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Research Article

Prevalence of Early Childhood Caries among Preschool Children in Dawadmi, Saudi Arabia

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Abstract:

Objectives: To determine the prevalence of early childhood caries among preschool children in Dawadmi city, Riyadh province, Saudi Arabia.

Methodology: A cross sectional study was conducted on 224 children from pre-school nurseries in Dawadmi city. Clinical examination was performed and dmft index scores were recorded using WHO diagnostic criteria. Data was analyzed using SPSS 20.0 and descriptive statistics was applied. The frequency and percentage of all the nominal variables were calculated. T-test was utilized to compare the dmft among groups of teeth. The level of statistical significant difference was set at $p \leq 0.05$.

Results: 224 children were examined, 56.7% were males and 43.3% were females, they were divided into two age groups; three – four years old and five – six years old. ECC was diagnosed in 163 children (72.77%), where 92 males and 71 females were only affected. The mean decayed missing filled tooth (dmft) was 3.69 (± 3.850). The mean of the decay component (d) was 3.22 (±3.552); the lower second molars had the highest prevalence of caries (d = 0.73) followed by the upper second molars (d = 0.70) and lower first molars (d = 0.60) respectively. The most affected caries group were the females aged three – four years (dmft = 5.57).

Conclusion: Starting preschool dental services is mandatory since the ECC prevalence was 72.77% among preschool children in Dawadmi city. There is an urgent need for a call to focus on preschoolers' oral health and parental education for prevention and early detection of ECC.

Key words: preschool children, early childhood caries, deciduous teeth, dmft

Introduction

Dental caries is a common chronic infectious transmissible disease resulting from tooth adherent specific bacteria, primarily *Streptococcus mutans*, which metabolize fermentable carbohydrates to produce acid which, over time, demineralize tooth structure. [1] The disease of early childhood caries (ECC), formerly termed "nursing bottle caries", "baby bottle tooth decay", is the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces affecting primary teeth in children under the age of six.[1] Acquisition may occur via vertical or horizontal transmission.[2] ECC can rapidly destroy the primary dentition of toddlers and infants, and if left untreated, can lead to pain, acute infection, nutritional insufficiencies and learning and speech problems. [3]

ECC has additionally general health, developmental, social and economic effects such as higher risks of new carious lesions in both the primary and permanent dentitions, hospitalizations' and emergency room visits, increased treatment costs, risk for delayed physical growth and development, loss of school days and increased days with restricted activity, diminished ability to learn, and reduced oral health-related quality of life.[1] Interaction between the uses of sweetened pacifiers, nursing on demand, sweetened milk formulas, fruit juices, neglected oral hygiene, streptococcus mutans, malnutrition, maternal education and dental knowledge, family structure and social status; makes its etiology complex.[4]

Internationally, the prevalence of ECC has been reported to range from 6–90%, with most developed countries in the lower end, and most developing countries, in the middle to higher end of this range.[5] Caries rates in Saudi Arabia are high among 6–15 year old children, and the same may be true in younger age groups. [6] Stewart *et at,* [7] reported that more than 92% of 6-year-old children had caries in their primary teeth in the Northwest Armed Forces Hospitals (NWAFH) in Tabuk. In another study, the prevalence of caries in Jeddah was reported to range from 70–76% in 6 year old children. [6] Similar results have been reported in preschool children from

Al Kharj [8] and Riyadh. [9] In another study, Wyne [10] stated that the overall caries prevalence was 74.8%. Recently, Togoo *et al*, [4] reported that ECC prevalence among 100 preschool children in Abha was 79%.

Since there have not been any previous studies in Dawadmi city, the present study was undertaken to determine the prevalence of early childhood caries among preschool children in Dawadmi City, Riyadh Province, Saudi Arabia.

Materials & Methods

The following study was conducted at the nursery schools in Dawadmi city in the Riyadh province of Saudi Arabia from February – May, 2014. The participants for this study were chosen randomly from different nursery schools, and the schools were officially pre-informed regarding the objectives of the study. The parents were also informed of the research goals and their consent was obtained following the College of Dentistry Research Center (CDRC) Guidelines after the approval of the research protocol by the CDRC.

