

Prevalence of Early Childhood Caries among the 3–5-year-old Children in Jeddah, Saudi Arabia

Shanthi Vanka¹, Amit Vanka², Othman Wali³, Neeraj S Chauhan⁴, Lama S Alhazmi⁵, Abdulmajeed A Alqazian⁶

ABSTRACT

Introduction: Dental caries is a significant dental public health issue and it is the world's most common oral health condition among children. In the Kingdom, the prevalence and severity of early childhood caries has been rising.

Aim: The aim of the study is to establish the prevalence of early childhood caries among children aged 3–5 years in Jeddah as well as the associated risk factor of visiting a dentist.

Methodology: The research is based on a cross-sectional observational design. Children from both private and public schools were randomly selected from schools in all of Jeddah's regions until a sufficient sample size was attained. For the diagnosis of early childhood caries, the American Academy of Pediatric Dentistry criteria were used.

Results: In Jeddah, the prevalence of early childhood caries is 57% among children aged 3–5 years.

Conclusion: Caries in young children is a public health issue. There should be an increased emphasis to the parents that the child should visit the dentist by 12 months of age as recommended by many professional organizations. Regular dental appointments would then help to lessen the caries burden on children at an early age. The Four A's treatment regimen is recommended to aid in the prevention and early detection of early childhood caries.

Keywords: Children, Early childhood caries, Jeddah, Prevalence, WHO criteria.

International Journal of Clinical Pediatric Dentistry (2022): 10.5005/jp-journals-10005-2152

INTRODUCTION

Dental caries is a significant public health issue, and it is one of the most common oral diseases among children worldwide. This disease not only damages the tooth, but also produces a number of morbid disorders in the oral cavity and other bodily systems.¹ Dental caries is particularly important in children because it affects tooth structure and increases vulnerability by affecting the kid's general health, which can have an indirect impact on child development.^{2,3} Khan et al.⁴ found a significant percentage of decaying, missing, and filled teeth in every age-group in different locations of Saudi Arabia in a meta-analysis.⁵

In both developing and developed countries, early childhood caries (ECC) is a severe public health issue.⁶ The prevalence and severity of ECC have been steadily growing in the kingdom, particularly among children. Caries prevalence was 74.8% in research conducted by Wyne in Riyadh in 2008, with a mean dmft score of 6.1.⁷ In research conducted by Al-Malik et al.⁸ in Jeddah in 2002, the prevalence of caries in preschool children was found to be 73%. It is vital to collect data on children's dental health on a regular basis to detect improvements and, as a result, design community activities to address the problem.

The study's aim is to find out the prevalence of ECC among the 3–5-year-old preschool children in Jeddah, as well as the associated risk factor of visiting a dentist. The study also aims to recommend a suitable health education and prevention program for the aforementioned problem.

MATERIALS AND METHODS

The research is based on a cross-sectional observational design. Children aged 3–5 were included in the target demographic. The sample size was established after pilot testing on a group

^{1,2}Department of Preventive Dental Sciences, Dentistry Program, Ibn Sina National College for Medical Studies, Jeddah, United Kingdom of Saudi Arabia

³Department of Basic and Clinical Sciences, Dentistry Program, Ibn Sina National College for Medical Studies, Jeddah, United Kingdom of Saudi Arabia

⁴Department of Public Health Dentistry, Bhabha College of Dental Sciences, Bhopal, Madhya Pradesh, India

⁵Dentistry Program, Ibn Sina National College for Medical Studies, Jeddah, United Kingdom of Saudi Arabia

⁶Department of Dentistry, Saudi Ministry of Health, Jeddah, United Kingdom of Saudi Arabia

Corresponding Author: Shanthi Vanka, Department of Preventive Dentistry, Dentistry Program, Ibn Sina National College for Medical Studies, Jeddah, United Kingdom of Saudi Arabia, Phone: +966 7554005315, e-mail: shanthiamit@rediffmail.com

How to cite this article: Vanka S, Vanka A, Wali O, et al. Prevalence of Early Childhood Caries among the 3–5-year-old Children in Jeddah, Saudi Arabia. *Int J Clin Pediatr Dent* 2022;15(S-2):S197–S200.

