

Oral Health Research Review

Making Education Easy

Issue 10 – 2011

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Oral Health Research Review is also made available to Dental Hygienists through the kind support of the New Zealand Dental Hygienists' Association

Welcome to issue 10 of Oral Health Research Review.

In this winter edition, we put the spotlight on a number of issues regarding the oral health of children, ranging from the relationships with obesity and asthma to their experiences, including fear, of going to the dentist and their motivations for toothbrushing behaviours. We also discuss complications associated with oral/peri-oral piercings on oral health and the effects that sports drinks have on tooth erosion.

We hope you find the papers selected for this issue interesting and informative, and we welcome any comments or feedback you may have.

Kind regards,

Jonathan Leichter D.M.D

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Sports drinks and dental erosion

Authors: Noble WH et al

Summary: This review began by describing dental erosion processes, with focus on how sports drinks contribute to these processes, mainly because they contain citric acid and sugars. The authors also discussed how endurance exercise-associated xerostomia and gastro-oesophageal reflux disease can contribute to dental erosion. Strategies to help minimise dental erosion associated with sports drinks were included.

Comment (JL): Dental erosion is a complicated, multifactorial process, and has been estimated to occur in 2–18% of the population. The increase in erosion is paralleled by an increase in the consumption of acidic soft drinks, sports drinks and energy drinks. Although these were developed for athletes during intense or prolonged exercise, they are now marketed to individuals not involved in sport, and consumption has risen to current total sales of US\$1.5 billion per year. This article provides a good overview of the topic with explanations of the erosive process, how sports drinks are implicated in this process, and how exercise and dehydration can increase the detrimental effects of these drinks through xerostomia and exercise-induced reflux. I found the section on treatment and the table of preventive measures to be the most useful parts of the article. There is also a long list of references for anyone wanting more information.

Comment (DB): Adequate hydration is of utmost importance for high endurance athletes. Lack of hydration can affect the body's ability to effectively regulate temperature, which can put additional strain on the body and significantly affect performance. Sports drinks that are high in both salts and sugars have been formulated to give an instant boost to athletes and help maintain electrolyte and mineral balances. Interestingly, water, when consumed in the same quantities, was shown to be equally effective in maintaining these balances; however, due to the pleasurable taste of sports drinks, athletes were shown to be more likely to consume them. The potential for dental erosion is enhanced by the reduced saliva flow during exercise and by the nature in which athletes frequently sip on these acidic drinks resulting in prolonged reduced pH of the oral environment. It is important that athletes are made aware of the increased risk, and that questioning around the consumption of sports drinks is included during caries risk assessment to ensure that appropriate advice can be given and preventive measures put in place.

Reference: *CDA Journal* 2011;39(4):233–8

http://www.cda.org/library/cda_member/pubs/journal/journal_0411.pdf

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Complications of oral and peri-oral piercings: a summary of case reports

Authors: Hennequin-Hoenderdos NL et al

Summary: The authors used MEDLINE and the Central Register of Controlled Trials (CENTRAL) to search for relevant studies on the complications of oral and peri-oral piercings. After exclusion of any noneligible papers, 86 cases with 96 complications were summarised. 81% of complications occurred in cases of tongue piercings, 20% in cases of lip piercings and 1% were associated with other peri-oral piercings. Oral complications included tooth fracture (mostly molars), gingival recession, periodontitis, embedding and prolonged bleeding. With regards to general health, eight cases of endocarditis associated with oral and peri-oral piercings were described. Infections and abscess formation were reasonably common with resulting multiorgan failure and death in one case!

Comment (JL): As health professionals, we need to make our patients aware of the possible risks and consequences of piercing, advise them to search for an experienced piercer with appropriate infection control measures, and to rinse regularly with an antimicrobial mouthrinse after any oral piercing procedure. Treatment of complications and associated lesions may require referral. Removal of all jewellery prior to any dental procedure is also recommended.

Comment (DB): The popularity of oral and peri-oral piercings has risen dramatically in recent times, with more and more young adults wishing to assert their independence and personalise their body through art. Given this recent increase, dental professionals need to be able to provide accurate information around the implications of such piercings, and also be able to adequately deal with complications that may present. This study of case reports found the most common complaints were gingival recession for lip piercings and tooth fracture for tongue piercings; however, life-threatening complications, such as inhalation of piercings or systemic infection, were significantly represented. The aseptic techniques practiced by the businesses providing piercing have been found to be of upmost importance, and patients should be discouraged from self-piercing or choosing a service provider that does not comply with adequate cross infection control standards.