This cross-sectional study was performed using stratified random sampling to calculate the sample. Two hundred and twenty four preschool-going children representing the age group three – six years, were subjected to dental examination according to the WHO diagnostic criteria [11] the parents were handed a self-constructed tailored questionnaire including the child's age, gender and medical and dental histories. All participants were examined with disposable mirror, probe, and tweezers, in addition to cotton rolls to remove any plaque or debris along with disposable masks and gloves. No radiographs were taken.

The inclusion criteria for the study required healthy children with complete primary teeth aged between three – six years old, and residents of Dawadmi city. Children with any systemic diseases, respiratory disorders or developmental orofacial/dental anomalies were excluded. As well as the presence of permanent incisors or first permanent molars were excluded. Due to insufficient aid, the non-cavitated lesions were also omitted. All decayed (d), missing (m), filled (f) teeth (t) were examined and recorded.

The collected data were analyzed using the SPSS® statistical package software version 20 (IBM Corp., Armonk, NY, USA). The frequency and percentage of all the nominal variables were calculated. T-test was utilized to compare the dmft among groups of teeth. The level of statistical significant difference was set at $p \leq 0.05$. Inter-examiner agreement was analyzed using Kappa statistics, and a high degree of agreement (Kappa index: 89.7%) was observed between the 2 examiners.

Results

Two hundred and twenty four children were included in the present study. 127 were males (56.7%) and 97 were females (43.3%), they were accordingly divided into two age groups; three – four year olds (9.82%) and five – six year olds (90.18%). Among the 163 (72.77%) ECC diagnosed children, 92 males and 71 females were only affected, while 61 children (27.23%) had no clinical caries **(*Table 1*)**.

Table 1: Prevalence of ECC according to gender and age group

Gender	Age Group		Total n (%)	ECC Present n (%)	ECC Absent n (%)
	3-4 y n (%)	5-6 y n (%)			
Male	15 (11.80%)	112 (88.20%)	127 (56.70%)	92 (72.44%)	35 (27.56%)
Female	7 (7.20%)	90 (92.80%)	97 (43.30%)	71 (73.20%)	26 (26.80%)
Total	22 (9.82%)	202 (90.18%)	224	163 (72.77%)	61 (27.23%)

Y = years, n=number

The mean decayed missing filled teeth (dmft) was 3.69 (± 3.85). The mean of the decay (d) component was 3.22 (± 3.552) **(*Table 2*).** The decay was the main component among dmft of the individual teeth where the lower second molars had the highest prevalence of caries (d = 0.73) followed by upper second molars (d = 0.70) and lower first molars (d = 0.60) ***(Table 3*)**.

Table 2: dmft score of the preschool children

Participants (n)	Mean d (±SD)	Mean m (±SD)	Mean f (±SD)	Mean dmft (±SD)
224	3.22 (3.552)	0.31 (0.797)	0.16 (0.537)	3.69 (3.850)

d=decayed, m=missing, f= filled teeth

Table 3: dmft score according to tooth location

TEETH	d (±SD)	m (±SD)	f (±SD)	dmft (±SD)
Upper 2nd Molars	0.70 (.855)	0.00 (.067)	0.01 (.115)	0.72 (.861)
Upper 1st Molars	0.42 (.716)	0.01 (.094)	0.02 (.148)	0.45 (.738)
Upper Canines	0.09 (.343)	0 (.000)	0.00 (.067)	0.09 (.361)
Upper Lateral I	0.20 (.560)	0.00 (.067)	0 (.000)	0.21 (.562)
Upper Central I	0.38 (.747)	0.04 (.267)	0 (.000)	0.42 (.777)
Lower Central I	0.03 (.210)	0.21 (.583)	0 (.000)	0.24 (.625)
Lower Lateral I	0.02 (.163)	0.01 (.134)	0 (.000)	0.03 (.210)
Lower Canines	0.06 (.293)	0 (.000)	0 (.000)	0.06 (.293)
Lower 1st Molars	0.60 (.819)	0.00 (.067)	0.05 (.279)	0.66 (.853)
Lower 2nd Molars	0.73 (.852)	0.02 (.163)	0.07 (.284)	0.82 (.887)