Source of support: Nil

Conflict of interest: None

of 3–5-year-old children in a school. After the pilot study, the percentage prevalence of 80% was chosen, with a confidence interval of 95% and a 5% acceptable margin of error, to provide a realistic estimate of the prevalence of caries, and the final sample size was calculated to be 244.

The age, gender, and details of a dental visit were among the demographic characteristics obtained from the questionnaire. The questions were designed around risk factors for ECC that had been studied previously. In a pilot study, it was then evaluated

and validated. Children from both private and public schools were readily recruited from schools around Jeddah's many regions until sufficient sample size was obtained.

This survey was conducted using a modified Malmo University form [World Health Organization (WHO)]⁹ All of the examinations were performed by two examiners with standardized equipment and according to WHO guidelines.¹⁰ ECC was described by Drury et al.¹¹ as the presence of one or more decaying (enamel and dentinal caries), missing (owing to caries), or filled tooth surfaces in any primary tooth in a child 71 months or younger. This definition was eventually adopted by the American Academy of Pediatric Dentistry.¹² This was the criteria used to diagnose ECC. The decayed missing and filled teeth (dmft) and decayed missing and filled surfaces (dmfs) values were calculated using the WHO Dentition Status and Treatment Need and the Malmo University form (WHO).^{9,10}

The ethical committee of Ibn Sina National College for Medical Studies granted permission to conduct this study. The school administration granted authorization for this study through a letter. The data for the study was collected by two examiners. They were trained and calibrated prior to data collection to ensure that the data collected was consistent. For caries, an interexaminer kappa value of 0.80 was reported.

The examinations were held on the campuses of the individual schools. The participants were examined while they were on a chair and exposed to natural light. The participants were placed in such a way that they received maximum illumination while avoiding direct sunlight. The examiner had access to the table where instruments and supplies were placed. The recorder was placed close enough to the examiner so he could hear the instructions clearly and observe that the findings were being recorded with accuracy.¹³

IBM SPSS version 22 was used to analyze the data. The study calculated numbers and percentages. The data were fitted to logistic regression models, and the corresponding odds ratios (OR) were generated to assess the strength of the associations. Statistical significance was defined as a probability value of less than 0.05.

RESULTS

The total number of participants that took part in the study was 305. The participants' average age was 5 years. In Table 1, the mean values for the caries dmft and dmfs have been listed. In Jeddah, the prevalence of ECC caries is 57% among children aged 3–5. Table 2 shows the frequency of dental caries among 3–5-year-olds in Jeddah, as well as its distribution by age, gender, and dentist visit. For ECC and age/gender/dentist visit, the Chi-square test was used. There was only visit to the dentist that was statistically significant

in terms of ECC (See Table 2). Because the dependent variable, ECC, was dichotomous, a logistic regression analysis was performed, with the results presented in Table 3. The impact of age and dental visits was significant. The findings showed that when children's ages progress from 3–5 years, they are more prone to get ECC. A visit to the dentist, on the other hand, has a significant but negative effect.

DISCUSSION

The purpose of this study was to determine the prevalence of ECC and related risk factors in 3–5-year-old Jeddah preschool children. The American Academy of Pediatric Dentistry's definition of early ECC was used to make the diagnosis.¹² ECC status was determined using the dmft and dmfs indices, as well as information on sociodemographic parameters from a questionnaire. Risk factors that had been studied in earlier studies were used to design the questions. In a pilot study with a population not related to the study population, the questionnaire was evaluated and validated to collect data.

