

1. J Dent. 2013 Oct 3. pii: S0300-5712(13)00245-5. doi: 10.1016/j.jdent.2013.09.007. [Epub ahead of print]

Effect of three-year consumption of erythritol, xylitol and sorbitol candies on various plaque and salivary caries-related variables.

[Runnel R](#), [Mäkinen KK](#), [Honkala S](#), [Olak J](#), [Mäkinen PL](#), [Nõmmela R](#), [Vahlberg T](#), [Honkala E](#), [Saag M](#).

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Abstract

OBJECTIVE:

The objective of the present paper is to report results from oral biologic studies carried out in connection with a caries study.

METHODS:

Samples of whole-mouth saliva and dental plaque were collected from initially 7- to 8-year-old subjects who participated in a 3-year school-based programme investigating the effect of the consumption of polyol-containing candies on caries rates. The subjects were randomized in three cohorts, consumed erythritol, xylitol, or sorbitol candies. The daily polyol consumption from the candies was approximately 7.5g.

RESULTS:

A significant reduction in dental plaque weight from baseline ($p < 0.05$) occurred in the erythritol group during almost all intervention years while no changes were found in xylitol and sorbitol groups. Usage of polyol candies had no significant or consistent effect on the levels of plaque protein, glucose, glycerol, or calcium, determined yearly in connection with caries examinations. After three years, the plaque of erythritol-receiving subjects contained significantly ($p < 0.05$) lower levels of acetic acid and propionic acid than that of subjects receiving xylitol or sorbitol. Lactic acid levels partly followed the same pattern. The consumption of erythritol was generally associated with significantly ($p < 0.05$) lower counts of salivary and plaque mutans streptococci compared with the other groups. There was no change in salivary Lactobacillus levels.

CONCLUSION:

Three-year consumption of erythritol-containing candies by initially 7- to 8-year old children was associated with reduced plaque growth, lower levels of plaque acetic acid and propionic acid, and reduced oral counts of mutans streptococci compared with the consumption of xylitol or sorbitol candies.

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PMID: 24095985 [PubMed - as supplied by publisher]

[Related citations](#)

[Topical xylitol administration by parents for the promotion of oral health in infants: a caries prevention experiment at a Finnish Public Health Centre.](#)

[Mäkinen KK](#), [Järvinen KL](#), [Anttila CH](#), [Luntamo LM](#), [Vahlberg T](#).

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Abstract

OBJECTIVES:

This demonstration programme tested topical use of xylitol as a possible oral health promoting regimen in infants at a Finnish Public Health Centre in 2002-2011.

METHODS:

Parents (usually mothers) began once- or twice-daily administration of a 45% solution of xylitol (2.96 m) onto all available deciduous teeth of their children at the age of approximately 6-8 months. The treatment (xylitol swabbing), which continued till the age of approximately 36 months (total duration 26-28 months), was carried out using cotton swabs or a children's toothbrush; the approximate daily xylitol usage was 13.5 mg per each deciduous tooth.

RESULTS:

At the age of 7 years, caries data on the deciduous dentition of 80 children were compared with those obtained from similar, untreated children (n = 90). Xylitol swabbing resulted in a significant (P < 0.001) reduction in the incidence of enamel and dentine caries compared with the comparison subjects (relative risk 2.1 and 4.0, respectively; 95% confidence intervals 1.42-3.09 and 2.01-7.98, respectively). Similar findings were obtained when the children were 5 or 6 years old. The treatment reduced the need of tooth filling relative risk and 95% confidence intervals at 7 years: 11.86 and 6.36-22.10, respectively; P < 0.001). Compared with untreated subjects, the oral counts of mutans streptococci were reduced significantly (P < 0.001).

CONCLUSIONS:

Considerable improvement in dental health was accomplished in infants participating in a topical at-home xylitol administration experiment, which was offered to families in the area by the Public Health Centre as a supplement to standard oral health care. Caregiver assessment of the programme was mostly rated as high or satisfactory.

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PMID: 23879257 [PubMed - indexed for MEDLINE]

[Related citations](#)

3. Community Dent Oral Epidemiol. 2013 Dec;41(6):534-40. doi: 10.1111/cdoe.12057. Epub 2013 Jun 20.

Long-term effects of maternal prevention on children's dental decay and need for restorative treatment.

[Laitala ML](#), [Alanen P](#), [Isokangas P](#), [Söderling E](#), [Pienihäkkinen K](#).

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Abstract

OBJECTIVES:

In a Finnish study carried out in 1990s, high-caries-risk mothers used xylitol gum on daily basis when their child was 3-24-month old, whereas the high-risk control mothers received biannual fluoride or chlorhexidine treatments. The maternal prevention reduced colonization of mutans streptococci and early childhood caries in children. The present retrospective study aimed to extend the post-trial follow-up to 10-year-old children (n = 148). Additionally, the dental health of these high-caries-risk children was compared with a reference group comprising the rest of the children in the same age cohort (n = 359).

METHODS:

The annual data on dental health and treatments were gathered from public dental care registers.

RESULTS:

The median caries-free age (dmft = 0 and DMFT = 0) was 8.2 in the xylitol, 5.8 in the control, and 8.1 in the reference group (xylitol versus control, P = 0.005, HR = 1.75; 95% CI 1.18-2.60, reference versus xylitol, P = 0.410, HR = 1.13; 95% CI 0.84-1.51 Cox regression). Thus, the children in the xylitol group had caries-free teeth longer than the control group. Compared to the reference group, the xylitol group did not show notable difference. Up to 4 years of age, figures for cumulative restorative treatment visits were 0.2 in the xylitol, 0.7 in the control, and 0.4 in the reference group (xylitol versus control P = 0.006, Student's t-test).

CONCLUSIONS:

The reduced mother-child transmission of mutans streptococci seems to have long-term effects on children's dental health. The maternal use of xylitol reduces caries occurrence and need for restorative treatment in assumed high-caries-risk children to the average level of the whole age cohort.

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PMID: 23786466 [PubMed - in process]

[Related citations](#)

4. J Dent Res. 2013 Jun;92(6):512-7. doi: 10.1177/0022034513487211. Epub 2013 Apr 15.

Tooth-surface-specific effects of xylitol: randomized trial results.

[Ritter AV](#), [Bader JD](#), [Leo MC](#), [Preisser JS](#), [Shugars DA](#), [Vollmer WM](#), [Amaechi BT](#), [Holland JC](#).

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Abstract

The Xylitol for Adult Caries Trial was a three-year, double-blind, multi-center, randomized clinical trial that evaluated the effectiveness of xylitol vs. placebo lozenges in the prevention of dental caries in caries-active adults. The purpose of this secondary analysis was to investigate whether xylitol lozenges had a differential effect on cumulative caries increments on different tooth surfaces. Participants (ages 21-80 yrs) with at least one follow-up visit (n = 620) were examined at baseline, 12, 24, and 33 months. Negative binomial and zero-inflated negative binomial regression models were used to estimate incidence rate ratios (IRR) for xylitol's differential effect on cumulative caries increments on root and coronal surfaces and, among coronal surfaces, on smooth (buccal and lingual), occlusal, and proximal surfaces. Participants in the xylitol arm developed 40% fewer root caries lesions (0.23 D2FS/year) than those in the placebo arm (0.38 D2FS/year; IRR = 0.60; 95% CI [0.44, 0.81]; $p < .001$). There was no statistically significant difference between xylitol and control participants in the incidence of smooth-surface caries ($p = .100$), occlusal-surface caries ($p = .408$), or proximal-surface caries ($p = .159$). Among these caries-active adults, xylitol appears to have a caries-preventive effect on root surfaces (ClinicalTrials.gov NCT00393055).