Reference: *Int J Dent Hyg* 2011;9(2):101-9

<http://onlinelibrary.wiley.com/doi/10.1111/j.1601-5037.2010.00504.x/abstract>

Children's perception of their dentists

Author: AlSarheed M

Summary: This study found that among the 76% of child questionnaire respondents (aged 9–12 years) who had visited a dentist, 64% reported liking the visit, 11% didn't like the visit and 12% reported being afraid (mostly due to fear of local anaesthesia and tooth extraction). In addition, 90% preferred their dentist to wear a white coat, 40% preferred them to wear a mask and protective eyewear, and 63% reported a preference for a decorated dental clinic over a plain clinic.

Comment (JL): It is of concern that 11% of children in this study reported that they disliked their visit to a dentist and another 12% reported that they were afraid of the dentist. An awareness of children's attitudes should enable us to make positive changes so that children will be more comfortable and have an improved quality of visit. If children experience positive interactions with less anxiety, they will be less likely to develop a fear of dentists, and this should carry over into adulthood resulting in regular dental visits and better dental health. I found the following findings of interest: i) children in this study indicated that they would prefer to be treated by a dentist of the same gender (we need more males entering our BOH programme); ii) more traditional formal attire with white coat is preferred – the wearer is perceived as more competent and the white coat is seen as a symbol of healing (the trend towards casual dress may not be a positive move); iii) the smell of the dentist was important (self-care is vital); iv) the use of protected devices such as masks and eye glasses needs to be explained (they can be intimidating); v) a decorated clinic with toys and posters is preferred; and vi) dental tools are scary (put out and use only the necessary instruments). For those of us treating children, this article is a worthwhile read! Children have strong preferences and we need to take these into account.

Comment (DB): This study evaluated children's preferences when receiving dental services in order to identify if changes could be made to make dental visits more pleasurable. Results showed that 64% of children were happy to attend the dentist, although children tended to prefer a dentist of the same gender as themselves. I was surprised that 90% of the children preferred their dentist to wear a white coat over a coloured one and wonder if this could be due to the white coat fitting the stereotypical image that children have been exposed to. Is it that they prefer a white coat, or just recognise the professional because of the white coat? This study has acknowledged that it is difficult to really ascertain whether it was preferences over the dentist's attire or clinic decoration that truly influenced a child's perception, or if it was really the personal attributes that came across during interactions. Despite this, they still advise that it is relatively easy to change dress style or décor to suit the preferences of children, and this may make a difference to their visit.

Reference: *Eur J Dent* 2011;5(2):186-90

http://www.eurjdent.com/images/Volume_5/5-186-190.pdf

Childhood obesity and dental caries among paediatric dental clinic attenders

Authors: D'Mello G et al

Summary: This cross-sectional study of 200 NZ children aged ≤ 8 years (70% European) found no significant association between caries experience and body mass index (BMI; $p=0.932$).

Comment (JL): NZ statistics show that 25–30% of our children are considered overweight or obese. Not only is childhood obesity associated with cardiovascular and metabolic risk factors, it is likely to continue into adulthood with ongoing medical risks. Hypertension, CV disease, respiratory system disease, type 2 diabetes and cancer are but a few of the adult complications of adult obesity. This cross-sectional study aimed to determine a correlation between deciduous dental caries experience and BMI among children who attended the paediatric dentistry clinics at the University of Otago School of Dentistry. Although no association was found, this may have been because of lack of information, the size of the sample, a type II error (false negative) or the high caries experience of the sample. Regardless of the outcome, dental caries and obesity do have common risk factors, and the regular monitoring of height and weight as part of the dental examination is recommended.

Comment (DB): This retrospective study explored the possibility that childhood obesity may be a risk factor for increased dental caries in the deciduous dentition. Records of children between 3 and 8 years of age who had attended the Otago University paediatric dentistry clinic between 2004 and 2006 were studied for BMI and dmft statistics. The results did not find a statistically significant association between BMI and dental caries experience for this age group. The difficulties encountered by the research team were predominantly due to inconsistent documentation by various students and operators within the department, resulting in often incomplete information. Of the 548 children seen during the specified time period, only 36.5% had sufficient data to allow for accurate calculations. This serves as a timely reminder to all of the importance of thorough and consistent record keeping.

Reference: *Int J Paediatr Dent* 2011;21(3):217-22

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Commercial mouthwashes are more effective than azole antifungals against *Candida albicans* biofilms in vitro

Authors: Ramage G et al

Summary: This investigation into the effectiveness of azoles, polyenes, an echinocandin and four over-the-counter mouthwashes against *Candida albicans*-derived planktonic and biofilm cells found: i) high sensitivity in the planktonic cells to all the antifungal agents tested; ii) high resistance in sessile cells to azoles (≥ 128 mg/dL); and iii) equal sensitivity in sessile cells to caspofungin and short treatments of three mouthwashes (Corsodyl, Listerine and Oraldene).

