

Hospitalization Increases Plaque and Gingivitis

A person's daily routine changes significantly when hospitalized, even for a short time. Stress, anxiety and the fear of pain and discomfort may make the body more fragile. Physical limitation of the patient or even the hospital environment can impact otherwise regular healthy oral habits.

Researchers at the Federal University of Piau in Brazil observed patients in two hospitals for changes in their plaque and gingivitis levels during a short stay. Patients were in one private and one public hospital and no subjects were in intensive care. Both demographic and socioeconomic data were collected from each of the 162 patients. One dentist with an assistant holding a flashlight carried out all the exams. Patients

were not told of their oral health status and no oral hygiene instructions were given. Data was collected from four sites per tooth for plaque and gingivitis.

There were four observation periods based on the number of days in the hospital: three, seven, 14 and 21 days. Sixteen patients were observed throughout the four observation times. Neither hospital had an oral health protocol for patients to follow. Daily toothbrushing was reduced by 72 percent of the patients, despite 83 percent reporting no barrier to daily oral hygiene.

Plaque levels increased at each time point, compared to baseline. Gingivitis scores increased significantly at days 7 and 21. There may have been pre-existing systemic conditions that contributed to the increases in plaque and gingivitis. These findings suggest the need for oral health care protocols for hospital patients.

Clinical Implications: Hospitalized patients need advice and coaching to maintain their regular daily oral hygiene habits. ■

Sousa, L., Filho, W., Mendes, R., Neto, J., Prado, R.: Oral Health of Patients Under Short Hospitalization Period: Observational Study. J Clin Perio 41:558-563, 2014.

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Smokers Cancel Their Hygiene Visits More Often Than Non-Smokers

Periodontal disease is still a significant problem, with nearly half the population suffering with chronic periodontitis. Periodontal therapy, both scaling and root planing and surgical procedures can stop the progression of disease. Patients are encouraged to maintain good daily oral hygiene and return to their dental professional for regular Supportive Periodontal Therapy (SPT) visits. Despite these efforts on the part of dental professionals, patient compliance with SPT is generally poor. Depending on the study, compliance rates show approximately one-third of perio patients are completely compliant with recommended SPT. Many things influence compliance, including age, severity of the disease, financial costs, attitude, anxiety, stress, depression and smoking.

Researchers at the University of Bern in Bern, Switzerland evaluated a group of 1,336 patient charts for those being seen by dental hygienists in the periodontal clinic of the dental school. Of this group, 32 percent were smokers, 23 percent were former-smokers and 45 percent were non-smokers. The patients had been seen over a period of 26 years, from 1985-2011. Of this group, 74 percent returned to see the dental hygienist and 26 percent never returned. Some were referred back to their general dentist, but others simply never returned.

Overall compliance of those returning was 70 percent. Of the smokers, 67 percent complied compared to non-smokers who complied at a level of 72 percent. A total of 66 patients presented with 100 percent compliance with the recommended interval, which amounts to about seven percent.

Clinical Implications: Compliance with SPT is low, and those who smoke are slightly less likely to comply. ■

Ramseier, C., Kobrehel, S., Staub, P., Sculean, A., Lang, N., Salvi, G.: Compliance of Cigarette Smokers with Scheduled Visits for Supportive Periodontal Therapy. J Clin Perio 41:473-480, 2014.

Air Polishing with Erythritol and Chlorhexidine

Maintenance therapy for periodontal patients focuses on removal of subgingival bacterial biofilm. Stainless steel curettes and power scalers are the most popular tools for this task. Recent research shows the benefit of subgingival air polishing for subgingival biofilm disruption rather than hand or power scalers.

Researchers at the University of Geneva in Switzerland compared two approaches to subgingival biofilm removal. One side of the mouth was treated with an air polisher using erythritol powder containing 0.3 percent chlorhexidine and the other side with a piezoelectric power scaler.

A total of 49 patients completed the 12 month study. Subjects all received baseline data collection, collection of subgingival plaque samples, calculus removal with hand instruments and oral hygiene instructions. Random assignment was then made for one side of the dentition to be air polished with erythritol powder and the other side to be treated with a power scaler. Sites over 4mm were treated subgingivally. Patients were seen every three months for one year, with the assigned treatment repeated for any remaining pockets 4mm or deeper. The time necessary for the treatment and the patient's comfort level were also recorded.

At the end of one year, both the groups showed improved probing depths and reduced bleeding scores. The air polishing group demonstrated lower levels of *Aggregatibacter actinomycetemcomitans* than the power scaling group. Treatment time was similar for both groups. The perception of pain and discomfort was significantly lower for the air polished sites compared to the power scaler treated sites.

Clinical Implications: Because of patient comfort and effectiveness, subgingival air polishing with erythritol powder may one day replace power scaling for periodontal maintenance visits. ■

Müller, N., Moëne, R., Cancela, J., Mombelli, A.: Subgingival Air-Polishing with Erythritol During Periodontal Maintenance. *J Clin Perio* 41(9):875-882, 2014.

