

# What's new for the clinician – summaries of recently published papers (September 2021)

SADJ September 2021, Vol. 76 No. 7 p492 - p495

Compiled and edited by V Yengopal

## 1. What are the determinants for increased caries risk among children?

Lopes-Gomes, R., Ramos-Jorge, M.L., Fernandes, I.B. et al. Untreated dental caries and visible plaque of mothers are not determinant for the incidence of caries in dentin among children: evidence from a 3-year prospective cohort study. *Clinical Oral Investigations* 2021; 25: 5431–5439

### INTRODUCTION

It is estimated that 621 million children throughout the world have untreated caries on primary teeth. 1 Early childhood caries (ECC), which affects preschool children, progresses rapidly and is associated with pain, difficulty chewing, weight loss, difficulty sleeping, altered behaviour, and a poorer quality of life for affected children and their families. Children with dental caries have greater treatment need, which is expensive and not readily accessible in most developing countries. In South Africa, ECC is a major public health problem with caries rates among children as high as 70% in some provinces.

While determinants that contribute to the initiation and progression of dental caries are complex and multifactorial, understanding their role is crucial for establishing appropriate prevention and management strategies. The determinants can be divided into biological, contextual/environmental, sociobehavioural/cultural and socioeconomic factors. Examples of biological determinants include host susceptibility and oral flora, and the contextual/environmental determinants include access to and utilization of dental healthcare services, oral health promotion programmes and fluoridation of water. Moreover, examples of sociobehavioural/cultural determinants regarding dental caries include dental hygiene practices, consumption of sugars, lifestyle habits such as alcohol consumption and tobacco use. Multiple individual, family, and community factors are recognised as exerting an influence on the risk of dental caries.

The mother's oral health status and behaviour is thought to be a key determinant in the dental caries experience of the child but the evidence for this is regarded as weak.

**Veerasamy Yengopal:** *BChD, BScHons, MChD, PhD, Community Dentistry Department, School of Oral Health Sciences, University of Witwatersrand, Medical School, no. 7 York Road, Parktown 2193, South Africa.*  
ORCID Number: 0000-0003-4284-3367  
Email: [veerasamy.yengopal@wits.ac.za](mailto:veerasamy.yengopal@wits.ac.za)

Lopes-Gomes and colleagues from Brazil (2021)<sup>1</sup> reported on a study that sought to evaluate whether characteristics related to mother's oral health are associated with the incidence of caries in dentin in preschool children.

### MATERIALS AND METHODS

Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines were used to guide the reporting of this study. A 3-year cohort study was conducted with a sample of 158 preschool children. The participants were selected from a representative sample of children aged one to 3 years and their mothers. The sample size was calculated considering on a 95% confidence interval (CI), 80% power, 1:1 proportion of non-exposed (mothers without untreated dental caries) to exposed (mothers with untreated dental caries), and prevalence of the outcome in children of mothers with and without untreated dental caries of 72 and 48%, respectively. These parameters determined the need to examine 132 mother-child pairs. The sample size was increased by 20%, leading to a final sample of 158 mother-child pairs (79 in each group). The selection of participants for each group was randomised, using a list of exposed and non-exposed children based on baseline information.

Two examiners performed the clinical examinations under artificial light following prophylaxis and drying of the teeth with compressed air. The examiners had previously undergone training and calibration exercises for the detection of dental caries using the International Caries Detection and Assessment System (ICDAS). The clinical examinations of the children were performed in a dental chair under artificial light with the aid of a mouth mirror and WHO probe. Visible plaque on the maxillary and mandibular incisors was evaluated after drying the teeth with compressed air. The possibilities for the outcome of this examination at follow-up compared to baseline were (1) remained without plaque, (2) reduction in the number of teeth with plaque, (3) maintenance of the same number of teeth with plaque, and (4) increase in the number of teeth with plaque.

The evaluation of dental caries was performed after prophylaxis and drying of the teeth. The detection of caries and its activity was performed using the ICDAS criteria. Tooth surfaces were classified as sound (code 0), initial caries (codes 1 and 2), enamel caries (codes 3 and 4), or dentin caries (codes 5 and 6).

Caries in enamel was classified as active when the enamel surface was whitish, rough, and opaque (not glossy). Caries in enamel was classified as inactive when the lesion was whitish or darkened, glossy, and had a hard, smooth consistency when the tip of the probe was moved lightly across the surface. Caries in dentin was classified as active when the surface had a soft consistency upon careful probing.

The incidence of caries in dentin at follow-up was investigated by comparing the data collected at baseline for the determination of new caries in dentin, independently of whether it was a tooth that was already present in the baseline or that erupted between the baseline and the follow-up. The examiner at the follow-up evaluation had no knowledge of the baseline findings. The charts were stapled after the second examination by a member of the research team.