PMCID: PMC3654758 [Available on 2014/6/1]

PMID: 23589387 [PubMed - indexed for MEDLINE]

[Related citations](#)



5. J Dent Res. 2012 Jul;91(7 Suppl):85S-90S.

Effects of xylitol wipes on cariogenic bacteria and caries in young children.

[Zhan L](#), [Cheng J](#), [Chang P](#), [Ngo M](#), [Denbesten PK](#), [Hoover CI](#), [Featherstone JD](#).

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Abstract

The aim of the study was to investigate the efficacy of the use of xylitol-containing tooth-wipes in

preventing dental caries in young children. In a double-blinded randomized controlled clinical trial, 44 mothers with active caries and their 6- to 35-month-old children were randomized to xylitol-wipe or placebo-wipe groups. The children's caries scores were recorded at baseline and 1 year. Salivary levels of mutans streptococci and lactobacilli were enumerated at baseline, 3, 6, and 12 months. Data were analyzed by intent-to-treat modeling with imputation for caries lesions and a linear mixed-effect model for bacterial levels. Significantly fewer children in the xylitol-wipe group had new caries lesions at 1 year compared with those in the placebo-wipe group ($P < 0.05$). No significant differences between the two groups were observed in levels of mutans streptococci and lactobacilli at all time-points. Daily xylitol-wipe application significantly reduced the caries incidence in young children as compared with wipes without xylitol, suggesting that the use of xylitol wipes may be a useful adjunct for caries control in infants (Clinicaltrials.gov registration number CT01468727).

PMCID: PMC3383105 **Free PMC Article**

PMID: 22699675 [PubMed - indexed for MEDLINE]

[Related citations](#)



6. Adv Dent Res. 2012 Sep;24(2):123-8. doi: 10.1177/0022034512449468.

[Are we ready for definitive clinical guidelines on xylitol/polyol use?](#)

[Fontana M](#), [González-Cabezas C](#).

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Abstract

In the past decades, numerous studies have looked at the anticaries effects of polyols, particularly xylitol, and a great many studies have focused on xylitol's antimicrobial properties. Researched vehicles have mostly included chewing gums, followed by lozenges/candies, toothpastes, and others (e.g., syrup). Good evidence supports the claims that xylitol is non-cariogenic and has a dose-/frequency-dependent antimicrobial effect on dental plaque/mutans streptococci, and that polyol use is very safe. However, interpretation of caries data has been controversial, due in part to variability in study designs, formulations/dosages tested, and outcomes reported (e.g., many caries studies have a "no gum" control, limiting the interpretation of the polyol's benefit; few studies have compared different polyols side-by-side, or in adults). Even when the level/strength of high-quality anticaries evidence is still limited, most recent systematic reviews have consistently concluded that the habitual use of sucrose-free xylitol or polyol-combination chewing gum/ lozenges is an effective adjunct in coronal caries prevention. Consequently, many health organizations worldwide are supporting this recommendation for at-risk populations. However, most experts agree that well-designed, placebo-controlled randomized clinical trials (RCTs) (focusing on efficacy, feasibility, adherence, dosage, vehicle, synergism with other preventive strategies, and cost) are still needed in target populations worldwide to reach definitive caries-preventive/therapeutic recommendations.

PMID: 22899694 [PubMed - indexed for MEDLINE]

[Related citations](#)



7. Adv Dent Res. 2012 Sep;24(2):117-22. doi: 10.1177/0022034512449835.

Clinical efficacy and effects of xylitol wipes on bacterial virulence.

[Zhan L](#), [Featherstone JD](#), [Lo J](#), [Krupansky C](#), [Hoang N](#), [DenBesten P](#), [Huynh T](#).

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Abstract

The aim of the study was to investigate whether xylitol-wipe use in young children prevented caries by affecting bacterial virulence. In a double-blinded randomized controlled clinical trial, 44 mother-child pairs were randomized to xylitol-wipe or placebo-wipe groups. Salivary mutans streptococci levels were enumerated at baseline, 6 months, and one year. Ten mutans streptococci colonies were isolated and genotyped from each saliva sample. Genotype-colonization stability, xylitol sensitivity, and biofilm formation of these isolates were studied. Despite a significant reduction in new caries at one year in the xylitol-wipe group, no significant differences were found between the two groups in levels of mutans streptococci. Children in the xylitol-wipe group had significantly fewer retained genotypes ($p = 0.06$) and more transient genotypes of mutans streptococci ($p = 0.05$) than those in the placebo-wipe group. At one year, there was no significant difference in the prevalence of xylitol-resistant genotypes or in biofilm formation ability of mutans streptococci isolates between the two groups. The mechanism of the caries-preventive effect of xylitol-wipe use may be related to the stability of mutans streptococci colonization. Further studies with genomic characterization methods are needed to determine specific gene(s) that account for the caries-preventive effect of xylitol.

PMID: 22899693 [PubMed - indexed for MEDLINE]

[Related citations](#)



8. Adv Dent Res. 2012 Sep;24(2):112-6. doi: 10.1177/0022034512449467.

Clinical evidence for polyol efficacy.

[Milgrom P](#), [Söderling EM](#), [Nelson S](#), [Chi DL](#), [Nakai Y](#).

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Abstract

Xylitol is a safe dental caries preventive when incorporated into chewing gum or confections used habitually. The goal of this paper is to identify and assess the work on xylitol and other polyols and dental caries since 2008. Xylitol is effective when used by the mother prenatally or after delivery to prevent mutans transmission and subsequent dental caries in the offspring. One new

completed trial confirmed that children of mothers who used xylitol lozenges after delivery had less dental caries than a comparison group. A similar study confirmed that the use of xylitol gum by the mother either prevented or postponed MS transmission to the offspring. Xylitol use among schoolchildren delivered via a gummy bear confection reduced *S. mutans* levels, but a once per day use of xylitol-containing toothpaste did not. Randomized trials, with caries outcomes, assessing xylitol-containing lozenges in adults and xylitol-containing gummy bears in children will release results in the coming year. Other studies are ongoing but are not systematic and will fail to answer important questions about how xylitol, or other polyols, can address the global dental caries problem.

PMCID: PMC3420363 **Free PMC Article**

PMID: 22899692 [PubMed - indexed for MEDLINE]

[Related citations](#)



9. Caries Res. 2012;46(6):519-22. doi: 10.1159/000341221. Epub 2012 Aug 10.

Xylitol carryover effects on salivary mutans streptococci after 13 months of chewing xylitol gum.

[Shinga-Ishihara C](#), [Nakai Y](#), [Milgrom P](#), [Söderling E](#), [Tolvanen M](#), [Murakami K](#).

Pediatric Dental Clinic, Okayama University Hospital, Okayama, Japan.

Abstract

To assess mutans streptococci (MS) during xylitol gum chewing (mean 3.8 g/day, 2.9 times/day) for 13 months and then for 15 months after the intervention, Japanese mothers with high salivary MS were randomized into two groups: xylitol gum (n = 56) and no gum (n = 51). The proportion of low MS levels was highest at 3 months of consumption (48.8%), but was significantly lower compared to baseline at the end of the intervention (p < 0.001). MS levels did not change during the postintervention period. The data suggest that in the xylitol group 23.3% showed persistent carryover effects by xylitol gum chewing in the postintervention period.

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PMID: 22890503 [PubMed - indexed for MEDLINE]

[Related citations](#)



10. Clin Oral Investig. 2013 Apr;17(3):785-91. doi: 10.1007/s00784-012-0774-5. Epub 2012 Jul 13.

Six months of high-dose xylitol in high-risk caries subjects--a 2-year randomised, clinical trial.

