THICKENERS FOR DYSPHAGIC PATIENTS: COMPARISON OF A NEW AMYLASE RESISTANT PRODUCT WITH FOUR STANDARD STARCH-BASED PRODUCTS. - IN VITRO STUDY -

Introduction
Patients with dysphagia are commonly prescribed thickened drinks to promote safe swallowing.1,2 Standard starch-based thickeners are sensitive to α-amylase, and may thin during consumption resulting in patients not receiving their prescribed consistency. This study compares the effect of human saliva on the consistency of drinks (water, full fat milk and black coffee) thickened with a newly developed thickener with α-amylase resistant features and four standard starch-based thickeners.

Methods
100 g artificial tap water (10ºDH), full fat milk and black coffee were thickened to custard consistency with an α-amylase-Resistant Thickener (ART; Nutrilix®, Nutricia) and four standard Starch-based Thickeners namely ST1: Thick&Easy®, Hormel; ST2: Resource® Thick&Easy, Novartis; ST3: Clinutren®, Nestlé; ST4: Magic Mix, Laboratoires DHN.

The custard consistency was defined as being 1200 and 1400 mPa.s at 50 °C. After 10 minutes, the thickened drinks were inoculated with 1 ml of human saliva. After 10 and 50 minutes, the amount of decantable thin liquid was determined by weight. The change in consistency was determined by measuring the uniaxial compression force with a Stable Micro Systems TA-XT2i Texture Analyser. Human saliva was collected from several persons on several days. Small batches of saliva having a similar amylase activity (217 U/ml) were stored at -20°C. Amylase activity was determined using the α-amylase Assay Procedure (Gerapha method, ICC Standard No. 303) using HR Reagent (Megazyme K-AMHR4).

Results
After addition of human saliva, the amount of decantable thin liquid for all drinks thickened with α-amylase-Resistant Thickener (ART) was lower than 1.3g of the total amount (Figure 1). The values were significantly (p<0.05) higher for drinks thickened with the four standard Starch-based Thickeners (ST). For ST the amount of decantable formed thick liquid varied from 9.4g for black coffee up to 90.5g for full fat milk. Concerning the four standard starch-based thickeners, the addition of human saliva had the largest effect on thickened full fat milk (p<0.05). For water and black coffee, the decantable liquid was less than 34.4g. In water, ST1 and ST4 were less sensitive for human saliva. In black coffee, the differences between starch-based thickeners were very small. After 50 minutes, ST4 showed the lowest amount of decantable liquid compared to ST1 and ST3.

After addition of human saliva, the maximum compression force for α-amylase-resistant thickener (ART) was the highest for all drinks (Figure 2). The compression force for ART was 0.38N, 0.18N, 0.31-0.56N for water, full fat milk and black coffee, respectively. These values were significantly (p<0.05) higher for drinks thickened with ST (0.18-0.25N), 0.11-0.13N, 0.22-0.27N for water, milk and coffee, respectively. Drinks thickened with ART retained better their consistency. Concerning the four standard starch-based thickeners, the addition of human saliva had the largest effect on consistency of thickened full fat milk (p<0.05). In the case of water, the standard starch-based thickener ST4 showed significantly the highest compression force of all standard starch-based thickeners and the lowest in the case of black coffee. However, both in water and coffee the maximum compression values were nearly the same, 0.25 and 0.24 N respectively. This indicated that the consistency of drinks thickened with ST4 remained unchanged in aqueous drinks without proteins and fat.

Conclusion
After addition of human saliva, drinks thickened with an α-amylase-resistant thickener ART have the lowest amount of decantable thin liquid and the highest maximum compression force. These drinks retain their consistency significantly better than drinks thickened with standard starch-based thickeners. From the standard starch-based thickeners ST4 shows the best features. Drinks thickened with an α-amylase-resistant thickener ART forms hardly or no thin liquid. It is expected that ART supports safer swallowing in patients with dysphagia.

References:
1 W.J. Dodds, Dysphagia 3, 171 (1989).

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