

Oral Health Research Review

Making Education Easy

Issue 9 - 2011

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Welcome to the ninth issue of Oral Health Research Review.

In this issue, we put the spotlight on the relationships between oral health and other conditions, including obesity, diabetes and renal disease. Another paper highlights the need for something to be done about the poor state of oral health among hospitalised patients. Disinfection of toothbrushes and pacifiers is addressed, as is the erosive effect of some common acid-containing medications, which is of particular concern for young children who may require these on a long-term basis.

We hope you find all the papers selected for this issue interesting, and we welcome your comments and feedback.

Kind regards,

Jonathan Leichter D.M.D

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Inflammation and genetic risk indicators for early periodontitis in adults

Authors: Stashenko P et al

Summary: This analysis of 190 periodontally healthy individuals monitored at 6-month intervals found that gingival crevicular fluid (GCF) interleukin (IL)-1 β levels increased with the severity of periodontitis, with a good correlation seen between GCF IL-1 β levels and clinical signs of incipient disease. However, there was no significant association between IL-1 genotype and periodontitis or its extent.

Comment (JL): It would certainly be useful if our patients could be screened for their risk of developing periodontal disease. Susceptible individuals could then be treated prophylactically, avoiding a disease that is not only linked to several systemic diseases, but also impacts negatively on quality of life by causing discomfort, masticatory problems, abscesses and tooth loss. At present, the best predictor of future attachment loss remains the extent of existing attachment loss. The authors of this paper monitored 190 subjects who were either healthy or had early periodontitis. The IL-1 β content of the GCF, IL-1 genotyping from blood, and clinical measurements including probing depths, clinical attachment levels, plaque index, gingival index and bleeding on probing were obtained every 6 months over an 18-month period. Results showed that GCF IL-1 β levels were positively correlated with attachment levels, probing depths, gingival index, bleeding on probing and smoking. Targeting the inflammatory response for intervention in treatment is therefore valid. However, the IL-1 genetic test genotype did not correlate with either the presence of disease or its progression, and can therefore not be used as a risk indicator to identify either individuals at risk or those in the earliest stages of disease.

Comment (RP): In the past decade there has been some enlightening research published investigating the complex relationships involved in the pathogenesis of periodontitis. The case for inflammation being a marker for early periodontal disease seems to be the most clinically significant finding thus far. The presence of IL-1 genotype in early periodontitis is of interest, and as noted in this study, further research on the correlation between the two is needed to identify the role this plays in progression of periodontal disease. Continued research in this area incorporating larger population bases in different areas of the globe will hopefully improve the method in which periodontal disease is treated, enabling the clinician to concentrate more on prevention rather than treatment.

Reference: *J Periodontol* 2011;82(4):588-96

<http://www.joponline.org/doi/abs/10.1902/jop.2010.100443>

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¹ Harrel S, Molinari J. *J Am Dental Assoc.* 2004; 139: 429-37. ² Fine DH, et al. *J Am Dental Assoc.* 1993; 124(5): 56-8. Medicines have benefits and some may have risks. Always read the label and use only as directed. Listerine® Antiseptic Mouthwash contains: Benzoic acid 0.12% w/v, Cineole (Eucalyptol) 0.0922% w/v, Ethanol 27.0% w/v, Thymol 0.064% w/v. Johnson & Johnson (New Zealand) Ltd, Auckland. TAPS PP9948 2033/11

Sex differences in gingivitis relate to interaction of oral health behaviors in young people

Authors: Furuta M et al

Summary: The aim of this study was to explain sex-based differences in gingivitis in young people aged 18 and 19 years. The authors of this study analysed data from 838 students, excluding any smokers from the study. General health habits and oral health behaviours were reported, and dental knowledge and attitudes ascertained. An oral examination was carried out with the percentage of sites with bleeding on probing used as an indicator for early periodontal disease or gingivitis. The level of plaque and calculus was also assessed. Females had greater oral health knowledge, a more positive attitude, a healthier lifestyle and superior oral health compared with the males. Structural equation modelling revealed significant differences in the pathways (from lifestyle, knowledge and attitude to percentage of bleeding on probing) through oral health behaviours and oral health status.