[Campus G](#), [Cagetti MG](#), [Sale S](#), [Petruzzi M](#), [Solinas G](#), [Strohmer L](#), [Lingström P](#).

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Abstract

OBJECTIVES:

The hypothesis was that the daily use of a high dose of a xylitol chewing gum for 6 months would reduce the increment of decayed permanent first molar surfaces ($\Delta D6S$) in high-risk schoolchildren after 2 years.

METHODS:

In this randomised, clinical trial, 204 schoolchildren with a high caries risk were assigned to two experimental groups, xylitol and non-xylitol. Caries status, salivary mutans streptococci, and lactobacilli were re-evaluated 2 years later in 74 xylitol-treated and 83 non-xylitol-treated schoolchildren. Differences in mean $\Delta D6S$ between groups registered at baseline and at follow-up were evaluated using the nonparametric Mann-Whitney U test.

RESULTS:

Outcome was the development of detectable carious lesions initial (D1-D2) and manifest (D3) in the permanent first molars. In the xylitol group, the difference in proportion of children with decayed first permanent molars at baseline and follow-up was 1.43% for manifest lesion and 2.86% for initial lesions; while in the non-xylitol group was 10.26% ($p < 0.01$) and 16.66% ($p < 0.01$), respectively. A statistically significant difference regarding means was also observed in the non-xylitol group: the $\Delta D6S$ for manifest lesion was 0.18 ($p = 0.03$) and 0.67 ($p = 0.02$) for initial lesion.

CONCLUSION:

The use of a chewing gum containing a high dose of xylitol for a period of 6 months has been shown to produce a long-term effect on caries development in high caries-risk children.

CLINICAL RELEVANCE:

A school-based preventive programme based on 6 months' administration of a high dose of xylitol via chewing gum proved to be efficacious in controlling caries increment in high-risk children.

PMCID: PMC3607712 **Free PMC Article**

PMID: 22791282 [PubMed - in process]

[Related citations](#)



11. Eur Arch Paediatr Dent. 2012 Apr;13(2):64-9.

[Caries prevention with xylitol lozenges in children related to](#)

maternal anxiety. A demonstration project.

[Olak J](#), [Saag M](#), [Vahlberg T](#), [Söderling E](#), [Karjalainen S](#).

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Abstract

AIM:

This was to compare the effect of a prevention program between children of anxious and non-anxious mothers.

METHODS:

Mothers (n=120) with high and low dental anxiety scores (DAS>15 and DAS <8, respectively), and with high levels of mutans streptococci (>10(5)cfu/mL) were recruited at a maternity clinic of Tartu, Estonia. Two groups: 30 highly anxious, and 30 non-anxious mothers used xylitol (6 g/day) for 33 months and a non-treatment group of 60 mothers, both highly and low anxious (30 in each sub-group), acted as controls. All mothers were interviewed for oral health habits and education, and their dental health was examined. Due to discontinued participation 75% of the children (n=90) were examined at 2 and at 3 years of age.

RESULTS:

Anxious mothers brushed less frequently (p=0.014), had a longer time since their last dental visit (p<0.0001), and a lower level of education (p<0.0001) than their non-anxious counterparts. However, maternal anxiety had no effect on children's dental health, contrary to the caries prevention program which was effective both at 2 and at 3 years of age (p<0.01; OR 6.6, 1.8-25.0 and OR 3.9, CI 1.5-10.0, respectively).

CONCLUSION:

Children benefited from the caries prevention program, irrespective of maternal anxiety.

PMID: 22449804 [PubMed - indexed for MEDLINE]

[Related citations](#)

12. Clin Oral Investig. 2012 Dec;16(6):1647-57. doi: 10.1007/s00784-011-0656-2. Epub 2011 Dec 24.

Risk indicators for the presence and extent of root caries among caries-active adults enrolled in the Xylitol for Adult Caries Trial (X-ACT).

[Ritter AV](#), [Preisser JS](#), [Chung Y](#), [Bader JD](#), [Shugars DA](#), [Amaechi BT](#), [Makhija SK](#), [Funkhouser KA](#), [Vollmer WM](#); [X-ACT Collaborative Research Group](#).

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Abstract

OBJECTIVE:

This paper uses baseline data from a randomized clinical trial to evaluate cross-sectional indicators of root caries in caries-active adults.

MATERIALS AND METHODS:

Adults (21-80 years) having at least 12 erupted teeth and between one and ten caries lesions were enrolled. Participants (n = 437) received caries exams by trained, calibrated examiners and responded to baseline demographic and medical-dental questionnaires. We examined associations between baseline characteristics and (1) the presence of any root caries using Mantel-Haenszel hypothesis tests and odds ratio (OR) estimators and (2) the number of root surfaces with caries among study participants with exposed root surfaces (n = 349) using Mantel-Haenszel mean score tests and Mann-Whitney estimators.

RESULTS/CONCLUSIONS:

Adjusting for study site and age, male gender [OR, 1.72; 95% confidence interval (CI), 1.08, 2.78], white race (OR, 2.39; 95% CI, 1.43, 3.98), recent dental visit (OR, 1.98; 95% CI, 1.07, 3.66), poor self-described oral health (OR, 2.65; 95% CI, 1.10, 6.39), and recent professional fluoride treatment (OR, 1.85; 95% CI, 1.06, 3.25) were significantly associated with increased odds to have any root caries, and study participants with exposed root surfaces characterized by male gender [Mann-Whitney probability estimate (MW) = 0.57; 95% CI, 0.51, 0.63], white race (MW, 0.61; 0.55, 0.68), recent dental visit (MW, 0.58; 0.50, 0.67), poor self-described oral health (MW, 0.61; 0.53, 0.69), and flossing at least once per day (MW, 0.57; 95% CI, 0.51, 0.62) were significantly more likely to have a greater number of root surfaces with caries than a randomly selected study participant from their respective complementary subgroups (female gender, non-white, etc.).

CLINICAL RELEVANCE:

Our findings may help identify individuals at higher root caries risk.

PMID: 22198596 [PubMed - in process]

[Related citations](#)



13. Int Dent J. 2011 Oct;61(5):274-80. doi: 10.1111/j.1875-595X.2011.00073.x.

[Effect of xylitol gum on the level of oral mutans streptococci of preschoolers: block-randomised trial.](#)

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Abstract

OBJECTIVES:

To assess the influence of xylitol chewing gum consumption on mutans streptococci level of 3-4 years old Japanese preschoolers.

METHODS:

248 participants were examined regarding caries-related factors at baseline and were followed up at 6, 9, and 12 months after the baseline: assessors were blinded, subjects were open labelled and blocked parallel randomised; 142 were selected to use xylitol gum for 3 months (from months 6 to 9) and 106 were controls.

RESULTS:

161 participants were analysed (xylitol n = 76, control n = 85). Nineteen caries-related variables, including xylitol gum consumption, were analysed for any association with the main outcome, plaque mutans streptococci scores development within the intervention period, by logistic regression. Six showed statistically significant associations by univariate analysis ($P < 0.05$). However, only xylitol gum consumption remained a significant negative association ($P < 0.05$) by multiple analyses. Interestingly, over 10% xylitol group children experienced diarrhoea, which was larger than previous investigations.

CONCLUSION:

Xylitol gum is effective in avoiding increased plaque mutans streptococci in young children.

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PMID: 21995376 [PubMed - indexed for MEDLINE]

[Related citations](#)

14. Int J Paediatr Dent. 2012 May;22(3):180-90. doi: 10.1111/j.1365-263X.2011.01182.x. Epub 2011 Sep 23.

[The caries-preventive effect of xylitol/maltitol and erythritol/maltitol lozenges: results of a double-blinded, cluster-randomized clinical trial in an area of natural fluoridation.](#)

[Lenkkeri AM](#), [Pienihäkkinen K](#), [Hurme S](#), [Alanen P](#).