Comment (JL): Immunocompromised and elderly patients often suffer from oropharyngeal candidiasis. This can lead to a nutritional compromise as the symptoms of pain, burning sensation and altered taste affect their food intake. This study compared commonly prescribed antifungals with over-the-counter mouthwashes. One of the key characteristics of candidal biofilms is its antifungal resistance. The extrapolymeric matrix material, which encases the yeasts and hyphae, forms an impenetrable barrier. In addition to this, metabolic inactivity of cells and upregulation of efflux pumps add to the resistance to the commonly prescribed azole antifungals. This study showed that three of the four over-the-counter mouthwashes tested exhibited significant antibiofilm activity, and may be a more appropriate oral chemotherapeutic strategy. More clinical trials are recommended.

Comment (DB): *C. albicans* is the most predominant organism associated with yeast biofilm infections, and is commonly resistant to azole antifungal treatments. Despite this, they are still actively prescribed for the treatment of oral fungal infections. This *in vitro* study looked at the effectiveness of commercial mouthwashes over traditional azole antifungal treatments. Results showed the most effective mouthwash on *C. albicans* was Corsodyl followed by Colgate Peroxyl when looking at planktonic minimum inhibitory concentrations testing, although when analysing the antibiofilm activity and effect on reduction in metabolism, Corsodyl, Listerine and Oraldene were significantly more effective than Colgate Peroxyl. Caspofungin and voriconazole were the most effective antifungal agents. While the use of commercial mouthwashes to control fungal infections is looking promising, side effects including staining of the enamel, potential burning sensation and taste alteration may be problematic.

Reference: Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;111(4):456-60

<http://www.ooooe.net/article/S1079-2104%2810%2900875-9/abstract>

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Disclaimer: This publication is not intended as a replacement for regular medical education but to assist in the process. The reviews are a summarised interpretation of the published study and reflect the opinion of the writer rather than those of the research group or scientific journal. It is suggested readers review the full trial data before forming a final conclusion on its merits.

A review of the clinical application and performance of pit and fissure sealants

Authors: Simonsen RJ and Neal RC

Summary: This review of recent publications that support an evidence-based approach to the clinical aspects of pit and fissure sealant application concluded that applying pit and fissure sealant to newly-erupted posterior, and occasionally anterior, teeth is the best available method to prevent: i) pit and fissure caries; and ii) progression of incipient caries to frank caries when the incipient lesion is sealed over with resin.

Comment (JL): If you have any doubts about the effectiveness of pit and fissure sealants, or queries about any clinical aspects of their application, read this review article. The authors have focussed on the most recent publications that support this evidence-based preventive strategy. After reviewing all the available literature published prior to 2008, the American Dental Association Council on Scientific Affairs concluded that placement of resin-based sealants on the permanent molars of children and adolescents is effective for caries reduction, with a reduction in incidence ranging from 86% at 1 year to 78.6% at 2 years and 58.6% at 4 years. This article goes further, comparing: fluoride-containing filled sealants and conventional sealants; resin-based sealants and glass-ionomer cements used as sealants; filled versus unfilled sealants; and coloured versus clear sealants. It was interesting to note that topical fluoride treatment prior to sealing has no clinical effect on the retention of the sealant, and that teeth with a partially lost sealant are not at a higher risk of developing caries than teeth that had never been sealed. While much of what we already do is confirmed in this article (such as the importance of regular follow-up checks), it is a worthwhile and informative read.

Comment (DB): This review of the literature found that resin sealants are cost effective in preventing caries on newly erupted permanent teeth, with a significant reduction in the number of children requiring restorative work. Interestingly, the method of cleaning the tooth prior to placement of sealant seemed of little importance, with retention rates as effective in patients who self-cleaned with a dry toothbrush prior to etching versus those who had received a professional prophylaxis with pumice. Fluoride treatment prior to sealing also did not negatively affect retention. The sealing of undetected incipient lesions was deemed not problematic as long as the seal remained well intact, emphasising the importance of regularly inspecting and maintaining sealants. Interestingly, while GIC sealants have been theorised as potentially more effective for caries prevention due to the release of fluoride, studies as yet have failed to support this, due mainly to the poor retention rates and potential for leakage, even when fully intact. However, GIC is useful as an interim measure to prevent caries in partially erupted teeth where moisture control is problematic.

