



General dental practitioners' approach to caries prevention in high-caries-risk children

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Received: 19 November 2019 / Accepted: 12 June 2020 / Published online: 22 June 2020
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Abstract

Aims To evaluate the advice and preventive care provided by General Dental Practitioners (GDPs) to high-caries-risk children in Jordan.

Methods A cross-sectional study using an open-ended questionnaire. GDPs were presented with a high-caries-risk child scenario and asked regarding: (1) oral hygiene and dietary advice they would give; (2) preventive-care they would offer; (3) barriers they face in prevention delivery. Answers were compared to an evidence-based guideline. Data were input into SPSS-20 and analysed using descriptive statistics and frequencies. Chi-square test was used to compare results by age, gender, practice location and type.

Results One-hundred and sixty GDPs were approached and 128 agreed to participate (80%), of whom 87 (69%) were female. The average age was 31 years [range 22–50]. Sixty-nine percent practiced in the capital, Amman. Sixty-five percent gave advice on tooth-brushing frequency, but only 23% suggested brushing at bed-time and 24% recommended parental supervision. None provided advice on toothpaste fluoride content. Seventy-one percent advised reducing sugary-food amounts, but only 21% focused on frequency and 2% suggested using diet diaries. Most knew about fissure-sealants (77%) and fluoride-varnish (80%). Forty-two percent reported barriers to delivering preventive-care, including parental attitudes (36%), child cooperation (30%), financial reward (19%), and training (6%). Participants practicing outside of the capital were less likely to use fluoride-varnish [$P=0.002$] and more likely to report barriers [$P=0.001$].

Conclusions Advice delivered by GDPs to high-caries-risk children in Jordan does not meet the standards of an evidence-based guideline. Future initiatives for oral-health-promotion should aim to address the barriers reported, especially outside the capital.

Keywords Early childhood caries · Caries prevention · Oral health promotion · Dentists

Introduction

Dental caries continues to affect a large number of children and adults around the world (Marcenes et al. 2013; Chen et al. 2019). This preventable disease can have significant impact on a child's quality of life (Ramos-Jorge et al. 2014),

their parents' well-being (Abanto et al. 2014), and governments' healthcare resources (Casamassimo et al. 2009). Children in developing countries are particularly under risk and suffer from a high incidence of childhood caries (Marthaler 2004). This includes children in the Middle East (Alayyan et al. 2017). Jordan, as a developing Middle Eastern country, is no exception. In fact, by the age of six, three-quarters of children are reported to have experienced caries with an average dmft of 3.3 (Rajab et al. 2014). No significant improvement has been noticed over recent decades (Hamdan and Rock 1993; Rajab et al. 2002, 2014).

Caries is a multifactorial disease that is impacted by socio-economic, behavioural, and biochemical factors (Fejerskov 1997). Multiple studies have demonstrated that the Jordanian population has difficulties implementing behaviours that help prevent caries in children. Rajab et al. (2002) reported

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that only half of six-to seven-year-old children brush their teeth daily, and the majority visit the dentist only when in pain. Sayegh et al. (2002) reported that children regularly consume biscuits, cakes, and carbonated drinks. Sayegh et al. (2005) reported that many families resort to night-time and prolonged bottle-feeding and breastfeeding. The implementation of healthy behaviours requires a variety of factors (Michie and West 2013). In Jordan, a lack of awareness within the general population is likely a contributing factor. In a recent study, only 16% of surveyed mothers thought that toothbrushing should start as soon as primary teeth erupt, 81% thought that sugar was better consumed in between meals, 46% thought attendance to the dentist was not necessary unless in pain, and 84% didn't know about fluoride varnish (ElKarmi et al. 2019).

Jordan is in need of child oral health promotion, including the delivery of oral health education and encouraging implementation of positive oral health habits by families. One-on-one chair-side oral health interventions are reported to be beneficial (Harris et al. 2012). As such, General Dental Practitioners (GDPs) working in the private and public sector play an important role (Richards 2013). There is approximately one GDP for every 920 people in Jordan (Jordanian Dental Association 2011). It is necessary to ensure they are armed with the knowledge, training, and resources to deliver suitable oral health messages and preventive interventions to high-caries-risk children.

Studies have shown that GDPs can sometimes be inconsistent in their oral health education messages (Threlfall et al. 2007; Wagle et al. 2017). In addition, GDPs in both developed and developing countries report barriers to delivering oral health education and preventive care, including insufficient training, poor parental motivation, and the lack of financial remuneration (Witton and Moles 2013; Suga et al. 2014). The aim of this investigation was to explore the GDPs' approach to oral health education and preventive treatment in high-caries-risk children and the barriers they perceive to delivering preventive care in Jordan.