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Abstract

OBJECTIVE:

Xylitol studies suggest caries reductions in the order of 50%. Based on animal/microbial studies, erythritol potentially has caries-preventive properties. However, clinical studies are required to confirm this. The aim of the study was to investigate the additional caries-preventive effect of xylitol/maltitol and erythritol/maltitol lozenges delivered at school, relative to controls receiving comprehensive prevention, in a low-caries prevalence population.

METHODS:

A 4-year, cluster-randomized, double-blinded clinical trial. Five hundred and seventy-nine 10-year-old consenting subjects from 21 schools were randomly assigned to one of five groups. Four groups used the lozenges on school days, in three teacher-supervised sessions daily, over 1 or 2 years. The daily amount was 4.7 g/4.6 g for xylitol/maltitol and 4.5 g/4.2 g for erythritol/maltitol. The groups received free examinations and care in the public health centre. Four hundred and ninety-six children were analysed. The main outcome measure was dentin caries increment based on a clinical examination at 4 years since the start. The groups were compared in relation to the increment using hierarchical logistic regression to adjust for potential clustering.

RESULTS:

Use of xylitol/maltitol or erythritol/maltitol lozenges did not result in caries reduction. A strong relationship between baseline caries prevalence and the 4-year increment was observed (OR = 7.38; 95% CI: 3.78-14.41).

CONCLUSIONS:

The results suggest that in relatively low-caries conditions the school-based use of xylitol/maltitol or erythritol/maltitol lozenges would not have additional caries-preventive effect when compared with comprehensive prevention.

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PMID: 21951305 [PubMed - indexed for MEDLINE]

[Related citations](#)



15. Med Princ Pract. 2011;20(4):303-20. doi: 10.1159/000324534. Epub 2011 May 11.

[Sugar alcohol sweeteners as alternatives to sugar with special consideration of xylitol.](#)

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Abstract

INTRODUCTION:

Dental caries is a diet-associated disease which continues to be a serious health problem in most industrialized and developing countries. Strategies to maximize caries prevention should automatically consider the use of sugar substitutes. It is important that public health authorities are made cognizant of the availability of new polyol-type sugar substitutes.

REVIEW SUMMARY:

Clinical studies have shown that xylitol, a natural, physiologic sugar alcohol of the pentitol type, can be used as a safe and effective caries-limiting sweetener. Habitual use of xylitol-containing food and oral hygiene adjuvants has been shown to reduce the growth of dental plaque, to interfere with the growth of caries-associated bacteria, to decrease the incidence of dental caries, and to be associated with remineralization of caries lesions. Numerous public regulatory bodies have endorsed the use of xylitol as a caries-limiting agent. Other sugar alcohols that have been successfully used as sugar substitutes include D-glucitol (sorbitol), which, however, owing to its hexitol nature, normally has no strong effect on the mass and adhesiveness of bacterial plaque and on the growth of mutans streptococci. A tetritol-type alditol, erythritol, has shown potential as a non-cariogenic sugar substitute. Combinations of xylitol and erythritol may reduce the incidence of caries more effectively than either alditol alone.

CONCLUSIONS:

Partial sugar substitution with polyols is an important dietary tool in the prevention of dental caries that should be used to enhance existing fluoride-based caries prevention programmes. The most effective method of conveying this information to the public is through a proper health claim for these alditols in food labelling. The present review summarizes clinical and biochemical aspects of the above three dietary polyols and emphasizes the role of sugar substitution as a potential health-promoting strategy.

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PMID: 21576989 [PubMed - indexed for MEDLINE]

[Related citations](#)



16. Eur J Dent. 2011 Jan;5(1):24-31.

[The effect of xylitol on the composition of the oral flora: a pilot study.](#)

[Söderling E](#), [Hirvonen A](#), [Karjalainen S](#), [Fontana M](#), [Catt D](#), [Seppä L](#).

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Abstract

OBJECTIVES:

Our aim was to investigate the effect of short-term xylitol consumption on the microbial composition of plaque and saliva.

METHODS:

Twelve volunteers (22-38 yrs) harboring mutans streptococci (MS) participated in the randomized, double-blind, cross-over study. The experimental chewing gum contained 65% xylitol while the control gum contained 63% sorbitol and 2% maltitol w/w. The polyol dose was approximately 6 g/day. Stimulated saliva and plaque samples were collected before and after the two four-week test periods. The samples were cultured for MS, total streptococci, lactobacilli, and total facultatives. A part of the samples were subjected to DNA-DNA hybridizations of 14 microbial plaque species: *Actinomyces naeslundii*, *A. viscosus*, *Fusobacterium nucleatum*, *Lactobacillus acidophilus*, *L. fermentum*, *L. paracasei*, *L. rhamnose*, *L. plantarum*, *Streptococcus gordonii*, *S. oralis*, *S. parasanguis*, *S. salivarius*, *S. sanguinis*, *Veillonella parvula*.

RESULTS:

The MS counts of the plaque samples collected from "caries-prone" tooth sites decreased significantly ($P < .01$) in the xylitol gum group but not in the sorbitol gum group. Also the plaque MS percentage decreased significantly in the xylitol gum group ($P < .01$). The salivary MS counts did not decrease either in the xylitol or in the sorbitol gum groups. Nor were changes detected in the salivary levels of total streptococci or lactobacilli. The DNA-DNA hybridization assay revealed no study-induced changes in the microbial composition of the dental plaque.

CONCLUSIONS:

Within the limitations of this pilot study, xylitol consumption reduced MS counts in plaque but appeared not to affect the microbial composition of plaque or saliva in general.

PMCID: PMC3037192 [Free PMC Article](#)

PMID: 21311610 [PubMed]

[Related citations](#)



17. Eur J Oral Sci. 2011 Feb;119(1):40-7. doi: 10.1111/j.1600-0722.2010.00804.x.

[The role of sugar, xylitol, toothbrushing frequency, and use of fluoride toothpaste in maintenance of adults' dental health: findings from the Finnish National Health 2000 Survey.](#)

[Tseveenjav B](#), [Suominen AL](#), [Hausen H](#), [Vehkalahti MM](#).

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Abstract

We assessed the effect of certain oral health-related behaviours on adults' dental health. As part

of the Finnish nationwide Health 2000 Survey, dentate subjects, 30-64 yr of age, reported their frequency of consumption of eight sugar- and xylitol-containing products, together with toothbrushing frequency and use of fluoride toothpaste, and underwent clinical oral examination (n = 4,361). The mean number of teeth present (NoT) was 24.2 and the mean numbers of sound teeth (ST), filled teeth (FT), and decayed teeth (DT) were 10.8, 12.1, and 1.1 for men and 9.6, 13.8, and 0.5 for women, respectively. Consumption of sugar-sweetened beverages was more frequent than that of other sugar-containing products, and greater in men than in women. Daily use of xylitol chewing gum was reported by 13% of the men and by 22% of the women. Toothbrushing at least twice daily was reported by 47% of the men and by 79% of the women; 86% and 96%, respectively, reported daily use of fluoride toothpaste. The frequency of consumption of sugar- and xylitol-containing products and of toothbrushing, as well as use of fluoride toothpaste, play a role in the dental health of dentate adults, with the impact being weak on NoT, ST, and FT, but stronger on DT, especially concerning toothbrushing frequency (relative risk = 1.5) and use of fluoride toothpaste (relative risk = 1.8). Understanding the impact of certain oral health-related behaviours on dental health in adults would facilitate better targeting of oral self-care messages.