Comment (JL): It is well documented that gingivitis is more prevalent in males than in females, and it has been suggested that oral health behaviours contribute to this risk. I was not surprised that females had the greater knowledge of oral health, a more positive attitude towards dental visits, a healthier lifestyle and a higher level of oral health behaviours than males. Even with the influence of female sex hormones on the effect that plaque and calculus have on the percentage of BOP, females still had a lower prevalence of gingivitis. This study confirms the need for us to pay particular attention to our young male patients, as their oral health appears to be more at risk than their female counterparts.

Comment (RP): This interesting research looked at the dental health of a large study group of Japanese young people, and attempted to identify the social factors that contribute to disparity between males and females. Females had a significantly lower percentage of sites with bleeding on probing and dental plaque than males, and also had higher dental IQ. The results showed that knowledge, attitude and lifestyle all had an important bearing on the prevalence of gingivitis in the sexes. As the authors noted, knowledge is strongly related to interest. Males and females, as this study and others show, have different dental needs and motivations. Dental care needs to be delivered on an individual basis if we hope to affect any behavioural change.

Reference: *J Periodontol* 2011;82(4):558-65

<http://www.joponline.org/doi/abs/10.1902/jop.2010.100444>

Efficacy of microwaves and chlorhexidine on the disinfection of pacifiers and toothbrushes: an *in vitro* study

Authors: Nelson-Filho P et al

Summary: This study compared disinfection of toothbrushes and pacifiers in a 1100 watt microwave oven at 70% for 7 minutes, spraying 4 times with 0.12% chlorhexidine solution and spraying 4 times with sterile tap water. The toothbrushes and pacifiers were first soaked in a solution containing *S. mutans* then disinfected with one of the above strategies. Microbiological culture and SEM examination were employed to evaluate the presence of *S. mutans*. It was found that 100% of the toothbrushes and 75% of the pacifiers sprayed with water were contaminated. Both the chlorhexidine spray and microwave showed 100% efficacy for disinfection with both toothbrushes and pacifiers.

Comment (JL): I doubt that many people have given much thought to the disinfection of their toothbrush and imagine that a quick rinse under the tap after brushing would be the general protocol among both members of the public and the dental profession. What do you do? Pacifiers have been linked to otitis media, dental caries and intestinal parasites. Not only do they constitute a site for the growth of micro-organisms, they are also a vehicle of contamination and transmission. However, they are often a lifesaver for the stressed, tired parent! Perhaps we should be passing advice regarding sterilising toothbrushes and pacifiers on to our patients?

Comment (RP): Further *in vivo* studies would enable this research to have more practical ramifications. While in theory disinfecting a pacifier is a good idea, in practice the reality may be quite challenging, especially given the taste of most chlorhexidine products. Pacifiers tend to be in and out of infants' mouths on a regular basis, so it would seem they would be constantly re-infected. Also, with the increase in electric toothbrush use, microwave disinfection would seem fairly impractical for most patients. The knowledge of how bacteria are transferred on pacifiers and toothbrushes is quite important to give to patients to enable them to make informed decisions.

Reference: *Pediatr Dent* 2011;33(1):10-3

<http://www.ingentaconnect.com/content/aapd/pd/2011/00000033/00000001/art00002>

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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.

Patient awareness of oral cancer health advice in a dental access centre: a mixed methods study

Authors: Williams M & Bethea J

Summary: This study was carried out to determine the extent of patient awareness in a dental access waiting room where posters and pamphlets regarding the risks of smoking and excess alcohol were displayed. Of the 1161 patients, 40% had read the poster only, while 4.5% had read the pamphlets provided. Only 2.4% had read both. Nine semistructured interviews were carried out in the high or very high alcohol and tobacco consumption groups. An information pamphlet about the causes, signs and symptoms of oral cancer was provided, but, even though all but one of the participants had read it, overall knowledge of the disease was limited.

Comment (JL): Although oral cancers are largely preventable by avoiding known risk factors, their incidence is increasing. Surgical techniques may have improved and nonsurgical management may have advanced, but oral cancer is still associated with high rates of morbidity and mortality. Oral squamous cell carcinoma accounts for 95% of oral cancers. Smoking and high alcohol consumption are the known risk factors, with the majority of cases occurring in people >50 years of age and predominantly in males. We need to find better ways to educate our patients. Are we doing enough?