Methodology

This study was a cross-sectional cohort study using a questionnaire with open- and closed-ended items. It was granted ethical approval by Jordan University Hospital research ethics committee (reference number: 198/2017) and was conducted in accordance with the World Medical Association's Helsinki declaration. A STROBE (Strengthening the Reporting of Observational studies in Epidemiology) statement was used to inform study design and result reporting.

The study recruited a convenience sample of GDPs practicing in Jordan. Recruitment took place at the 25th Jordanian International Dental Conference in October

2017. This is the largest national conference in the country and was attended by a large number of dentists from Jordan and neighbouring countries. Researcher JK attended the conference and would approach attendees, introduce them to the study, and provide them with the study's information sheet. Those who agreed to take part were then asked to provide written consent and complete a short questionnaire. To be included in the study, the participant had to be: (1) a GDP and (2) currently practicing in Jordan.

The questionnaire was developed by the research team. It was then piloted in a small group of five GDPs to ensure clarity of language and relevancy of questionnaire items. Participants were first asked to provide some basic information regarding themselves, including age, gender, qualifications, duration of practice in Jordan, practice location and practice type (private, public).

They were then given a scenario of a 7-year-old child with multiple decayed primary teeth attending their clinic and asked:

- 1- What oral hygiene and dietary advice would they give to the child and his parents?
- 2- What preventive treatments would they recommend for this child and his parents?

The questions were open-ended to allow the participants to freely express their views and experiences. Their answers were then organised and compared to the recommendations for high-caries-risk seven-year-olds in 'Delivering Better Oral Health (DBOH)' (Public Health England 2014), an evidence-based guideline designed to help GDPs in the United Kingdom inform their decisions regarding oral health promotion for their patients. The checklist of items derived from DBOH and used by the research team to evaluate the participants' answers can be seen in Table 1.

In addition to the aforementioned clinical scenario, participants were asked whether they perceive any barriers to providing preventive advice and treatment in this cohort of patients. A list of potential barriers and facilitators was drawn by the research team based on the findings of previous studies exploring the issue in different parts of the world (Witton and Moles 2013; Suga et al. 2014; Aljafari et al. 2015). The barriers included: lack of child cooperation during preventive treatment, lack of parental motivation/interest, lack of time, lack of knowledge, and poor financial reimbursement.

Data were entered into SPSS-22 and analysed. Descriptive statistics and frequencies were used to report on participants' basic characteristics, approach to preventive care, and perceived barriers. Chi-square test was used to investigate any potential associations between the participants' characteristics, including age, gender, practice location and type,

Table 1 Checklist of recommended action for a high-caries-risk 7-year-old

Recommended action	Evidence source
Brush at least twice daily, with a fluoridated toothpaste	Toumba et al. (2019)
Brush last thing at night and at least on one other occasion	Duckworth et al. (2001)
Use fluoridated toothpaste (1450–1500 ppm fluoride)	Toumba et al. (2019)
Spit out after brushing and do not rinse, to maintain fluoride concentration levels	Chestnutt et al. (1998)
Brushing should be supervised by an adult	Toumba et al. (2019)
Encourage generally healthy diet (increase fruit and vegetables intake, reduce saturated fats and salt)	WHO (2003)
The amount of sugary food and drinks should be reduced	Moynihan and Kelly (2014)
The frequency of sugary food and drinks should be reduced and when consumed limited to mealtimes	Moynihan and Kelly (2014)
Avoid sugar-containing foods and drinks at bedtime	Levine (2001)
Use three-day diet diaries to aid in dietary modification	Watt et al. (2003)
Apply fluoride varnish to teeth two or more times a year (2.2% NaF)	Toumba et al. (2019)
Fissure seal permanent molars with a finresin sealant	Ahovuo-Saloranta et al. (2007)

and their approach and perceived barriers to preventive care delivery.

Results

Sample

One-hundred and sixty dentists were approached and 128 (80%) agreed to participate. Eighty-seven (69%) of the participants were female and 41 were male (31%). The average age was 31 years [range 22–50]. One hundred and twenty-six (98.5%) of the participants had a bachelor's degree and only two (1.5%) had a masters degree. One hundred and twelve participants (87.5%) practiced in a private clinic while 16 (12.5%) worked in the public sector. Eighty-eight (69%) practiced in the capital, Amman, while the rest (31%) were dispersed through the other counties of the country.

