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More Effective Than Xylitol And Sorbitol In Managing Oral Health Endpoints

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Abstract

Introduction

Erythritol is a four-carbon polyol (sugar alcohol) that shares many of the functional properties that are typical for the polyols family (e.g., sorbitol, xylitol). Such characteristics are important in practical applications of erythritol and include the following general features: relatively high stability in acidic and alkaline environments, high stability against heat, sweetness close to that of sucrose, calorific reduction compared to sucrose, safety, no cariogenic potential, low glycemic index, and suitability as a bulking agent in food manufacturing [1]. Erythritol differentiates from all other polyols in that it is commercially produced using fermen- tation, a recognized natural process. Erythritol has been reported to have approximately 60–80% of the sweetness of sugar [2, 3], while contributing no calories (noncaloric) and having good digestibility (well tolerated) without any impact on blood glucose and insulin levels [4].

A significant volume of toxicology and safety studies exists, showing a complete lack of adverse effects associated with consumption of erythritol [5]. This body of evidence demonstrating the safety of erythritol, combined with its zero-calorie sweetness and mouth feel, is all key contributors to the general acceptance by consumers for use in a wide variety of food products [5, 6].

While known for its nutritional and technological ben- efits, erythritol has also been shown to exert a number of beneficial oral health effects (summarized in Table 1). Specifically, the noncariogenicity of erythritol was established first in rats by a group of researchers in 1992 [7].

Inclusion of erythritol in studies aimed at investigating the effects of polyols on dental caries followed the logical scientific process: other common polyols, notably xylitol and sorbitol, both of which are commonly used as sugar replacers in food products, had for dozens of years been studied as potential caries-preventive agents. Inventions related to erythritol manufacturing and comprehensive safety conclu- sions of the metabolic effects of erythritol have marked its gradual advent in the real world of consumers. The palette of polyol sweeteners has been expanding and may be nearing completion, since the number of physiologically acceptable polyol

sweeteners can be considered limited. Erythritol maybe regarded as a welcome addition to this palette.

Erythritol Reduces the Risk of Dental Caries

By the beginning of the new millennium, preliminary information on the oral biology of common polyols had reached a stage that encouraged the undertaking of long-term clinical trials to investigate the effect of erythritol on the incidence and propagation of dental caries in humans. The first, and for the time being the only, long-term human caries trial using erythritol alone (no mixture with other polyols) was executed by Tartu University Institute of Stomatology in Tartu, Estonia, in 2008–2011 [37].

Discussion

Erythritol is the newest polyol (sugar alcohol) used as a bulk sweetener in foods. It differs in many ways from all other polyols. It has the smallest molecular size as this polyol is of the tetritol type and it is the first polyol to be commercially produced by fermentation, a natural process [1]. Its unique metabolic profile renders it to be noncaloric, nonglycemic, noninsulinemic, and very well tolerated. It has been consumed by animals and humans for ages as small quantities of erythritol occur widely in microorganisms, algae, fermented foods, lichens, mushrooms, many fruits and vegetables, and also animal and human tissues [5, 20, 57].

Unlike all other polyols including sorbitol and xylitol, ingested erythritol is rapidly and almost completely absorbed from the small intestine, not metabolized, and excreted unchanged in the urine [32]. Depending on the quantity ingested, approximately 10% of ingested erythritol may reach the colon [5]. Its high systemic bioavailability has been linked to additional health benefits for people with diabetes by reducing arterial stiffness and improving small vessel endothelial function [18].

Owing to its sweet taste and high digestive tolerance, erythritol is well suited to replace sugar pound-for-pound in foods without replacing any calories thereby significantly reducing the energy density of those foods. All dental and oral biological studies carried out to date have suggested erythritol to be noncariogenic. Erythritol is being used as a sweetener in dentally safe confectionery items, desserts, tabletop sweeteners, beverages, and many other sugar-free and calorie-reduced foods. Erythritol is authorized for use in foods in more than sixty countries and is included in the GSFA-list (General Standard for Food Additives) of the *Codex*

Conclusions

The present review summarizes the oral health benefits of erythritol use as demonstrated by a reduction in the overall number of dental caries and associated dental surface restorations (dentist treatments) when used routinely. It also can serve as a suitable matrix for subgingival air-polishing to replace traditional root scaling in periodontal therapy. The dental and oral biological studies on erythritol, xylitol, and sorbitol discussed have reemphasized important differences between the individual polyols. Polyols can therefore not be regarded as a single entity of organic molecules with exactly identical molecular parameters and similar biological effects. The evidence demonstrating better efficacy of erythritol compared to sorbitol and xylitol to maintain and improve oral health is growing and offers a clear distinction among polyols.

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