In this study of 3–5-year-old preschool children, the prevalence of ECC was 57%. Caries was found in 54.5% among the 3-year-olds, 58% in the 4-year-olds, and 56.6% in the 5-year-olds. Farsi¹⁴ conducted a study on 4- and 5-year-old children in 2010, finding that caries prevalence was 61% among the 4-year-old and 67% among the 5-year-old. When Al-Malik did a survey on 3–5-year-old children in Jeddah in 2002, a percentage prevalence of 73% was recorded.⁸ Caries was found in 61% among 3-year-old, 73% in 4-year-olds, and 76% in 5-year-olds. ECC is common in various Middle Eastern nations, with rates as high as 76% in Palestine and 83% in the United Arab Emirates.^{15–17}

The dt of the 3–5-year-olds in this study was 2.16 ± 2.672 , the mt was 0.13 ± 0.673 , the ft was 0.24 ± 1.290 , and the dmft was 2.51 ± 2.992 . The mean ds was 2.50 ± 3.489 , the mean ms was 0.49 ± 2.134 , the mean fs was 0.59 ± 3.970 , and the mean dmfs was 3.58 ± 5.604 . Farsi's study in 2010¹⁴ found that the average dmft value was 3.9. The children in Al-Malik et al.'s⁸ study had a mean dmft of 4.80 (± 0.16) and a mean dmfs of 12.67 (± 0.49).

In Jeddah, there is a definite downward trend in the prevalence of dental caries among children aged 3–5-year-old children. This could be attributable to a higher level of knowledge among parents and children. The increased availability of dental treatment in Jeddah might be attributed to an increase in dental institutes, hospitals, and clinics, which would be a significant influence in the declining trend in caries prevalence. However, despite the fact that the prevalence of dental caries is reducing, there is still a need to improve caries prevention techniques because the prevalence of caries is still significantly high.

The reduction of caries could be achieved by enhancing the oral healthcare delivery system. Increased awareness programs for parents and children in schools and the community should be implemented to prevent the onset of caries in the oral cavity in young children.¹⁸ Caries prevention and early detection may be achieved with the participation of dentists and dental public health personnel in organized community activities.

For the children in Jeddah, going to the dentist has been found to be a risk factor for ECC. Fifty percent of the participants in the study have never visited a dentist. Although it is encouraging that many parents have taken their children to the dentist, measures to raise awareness among parents who take their children to the dentist must be developed. Dental caries affected 58% of children who went to

Table 1: Mean caries value of the participants

S.no	Caries index	Mean \pm Standard deviation
1.	dt	2.16 ± 2.672
2.	mt	0.13 ± 0.673
3.	ft	0.24 ± 1.290
4.	dmft	2.51 ± 2.992
5.	ds	2.50 ± 3.489
6.	ms	0.49 ± 2.134
7.	fs	0.59 ± 3.970
8.	dmfs	3.58 ± 5.604

Table 2: Caries prevalence according to age, gender and visit to the dentist

Independent variables	Caries free	Caries present	Total
Total	131(43%)	174 (57%)	305 (100)
Age			
3 years	10 (45.5%)	12(54.5%)	22 (100%)
4 years	46 (41.8%)	64 (58.2%)	110 (100%)
5 years	75 (43.4%)	98 (56.6%)	173 (100%)
Gender			
Male	71 (43.3%)	93 (56.7%)	164 (100%)
Female	60 (42.6%)	81 (57.4%)	141 (100%)
Visit to a dentist*			
Yes	64 (42.1%)	88 (57.9%)	152 (100%)
No	67 (43.8%)	86 (56.2%)	153 (100%)

*Statistically significant with a *p* value <0.05

Table 3: Logistic regression analysis for the variables

Model	B	Std. error	Beta	t	Sig.
(Constant)	0.176	1.415		0.124	0.901
Age	0.807	0.267	0.170	3.020	0.003*
Gender	0.187	0.337	0.031	0.554	0.580
Visit to a dentist	-1.041	0.335	-0.174	-3.107	0.002*

Dependent variable: Early childhood caries

* Statistically significant with a *p* value <0.05

the dentist. This should be considered in light of the fact that children who require medical attention are more likely to seek treatment from a dentist. This is consistent with findings from a 2014 study by Beil et al.¹⁹

Several maternal cognitive, behavioral, and psychosocial characteristics were linked to young children's brushing practices in a study by Finlayson et al. in 2007.²⁰ Many professional organizations recommend that children see a dentist by the age of 12 months, and this should be emphasized to parents. The dentist should also emphasize that the parents should bring their children to the dentist for the first time at the age of 1 year. Following that, regular checkup to lessen the caries burden on children at a young age is recommended.