Xylitol Interferes with Periodontal Pathogens

The destruction of healthy connective tissue and bone in periodontal disease is caused in part by proteinases secreted by the bacteria. Subgingival bacteria release endotoxins that trigger an infection in the tissues and an inflammatory response. The greatest destruction is due to the cytokines released by white blood cells in a reaction to the lipopolysaccharide released by the bacteria that triggers the body's immune response. Two of the cytokines associated with periodontal destruction are interleukin-1 (IL-1) and tumor necrosis factor alpha (TNF-). Xylitol inhibits the growth and acid production by *Streptococcus mutans*, but little is known of the effects on periodontal pathogens.

Researchers in the Department of Oral Microbiology at Pusan National University in Korea evaluated the laboratory effects of xylitol on cytokine expression by *Porphyromonas gingivalis* (Pg). The bacteria were grown in anaerobic conditions and lipopolysaccharide was extracted and added to macrophage cultures. Expression of

IL-1 and TNF- were then measured at two and four hours.

To test the impact of xylitol, the macrophages were pre-treated with a variety of xylitol concentrations (1, 2, 4 or 8 percent) before being exposed to lipopolysac-



charide from Pg. Xylitol pretreatment reduced the production of IL-1 and TNF- at a dose dependent rate. Four and 8 percent significantly inhibited cytokine production without killing the cells. Xylitol also showed an inhibitory effect on the growth of Pg.

These findings suggest that xylitol, a natural sugar, may provide good clinical effects for controlling periodontal disease by preventing bacterial proliferation and cytokine expression.

Clinical Implications: Daily xylitol use may provide preventive benefits for periodontal disease as well as caries. ■

Han, S., Jeong, S., Chung, J.: Xylitol Inhibits Inflammatory Cytokine Expression Induced by Lipopolysaccharide from *Porphyromonas Gingivalis*. *Clin Diagn Lab Immunol* 11: 1285-1291, 2005.

Review of Xylitol Research and Update on Ongoing Efforts

This review article reported on xylitol research from 2008. Xylitol is a safe natural sugar that effectively prevents transmission of *Streptococcus mutans* from mother to baby when used by the mother several times each day after the child's birth. Children receiving xylitol lozenges several times daily experienced significantly less dental caries than control children. School children receiving xylitol several times daily in

a gummy bear confection showed reduced levels of *Streptococcus mutans*. Once daily use of xylitol containing toothpaste was not effective. Xylitol provides an added benefit to chewing gum beyond the increase in salivary flow.

Evidenced-based reviews often include only a few studies following the same clinical study design. Field studies are

more difficult to conduct than in-house clinical trials as many factors influence the process.

Recently, the American Academy of Pediatric Dentistry strengthened its recommendation of xylitol use stating that "AAPD supports the use of xylitol as part of a preventive strategy aimed specifically at long term caries pathogen suppression and caries reduction in higher risk populations."

Studies confirm the benefits of xylitol use in children to elevate salivary pH and prevent dental caries. Other studies provide new evidence of how xylitol reduces numbers of *Streptococcus mutans*, not by growth inhibition, but rather by prevention of bacterial adhesion to tooth surfaces exposed to xylitol.

Despite a multitude of studies published, information about the clinical benefits of xylitol is not reaching clinicians. Future studies are needed to determine the best ways to address the global dental caries problem.



Clinical Implications: Xylitol provides significant preventive benefits for those at risk for caries and for long term caries prevention. ■

Milgrom, P., Söderling, E., Nelson, S., Chi, D., Nakai, Y.: Clinical Evidence for Polyol Efficacy. Adv Dent Res 24(2): 112-116, 2012.

Oral Probiotics Reduce Levels of Strep Mutans

Dental caries is a preventable disease that affects people of all ages. Biofilm containing *Streptococcus mutans* (Strep mutans) together with a susceptible host and fermentable nutrients leads to demineralization of tooth structure. Current preventive measures focus primarily on topical fluorides, diet and oral hygiene. Recently oral probiotics have been introduced for caries prevention. Probiotics are living microorganisms that confer a health benefit to the host. Probiotics produce substances harmful to Strep mutans, they stimulate immune response, modulate inflammation, compete with oral bacteria for nutrients and binding sites on the teeth.

Research has shown beneficial effects to the gastrointestinal tract from probiotics. Oral probiotics are designed to be dissolved in the mouth to compete with the common oral microflora.

Researchers in Belgium and The Netherlands reviewed the research on oral probiotics. They began with 725 research articles,

narrowing it down to 19 that measured Strep mutans levels and of these, 12 studies that were included in a meta-analysis - combining data from the similarly designed studies.

Test subjects who were given probiotics had lower Strep mutans levels than those given a placebo or nothing. Lactobacillus counts did not show significant differences between control and probiotic groups.

Three studies were long term and could measure the impact of oral probiotics on caries incidence. Young children drinking milk containing *Lactobacillus rhamnosus* did experience a significant reduction in caries incidence. Milk containing both probiotics and fluoride was beneficial in the prevention of root caries in older individuals.

Clinical Implications: These findings suggest that oral probiotics may be an effective approach to preventing dental caries. ■

Laleman, I., Detaillieu, V., Slot, D., Slomka, V., Quirynen, M., Teugels, W.: Probiotics Reduce Mutans Streptococci Counts in Humans: A Systematic Review and Meta-Analysis. J Clin Invest 18:1539-1552, 2014.