Metabolic and nutritional effects of two types of meals with modified texture in dysphagic subjects

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Background

Dysphagia is a common problem with ageing, affecting between 2.3-16% of individuals , and occurs more often in the institutionalized elderly. The causes of dysphagia occur simultaneous to other geriatric problems and can be related to neuromuscular, musculoskeletal, tumoral, infectious, cardio-respiratory, and iatrogenic issues (1). In general, there is widespread difficulty in identifying the optimum solutions to meet these needs. The most critical points can be summarized as (i) difficulties in planning specific nutritional intake due to the great variability in manually prepared recipes and due to the large proportion of scraps, (ii) difficulty in developing a varied and appetizing menu, for example, considering the organizational difficulties for the preparation stages and the tendency to blend finished foods and ingredients without giving particular attention to the organoleptic quality and the subjective perception of food, (iii) difficulty in making recipes well-connoted to the perceptive point-of-view of taste, color and identity of a dish in relation to the "food memory" of the patient, (iv) difficulties in administering food within 24 hours, and (v) issues arising from the need to integrate traditional foods with supplements. From the psychological and organoleptic point-of-view of the patient, food may no longer be perceived a source of taste and pleasure, rather a "medicinal meal" that they do not want to consume.

Aim

This study aims to investigate the impact of two feeding models, (i) traditional kitchen prepared smoothed dishes (indicated for abbreviation as CF), and (ii) a meal with modified, homogenized consistency obtained from dehydrated and rehydrated instantaneous preparations by means of special equipment (indicated for abbreviation as OI), in assessing changes in nutritional status, different compliance, perceived quality, morbidity and mortality, and clinical safety.

Methods

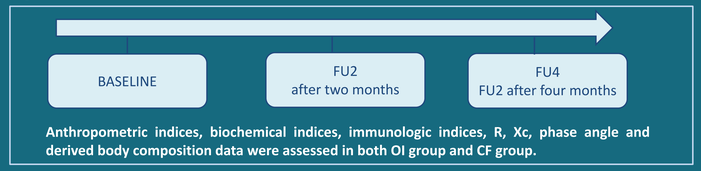
The present retrospective study refers to two groups of 15 patients affected by medium severity dysphagia (not candidates for artificial nutrition), who were admitted to residential care for the disabled, and who were treated with two different methods of food technology preparation.

Previous to this the patients had followed the traditional food and feeding method, although some of them, due to clinical problems, had occasionally been given the new homogenized instantaneous food. The menus were of two different types, although the menu OI was coherent and consistent with the traditional smoothie menu CF.

Anthropometric indices (weight, height, and arm circumference), **biochemical indices** (cholinesterase, transferrin and albumin), **immunologic indices** (lymphocytic count and bioimpedance parameters), **R**, **Xc**, **phase angle** and **derived body composition data** (BIA 101 – S Akern Firenze) were assessed. Assessment for oropharyngeal motor dysphagia was based on the oral Smithard test (2). All patients underwent a nutritional screening test (3).

Follow-up was taken at 2 months (FU2) and at 4 months (FU4).

Figure 1. Flowchart Study



Anthropometric indices, biochemical indices, immunologic indices, R, Xc, phase angle and derived body composition data were assessed in both OI group and CF group.

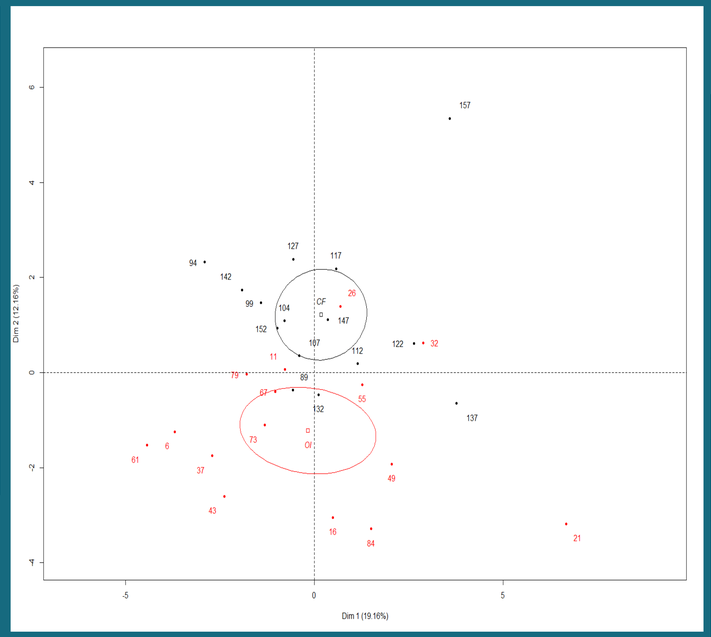


Figure 2. Confidence ellipses around the strategies of feeding (OI in red and CF in black). Synthetic dimensions are described in Table 1. Data points are individual observations at FUP4.