d=decayed, m=missing, f= filled teeth

The most affected group by caries were the females aged three – four years (dmft = 5.57) followed by males aged five – six years (dmft = 3.99) then males aged three – four years (dmft = 3.60) and the least affected were females aged five – six years (dmft = 3.19) ***(Table 4)***. When dmft of upper anterior teeth were compared with upper posterior teeth; upper anterior teeth with lower anterior teeth; upper posterior teeth with lower

posterior teeth and lower anterior teeth with lower posterior teeth; highly statistical significant differences were observed as shown in ***Table 5***.

Table 4: dmft according to gender and age group

Gender	Age Group	Number of Participants	d (±SD)	m (±SD)	f (±SD)	dmft (±SD)
Male	3-4 y	15	3.07 (4.464)	0.13 (.352)	0.40 (.910)	3.60 (4.672)
	5-6 y	112	3.48 (3.559)	0.36 (.868)	0.15 (.523)	3.99 (3.845)
Female	3-4 y	7	5.14 (5.178)	0.00 (.000)	0.43 (.787)	5.57 (5.593)
	5-6 y	90	2.78 (3.207)	0.00 (.785)	0.11 (.436)	3.19 (3.538)

d=decayed, m=missing, f= filled teeth

Table 5: Comparison of dmft among groups of teeth

dmft score	P-value
Upper Anterior teeth 0.72 (SE = 0.093) **VS** Upper Posterior teeth 1.17 (SE = 0.092)	0.001*
Upper Anterior teeth 0.72 (SE = 0.093) **VS** Lower Anterior teeth 0.33 (SE = 0.058)	0.000*
Upper Posterior teeth 1.17 (SE = 0.092) **VS** Lower Posterior teeth 1.48 (SE = 0.097)	0.021*
Lower Anterior teeth 0.33 (SE = 0.058) **VS** Lower Posterior teeth 1.48 (SE = 0.097)	0.000*

* Statistical significance at $P \leq 0.05$

Discussion

The aim of the present research was to study the prevalence of different patterns of caries in a sample of three – six year old children in Dawadmi city, Riyadh province, Saudi Arabia. The prevalence of ECC in our study was found to be 72.77% which is in accordance with similar studies carried out in Riyadh[10] (74.8%) Abha[4] (79%) and recently in Dammam [12] (73%) while it was in contradistinction to that observed by Wyne *et al,* [13] and Al-Wazzan[14] in Riyadh which was equivalent to 94 % while in Al-Qassim[9] was 91.2% while the lowest ECC prevalence was found in AlHassa [15](62.7%) in Saudi Arabia. Some studies have determined the prevalence of caries among preschool children to be lesser compared to the current estimate, even though the disparity is trivial[16] (51 %). Whereas in Amman (Jordan), the prevalence of ECC was 31% [17], similarly the prevalence of ECC in Ajman, United Arab Emirates[18] was 31.1%. It is justifiable to state that we are still higher that the estimated goal of the WHO / FDI where they stated that 50% of five – six years old children should be caries free in consistency with Llompart and his colleagues.[19] They interpreted the wide global variations to be attributed to differences in case definitions and diagnostic criteria of ECC apart from risk factors. This may indicate common determinants of disease in countries with similar cultures.

The mean dmft (3.69 ± 3.85) in this study is low compared to reports from different cities around Saudi Arabia, where Wyne and his colleagues [15] stated that the mean dmft of nursing caries in preschool children in Riyadh was 8.6 (± 3.4) and in another study of Wyne *et al,* [13] in Riyadh, they found that dmft score was 6.3 and Al-Wazzan [14] stated that the mean dmft score was 7.3 ; while in Al Kharj, Tahir [8] revealed that the dmft was 7.1, and by excluding caries free children it was 8.5 ; Al Malik *et al* [6], in 2003 reported the mean dmft for the 987 children in Jeddah was 4.80 (±4.87) per child and the mean dmfs was 12.67 (±15.46); in another study, Wyne [10] reported the mean dmft score to be 6.1 (±3.9). El Nadeef *et al*, [20] carried out a national survey of the oral health of five year old children in the United Arab Emirates and found that only 17% were caries free with a mean dmft index of 5.1, ranging from 3.8 in Ajman to 6.6 in Dubai.

