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Title: Topshake , a new breakfast for persons with dementia and swallowing problems

Introduction

Research for Belgium has proven that 7% of the elderly who live at home, and 14% of the elderly in care homes suffer from malnutrition³. One of the causes of malnutrition in older people suffering from dementia are swallowing problems. To provide a solution for this problem, Mobilab developed together with Lab4food and Top Foods a nutritious 'Topshake' that replaces a breakfast, which contains all necessary nutrients with a controlled and adapted texture and viscosity. Five different flavors were tested in this study, each for each day of the week.

Objectives

The aim of this study was to evaluate the swallowing function, the eating behavior, the nutritional intake and the time needed for the caregiver to assist during breakfast. From technological point of view, the goal was to determine the viscosity of the Topshake and correlate this 'value' for the swallowing and eating function.

Methods

The study is a Quasi-experimental crossover design (ABAB-type, also called single-factor experiment with repeated measures). The study takes only the working days into account, from Monday until Friday, the weekend was excluded. For 1 week (period A), patients received a traditional breakfast as standard meal on a normal plate, while the next week (period B), the patients received the 'Topshake' (a different recipe each day), by using a goblet. This 2-week trial is performed twice, which resulted in a total test period of 4 weeks. In addition, the caloric value of each product was calculated. The standard meal and the shake recipes were standardized for caloric intake. The study was executed in twelve nursing homes. At each location, the whole menu was weighed with the same balance. On a structured base, the eating behavior (Watson, 1993) and the swallowing function (own scale, unpublished) were daily observed. Patients were included from twelve Belgian nursing homes. It was important that the diagnosis of dementia was confirmed by a medical doctor in accordance with the Diagnostic and Statistical Manual of Mental Disorders (DSM V) criteria. The Mini Mental State Examination score (Folstein, 1975) had to be below 11 and the Katz scale (Katz, 1983) had to show that the patient needed assistance for eating. The family had to give their informed consent, and all patients had to use their breakfast at the table, clothed. This study was approved by the medical ethical committee. On this basis, 84 patients were selected, which resulted in 78 patients whose data were included in the study.

In the lab the Brookfield viscometer was used for measuring stepwise changes in shear rate (up and

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³ Nutriactionstudy, 2015

down at 5, 10, 30, 50, 90 and 100 rpm), to determine the hysteresis loop that is typical for thixotropic fluids (Steffe 1996; Mewis and Wagner 2009). Each rotational speed was held for 15 min, and the viscosity value at that moment was used to evaluate the thixotropic behavior. These shear rates are close to the estimated shear rates in the mouth (Shama and Sherman 1973; Steffe 1996; ADA 2002). All experiments with the Brookfield viscometer were performed in a beaker of 115 mm diameter at 10 degrees celcius (water bath-controlled). Every day during the clinical study, the viscosity of the Topshake given to the patient, was measured, using this method in the lab.

Results

This study shows an increased food intake (both expressed in grams and in kilojoules) for the Topshake breakfast, as compared with the standard breakfast. Because the standard meal and the shake recipes were standardized for caloric intake, the percentage of intake was calculated. The first week (period A, traditional breakfast) the daily average intake was 79.4%. In the second week (period B) the intake increase up to 93.1%. During the third week (period A) the intake was 82.5% and the last week (period B) it was 92.1%. Due to this percentages, paired t-tests showed a significant increase between the first and second week, between the third and fourth week, and between the first and fourth week ($P < 0.0001$).

Using the Chi-square test, the analysis of the eating behavior showed statistically significant differences for all items, the most important characteristics being "leaving the mouth open" ($P < 0.001$) and "refuse to swallow" ($P < 0.0001$). The swallowing function was evaluated on 11 items, self-constructed scale, type Likert, with a reliability of 0.868. Several items indicated that the Topshake improved the safety of swallowing (Chi-square): Closing of the lips ($p < 0.05$), less food remainders after swallowing ($p < 0.01$), less hoarding of food ($P < 0.05$), less coughing ($P < 0.05$) and less moist sounding voice ($P < 0.05$) and less vomiting ($p < 0.05$). The measurement of the viscosity shows that there is a significant relation between eating behavior and viscosity ($p < 0.01$) and swallowing function and viscosity ($p < 0.01$).

Finally, there was also a significant time gain ($P < 0.05$) measured of at least 4 minutes for each breakfast for each patient.

Discussion and conclusion

The results from this research shows that this new breakfast is well balanced and developed for improved chewing and swallowing function for demented elderly. The patient did not only eat more, they needed less time to finish their meal. The relation between viscosity and swallowing function and eating behavior shows us that a viscosity of more than 3000 mPas seems to be optimal. The results showed no measurable differences over the five tested flavours.

This means that the Topshake is safer and more adapted for the needs of people with dementia and swallowing problems and also improves their wellbeing significantly. The nurse gain time while assisting during breakfast as well. We may conclude that this concept has advantages for each party and that we can develop this concept for other patients with swallowing problems.

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