Caries experience in the mothers was determined using the criteria established by the World Health Organization (WHO). The examinations were performed in a dental chair under artificial light with the aid of a mouth mirror and WHO probe by a third examiner who had undergone training and calibration exercises. The possibilities for the outcome of this examination at follow-up compared to baseline were (1) remained without untreated caries, (2) reduction in the number of teeth with untreated caries, (3) maintenance of the same number of teeth with untreated caries, and (4) increase in the number of teeth with untreated caries. Visible dental plaque in the mothers was investigated by a visual inspection after drying the teeth. The possibilities for the outcome of this examination at follow-up compared to baseline were the same as those described for the children. The mothers were also asked to fill out a questionnaire addressing the child's sex and age as well as socioeconomic and demographic data of the family, such as mother's education (< or  $\geq$  9 years of study), family income ( $\geq$  or < two times the monthly minimum wage in that setting), and number of children (one or  $\geq$  two). The terms "high" and "low" were employed to facilitate the description of the data. For example, low mother's education was less than 9 years of study and high mother's education was nine or more years of study. The possibilities for mother's education and family income at baseline and follow-up were low-low, low-high, high-low, and high-high. The mothers were also asked to fill out a dietary log for three consecutive days recording the children's food intake. This log was used to calculate the mean daily intake of snacks containing sugar between main meals. Sugar intake  $\leq$  twice a day was considered low and intake > twice a day was considered high.

## RESULTS

A total of 137 children (67 in the exposed group and 70 in the non-exposed group) and their mothers participated through to the end of the study, corresponding to an 86.7% response rate. The main reason for dropouts was the

absence of the child on the day scheduled for the follow-up evaluation.

At follow-up, mean age of the children was 62.6 months ( $\pm$  11.6) and girls accounted for 51.4% of the sample. The majority of the mothers (52.5%) had low education at both baseline and follow-up. Family income was higher than two times the monthly minimum wage among 44.5% of the sample at both evaluations. Regarding mother's oral health status, 16.1% had the same number of untreated caries at baseline and follow-up and 16.8% exhibited an increase in the number of untreated caries between the two evaluations. The number of teeth with visible plaque increased among 31.4% of the mothers.

Sixty children (43.8%) exhibited new caries in dentin at the 3-year follow-up evaluation compared to baseline and the incidence of caries was more frequent in the exposed group. A total of 52.2% of the 67 exposed children and 35.7% of the 70 non-exposed children exhibited new caries in dentin at follow-up.

The frequency of new caries in dentin was greater among children whose mothers maintained a low level of education (59.7%) and low income (69.2%) as well as those from families in which the income diminished between the two evaluations (57.7%). The same was found for children whose mothers maintained the same number of teeth with untreated caries (61.2%) as well as those who either maintained (73.9%) or experienced an increase (60.5%) in the number of teeth with visible plaque. Regarding the children's sugar intake, the frequency of new caries in dentin was lower among those who reduced their intake (19.2%). Children who maintained the same number of teeth with visible plaque had a greater frequency of new caries in dentin (62.1%). Those who experienced an increase in the number of teeth with visible plaque also had a greater frequency of new caries in dentin (50%). The frequency of new caries in dentin was greater among those who had active caries at baseline (61.9%) and those who had caries in dentin at baseline (77.1%).

The unadjusted analysis revealed that mother's education, family income, number of mother's teeth with untreated caries, number of mother's teeth with visible plaque, child's sugar intake, number of child's teeth with visible plaque, active caries at baseline, and caries in dentin at baseline were risk factors for the development of new caries in dentin among the children. In the final model, the maintenance of low mother's education (RR 1.54; 95% CI 1.03 to 2.38), the maintenance of low family income (RR 2.05; 95% CI 1.29 to 3.26), the reduction in family income (RR 2.49; 95% CI 1.62 to 3.83), the increase in the frequency of daily sugar intake (RR 1.67; 95% CI 1.09 to 2.52), the maintenance of high sugar intake (RR 1.81; 95% CI 1.14 to 2.87), and the occurrence of caries in dentin at baseline (RR 1.53; 95% CI 1.19 to 1.97) were risk factors for the incidence of caries in dentin.

## CONCLUSIONS

The authors reported that untreated dental caries and visible plaque were not associated with increased incidence of caries in dentin among the children. However, low mother's education (less than 9 years of study), a low

family income or reduction in income, high daily sugar intake, and a history of caries in dentin were risk factors for the incidence of caries in dentin in the 3-year follow-up period. Children with experience of caries in dentin in early childhood have an approximately twofold greater risk of developing future caries in dentin.

### Implications of practice

The socio-economic status of the mother and her educational level are key determinants for increased caries

risk among children. Oral Health education of the mothers and a change of behaviour will have significant benefits for both the oral health status of mother and child.

### Reference

1. Lopes-Gomes, R., Ramos-Jorge, M.L., Fernandes, I.B. et al. Untreated dental caries and visible plaque of mothers are not determinant for the incidence of caries in dentin among children: evidence from a 3-year prospective cohort study. *Clinical Oral Investigations* 2021; 25: 5431–5439

## 2. Do preoperative glycosylated hemoglobin (HbA1C) and random blood glucose levels predict wound healing complications following exodontia in type 2 diabetes mellitus patients?

Krishnan B, Prasad GA, Saravanan R, Madhan B, Kadiravan T. Do preoperative glycosylated hemoglobin (HbA1C) and random blood glucose levels predict wound healing complications following exodontia in type 2 diabetes mellitus patients?—a prospective observational study. *Clinical Oral Investigations*. 2021; 25:179-85.