© 2011 Eur J Oral Sci.

PMID: 21244510 [PubMed - indexed for MEDLINE]

[Related citations](#)



18. Caries Res. 2009;43(6):455-61. doi: 10.1159/000264682. Epub 2009 Dec 10.

[Six months of daily high-dose xylitol in high-risk schoolchildren: a randomized clinical trial on plaque pH and salivary mutans streptococci.](#)

[Campus G](#), [Cagetti MG](#), [Sacco G](#), [Solinas G](#), [Mastroberardino S](#), [Lingström P](#).

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Comment in

- [Xylitol gum, plaque pH and mutans streptococci.](#) [Evid Based Dent. 2010]

Xylitol gum, plaque pH and mutans streptococci. *Duane B. Evid Based Dent. 2010; 11(4):109-10.*

Abstract

A randomized clinical trial was designed to evaluate the effect of daily high-dose xylitol chewing gum on plaque pH and salivary mutans streptococci (MS) in a sample of schoolchildren at high risk of caries. The study was performed on 204 subjects (acceptance rate 88.3%). Inclusion criteria were: >1 and <4 carious lesions, and a salivary MS concentration >10(5) CFU/ml. Subjects were randomly assigned to the xylitol or control group. Study design included one examination at baseline (t(0)), one after 3 months of chewing (t(1)), one after 6 months of chewing (t(2)) and the last 3 months after the end of chewing period (t(3)). Plaque pH was

assessed using the MicroTouch technique, following a sucrose challenge. The area under the curve (AUC(5.7) and AUC(6.2)) was recorded. Whole saliva was collected in sterile vials and MS CFU/ml were counted. Data were analysed using repeated-measures ANOVA. The main result was that plaque acidogenicity was reduced in both groups. The differences between treatments were statistically significant both for plaque pH and MS concentration; the interaction term for treatment and time was statistically significant ($p < 0.01$). At t(2), the xylitol group children with a salivary MS concentration $>10(5)$ and those with $\leq 10(5)$ showed significantly lower AUC(5.7) and AUC(6.2) values than the control group. These results suggest that the long-term use of high-dose non-sucrose chewing gums had beneficial effects on plaque pH, and that this effect was statistically greater when using xylitol chewing gums, both on plaque pH and MS salivary concentration.

Copyright 2009 S. Karger AG, Basel.

PMID: 20016175 [PubMed - indexed for MEDLINE]

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19. J Dent Res. 2010 Jan;89(1):56-60. doi: 10.1177/0022034509352958.

[Xylitol gum and maternal transmission of mutans streptococci.](#)

[Nakai Y](#), [Shinga-Ishihara C](#), [Kaji M](#), [Moriya K](#), [Murakami-Yamanaka K](#), [Takimura M](#).

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Comment in

- [Use of xylitol chewing gum in mothers may delay transmission of mutans streptococci to their infants.](#) [J Evid Based Dent Pract. 2011]

Use of xylitol chewing gum in mothers may delay transmission of mutans streptococci to their infants. *O'Connell AC. J Evid Based Dent Pract. 2011 Mar; 11(1):62-4.*

Abstract

An important caries prevention strategy for children includes measures to interfere with transmission of mutans streptococci (MS). This study confirmed the effectiveness of maternal early exposure to xylitol chewing gum on mother-child transmission of MS. After screening, 107 pregnant women with high salivary MS were randomized into two groups: xylitol gum (Xylitol; $n = 56$) and no gum (Control; $n = 51$) groups. Maternal chewing started at the sixth month of pregnancy and terminated 13 months later in the Xylitol group. Outcome measures were the presence of MS in saliva or plaque of the children until age 24 months. The Xylitol-group children were significantly less likely to show MS colonization than Control-group children aged 9-24 months. The Control-group children acquired MS 8.8 months earlier than those in the Xylitol group, suggesting that maternal xylitol gum chewing in Japan shows beneficial effects similar to those demonstrated in Nordic countries.

PMID: 19948944 [PubMed - indexed for MEDLINE]

[Related citations](#)



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[Xylitol, mutans streptococci, and dental plaque.](#)

[Söderling EM.](#)

Institute of Dentistry, University of Turku, FI-20520 Turku, Finland. eva.soderling@utu.fi
PMID: 19717413 [PubMed - indexed for MEDLINE]

[Related citations](#)



21. Adv Dent Res. 2009;21(1):44-7. doi: 10.1177/0895937409335623. Epub 2009 Jul 31.

[Xylitol and its vehicles for public health needs.](#)

[Milgrom P](#), [Ly KA](#), [Rothen M](#).

Northwest Center to Reduce Oral Health Disparities, University of Washington, Seattle, WA 98195, USA.

PMCID: PMC3812061 **Free PMC Article**

PMID: 19710081 [PubMed - indexed for MEDLINE]

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[Xylitol pediatric topical oral syrup to prevent dental caries: a double-blind randomized clinical trial of efficacy.](#)

[Milgrom P](#), [Ly KA](#), [Tut OK](#), [Mancl L](#), [Roberts MC](#), [Briand K](#), [Gancio MJ](#).

Northwest Center to Reduce Oral Health Disparities, Department of Dental Public Health Sciences, School of Dentistry, University of Washington, Seattle, WA 98195-7475, USA.
dfrc@u.washington.edu

Comment in

- [Xylitol syrup can reduce dental caries progression in young children.](#) [J Pediatr. 2010]

Xylitol syrup can reduce dental caries progression in young children. *Edelstein BL. J Pediatr. 2010 Jan; 156(1):164.*

- [Solving the problem of early childhood caries: a challenge for us all.](#) [Arch Pediatr Adolesc Med. 2009]

Solving the problem of early childhood caries: a challenge for us all. *Edelstein BL. Arch Pediatr Adolesc Med. 2009 Jul; 163(7):667-8.*

Abstract

OBJECTIVES:

To evaluate the effectiveness of a xylitol pediatric topical oral syrup to reduce the incidence of dental caries among very young children and to evaluate the effect of xylitol in reducing acute otitis media in a subsequent study.

DESIGN:

Double-blind randomized controlled trial.

SETTING:

Communities in the Republic of the Marshall Islands.

PARTICIPANTS:

One hundred eight children aged 9 to 15 months were screened, and 100 were enrolled. Intervention Children were randomized to receive xylitol topical oral syrup (administered by their parents) twice a day (2 xylitol [4.00-g] doses and 1 sorbitol dose) (Xyl-2 x group) or thrice per day (3 xylitol [2.67-g] doses) (Xyl-3x group) vs a control syrup (1 xylitol [2.67-g] dose and 2 sorbitol doses) (control group).

MAIN OUTCOME MEASURES:

The primary outcome end point of the study was the number of decayed primary teeth. A secondary outcome end point was the incidence of acute otitis media for reporting in a subsequent report.

RESULTS:

Ninety-four children (mean [SD] age, 15.0 [2.7] months at randomization) with at least 1 follow-up examination were included in the intent-to-treat analysis. The mean (SD) follow-up period was 10.5 (2.2) months. Fifteen of 29 of the children in the control group (51.7%) had tooth decay compared with 13 of 32 children in the Xyl-3x group (40.6%) and eight of 33 children in the Xyl-2x group (24.2%). The mean (SD) numbers of decayed teeth were 1.9 (2.4) in the control group, 1.0 (1.4) in the Xyl-3x group, and 0.6 (1.1) in the Xyl-2x group. Compared with the control group, there were significantly fewer decayed teeth in the Xyl-2x group (relative risk, 0.30; 95% confidence interval, 0.13-0.66; P = .003) and in the Xyl-3x group (0.50; 0.26-0.96; P = .04). No statistical difference was noted between the 2 xylitol treatment groups (P = .22).