Reference: Aust Dent J 2011;56(Suppl s1):45-58

<http://onlinelibrary.wiley.com/doi/10.1111/j.1834-7819.2010.01295.x/abstract>

The effect of 1% chlorhexidine gel and 0.12% dentifrice gel on plaque accumulation: a 3-day non-brushing model

Authors: Slot DE et al

Summary: These authors compared a 0.12% chlorhexidine toothpaste, a 1% chlorhexidine gel and a regular toothpaste with a 0.2% chlorhexidine mouthwash as a positive control. An experienced hygienist ensured that all participants were plaque-, stain-, and calculus-free at the start of the trial. Fluoride application trays were used twice daily to apply the trial treatments while participants in the chlorhexidine mouthwash group rinsed twice daily. No other forms of oral hygiene were practiced for the 3-day period. It was found that the tray application of 1% chlorhexidine gel was significantly more effective than the chlorhexidine or regular toothpastes (mean full mouth plaque index 0.88 vs. 1.16 and 1.31, respectively), and was comparable with rinsing with the 0.2% chlorhexidine mouthwash (0.79).

Comment (JL): This single-blind, randomised, parallel clinical trial was designed to compare four methods of nonbrushing plaque control. Many of our patients do not manage to achieve satisfactory levels of plaque control with mechanical cleaning due to hard-to-reach areas, inadequate skills, lack of compliance and/or poor motivation. In these cases, the adjunctive use of antiseptic or chemical agents has an important role to play, with chlorhexidine considered to be the leading antiseptic for combating biofilms.

Comment (DB): While toothbrushing has been accepted as the most effective form of plaque control, many individuals struggle to maintain good oral hygiene. This can be due to various reasons, including manual dexterity, poor skills and lack of motivation. This study aimed to compare the effectiveness of four topical treatments on plaque control. Participants were given a thorough professional clean prior to commencing the trial, and were randomly assigned to use one of the topical treatments instead of toothbrushing for 3 days. Plaque accumulation and gingival bleeding was then measured. The results showed that 1% chlorhexidine gel used in an application tray was statistically significantly more effective than the 0.12% dentifrice gel. The application tray was however less user friendly and the least popular choice for participants. The 0.2% mouthrinse was equally effective as the 1% gel.

Reference: Int J Dent Hyg 2010;8(4):294-300

<http://onlinelibrary.wiley.com/doi/10.1111/j.1601-5037.2010.00487.x/abstract>

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Comparison of the remineralizing potential of child formula dentifrices

Authors: Ekambaram M et al

Summary: This study compared toothpastes with 500ppm amine fluoride (AmF), 500ppm monofluorophosphate (MFP), 500ppm MFP and xylitol, 500ppm sodium fluoride (NaF) with a nonfluoridated control. Forty sound primary teeth were used for the study, which involved pH cycling and evaluation with polarising light microscopy and microradiography. Results showed that all of the test groups slowed down lesion progression, the 500ppm NaF product produced a reduction in the depth of the lesion, and the nonfluoridated product showed an increase in lesion depth.

Comment (JL): The limitation of this article within the NZ context is that the authors evaluated child formula fluoridated toothpastes (500ppm). Our Ministry of Health guidelines recommend twice daily supervised use of 1000ppm toothpaste, the amount used depending on the age of the child; a smear is used for children up to 5 years of age, while from 6 years old, a pea-sized amount is recommended. The authors acknowledge that their findings "should be interpreted with caution", as the dosage used is not in line with fluoride guidelines.

Comment (DB): Whether to use a child or adult strength toothpaste has been a matter of confusion for the public over recent times, with conflicting information given regarding the need for maximum caries protection without causing fluorosis. This study aimed to investigate the remineralisation capacity of various child strength dentifrices to determine if they are effective in preventing caries. The limitations of the study were due to the *in vitro* design, which does not exactly replicate the conditions within the oral environment. For example, the enzyme required to enable MFP hydrolysis was absent, therefore results for this particular dentifrice were less positive in comparison with others. Within the limitations of this study, a 500ppm NaF dentifrice showed a statistically significant remineralisation potential. However, before recommending toothpaste dosage to children, it is important to first assess caries risk and also take into consideration other fluoride sources such as water and mouthrinses. The NZ Ministry of Health recommends that children under the age of 2 years use a smear of toothpaste at 1000ppm as opposed to 500ppm.