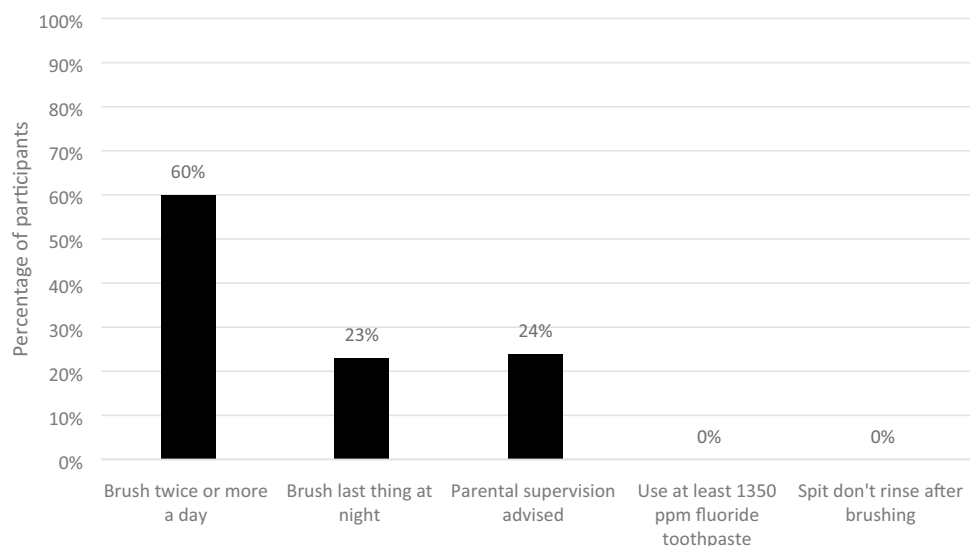
Oral hygiene advice

The majority of participants (60%) reported that they would advise the child to brush their teeth twice or more daily. However, a much smaller number focused on brushing before going to bed (23%) or parental supervision (24%). Moreover, none of the participants recorded that they would give specific advice on fluoride toothpaste concentration or spitting but not rinsing. There were no significant differences in answers based on participants' age, practice location, or type (private, public). Figure 1 summarises these results.

Dietary advice

The majority of the participants (71%) said that they would advise the family to reduce the child's sugary food and drink intake and slightly more than half (56%) said they would give general healthy eating advice; including

Fig. 1 Oral hygiene advice was given to high-caries-risk 7-year-old child



eating more fruits and vegetables and reducing saturated fats and salt. However, only 21% indicated that they would target sugar intake frequency, and only 15% said they would advise the patient to limit sugar intake to meal times. Only 2% said they would use a diet diary to aid them in the patient's dietary analysis and behaviour modification. There were no significant differences in answers based on participant's age, practice location, or type (private, public). Figure 2 summarises these results.

Self-reported provision of preventive treatment

Most participants reported that they would use fluoride varnish or gel (80%) and fissure sealants (77%) in high-carries-risk children. None of the participants detailed the frequency of fluoride application. Dentists outside of the capital, Amman, were significantly less likely to apply fluoride; only 54% reported they would do so in comparison with 81% of those in Amman [Chi-square test, $P = 0.002$].

Fig. 2 Dietary advice given to a high-carries-risk 7-year-old child

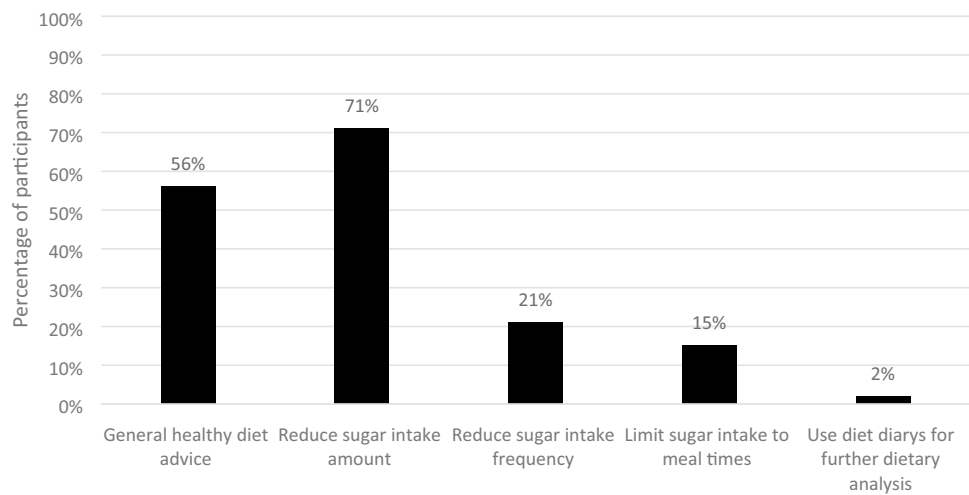
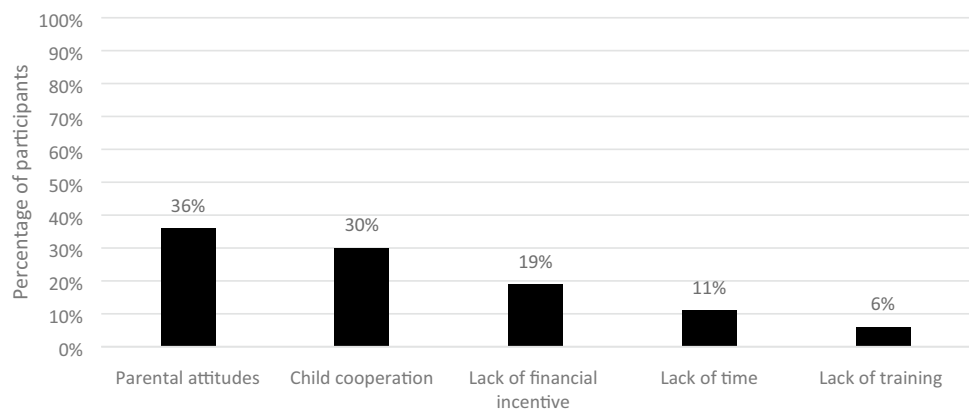