CONCLUSION:

Xylitol oral syrup administered topically 2 or 3 times daily at a total daily dose of 8 g was effective in preventing early childhood caries.

PMCID: PMC2722805 **Free PMC Article**

PMID: 19581542 [PubMed - indexed for MEDLINE]

[Related citations](#)



23. *Pediatr Dent.* 2009 May-Jun;31(3):257-66.

[Xylitol: effects on the acquisition of cariogenic species in infants.](#)

[Fontana M](#), [Catt D](#), [Eckert GJ](#), [Ofner S](#), [Toro M](#), [Gregory RL](#), [Zandona AF](#), [Eggertsson H](#), [Jackson R](#), [Chin J](#), [Zero D](#), [Sissons CH](#).

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Abstract

PURPOSE:

The purpose of this study was to examine the effects of xylitol gum (XG) on the acquisition pattern of 39 bacterial species, including mutans streptococci (MS), in infants.

METHODS:

Ninety-seven mothers (MS counts > 10(5) CFU/ml) were randomly divided into 4 groups and received: (1) XG (4.2 gm/day); (2) XG (6 months after baseline exams); (3) sorbitol gum (4.2 gm/day); or (4) no gum. Groups 1 and 3 chewed gum 3 times a day for 9 months. Microbiota of plaque and saliva samples from the mother-child pairs were analyzed by culturing and via checkerboard DNA-DNA hybridization.

RESULTS:

MS was isolated from 33% of the pre-tate infant (< or =5 months old) baseline saliva samples and from 41% of the saliva and 65% of the plaque samples at the final visit. At baseline, positive responses to "mother's checking of baby's food temperature using baby's spoon" and "starting a bottle after stopping breast-feeding" were significant predictors ($P = .009$ and $P < .001$, respectively) of infant's total streptococci counts. At the final visit (9 months later), there were no significant differences between treatment groups for infants' 39 microbial plaque species, including MS.

CONCLUSIONS:

Maternal use of xylitol gum did not result in statistically significant differences in the microbial plaque composition of 9- to 14-month-old infants.

PMID: 19552232 [PubMed - indexed for MEDLINE]

[Related citations](#)

24. Quintessence Int. 2009 Apr;40(4):279-85.

Effect of xylitol and sorbitol on plaque acidogenesis.

[Splieth CH](#), [Alkilzy M](#), [Schmitt J](#), [Berndt C](#), [Welk A](#).

Department for Preventive and Pediatric Dentistry, Ernst-Moritz-Arndt-University, Greifswald, Germany. splieth@unigreifswald.de

Abstract

OBJECTIVE:

To evaluate the in vivo potential of xylitol to reduce plaque acidogenicity in comparison to sorbitol.

METHOD AND MATERIALS:

After completing a questionnaire on general health, smoking, diet, and oral hygiene habits, 61 dentate adults refrained from oral hygiene for 3 days before the clinical baseline examination, which included decayed, missing, and filled teeth (DMFT) index, mutans streptococci and lactobacilli counts, and plaque acidogenicity (cH) index after a sucrose rinse. Then the participants were randomly allocated to consume either sorbitol or xylitol lozenges (5 pieces/day, 2 g each) for 4 weeks and were asked to refrain from oral hygiene for the 3 days prior to the final examination (cH, area < pH 7, bacterial counts).

RESULTS:

The variation of acidogenicity in different individuals was considerable at baseline (range: 0.2 to 446.6 min micromol/L) with a mean value of 37.9 +/- 58.9 min micromol/L for the sorbitol group and 60.6 +/- 87.6 min micromol/L for the xylitol group. At the end of the study, the reduction in the xylitol group (42.9 +/- 80.6 min micromol/L) was statistically significantly higher than in the sorbitol group (6.0 +/- 69.4 min micromol/L, P = .034), which was also confirmed in an additional analysis excluding 2 participants with extreme values (reduction for xylitol: 29.5 +/- 36.9 min micromol/L; sorbitol: 1.7 +/- 57.0 min micromol/L; P = .019). Statistically significant differences were also found for the area below pH 7 (reduction for xylitol: 10.8 min pH; sorbitol, 0.2 min pH; P = .0025).

CONCLUSION:

The regular consumption of xylitol lozenges modifies dental plaque, resulting in a marked reduction in the plaque acidogenicity, which could not be detected using sorbitol lozenges. Therefore, xylitol could have an additional benefit in caries prevention.

PMID: 19417872 [PubMed - indexed for MEDLINE]

[Related citations](#)

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[Consistent evidence to support the use of xylitol- and sorbitol-containing chewing gum to prevent dental caries.](#)

[Twetman S.](#)

Department of Cariology and Endodontics, Faculty of Health Sciences, University of Copenhagen, Denmark.

Comment in

- [Polyol-containing chewing gums: flawed evidence.](#) [Evid Based Dent. 2009]

Polyol-containing chewing gums: flawed evidence. *Berger VW. Evid Based Dent. 2009; 10(2):36; author reply 36.*

Comment on

- [The impact of polyol-containing chewing gums on dental caries: a systematic review of original randomized controlled trials and observational studies.](#) [J Am Dent Assoc. 2008]

The impact of polyol-containing chewing gums on dental caries: a systematic review of original randomized controlled trials and observational studies. *Deshpande A, Jadad AR. J Am Dent Assoc. 2008 Dec; 139(12):1602-14.*

Abstract

DATA SOURCES:

Studies were identified using searches with Medline, the Cochrane Library and Google Scholar.

STUDY SELECTION:

Studies were screened independently and were included if they evaluated the effect of one or more chewing gums containing at least one polyol (xylitol, sorbitol, mannitol or maltitol) on caries development, provided they supplied original data generated by means of a comparative design (experimental or observational) and were published in English. Studies were excluded if only an abstract was available or they described only the pharmacodynamic or pharmacokinetic properties of polyols or did not include a no-treatment arm in the study. Randomised trial quality was assessed using the Jadad scale, and the US Preventive Services Task Force criteria to grade the internal validity of individual nonrandomised studies.

DATA EXTRACTION AND SYNTHESIS:

Data were extracted independently with only the final outcomes of a study being recorded. It was decided that surface rather than tooth level data would be recorded. Incremental caries was

converted to prevented fraction (PF; the proportional reduction in dental caries in experimental groups relative to control groups) for meta-analysis. The studies were grouped according to type of polyol and a separate meta-analysis performed. Data were pooled using both a random and a fixed-effects model and heterogeneity assessed using I².

RESULTS:

Of 231 articles identified 25 studies were initially selected with 19 being included in the review [six randomised controlled trials (RCT) of which four were cluster RCT, nine controlled clinical trials (CCT) and four cohort studies]. Two RCT had a Jadad score of three or higher. The mean preventive fraction for the four main gum types are shown in the table 1, results of all except the sorbitol -mannitol blend were statistically significant. Sensitivity analyses confirmed the robustness of the findings.

CONCLUSIONS:

Although research gaps exist, particularly on optimal dosing and relative polyol efficacy, there is consistent evidence to support the use of xylitol- and sorbitol-containing chewing gum as part of normal oral hygiene to prevent dental caries.

PMID: 19322219 [PubMed]

[Related citations](#)



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[Xylitol gummy bear snacks: a school-based randomized clinical trial.](#)

[Ly KA](#), [Riedy CA](#), [Milgrom P](#), [Rothen M](#), [Roberts MC](#), [Zhou L](#).