Comment (RP): While this study looked at a very pertinent topic for oral health professionals, the findings in this study are based on a very select group, with only nine patients being interviewed. As noted in the research, those most at risk for oral cancers are probably the hardest to reach via traditional educational methods. Leaflets and pamphlets were used in this study, and it was found, not surprisingly, that this was an ineffective method of educating those most at risk. "Influencing people's consumption of tobacco and alcohol requires a deeper understanding of why people behave as they do. It is about changing deep rooted social habits that can become addictive, rather than just helping people make better choices" (Boyce et al. 2008). How we do this in the dental environment is the challenge for the oral health provider.

Reference: *Br Dent J* 2011;210:E9

<http://www.nature.com/bdj/journal/v210/n6/full/sj.bdj.2011.201.html>

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Periodontitis and obesity: a study of the fourth Korean National Health and Nutrition Examination Survey

Authors: Kim E-J et al

Summary: This study investigated the relationship between obesity and periodontal disease among a sample of Korean adults. Of the 4246 subjects participating in the Korean National Health and Nutrition Examination Survey (KNHANES), 2261 were measured to evaluate periodontitis and body mass index (BMI), while 2285 were measured to evaluate periodontitis and waist circumference. Periodontitis was defined as a Community Periodontal Index (CPI) score of code 3 or more where 'code 3' indicated that one or more of the index sites had a pocket depth >3.5mm. A multivariate regression analysis revealed no association between BMI and periodontitis, but there was a significant association between abdominal obesity and periodontitis. Moreover, after adjusting for all covariates, obese individuals had a significantly greater risk of periodontitis (odds ratio 1.358 [CI 1.003, 1.839]).

Comment (JL): Epidemiological studies in the US, Japan, Jordan and Brazil have reported a positive correlation between obesity and periodontal disease; however, studies in Europe have not shown a significant relationship. The authors of this study found a significant relationship between obesity and the prevalence of periodontitis when using waist measurement as the obesity indicator. Sociodemographic variables, oral health behaviour and general and oral health status were adjusted for. When BMI was used, no significant association was found. They suggest that further studies are indicated as their assessment of periodontitis by CPI could have overestimated the prevalence by including pseudopockets. No cause-effect relationship was found as the study was cross-sectional in design.

Comment (RP): This is a topical area of research in light of the present epidemic of obesity affecting NZ. Like some other recent research, the authors showed a correlation between obesity and periodontal disease. However, this study only revealed abdominal obesity to have a bearing on periodontal disease, while other studies have shown BMI to also have an effect. Research specific to NZ's population would be useful, taking into account our unique ethnicity and diet and contributing social factors. This research also highlights the need for a holistic approach to dentistry. Access for patients to services such as basic dietary counselling may help to reduce the chances of periodontal disease occurring as a result of obesity.

Reference: *J Periodontol* 2011;82(4):533-42

<http://www.joponline.org/doi/abs/10.1902/jop.2010.100274>

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 Rachel Perrott – DipDentHyg

After graduating from the University of Otago, Rachel worked in private practice setting up hygiene clinics in two West Auckland practices. Shifting to part-time hygiene work, she is presently raising a family while studying early childhood development. She plans to further her study into the area of health promotion.

Oral health status among hospitalized patients

Authors: Carrilho Neto A et al

Summary: The authors of this cross-sectional study examined 82 hospitalised patients to investigate their oral health status, as many studies have demonstrated an association between oral infections and systemic diseases. Their aim was to identify the main oral health problems, in particular oral infection foci, and the oral treatment needs of these patients. In addition to an interview about demographics, health behaviours and oral conditions, an examination was carried out to evaluate oral hygiene, prostheses quality and hygiene, mucous oral lesions, caries status and periodontal status. Oral hygiene was associated with age, but not physical disability, while difficulty eating was associated mainly with age and tooth loss. Among fully and partially dentate patients, 100% had dental plaque, 98.1% had gingival inflammation, 74.5% had periodontal disease, 69% had poor oral hygiene, 60% had caries and 36.5% had oral lesions, most frequently candidiasis (19.6%). There were associations between caries and both smoking and poor oral hygiene, while hospital length of stay and age were related to increased dental plaque and gingival inflammation indices.