Fig. 3 Perceived barriers to preventive care delivery



Perceived barriers to preventive care

When asked if they perceive barriers to delivering preventive care to high-carries-risk children, fifty-four participants (42%) suggested that they do. Those outside Amman were more likely to report barriers (65%) than those in Amman (31%) [Chi-square test, $P < 0.001$].

Perceived parental lack of interest and motivation was the most frequently mentioned barrier, as 46 participants (36%) indicated that they have faced that issue. In addition, 38 participants (30%) cited child cooperation, while 24 (19%) and 14 (11%) mentioned lack of financial incentive or time, respectively. Only seven participants (6%) felt that lack of training or knowledge was a barrier to delivering preventive care. Figure 3 summarises these results.

Discussion

The findings of this study demonstrate that most GDPs in Jordan are familiar with the general principles of caries prevention, namely: brushing teeth twice a day with a

fluoride toothpaste and reducing sugar consumption. However, the majority do not seem to incorporate practical, detailed, and tailored advice on how this can be achieved and implemented in high-caries-risk children and their families. The majority reported that they would deliver preventive treatments such as fluoride varnish and fissure sealant in those patients, although those outside the capital were less likely to use fluoride varnish. GDPs viewed parental attitudes and child cooperation as the biggest barriers to delivering preventive care.

Only a minority of participants in this study reported that they would advise the family of a young child with high-caries-risk to brush their teeth last thing before going to bed or to have parental supervision during brushing. In addition, only a few indicated that they would take a tailored approach to dietary counselling, including the use of diet diaries and practical advice on reducing sugar intake frequency or limiting it to mealtimes. Furthermore, none of the participants mentioned that they would advise the family on toothpaste fluoride concentration or spitting but not rinsing after brushing, despite those being evidence-based approaches to increasing fluoride exposure and reducing caries risk (Chestnutt et al. 1998; Public Health England 2014; Toumba et al. 2019). Previous studies in developed countries (Threlfall et al. 2007; Pearce and Catleugh 2013) and other developing countries (Wagle et al. 2017) noticed a similar trend in reported oral health education delivery. The persistence of this issue across multiple countries, with varying socioeconomic settings, dental education and healthcare systems, and guidelines, indicates a defect in GDPs preventive training and motivation that needs investigation and management on both a global and individual-country basis.

It is encouraging that the majority of the dentists that took part in this study reported that they would use fissure sealants and fluoride varnish in high-risk children. Although these findings are self-reported and, therefore, do not necessarily guarantee that the participants use these treatments in their clinics, they show that GDPs in Jordan are aware of the importance of sealants (Ahovuo-Saloranta et al. 2007) and fluoride varnish (Toumba et al. 2019) in caries prevention. GDPs in this study cited parental awareness and child cooperation as barriers that hinder their delivery of preventive treatment. Elsewhere, GDPs reported similar trends (Threlfall et al. 2007; Humphreys et al. 2010). This puts high-risk families at a further disadvantage as they are more likely to have poor oral health awareness (ElKarmi et al. 2019) and present late when the child is in pain (Rajab et al. 2002). It is important to explore oral health promotion initiatives that target parents outside the dental setting to encourage early and regular dental attendance. It is also important to examine whether GDPs need help to improve their communication and rapport with those families once they attend.