Northwest/Alaska Center to Reduce Oral Health Disparities, Department of Dental Public Health Sciences, Box 357475, University of Washington, Seattle, WA 98195-7475, USA. kietaly@u.washington.edu

Abstract

BACKGROUND:

Habitual consumption of xylitol reduces mutans streptococci (MS) levels but the effect on *Lactobacillus* spp. is less clear. Reduction is dependent on daily dose and frequency of consumption. For xylitol to be successfully used in prevention programs to reduce MS and prevent caries, effective xylitol delivery methods must be identified. This study examines the response of MS, specifically *S. mutans/sobrinus* and *Lactobacillus* spp., levels to xylitol delivered via gummy bears at optimal exposures.

METHODS:

Children, first to fifth grade (n = 154), from two elementary schools in rural Washington State,

USA, were randomized to xylitol 15.6 g/day (X16, n = 53) or 11.7 g/day (X12, n = 49), or maltitol 44.7 g/day (M45, n = 52). Gummy bear snacks were pre-packaged in unit-doses, labeled with ID numbers, and distributed three times/day during school hours. No snacks were sent home. Plaque was sampled at baseline and six weeks and cultured on modified Mitis Salivarius agar for *S. mutans/sobrinus* and Rogosa SL agar for *Lactobacillus* spp. enumeration.

RESULTS:

There were no differences in *S. mutans/sobrinus* and *Lactobacillus* spp. levels in plaque between the groups at baseline. At six weeks, log₁₀ *S. mutans/sobrinus* levels showed significant reductions for all groups ($p = 0.0001$): X16 = 1.13 (SD = 1.65); X12 = 0.89 (SD = 1.11); M45 = 0.91 (SD = 1.46). Reductions were not statistically different between groups. Results for *Lactobacillus* spp. were mixed. Group X16 and M45 showed 0.31 (SD = 2.35), and 0.52 (SD = 2.41) log₁₀ reductions, respectively, while X12 showed a 0.11 (SD = 2.26) log₁₀ increase. These changes were not significant. Post-study discussions with school staff indicated that it is feasible to implement an in-classroom gummy bear snack program. Parents are accepting and children willing to consume gummy bear snacks daily.

CONCLUSION:

Reductions in *S. mutans/sobrinus* levels were observed after six weeks of gummy bear snack consumption containing xylitol at 11.7 or 15.6 g/day or maltitol at 44.7 g/day divided in three exposures. *Lactobacillus* spp. levels were essentially unchanged in all groups. These results suggest that a xylitol gummy bear snack may be an alternative to xylitol chewing gum for dental caries prevention. Positive results with high dose maltitol limit the validity of xylitol findings. A larger clinical trial is needed to confirm the xylitol results.

TRIAL REGISTRATION:

[ISRCTN63160504].

PMCID: PMC2527560 **Free PMC Article**

PMID: 18657266 [PubMed]

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27. Int Dent J. 2008 Feb;58(1):41-50.

[Thirty-nine-month xylitol chewing-gum programme in initially 8-year-old school children: a feasibility study focusing on mutans streptococci and lactobacilli.](#)

[Mäkinen KK](#), [Alanen P](#), [Isokangas P](#), [Isotupa K](#), [Söderling E](#), [Mäkinen PL](#), [Wenhui W](#), [Weijian W](#), [Xiaochi C](#), [Yi W](#), [Boxue Z](#).

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Abstract

AIM:

To investigate the use of xylitol-containing chewing-gums in public elementary schools as a means to affect the growth of salivary and plaque mutans streptococci and salivary lactobacilli.

DESIGN:

Over a period of 24 months, 750 8- to 9-year-old children chewed xylitol (X group; n = 255) or xylitol-sorbitol (XS group; n = 264) gum on school days (454 days over 2 years), or chewed no gum at all (C group; n = 231). Consumption of xylitol in the X and the XS groups was 6.6 and 5.4g per day, respectively. Use of gum took place at school in four daily episodes of which three were supervised by teachers. Following the 24-month chewing-gum period, the subjects were re-examined after 15 months (total follow-up period: 39 months) at which time an extraneous comparison group (ExC; n = 117) was also examined. The numbers of subjects examined after 39 months were: X, 239; XS, 248; C3 217.

METHODS:

Salivary and plaque levels of mutans streptococci and the salivary levels of aerobically cultured aciduric bacteria (mostly representing lactobacilli) were determined using the Orion Diagnostica Dentocult SM and LB test kits, respectively.

RESULTS:

There were statistically significant differences after 24 and 39 months between the two xylitol chewing-gum groups and the C group with regard to salivary and plaque mutans streptococci and salivary lactobacilli: the use of xylitol-containing chewing-gums significantly reduced these bacterial scores. The reductions were statistically more significant in the X group than in the XS group. The bacterial scores of groups C and ExC were similar.

CONCLUSIONS:

Long-term use of xylitol-containing chewing-gum can reduce the growth of mutans streptococci in saliva and dental plaque, and lactobacilli-type bacteria in saliva, even if xylitol is used only on school days. The results also suggest that xylitol gum use can have a long-term, delayed growth-retarding effect on these micro-organisms, since reduced bacterial growth was still observed 15 months following the termination of xylitol use. The results indicate a close biochemical relationship between xylitol and mutans streptococci, and suggest that a similar relationship may exist regarding aerobically cultured aciduric bacteria present in saliva.

PMID: 18350853 [PubMed - indexed for MEDLINE]

[Related citations](#)

28. Caries Res. 2007;41(3):198-203.

[Long-term effect of xylitol gum use on mutans streptococci in adults.](#)

[Haresaku S](#), [Hanioka T](#), [Tsutsui A](#), [Yamamoto M](#), [Chou T](#), [Gunjishima Y](#).

Department of Preventive and Public Health Dentistry, Oral Public Health, Fukuoka Dental College, Fukuoka, Japan.

Abstract

Many studies have shown the effects of chewing xylitol gum on mutans streptococci (MS) over short- and long-term periods in children; however, few studies have addressed long-term periods in adults. The objective of this investigation was to examine for 6 months the effects of chewing xylitol gum on MS in saliva and plaque in 127 adults (mean age 28.0 years). The participants were assigned to three groups according to gum type, in part taking preference for flavor into account and in part at random: xylitol (XYL), maltitol (MAL) and control (CR); 33, 34 and 27 subjects in each group, respectively, completed the trial. Daily gum use of the XYL and MAL groups was 7.9 and 7.1 g, respectively. MS levels, which declined significantly in saliva ($p < 0.05$) and plaque ($p < 0.001$) in the XYL group after 6 months, exhibited a significant increase in plaque in the MAL group ($p < 0.001$). Differences in relative changes of MS levels in plaque during the experimental period were significant between the XYL group and the CR ($p < 0.05$) and MAL groups ($p < 0.001$). Differences in relative change of amount of plaque during the experimental period were not statistically significant between the groups. The present study demonstrated that chewing xylitol gum for 6 months continued to inhibit the growth of mutans streptococci in adults.

Copyright 2007 S. Karger AG, Basel.

PMID: 17426399 [PubMed - indexed for MEDLINE]

[Related citations](#)



29. Eur Arch Paediatr Dent. 2006 Dec;7(4):241-5.

[Caries in 4-year-old children after maternal chewing of gums containing combinations of xylitol, sorbitol, chlorhexidine and fluoride.](#)

[Thorild I](#), [Lindau B](#), [Twetman S](#).

Public Dental Clinic, Varberg.

Abstract

AIM:

To evaluate the effect of maternal use of chewing gums containing combinations of xylitol, sorbitol, chlorhexidine and fluoride on caries prevalence in a group of mother's 4-year-old children.

STUDY DESIGN:

Randomised controlled trial.

