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Encapsulated Sugar - a Novel Method for Sugar Administration

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Objectives Caries remains a widespread health problem with sugars as the central etiology factor. Dietary advice has primarily focused on reducing intake frequency and amount. Recently, a new way of administering sugar has emerged where sugars are encapsulated in a hydrogel network. The aim was to evaluate the effect of three versions of this new sugar formulation containing glucose/fructose on the metabolic activity in bacterial suspensions *in vitro* and on the dental biofilm metabolism *in vivo*.

Methods The following novel formulations, containing 60% glucose/fructose, were tested: a) beads (Maurten AB, Sweden, non-commercial product), b) gel (Gel 100; Maurten AB) and c) reference solution for products a and b. The acid production *in vitro* of six different bacterial suspensions was followed up to 90 min using a micro-pH meter after the addition of 25 µl (products c) or 50 mg (products a and b). *In vivo*, 13 healthy volunteers rinsed with respective product after which biofilm acidogenicity was followed using the microtouch method up to 45 min after consumption. Data was analyzed using one-way ANOVA/Tukey multiple comparison test. $p < 0.05$ was considered statistically significant.

Results The beads resulted in the most favorable outcome for all bacterial strains *in vitro*. A statistically significant reduction in plaque-pH was found for both the beads and the gel in comparison to the reference solution at different time points ($p < 0.01$) and when evaluated as area under the curve ($p < 0.001$). The percentage reduction in total biofilm acidogenicity in comparison to the reference product was for the beads 66.0% and for the gel 54.7%.

Conclusions The encapsulated sugars showed *in vitro* and *in vivo* promising results with lower acidogenicity compared to a reference product - a central mechanism for the caries disease.