### INTRODUCTION

Diabetes is one of the most prevalent non-communicable diseases. In 2020, the International Diabetes Federations reported that approximately 4 581 200 million adults in South Africa have diabetes. Diabetes mellitus (DM) DM may be diagnosed based on glycosylated hemoglobin criteria (HbA1C) or plasma glucose criteria (fasting blood glucose (FBG) or 2-h postprandial after a 75-g oral glucose tolerance test (PPBG)). A HbA1c of  $\geq 6.5$ , FBS  $\geq 126$  mg/dl (7 mmol/l), PPBG  $\geq 200$  mg/dl (11 mmol/l) is considered diagnostic for DM. A random blood glucose (RBG) level  $\geq 200$  mg/dl in patients with classic symptoms of hyperglycemia may also be indicative of DM.<sup>1</sup>

There appears to be evidence to strongly suggest an association between DM and surgical site infections (SSI) and individuals with uncontrolled DM show a predilection to increased severity of morbidity and frequency of mortality.<sup>1</sup> The type 2 diabetic patient undergoing exodontia/extraction is also believed to be at a higher risk for wound healing complications and surgical site infections. This belief often leads many dentists to prescribe pre- and postoperative antibiotics to minimize the risk of surgical site infections, even though there is little evidence to support this practice.<sup>1</sup> Krishnan and colleagues in India (2021)<sup>1</sup> reported on a trial that sought to analyze if preoperative HbA1C and Random Blood Glucose (RBG) testing could predict the risk of wound healing and infectious complications in type 2 DM patients undergoing exodontia/extractions in an office setting.

### MATERIALS AND METHODS

This prospective observational study was conducted over a 15-month period (July 2017 to October 2018), in the dentistry outpatient clinic of a Public Sector Teaching Hospital in India.

There were 2 study groups. Group A included 133 patients, irrespective of gender and above the age of 35, with a history of type 2 DM for at least 1-year duration and needing exodontia. These included patients on oral hypoglycemics, insulin, or both. Group B consisted of age- and gender-matched non-diabetic 133 patients (control group) undergoing exodontia. HbA1C values and preoperative RBG levels were obtained for patients in both groups. Patients with conditions that predispose to delayed wound healing (immunodeficiency, malignancy, steroid use), co-existing local or systemic infections with recent antibiotic use, and pregnancy were excluded. Data collected included parameters such as duration of DM and type of medication used, the number of teeth extracted and reason for extraction, and habits such as smoking and alcoholism. All patients underwent exodontia/ extraction under local anaesthesia (2% lignocaine with 1:200,000 adrenaline) by surgical residents in the outpatient clinics. Patients in both groups received similar instructions on post-surgical wound care, prescribed with analgesics, and offered a follow-up review between the 7th and 10th post-op day or return to the outpatient clinics if they had any problem. During this review, postoperative wound healing complications included (a) non-infectious (alveolar osteitis, excess or unhealthy granulation tissue with sequestra in extraction sockets), (b) infectious complications (local or systemic) and (c) additional procedures and medications provided were recorded by a faculty/senior resident. Patients who did not report for the follow-up review were deemed to have had uncomplicated healing.

### RESULTS

The duration of diabetes among the participants ranged from 1 to 25 years with a mean of  $6.9 \pm 4.5$  years. 80.5% of diabetics were treated with oral hypoglycemics, while 14% were on a combination of oral hypoglycemics and insulin. A vast majority of patients in both groups underwent extraction of only a single tooth. In both

groups, about 10% of extractions required a transalveolar method. The diabetic group had more smokers (19.5%) in comparison to the control group (7.5%). There was no significant difference in non-infectious complications between the two groups. The absolute risk of infectious complications in diabetics was 10.5% compared to a 6.8% risk among the control group (95% CI). However, this excess infection risk was not statistically significant. Among the diabetics who developed infectious complications, the Random Blood Glucose (RBG) and HbA1C values were elevated, but were not statistically significant. In both groups, infectious complications were managed with intraoral surgical drainage and/or oral antibiotics and no patient needed hospitalization and intravenous antibiotics. Age, RBG values, HbA1C, duration of DM, and number and nature of exodontia performed did not show any statistical significance in the logistic regression model.

## CONCLUSIONS

This study observed a slight, but not statistically significant increase in the risk of infectious complications in type 2 DM patients undergoing exodontia/extraction. Surgical site infections were amenable to surgical drainage with or without oral antibiotics on an outpatient basis with favourable healing outcomes.

## Implications for practice

The Random Blood Glucose (RBG) and HbA1C values were not significantly associated with risk of infectious complications. Resorting to prophylactic antibiotics and warning about possible adverse healing for routine exodontia in type 2 DM patients is unnecessary.

## Reference

1. Liapis D, De Bruyne MA, De Moor RJ, Meire MA. Postoperative pain after ultrasonically and laser-activated irrigation during root canal treatment: a randomized clinical trial. *International Endodontic Journal*. 2021; 54: 1037-50.