Reference: *Int J Paediatr Dent* 2011;21(2):132-40

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-263X.2010.01101.x/abstract>

Dental caries status and salivary properties of asthmatic children and adolescents

Authors: Paganini M et al

Summary: Sixty-five participants with asthma, aged 3–15 years, were compared with an asthma-free control group of similar age, gender and social background. A marked reduction in the salivary flow of asthmatic children and adolescents versus nonasthmatics was observed (0.80 vs. 1.10 mL/min; $p=0.002$). The initial pH also showed a statistically significant difference, but there were no differences in buffering capacity. Logistical regression showed that asthma severity increases the risk of having a reduced salivary flow by about 17 times. No association was found between asthma severity and either pharmacological treatment or caries experience.

Comment (JL): Saliva provides us with both immunological and nonimmunological antimicrobial factors in the mouth, with decreased salivary flow rate a risk indicator for caries. Recent studies show that about 3.8% of the infantile population have asthma, with the prevalence increasing in many countries. This study aimed to evaluate the dental caries status and salivary flow properties in 3- to 15-year-old asthmatic children/adolescents. This article reinforces the importance of taking a thorough medical history and paying special oral health attention to our asthmatic patients.

Comment (DB): The aim of this study was to determine if asthma medication had a detrimental effect on the caries prevalence of children. 130 patients from Londrina, Brazil participated in the study and they were divided into two groups, 65 being children with asthma and 65 without. I was interested to see that while this study was able to demonstrate a reduced saliva flow for asthmatic children, this did not result in an increase in dental caries. There is a question around whether this lack of relationship may be due to the availability and accessibility of quality dental care for children in the area. It would be interesting to repeat this study across different demographic areas, with adjustments made to account for socioeconomic status and ethnicity.

Reference: *Int J Paediatr Dent* 2011;21(3):185-91

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-263X.2010.01109.x/abstract>

Independent commentary by Jonathan Leichter DMD, Cert Perio (Harvard).

Dr Leichter is currently Senior Lecturer in the Department of Oral Sciences at the University of Otago. Dr Leichter joined the faculty after 20 years in fulltime private practice in New York and Boston, 18 of which were spent in specialist practice limited to periodontology and implant dentistry. Trained at Tufts University and obtaining his specialist training at Harvard University, he has been actively involved in clinical dental implant practice since 1984. Since 2002, he has supervised and mentored postgraduate students in periodontology, endodontics and prosthodontics. His research interests and publications are in the field of periodontology, dental trauma and laser applications in dentistry.

Independent commentary by Deanna Beckett.

Deanna Beckett graduated as a Dental Therapist in 1996 and is currently employed as a Professional Practice Fellow with the Bachelor of Oral Health programme at the School of Dentistry, University of Otago. In addition to her University position, Deanna holds a fortnightly weekend clinic at the Fiordland Dental Centre, providing oral health care for children and adolescents in the greater Fiordland area. Before joining the University staff, Deanna also worked as a Dental Therapist in a variety of schools in the Mid Central, Nelson/Marlborough and Otago areas.

Children's understanding of and motivations for toothbrushing: a qualitative study

Authors: Gill P et al

Summary: This qualitative study explored the understandings and motivations of children aged 6–7 years and 10–11 years with regards to toothbrushing. Sixty-six children of varied socioeconomic and ethnic groups participated. The overwhelmingly prominent reason for brushing is parental prompting, generally a verbal reminder only and not followed by supervision. At sleepovers or access visits, toothbrushing is forgotten about. Children did not relate caries prevention to toothbrushing. Their most prominent reasons for brushing were concerned with appearance, freshness and cleanliness. Oral health information is mostly obtained from teachers.

Comment (JL): It has been shown that the provision of fluoride is a key element in the prevention of dental caries and that brushing regularly with a fluoride-containing toothpaste is the most effective way of bringing fluoride into contact with the teeth. This article highlights several factors: i) we must take into account the complex domestic arrangements of many children; ii) oral health education in parents needs to be targeted; and iii) both children and their parents need to be engaged to ensure compliance.

Comment (DB): This qualitative study into children's toothbrushing identified that one of the main reasons children brush their teeth is 'because they are told to'. There were some concepts of toothbrushing being health related, but children associated it more with having a fresh mouth and breath than to preventing caries. Not many children demonstrated an understanding of how long they should be brushing for, although some electric toothbrushes had the additional bonus of a timer to assist. Of the most concern was the lack of supervision or guidance of children's toothbrushing techniques, and this was apparent irrespective of gender, age and socioeconomic status. This was further complicated when parents were separated, with routines often more lax when staying with the 'absent' parent. An increase in education to parents and children around the importance of supervised toothbrushing with fluoridated toothpaste for two minutes twice a day has been recommended.

Reference: *Int J Dent Hyg* 2011;9(1):79-86

<http://onlinelibrary.wiley.com/doi/10.1111/j.1601-5037.2010.00442.x/full>

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