	

* Significant difference

Discussion

The overall prevalence of ECC in Quchan is high. Based on new definition, a cross-sectional study conducted in Anguilla¹⁰, reported ECC and S-ECC prevalences of 50% and 17%, respectively, which were lower than those of Quchan. On the other hand, severity of ECC (d_2psmfs) was more than that of Quchan (4.71 ± 9.32 versus 3.85 ± 5.34). It shows that each child has more affected surface tooth in Anguilla than in Quchan. Another similar study⁹ conducted in Seoul demonstrated that the prevalences of ECC and S-ECC were 56.5% and 47%, respectively. The prevalence of ECC is compatible with Quchan but the prevalence of S-ECC in Seoul is higher than in Quchan (47% versus 25%, respectively). The water supplies in Seoul are not fluoridated and neither professional fluoride application nor fluoride supplements are widely used⁹. With regard to the fact that for determining S-ECC, smooth surfaces were considered, we assumed that the cause of this difference may be due

to the existence of natural fluoride in the water supply in Quchan and lack of it in Seoul. This confirms the fact that fluoride has its greatest effect on smooth surfaces. Many other studies have been carried out in different countries on the prevalence of ECC but the criteria for diagnosis of ECC were different. Some researchers claimed that a minimum of one infected incisor is a sufficient criterion for diagnosing the condition. Others believed that a minimum of two infected teeth is required, whereas some reported that at least three infected maxillary incisors are required^{1,11}. But, most of them didn't include molar teeth in diagnostic criteria. In these studies, the ECC prevalence has been variously reported from 1% to 70% in some ethnic minority groups, immigrants and underprivileged and deprived communities, but the norm in developed western societies is 1% to 12% depending on age¹². The inclusion of non-cavitated lesions, especially in the pit and fissure of molars, has an important effect on both prevalence and severity of

caries. For example, in the present study and also studies conducted in Seoul and Anguilla comparing the d_2mfs and d_2psmfs , the effect of decalcified lesions on dental status was quite clear, especially in Seoul with lack of fluoride in its water supplies. In both studies (the present study and the one conducted in Anguilla), the severity of ECC in molar region was almost three times more than in anterior upper region. One study conducted in rural Puerto Rico children, revealed that of the forty-six children with carious molars, only ten did not have infected maxillary incisors. Of the sixty-two children with carious maxillary incisors, thirty-six showed evidence of the caries process on molars¹³. Therefore, the previous studies with a case definition based solely on maxillary anterior teeth, may have underestimated caries incidence. The results of this study demonstrated that untreated decayed teeth (d component) dominated the dmft score and in fact, none of the children had filled or missing teeth due to caries. This proves that their parents were unaware of the importance of the primary teeth and they didn't know how important it was to have their children's teeth checked regularly. Socioeconomic status (SES) has been reported as an important risk factor for ECC in several studies¹⁴⁻¹⁸. In this study we used variables such as educational level of father, educational level of mother, father's occupation and number of sibling to determine socioeconomic status. Relationship between SES and both ECC and S-ECC was statistically significant. The above-mentioned four variables could affect food selection, feeding practices, oral health behavior and life-style in families. This can be a reason for higher prevalences of ECC and S-ECC, which were found in low socio-economic group in the present study. Among factors relating to feeding practices, two variables had statistically significant relationship with ECC or S-ECC or both of them. They included frequency of bottle-feeding (with S-ECC, $P=0.02$) and snacking frequency (with ECC, $P=0.009$ and with S-ECC, $P=0.046$). In this study, children who snacked upon demand had a higher prevalence of ECC and S-ECC. The high frequency of sucrose consumption increases the acidogenicity of plaque and enhances the establishment and growth of aciduric streptococci mutans¹⁹. Many studies found an association between the frequency of snacking and dental caries²⁰⁻²². This supports nutritional recommendations of limiting snacking times among

children and encouraging regular meals. Among factors related to oral hygiene practices, two factors had a statistically significant relationship with ECC: The age of starting tooth brushing and the person responsible for child's oral hygiene. In the present study, children who started brushing at a later age had a higher prevalence of ECC. Fifty percent of children with ECC started brushing after 24 months of age. These findings are in agreement with the study conducted on Australian children¹⁴. Thus, promotion of early hygiene care should be strongly encouraged. Oral hygiene habits established at the age of 1 year can be maintained throughout early childhood²³. In this study, 68.2% of children with ECC brushed on their teeth, which was almost twice more than that of children who were assisted by parents. This finding was similar to the finding of other researchers²⁴⁻²⁶. Parents or caregivers must assume total responsibility for the tooth cleaning of infants and young children. However, no such relationship was noted in some other studies^{14,27}. This difference may be due to the fact that hygiene quality is more important than the frequency of tooth brushing or whether child brushes on his own or is assisted. Some studies concluded that the accumulation of biofilm, which is representative of poor hygiene quality, was the main risk factor for dental caries in children under 3 years old^{2,25,28}. In this study the highest prevalences of ECC and S-ECC were found in children whose first tooth erupted between 6 to 9 months of age. The more duration in which teeth are exposed to cariogenic factors, the more likelihood of caries development.

Conclusion

- 1- The overall prevalence and severity of ECC are high among preschool children in Quchan.
- 2- It is important to increase the awareness of parents especially mothers who are pregnant, lactating or have young children, about the importance of primary teeth, proper feeding habits and oral health practices.
- 3- Access to dental services for preschool children should be alleviated.

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