Caries in young children is a public health issue. It is possible to avoid ECC by setting short-term or long-term goals. However, caries prevention measures can be split into three categories: personal, professional, and administrative. The following are the specifics of the strategies.

Personal Strategies

- Oral hygiene is a habit that should be followed on a regular basis.
- Visiting the dentist at least once a year.
- Using fluoridated toothpaste.
- Fluoride-optimized drinking water.
- Enhance dietary habits.
- Active participation in dentist-led public awareness campaigns aimed at improving oral health.

Professional Strategies

- Community awareness initiatives at regular intervals.
- Fluoride administration.

- Application of pit and fissure sealants.
- Caries treatment camps for patients with early caries.
- Acute caries treatment in an emergency.
- Nutritional advice to urge patients to consume a caries-preventive diet.

Administrative Strategies

- Increase the number of dental care centers to improve access to dental care.
- Dental public health personnel holds frequent awareness campaigns in community centers.
- Community-based dietary education initiatives.
- Community-based comprehensive oral treatment clinics.
- Community-wide conferences and continuing dental education initiatives to promote long-term caries prevention techniques among dentists.
- Community meetings with dentistry, dental public health, and public health specialists to devise community-based initiatives for preventing dental caries.

It is also recommended that a 4A's management protocol be used as a strategy for caries reduction. The 4A's management protocol recommended to be followed is illustrated in the [Figure 1](#).

In conclusion, ECC in young children is a dental public health issue. There should be an increased emphasis to the parents that the child should visit the dentist by 12 months of age as recommended by many professional organizations. Regular dental appointments would then help to lessen the caries burden on children at an early age. The 4A's treatment regimen is recommended to aid in the prevention and early detection of ECC.

Prevention is better than cure.

