World Academy of Science, Engineering and Technology
International Journal of Nutrition and Food Engineering
Vol:11, No:03, 2017

# Compression-Extrusion Test to Assess Texture of Thickened Liquids for Dysphagia

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**Abstract :** Dysphagia or difficulty in swallowing affects mostly elder people: 56-78% of the institutionalized and 44% of the hospitalized. Liquid food thickening is a necessary measure in this situation because it reduces the risk of penetration-aspiration. Until now, and as proposed by the American Dietetic Association in 2002, possible consistencies have been categorized in three groups attending to their viscosity: nectar (50-350 mPa•s), honey (350-1750 mPa•s) and pudding (>1750 mPa•s). The adequate viscosity level should be identified for every patient, according to her/his impairment. Nevertheless, a systematic review on dysphagia diet performed recently indicated that there is no evidence to suggest that there is any transition of clinical relevance between the three levels proposed. It was also stated that other physical properties of the bolus (slipperiness, density or cohesiveness, among others) could influence swallowing in affected patients and could contribute to the amount of remaining residue. Texture parameters need to be evaluated as possible alternative to viscosity. The aim of this study was to evaluate the instrumental extrusion-compression test as a possible tool to characterize changes along time in water thickened with various products and in the three theoretical consistencies. Six commercial thickeners were used: NM® (NM), Multi-thick® (M), Nutilis Powder® (Nut), Resource® (R), Thick&Easy® (TE) and Vegenat® (V). All of them with a modified starch base. Only one of them, Nut, also had a 6,4% of gum (guar, tara and xanthan). They were prepared as indicated in the instructions of each product and dispensing the correspondent amount for nectar, honey and pudding consistencies in 300 mL of tap water at 18ºC-20ºC. The mixture was stirred for about 30 s. Once it was homogeneously spread, it was dispensed in 30 mL plastic glasses; always to the same height. Each of these glasses was used as a measuring point. Viscosity was measured using a rotational viscometer (ST-2001, Selecta, Barcelona). Extrusion-compression test was performed using a TA.XT2i texture analyzer (Stable Micro Systems, UK) with a 25 mm diameter cylindrical probe (SMSP/25). Penetration distance was set at 10 mm and a speed of 3 mm/s. Measurements were made at 1, 5, 10, 20, 30, 40, 50 and 60 minutes from the moment samples were mixed. From the force (g)–time (s) curves obtained in the instrumental assays, maximum force peak (F) was chosen a reference parameter. Viscosity (mPa•s) and F (g) showed to be highly correlated and had similar development along time, following time-dependent quadratic models. It was possible to predict viscosity using F as an independent variable, as they were linearly correlated. In conclusion, compression-extrusion test could be an alternative and a useful tool to assess physical characteristics of thickened liquids.

**Keywords :** compression-extrusion test, dysphagia, texture analyzer, thickener
**Conference Title :** ICFSN 2017 : International Conference on Food Science and Nutrition
**Conference Location :** Madrid, Spain
**Conference Dates :** March 26-27, 2017