The Decayed component making the major component of the dmft score, suggests the large unmet treatment needs. This may be due to lack of oral awareness in parents, oral hygiene practices, high cost of dental treatment and limited accessibility and availability of dental services. No radiographs were taken in the present study. Subsequently, there may have been undiagnosed caries and the actual caries experience of these children may have been higher than the recorded values. The limitations of our research lies within the non cavitated lesions that were not recorded which resulted in underestimation of the actual ECC prevalence.

In the present study, among the posterior teeth , the mandibular second molars had the highest prevalence of caries (0.73± 0.85), while among the anterior teeth, the lower central (0.03±0.74) and lateral incisors (0.02±0.16) had the least caries prevalence respectively, similar to previous studies in Saudi Arabia[10,11,21] , whereas Al Malik *et al* [6] have found that the most commonly affected teeth with caries were the mandibular first molars (61.2%) followed by the second molars (60%) but the least affected were the mandibular lateral incisors (7.7%) similar to our observations. In our study, the posterior region was more commonly affected by caries than the anterior region. This is in agreement with the study in Pondicherry who reported that this may be due to the complex morphological nature of posterior teeth.[22] Statistically significant differences were noted when the dmft of the upper incisors were compared with the lower incisors, the upper and lower incisors with the upper and lower molars, then the lower incisors with lower molars were compared in accordance to that described by Al Malik *et al.* [6] The Inter arch analysis comparing teeth of upper and lower arch revealed that maxillary arch was more affected than the mandibular arch. Also mean dmft in the upper arch was higher than in the lower arch. The results of the present study are in agreement with the studies carried out in Saudi Arabia [15], Kerala[23] and Karnataka in India. [24]

No statistical significant association was found between the age and gender of the children with ECC. The dmft score slightly increased in males with age while an apparent decrease was observed in females with age, in accordance with that reported by Gaidhane *et al* [25] in India. The study of dental caries in primary dentition is important not only for the resulting deterioration in quality of life of young children [26, 27, 28], but also because the presence of caries in the primary dentition is the strongest predictor of caries in the permanent dentition. [29, 30]

Despite free availability of dental care in Saudi Arabia and considerable governmental expenditure on the dental services, a high dmft and decayed component still persist. In 2013, Al Agili [31] reported that the national prevalence of dental caries and its severity in children in Saudi Arabia was estimated to be approximately 80% for the primary dentition with a mean dmft of 5.0 and approximately 70% for children's permanent

dentition with a mean DMFT score of 3.5 indicating that the WHO 2000 goals are still unmet for Saudi Arabian children. This may be an indication of poor interest in dental care by the parents and behavioral studies are required to find out the reasons for lack of interest on the part of mothers. [32] Recently, Ozen et al [33] stated that children are under the risk of multiple caries factors, thus evaluation of habits that affect or increase the severity of carious lesions would in turn be difficult.

Oral health programs are needed to target treatment and underlying causes of dental caries alongside parental education and reinforce awareness of the importance of dental health of their children. Such services will not only meet the huge treatment need in these young children presently but more importantly will play a pivotal role in the prevention of dental decay of their permanent dentition through direct contact by dental professionals with these children and their parents.

Conclusion

Early Childhood Caries is a public health problem that warrants the attention and resources of the community. The present study shows an ECC prevalence of 72.77% among preschool children, it was not as high as other reported researches from different cities of KSA, however, the figures were still high according to WHO/FDI oral health goals.

The results of the present study have a number of implications on prevention and management of ECC. Starting preschool dental services is mandatory. Further studies are needed on a wider scale to establish the prevalence of ECC among larger population groups in central region of Saudi Arabia.

Conflict of interest

Authors declare no conflict of interest associated with this publication.

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