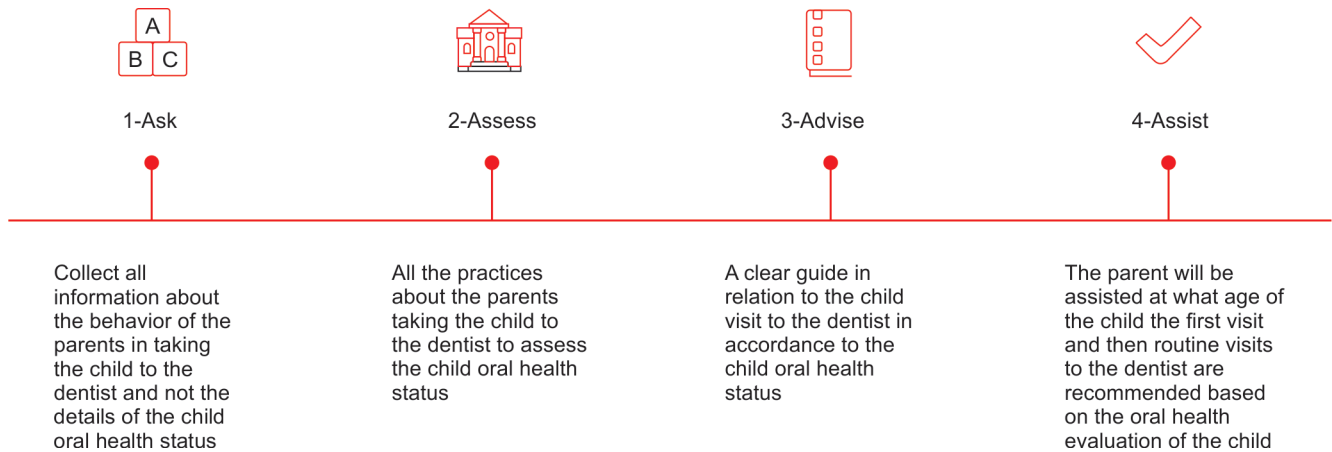


Fig. 1: Recommended 4A's protocol for early childhood caries prevention

REFERENCES

- Saravanan S, Madivanan I, Subashini B, et al. Prevalence pattern of dental caries in the primary dentition among school children. *Indian J Dent Res* 2005;16(4):140–146. DOI: 10.4103/0970–9290.29907
- Sheiham A. Dental caries affects body weight, growth and quality of life in pre-school children. *Br Dent J* 2006;201(10):625–626. DOI: 10.1038/sj.bdj.4814259
- Al Agili DE. A systematic review of population-based dental caries studies among children in Saudi Arabia. *Saudi Dent J* 2013;25(1):3–11. DOI: 10.1016/j.sdentj.2012.10.002
- Khan SQ, Khan NB, Arrejaie AS. Dental caries. A meta analysis on a Saudi population. *Saudi Med J* 2013;34(7):744–749.
- Aljanakh M. Prevalence and severity of dental caries among public school students aged 16-18 in Hail, Kingdom of Saudi Arabia. *Int J Health Sci (Qassim)* 2017;11(3): 50–53.
- Livny A, Assali R, Sgan-Cohen HD. Early childhood caries among a Bedouin community residing in the eastern outskirts of Jerusalem. *BMC Public Health* 2007;7:167. DOI: 10.1186/1471-2458-7-167
- Wyne AH. Caries prevalence, severity, and pattern in preschool children. *J Contemp Dent Pract* 2008;9(3):24–31. DOI: 10.5005/jcdp-9-3-24
- Al-Malik MI, Holt RD, Bedi R. Erosion, caries and rampant caries in preschool children in Jeddah, Saudi Arabia. *Community Dent Oral Epidemiology* 2002;30(1):16–23. DOI: 10.1034/j.1600–0528.2002.300103.x
- Malmö University, Department of Cariology, SE-205 06 Malmö, Sweden; Version WHO CC 02ext+/DB; html/GLT [cited 2009]. Available at www.whocollab.od.mah.se/expl/cariesrecord02ext.html
- Oral health. World Health Organization surveys: Basic methods. 4th ed. : Geneva; 1997.
- Drury TF, Horowitz AM, Ismail AI, et al. Diagnosing and reporting early childhood caries for research purposes. *J Public Health Dent* 1999;59(3):129–127. DOI: 10.1111/j.1752–7325.1999.tb03268.x
- American Academy of Pediatric Dentistry Definition of Early Childhood Caries (ECC) Chicago. Reference Manual 2004–2005; 1.
- “Early childhood caries”- prevalence and associated risk factors. Shanthi G and Amit Vanka
- Farsi N. Developmental enamel defects and their association with dental caries in preschoolers in Jeddah, Saudi Arabia. *Oral Health Prev Dent* 2010;8(1):85–92.
- Azizi Z. The prevalence of dental caries in primary dentition in 4- to 5-year-old preschool children in northern Palestine. *Int J Dent* 2014;2014:839419. DOI: 10.1155/2014/839419
- El-Nadeef MA, Hassab H, Al-Hosani E. National survey of the oral health of 5-year-old children in the United Arab Emirates. *East Mediterr Health J* 2010;16(1):51–55. DOI: 10.26719/2010.16.1.51
- Anil S, Anand PS. Early childhood caries: prevalence, risk factors, and prevention. *Front Pediatr* 2017;5:157. DOI: 10.3389/fped.2017.00157
- Vanka S, Vanka A. Caries prevention: global strategy. *Eur J Dent* 2013;7(2):266. DOI: 10.4103/1305–7456.110202
- Beil H, Rozier RG, Preisser JS, et al. Effects of early dental office visits on dental caries experience. *Am J Public Health* 2014;104(10):1979–1985. DOI: 10.2105/ajph.2013.301325
- Finlayson TL, Siefert K, Ismail AI, et al. Maternal self-efficacy and 1–5-year-old children’s brushing habits. *Community Dent Oral Epidemiol* 2007;35(4):272–281. DOI: 10.1111/j.1600–0528.2007.00313.x