EFFECT OF HUMAN SALIVA ON THE CONSISTENCY OF A NEWLY DEVELOPED MILDLY THICK ORAL NUTRITIONAL SUPPLEMENT FOR PATIENTS WITH DYSPHAGIA

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INTRODUCTION

Dysphagia is defined as the difficulty or inability to swallow. It may cause dehydration, malnutrition, and aspiration pneumonia (1). To promote safer swallowing, patients with dysphagia get prescribed modification of diet and fluids (2). To increase the viscosity of foods/drinks for patients with swallowing difficulties, starch-based thickeners (ST) are commonly used. These are highly sensitive to \( \alpha \)-amylase in saliva, leading to a potential thin and unsafe fluid (ONS) with multi-fibres (AR) in comparison with standard ST.

METHODS

Materials: AR product: pre-thickened mildly-thick ONS with multi-fibres (Nutilis® Complete) from Nutricia. Control: artificial tap water (10°DH) thickened with standard ST. Hundred gram water was thickened to mildly thick consistency with ST. Mildly thick consistency was defined as being 450 - 600 mPa.s measured at 50 s⁻¹ and at 20°C.

Saliva: Human saliva was collected from several persons on several days. Small batches of saliva having a similar activity (217 U/ml) were stored at -20°C. Amylase activity was determined using the \( \alpha \)-amylase Assay Procedure (Ceralpha method, ICC Standard No. 303) using HR Reagent (Megazyme R-AMHR4). In vitro study: Ten minutes after opening the pre-thickened drink or start of preparation of the thickened drink, 1 ml of saliva was added. After 10 and 50 min the amount of decantable thin liquid formed was measured by weight. The change in consistency was determined by measuring the uniaxial compression force with a Stable Micro Systems TA-XT2i Texture Analyser.

Human testing: About 12 healthy subjects participated in this single-blind, randomised, cross-over study. Each person performed two series of two tests (in total four tests) on two different days. The same set of products was tested but in different order the second day. In each test, the subject took one cup of about 30g product (AR or ST). Persons were instructed to move the tongue approximately 1 rotation per sec. After 10 sec the bolus was spat out into an aluminium canister and viscosity measurement was started directly. Viscosity measurements on fresh samples were performed in a rotational viscometer, Rapid Visco Analyser (RVA) at 50 s⁻¹ and 20°C. The viscosity was obtained after 30 min.

RESULTS

In vitro study: After addition of human saliva, no decantable thin liquid was formed for AR (Figure 1). For drinks thickened with ST the amount of thin liquid formed varied between 8 and 21 ml (P<0.01), which corresponds with 2 to 4 boluses.

After addition of human saliva, the value for the maximum compression force for the AR product was relatively unaffected (Figure 2). The values were significantly different for water thickened with ST (P<0.05). For ST the force decreased with almost 10% after 10 minutes and with more than 20% after 50 minutes, showing a decrease in consistency. This result is in good agreement with the formation of thin liquid with ST.

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Human testing: After handling in the mouth, the relative viscosity of water thickened with ST was 12%. This value was significantly higher for the AR product (P<0.0001), for which the relative viscosity was 79%. This shows that products having \( \alpha \)-amylase-resistance features retain their consistency considerably better than ST products once in contact with human saliva.

CONCLUSION

Both in vitro tests and human testing show that the newly developed ready-to-use mildly-thick energy-dense AR ONS with multi-fibres retains the consistency significantly better than drinks thickened with ST in presence of saliva.

Therefore, we hypothesize that the use of AR products supports safer swallowing for patients with dysphagia.

REFERENCES