About a fifth of the participants mentioned poor financial reimbursement and one-tenth mentioned lack of time as barriers to delivering preventive care. Suga et al. (2014) reported similar findings in other parts of the world. It is time to reconsider how GDPs are reimbursed for giving oral health education and delivering preventive care. More importantly, it is necessary to shift the oral health paradigm towards prevention, increasing its importance in the eyes of dental students, GDPS, oral health authorities and local communities and government. Only a few dentists thought their training was a barrier to preventive care delivery. However, examining the content of oral health advice delivered by the participants, it is clear that providing GDPs in Jordan with better preventive care training during undergraduate school and Continuing Professional Development (CPD) is worth exploring for its benefits.

Practitioners outside the capital, Amman, were significantly less likely to provide fluoride varnish applications and more likely to report that they face barriers in delivering preventive treatment. Looking at previous studies, child cooperation and parental attitudes (Aljafari et al. 2015), dentist training and beliefs (Gnich et al. 2015), poor financial remuneration (Steele et al. 2009) and organisational issues (Witton and Moles 2013) were all cited as reasons for GDPs elsewhere to limit their preventive treatments. Jordan's population and economy are highly concentrated in its capital city (Department of Statistics 2017). The average dentist to population ratio in Jordan is 1:920. However, some governorates in the country have ratios as low as 1:8411 (Jordanian Dental Association 2011). It is possible that socio-economic discrepancies and the imbalanced distribution of GDPs throughout the country contribute to this issue. In light of this study's small sample of GDPs from outside the capital, further investigations, perhaps using qualitative methodology, can help illuminate this specific issue.

Promoting health is a process that needs action on multiple fronts (World Health Organisation 1986). In light of the findings of this study and what we know regarding dental caries in Jordan, we recommend:

1. Exploring oral health promotion programmes for high-risk families outside the dental setting, including in schools and at general and maternal healthcare providers.
2. Further exploring views of GDPs outside the capital and building initiatives to reduce the socioeconomic and healthcare discrepancies between the capital and the rest of the country.
3. Providing Dental students and GDPs with training on preventive care delivery and shifting their attention to the importance of caries prevention.

4. Drafting an evidence-based guideline for caries prevention for the use of GDPs in Jordan and other countries in the region.
5. Reconsidering the financial reimbursement for GDPs for providing oral health education and preventive care.

Study limitations

The sample in this study compares well to the Jordanian GDP population in terms of practice location and type (Jordanian Dental Association 2011). However, this study has its limitations. First, this was a convenience sample taken at a national conference. It is possible that those that did not attend have different opinions. This is minimized by the fact that every GDP in Jordan needs yearly CPD hours to continue to practice. Second, some of those approached did not take part, and it is possible they have different opinions that have not been represented. Third, the number of participants from outside the capital was relatively small and further studies might be needed to confirm their opinions. Fourth, the questionnaire we used was piloted but not validated. It had open-ended questions, meaning the respondents could have forgotten to record answers that they did in fact know; On the positive side, this design helped us better capture what dentists recalled ‘off the top of their heads’ and might be more representative of their everyday approach than using multiple choice. Finally, when it comes to the provision of fissure sealants and fluoride varnish, it is possible that the respondents gave what they thought was a socially accepted answer; nonetheless, this at least shows their awareness of the importance of those treatments.

Conclusion

GDPs in Jordan deliver oral health advice to high-caries-risk children that focuses on tooth brushing frequency and limitation of sugar intake. The advice delivered lacks evidence-based practical and tailored details including parental supervision, brushing at night, fluoride toothpaste concentration, spitting after brushing, limiting sugar to mealtimes and using dietary diaries for further analysis. The majority of GDPs are aware of preventive treatments such as fissure sealant and fluoride varnish. However, some, especially those in less developed and serviced areas, might face barriers in preventive treatment delivery related to the child, parent, and healthcare system. Future studies need to further investigate those barriers and explore initiatives for community oral health promotion, dentist training, and dental reimbursement reorganisation with special focus on areas outside the capital.

Author contributions “All authors have made substantive contribution to this study and/or manuscript, and all have reviewed the final paper prior to its submission.” AA and RE contributed to study design, data collection, data analysis, and manuscript writing; JK contributed to data collection, analysis and manuscript writing; MTH contributed to study design, data analysis and manuscript writing.

Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

Ethical approval Ethical approval was obtained from Jordan University Hospital research ethics committee (Reference Number 198/2017) in accordance with institutional and national ethical standards and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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