Comment (JL): This study found, not surprisingly, that none of the patients reported receiving any oral hygiene or instructions during their period of hospitalization. Poor oral hygiene was common with a high prevalence of edentulism, gingival inflammation, periodontal disease, caries and oral lesions. Almost half of the patients had physical disabilities that interfered with their ability to perform self-hygiene. Many patients had difficulty eating, mostly because of oral problems. One cannot help but wonder how their oral status must impact on their ability to regain systemic health. It would appear that the oral health needs of this particular group of people are being badly neglected.

Comment (RP): Many studies have shown the relationship between systemic diseases and diseases affecting the oral cavity. It would seem obvious therefore that when a patient is treated in hospital for a systemic disease that has been shown to have a correlation to dental diseases, then the mouth should also be treated. The bare minimum should be that these patients have access to oral hygiene instruction. It does seem quite inadequate to be treating one without treating the other. Maybe with results from this type of study, governing bodies will be forced into action in providing more holistic healthcare.

Reference: *Int J Dent Hyg* 2011;9(1):21-9

<http://onlinelibrary.wiley.com/doi/10.1111/j.1601-5037.2009.00423.x/full>

In vitro alterations in dental enamel exposed to acidic medicines

Authors: Valinoti AC et al

Summary: Three acidic medicines were selected for this study – Klaricid®, Claritin® and Dimetapp®. 250 bovine enamel blocks were used to determine changes in surface roughness and microhardness after the experimental phase. This constituted pH-cycling regimens (physiological and erosive), which are an efficient way to stimulate the oral environment *in vitro*. It was found that all three medicines produced a significant reduction in hardness in a physiological oral environment. All three medicines were associated with greater roughness in blocks exposed to physiological and erosive environments, with the exception of Claritin® in blocks exposed to the physiological environment. Dimetapp® was the most erosive and Klaricid® the least erosive medicine.

Comment (JL): Acids are commonly used in medicines to maintain chemical stability, ensure physiological compatibility and improve flavour. In children with chronic diseases, liquid oral medicines are consumed daily for prolonged periods. It has been shown in various studies that acidic medicines can reduce the enamel hardness of primary teeth, influence the enamel roughness and cause morphological enamel alterations. But what about those children whose teeth are already under an acidic attack from a highly erosive diet? In the already erosive environment in this study, enamel destruction was so extensive that the enamel hardness could not be verified! It would be hoped that the pharmaceutical industry is made aware of these findings so that current formulations can be altered to minimise the effects on our patients' teeth.

Comment (RP): This study examined specifically the effects of Klaricid, Dimetapp and Claritin on bovine enamel in an *in vitro* study. The authors mention some limitations such as the inability of *in vitro* studies to accurately mimic the oral environment, in particular the buffering capacity of saliva and salivary pellicle, also the differences in how bovine enamel responds as opposed to human enamel. However, the study does show the risk of erosion when certain medications are used on an ongoing basis. A thorough medical history is imperative to ascertain what medications a patient is on, and in what form they are taken, so risk factors can be correctly identified.

Reference: *Int J Paediatr Dent* 2011;21(2):141-50

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-263X.2010.01104.x/abstract>

Diabetes mellitus-associated periodontitis: differences between type 1 and type 2 diabetes mellitus

Authors: Aspriello SD et al

Summary: This study compared 24 periodontitis patients with type 1 diabetes mellitus with 24 periodontitis patients with type 2 diabetes mellitus. The subjects were affected by the same degree of periodontal disease, so as to eliminate bias. Participants were evaluated clinically and radiographically by the same examiner. Gingival crevicular fluid (GCF) samples were collected from six maxillary anterior sites in each patient with >5mm probing depths, and fasting blood samples were collected. Results showed that the full mouth means of the periodontal parameters (plaque index, gingival index, sulcus bleeding index, probing depth and clinical attachment loss) did not differ significantly between the two groups. Significantly higher levels of GCF interleukin (IL)-1 β and tumour necrosis factor (TNF)- α were found in the type 1 diabetes group than in the type 2 diabetes group. Levels were also higher in cases of recent onset of the disease, with significant negative correlations between duration of type 1 diabetes and GCF levels of both IL-1 β and TNF- α .

