Health potential of polyols as sugar replacers, with emphasis on low glycaemic properties

Source

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Abstract

Abstract Polyols are hydrogenated carbohydrates used as sugar replacers. Interest now arises because of their multiple potential health benefits. They are non-cariogenic (sugar-free tooth-friendly), low-glycaemic (potentially helpful in diabetes and cardiovascular disease), low-energy and low-insulinaemic (potentially helpful in obesity), low-digestible (potentially helpful in the colon), osmotic (colon-hydrating, laxative and purifying) carbohydrates. Such potential health benefits are reviewed. A major focus here is the glycaemic index (GI) of polyols as regards the health implications of low-GI foods. The literature on glycaemia and insulinaemia after polyol ingestion was analysed and expressed in the GI and insulinaemic index (II) modes, which yielded the values: erythritol 0, 2; xylitol 13, 11; sorbitol 9, 11; mannitol 0, 0; maltitol 35, 27; isomalt 9, 6; lactitol 6, 4; polyglycitol 39, 23. These values are all much lower than sucrose 65, 43 or glucose 100, 100. GI values on replacing sucrose were independent of both intake (up to 50 g) and the state of carbohydrate metabolism (normal, type 1 with artificial pancreas and type 2 diabetes mellitus). The assignment of foods and polyols to GI bands is considered, these being: high (> 70), intermediate (> 55-70), low (> 40-55), and very low (< 40) including non-glycaemic; the last aims to target particularly low-GI-carbohydrate-based foods. Polyols ranged from low to very low GI. An examination was made of the dietary factors affecting the GI of polyols and foods. Polyol and other food GI values could be used to estimate the GI of food mixtures containing polyols without underestimation. Among foods and polyols a departure of II from GI was observed due to fat elevating II and reducing GI. Fat exerted an additional negative influence on GI, presumed due to reduced rates of gastric emptying. Among the foods examined, the interaction was prominent with snack foods; this potentially damaging insulinaemia could be reduced using polyols. Improved glycated haemoglobin as a marker of glycaemic control was found in a 12-week study of type 2 diabetes mellitus patients consuming polyol, adding to other studies showing improved glucose control on ingestion of low-GI carbohydrate. In general some improvement in long-term glycaemic control was discernible on reducing the glycaemic load via GI by as little as 15-20 g daily. Similar amounts of polyols are normally acceptable. Although polyols are not essential nutrients, they contribute to clinically recognised maintenance of a healthy colonic environment and function. A role for polyols and polyol foods to hydrate the colonic contents and aid laxation is now recognised by physicians. Polyols favour saccharolytic anaerobes and aciduric organisms in the colon, purifying the colon of endotoxic, putrefying and pathological organisms, which has clinical relevance. Polyols also contribute towards short-chain organic acid formation for a healthy colonic epithelium. Polyol tooth-friendliness and reduced energy values are affirmed and add to the potential benefits. In regard to gastrointestinal tolerance, food scientists and nutritionists, physicians, and dentists have in their independent professional capacities each now described sensible approaches to the use and consumption of polyols.

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