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Abstrakt:

α-cyclodextrin – a weight loss agent?

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In recent years, an alarming increase in overweight, obesity and the following diseases has been observed. Unfortunately, the current pharmacological treatments lack effectiveness or display a severe side effect profile\(^v\). New improved drugs against overweight and obesity are therefore desirable. In USA and Canada, α-CD is marketed as a dietary fibre and used as a weight loss supplement (Mirafit FBCx™, Alpha-Fibe FBCx™). Moreover, a study has shown that adding α-CD to a diet resulted in greater weight loss compared to placebo\(^ii\) and in another study α-CD prevented weight gain\(^iii\). The underlying mechanism for α-CDs possible weight loss ability is still to be accounted for. Findings from two studies show that α-CD can significantly lower the post-prandial plasma glucose response after a starch-rich meal\(^i, iv\). It is therefore hypothesized that α-CD inhibits the enzymatic degradation of starch, which this study aims to investigate further.

γ-cyclodextrin (γ-CD) and a starch solution was chosen as substrates. The hydrolysis by porcine pancreatic α-amylase (PPA) in the presence of α-CD was monitored at 37°C, pH 6.5. The degradation reactions were followed over time by quantification of the amount of reducing ends as maltose equivalents. The hydrolysis of γ-CD revealed that the presence of α-CD inhibited the enzymatic degradation in a dose-dependent manner. α-CD in a molar ratio of 0.2:1 (α-CD:γ-CD) was not sufficient to inhibit the degradation, whereas α-CD in a molar ratio of 1:1 showed some effect since the initial degradation rate decreased (from 4.6 mM/hour for the control (no α-CD present) to 4.0 mM/hour). In ratio 5:1 the degradation rate was almost 50% less (2.4 mM/hour). Lastly, the initial degradation rates in ratio 15:1 and 20:1 were only one third (1.2 mM/hour) of what was observed in the absence of α-CD. These results shows that α-CD is capable of inhibiting the enzymatic degradation of γ-CD considerably and that there might be an upper limit to the inhibitory effect.