Comment (JL): Diabetes, the most common human endocrine disease, is an important and independent risk factor for the development of gingivitis and periodontal disease. This study highlights the necessity of treating periodontitis during the early stages of type 1 diabetes development.

Comment (RP): With the increase in diagnoses of type 1 and type 2 diabetes in NZ, it is worth noting the unique effects each of these may have on the oral environment. This study was done on a small group, but the results seem to suggest that patients are more at risk for periodontal disease earlier on in the diagnosis period of type 1 diabetes. Type 1 diabetes is primarily diagnosed in children and young adults. Although this age group is not usually at high risk of periodontal disease, thorough and regular checks of the periodontium are essential.

Reference: *J Periodont Res* 2011;46(2):164-9

<http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0765.2010.01324.x/abstract>

The effect of xylitol on the composition of the oral flora

Authors: Söderling E et al

Summary: This 18-week randomised, double-blind, crossover pilot study investigated the effect of xylitol on a wide range of oral flora, as previously published studies have only targeted a few specific organisms. Results showed that mutans streptococci (MS) counts from 'caries-prone' tooth surfaces and from plaque decreased significantly for all ten evaluable subjects after chewing xylitol gum ($p < 0.01$). No effect was detected on salivary MS counts or salivary levels of total streptococci or lactobacilli. In the control/sorbitol gum group, no changes were seen in any MS counts. When all available plaque was cultured for total facultatives, no study-induced effects were detected in microbial counts and the plaque composition remained unchanged.

Comment (JL): Xylitol is known to benefit oral health through several mechanisms – it increases salivary flow, which promotes mineralisation, it is nonfermentable by oral bacteria, and it has been shown to reduce MS counts. Although the results in this study do not appear dramatic, chewing xylitol gum is an easy addition to a patient's homecare regimen, and one that I routinely recommend.

Comment (RP): Continued use of xylitol has been proven to reduce MS in the oral cavity. This study, albeit a pilot study, did not further our existing knowledge on the role of xylitol on MS. The study group consisted of 12 people, 10 of whom were pre-existing xylitol users. The author noted this as a confounding factor, possibly affecting the less than dramatic decrease in MS. Further research in this area would be useful. With increased knowledge of the interaction between different bacteria in the mouth and agents such as xylitol, this could further the scope of dental care in targeting specific problematic bacteria.

Reference: *Eur J Dent* 2011;5(1):24-31

http://www.eurjdent.com/images/Volume_5/5-24-31.pdf

Clinical oral findings in dialysis and kidney-transplant patients

Authors: Dirschnabel AJ et al

Summary: This study was conducted in 116 patients, 46 of whom were undergoing haemodialysis, 33 were renal transplant recipients and 37 were healthy control patients. Oral evaluations were carried out by a single investigator, and any necessary biopsies were sent for histopathological evaluation. Renal patients had twice as many oral findings as the control group, with at least one pathological entity in the oral mucosa seen in 95.6% and 93.9% of dialysis and renal transplant participants, respectively, versus 56.7% of control participants. Xerostomia and saburral tongue were the most prevalent findings. Geographic tongue was most frequent in the kidney transplant group. The frequency of oral lesions was not affected by the amount of time the patient had been on dialysis or the time since kidney transplant.

Comment (JL): Studies about the prevalence of oral lesions in end-stage renal disease patients undergoing haemodialysis and renal transplant patients are scarce. As the number of patients treated with dialysis/renal transplantation increases each year, it is important for us to be aware of the oral lesions that may be present.

Comment (RP): Much research has been published on the oral effects associated with dialysis and kidney transplants. This paper looked specifically at the prevalence of oral lesions in this high-risk group of patients. While the results do show a greater prevalence of common oral lesions associated with kidney transplants and dialysis, the study group was quite small. However, it does reinforce the importance of taking a thorough medical history for each patient and keeping it regularly updated. Early intervention is the best treatment for any oral lesion. Being aware of what the various clinical manifestations can be is crucial, and regular thorough intra-oral exams are also imperative in treating patients undergoing dialysis or who have had kidney transplants.

Reference: *Quintessence Int* 2011;42(2):127-33

<http://tinyurl.com/QuinInt-42-127>

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