METHODS:

After screening 416 women with newborn babies, 173 mothers with high counts of salivary mutans streptococci (MS) were randomly assigned into three experimental chewing gum groups containing A) xylitol (n=61), B) chlorhexidine/xylitol/sorbitol (n=55), and C) sodium fluoride/xylitol/sorbitol (n=57). The intervention started when each child was 6 months old, was terminated one year later. All of the mothers were instructed to chew one piece of the appropriate gum for 5 minutes, three times a day. The outcome measure was the presence of cavitated and non-cavitated (enamel) lesions in the primary dentitions of the children at the age of 4 years.

RESULTS:

The drop-out rate in the experimental groups was 15-20%. The mean defs, on examination at aged 4 years was 0.4 +/-1.0 in group A, 0.7 +/-1.7 in group B and 1.4 +/-3.0 in group C. The difference between group A and C was statistically significant ($p<0.05$).

CONCLUSIONS:

Less caries was observed in children of mothers who chewed gums with xylitol as the single sweetener during the time of eruption of the first primary teeth compared with those who used gums containing fluoride, sorbitol and lower amounts of xylitol.

PMID: 17164069 [PubMed - indexed for MEDLINE]

[Related citations](#)

30. Caries Res. 2006;40(6):508-13.

[Field trial on caries prevention with xylitol candies among disabled school students.](#)

[Honkala E](#), [Honkala S](#), [Shyama M](#), [Al-Mutawa SA](#).

Faculty of Dentistry, Kuwait University, Safat, Kuwait. Eino.Honkala@hsc.edu.kw

Comment in

- [Another "inconclusive" xylitol study adds to the evidence.](#) [J Evid Based Dent Pract. 2007]

Another "inconclusive" xylitol study adds to the evidence. *Bader J. J Evid Based Dent Pract. 2007 Sep; 7(3):120-2.*

Abstract

BACKGROUND:

In a 1999 survey high caries levels were found among physically disabled school students in

Kuwait.

OBJECTIVES:

A field study was planned to test the efficacy of xylitol candies in preventing caries among individuals in two special schools in Kuwait.

METHODS:

Altogether 176 students were examined in 2002 and 145 (105 in xylitol group and 40 in the control group) after 18 months' intervention. The WHO criteria were used in recording caries according to surfaces (third molars were excluded) by 2 calibrated examiners (E.H., M.S.). The students were allocated to the xylitol group only if the parent/caregiver returned the informed consent form. School health nurses distributed xylitol candies to the students 3 times during the school day (after breakfast and lunch, and before leaving the school).

RESULTS:

In the xylitol group, the baseline DS and DMFS scores were 3.4 and 8.2 and in the follow-up 1.9 and 7.1, respectively. In the control group, the baseline scores were DS 3.9 and DMFS 9.8, and the follow-up scores DS 3.9 and DMFS 13.2.

CONCLUSION:

Xylitol seemed to have a strong preventive and a clear remineralizing effect on caries.

PMID: 17063022 [PubMed - indexed for MEDLINE]

[Related citations](#)



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[Delivery challenges for fluoride, chlorhexidine and xylitol.](#)

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Abstract

The progression or reversal of dental caries is determined by the balance between pathological and protective factors. It is well established that a) fluoride inhibits demineralization and enhances remineralization, b) chlorhexidine reduces the cariogenic bacterial challenge, and c) xylitol is non-cariogenic and has antibacterial properties. The challenge that we face is how best to deliver these anti-caries entities at true therapeutic levels, over time, to favorably tip the caries balance. High caries risk people, including children with Early Childhood Caries (ECC), are a special challenge, since high cariogenic bacterial activity can override fluoride therapy. Current fluoride and chlorhexidine varnishes deliver all their activity within about 24 hours. Early studies with experimental slow release fluoride devices retained elevated levels of fluoride for

months in a therapeutic range but have not been pursued. Preventive dentistry has largely ignored the benefits of reducing the bacterial challenge, partially due to primitive and inadequate delivery systems. For example, Chlorhexidine applied as a rinse partially reduces some bacteria but not others that are hiding within the biofilm. Better antibacterials and better delivery systems are needed. Xylitol delivered by gum or lozenge appears to be effective clinically in reducing cariogenic bacteria and caries levels, but novel systems that deliver therapeutic amounts when needed would be a major advance, especially for young children. Reducing the cariogenic bacterial challenge and enhancing the effect of fluoride by the use of new sustained-delivery systems would have a major effect on dealing with caries as a disease.

PMCID: PMC2147587 **Free PMC Article**

PMID: 16934125 [PubMed]

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Effect of xylitol candies on plaque and gingival indices in physically disabled school pupils.

[Shyama M](#), [Honkala E](#), [Honkala S](#), [Al-Mutawa SA](#).

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Abstract

OBJECTIVE:

To evaluate the effectiveness of xylitol candies on plaque and gingival index scores on physically disabled school pupils in Kuwait.

METHODOLOGY:

Altogether 145 school pupils (105 in the xylitol group and 40 in the control group), with ages ranging from 10 to 27 years (mean age = 14.7 +/- 3.1 years), participated in this 18-month intervention program. The school health nurses distributed xylitol candies to the pupils three times during the school day. Plaque was scored according to the Silness and L oe Plaque Index, and gingivitis according to the L oe and Silness Gingival Index.

RESULTS:

The mean Plaque Index score decreased from 1.73 to 1.14 ($p < 0.001$), and the mean Gingival Index score from 1.74 to 1.16 ($p < 0.001$) in the study group. Significant differences were found between the xylitol and the control groups in the reduction of Plaque ($p = 0.037$) and Gingival Index scores ($p = 0.008$). There was high correlation between the individual Plaque and Gingival Index scores at baseline ($r = 0.93$) and at the final examinations ($r = 0.95$).

CONCLUSION:

Consuming xylitol candies three times during school days seemed to reduce both the Plaque and Gingival Index scores. This school-based delivery system offered a practical way to distribute and use xylitol candies among these disabled pupils. The regular use of xylitol candies may, therefore, support oral hygiene routines in disabled pupils.

PMID: 16838877 [PubMed - indexed for MEDLINE]

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[Mutans streptococci dose response to xylitol chewing gum.](#)

[Milgrom P](#), [Ly KA](#), [Roberts MC](#), [Rothen M](#), [Mueller G](#), [Yamaguchi DK](#).

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Abstract

Xylitol is promoted in caries-preventive strategies, yet its effective dose range is unclear. This study determined the dose-response of mutans streptococci in plaque and unstimulated saliva to xylitol gum. Participants (n = 132) were randomized: controls (G1) (sorbitol/maltitol), or combinations giving xylitol 3.44 g/day (G2), 6.88 g/day (G3), or 10.32 g/day (G4). Groups chewed 3 pellets/4 times/d. Samples were taken at baseline, 5 wks, and 6 mos, and were cultured on modified Mitis Salivarius agar for mutans streptococci and on blood agar for total culturable flora. At 5 wks, mutans streptococci levels in plaque were 10x lower than baseline in G3 and G4 (P = 0.007/0.003). There were no differences in saliva. At 6 mos, mutans streptococci in plaque for G3 and G4 remained 10x lower than baseline (P = 0.007/0.04). Saliva for G3 and G4 was lower than baseline by 8 to 9x (P = 0.011/0.038). Xylitol at 6.44 g/day and 10.32 g/day reduces mutans streptococci in plaque at 5 wks, and in plaque and unstimulated saliva at 6 mos. A plateau effect is suggested between 6.44 g and 10.32 g xylitol/day.

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PMID: 16434738 [PubMed - indexed for MEDLINE]

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