Table 1. Study results. Data are I quartile / Median / III quartile for continuous variables and percentage (number of cases) for categorical variables. p-value for trend indicates the statistical significance of the change over time of each variable. p-value between strategies (to be read in column-wise view) indicates the statistical significance of the median values between the two strategies (OI and CF) at each time point (which are compared row-wise). Overall values refer to the overall sample, and are not stratified according to the strategy.

		Strategy	Base	FU2	FU4	p-value (for trend)
Albumin	Overall		3.625/3.915/4.125	3.600/3.900/4.250	3.400/3.700/4.200	*0.629*
		OI	3.335/3.800/3.970	3.400/3.600/4.200	3.500/3.700/4.200	*0.849*
		CF	3.900/4.000/4.200	3.800/3.950/4.275	3.425/3.700/4.050	*0.102*
p-value (between strategies)			0.067	0.147	0.716	
Azotemia	Overall		18.75/24.50/31.00	19.75/24.00/34.00	22.00/27.00/35.00	*0.061*
		OI	17.25/20.50/25.25	19.00/23.00/33.00	21.00/28.00/35.00	*0.297*
		CF	24.25/28.00/34.75	21.00/29.00/34.00	23.50/27.00/33.50	*0.368*
p-value (between strategies)			0.021	0.669	0.898	
BIA Lean Mass (Kg/m)	Overall		23.000/25.900/28.500	23.900/26.900/29.000	23.925/26.300/29.550	*0.7*
		OI	22.825/24.750/25.850	23.450/25.600/26.950	22.850/24.000/26.300	*0.927*
		CF	25.050/28.500/29.950	27.200/29.100/31.725	27.000/29.600/30.550	*0.943*
p-value (between strategies)			*0.007*	*0.003*	*<0.001*	
BIA Fat Mass (Kg/m)	Overall		6.400/ 8.200/13.200	3.600/ 7.700/13.000	5.025/ 7.250/10.975	*0.994*
		OI	5.175/7.250/8.500	3.250/6.700/8.250	4.400/7.200/8.150	*0.9*
		CF	6.500/11.000/18.850	4.825/10.850/17.750	5.150/ 7.400/15.550	*0.904*
p-value (between strategies)			*0.141*	*0.107*	*0.338*	
Hydration	Overall		72.700/73.300/73.800	73.500/75.100/77.700	72.950/73.650/73.875	*0.708*
		OI	69.275/73.000/73.900	73.350/75.100/77.500	73.350/73.700/75.550	*0.829*
		CF	73.150/73.400/73.700	73.625/75.700/77.475	71.000/73.500/73.850	*0.28*
p-value (between strategies)			*0.536*	*0.702*	*0.278*	
Lymphocytic count	Overall		1.5500/2.1050/2.6700	1.8825/2.7300/4.9700	3.8100/5.1900/7.2050	*0.012*
		OI	1.3650/1.6300/2.1900	1.4500/1.8900/2.8300	3.9275/5.5000/6.5550	*0.023*
		CF	2.0725/2.4200/2.9700	2.7150/4.3700/6.3900	3.9100/4.7300/7.2600	*0.005*
p-value (between strategies)			*0.018*	*0.003*	*0.888*	
MNA	Overall		17.000/17.500/19.375	16.625/17.750/19.500	17.500/18.250/19.875	*0.309*
		OI	17.00/18.50/19.75	17.50/19.50/20.00	18.00/20.00/20.50	*0.237*
		CF	16.75/17.50/18.50	15.50/17.00/18.00	16.50/17.50/18.50	*0.323*
p-value (between strategies)			*0.324*	*0.004*	*0.006*	

Results

The comparison between the initial and final observations after 4 months shows a slight decrease in both weight and BMI, a non-significant phase angle increment in both groups, a significant increase in lean mass and a significant decrease in fat mass in the CF group and correspondingly in the OI group but not significantly. As far as total water is concerned, both groups had a significant increase. But the percentage hydration is significantly increased only in OI. Circulating proteins have a different pattern as albumin and prealbumin increase significantly in OI. In group CF, albumin decreases significantly while prealbumin increases in a non-significant way. Also, the lymphocytic count increases significantly in OI. Azotemia significantly increases in OI. The MNA significantly increases in the OI group.

Conclusions

From the results obtained in this preliminary study, including daily clinical observation, the trend of anthropometric and bio-temporal indices, and the use of a detection card for signs, symptoms and food consumed during administration, it is inferred that the instantaneous homogenized feeding method (OI) produces a substantial improvement in nutritional status in comparison to traditional smoothed meals (CF). The best introduction of calories in the OI group involved proteins and water. This highlights the importance of sensory aspects and also indicates that organizational and production characteristics offer more advantages over the traditional dietetic management of patients admitted to protected structures. Observation of the data-mining analysis, which shows an overall nutritional improvement in the OI group, and by taking into account correlations among biomarkers and clinical outcome measures, it becomes evident that the OI meals, being more attractive and pleasing, allow a greater introduction of nutrients.

The dysphagic patient who, in addition to being elderly, is given food with modified consistency can successfully take nutrients with high caloric density. These foods of modified consistency also assure that the patients who are prescribed them are given the correct consistency for their condition, because each product is manufactured according to the consistency specifications, reducing the typical variations of the traditional smoothie products.

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