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RESEARCH ARTICLE

Complete Oral nutritional Supplements: Compliance, Palatability, Tolerance In Healthy Volunteers

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Abstract

Introduction: Malnutrition is common in acute and chronic illness. Oral Nutritional Supplements (ONS) augment oral intake when food consumption is insufficient. All new ONS require acceptability testing prior to human use. ONS success depends on patient acceptability. This acceptability study examined 1) palatability, 2) compliance 3) gastrointestinal (GI) tolerance of a product range of six ONS in healthy volunteers.

Methods: The study design met the standardised clinical safety requirements outlined in Directive 2001/20/EC of the European Parliament and Council, (2001) for the conduct of acceptability studies of medicinal products prior to human use. ONS were taste-tested for Palatability by sensory panels.Volunteers taste-tested ONS daily for thirty days for Compliance and GI Tolerance.

Results: Palatability (n=20): The mean Palatability rating for all six products was 6 (SD +/-1.5); (1= dislike extremely; 9= like extremely). Compliance evaluation (n=134) showed ≥90% of volunteers consumed the prescribed ONS amount for the entire thirty days. GI Tolerance (n=134) was excellent with side effects mild in nature and of short duration.

Conclusion: This acceptability study demonstrates a suitable methodology that adheres to EU clinical safety requirements. Palatability and Compliance were uniformly high, consistent and sustained. GI side effects were uncommon, mild and brief. The tested ONS were palatable, acceptable and well tolerated in healthy adults.

Keywords: Cachexia; Compliance; Malnutrition; Oral Nutritional Supplements; Palatability; Tolerance.

Introduction

Malnutrition is common in many acute and chronic illnesses. It is defined as either a low BMI (<18.5kg/m2), or a combination of unintended weight loss together with either a low BMI (age specific) or a low Free Fat Mass Index (gender specific) [1, 2]. Consequences include compromised immune response, fatigue, impaired wound healing and reduced muscle strength. Cachexia occurs in multiple disease processes and is characterised by loss of skeletal muscle mass (with or without fat mass loss), abnormal metabolism and reduced dietary intake which is accompanied by weight loss and functional decline [3]. Cachexia and malnutrition in cancer, for example, are poor prognostic indicators and can reduce tolerance to anti-cancer therapy, impair patient outcomes and reduce survival [4, 5].

Oral Nutritional Supplements (ONS) are defined as "multi-nutrient liquid, semi-solid or powder products that provide macronutrients and micronutrients with the aim of increasing oral nutritional intake". They are important in modern healthcare. Typically they augment food intake if insufficient and are frequently recommended for people who are undernourished or at risk of malnutrition. ONS can improve quality of life in cancer cachexia, but do not effect survival [6]. Nutritionally complete ONS contain both macronutrients (carbohydrate, fat and protein) and essential micronutrients in quantities and balance that enables them (in sufficient volume) to act either as a sole nutrition source or major dietary supplement. ONS success depends on compliance, palatability and gastrointestinal (GI) tolerance [7]. The patient ONS experience is critical but subjective. Lessons learned must be incorporated into ONS clinical guidelines and practice.

Compliance is the degree to which a person adheres to a recommended treatment plan. It has been suggested that ONS may reduce the intake of ordinary diet, thus reducing their own effectiveness [8]. However, increased daily protein and /or energy intake was shown when ONS were used. Because many studies also include dietary advice in an intervention, it can be difficult to identify which factors directly influence outcomes.

ONS convenience, duration of use, GI tolerance and

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volume consumed affect overall acceptability and therefore compliance. ONS compliance varies (37%-100%) across healthcare settings and patient groups. It is lower in the acutely ill hospitalised compared to community dwelling elderly. In older patients the use of smaller volume ONS improved compliance [9-12].

As appetite is frequently impaired during any illness or chronic disease, hunger is often absent and individuals not motivated to eat. ONS palatability is therefore particularly significant for long-term compliance [13]. Palatability is influenced by many factors: aftertaste, appearance, consistency, smell, taste, temperature, and volume. Milk-based ONS products have been rated higher than juice-based products in several palatability studies [14, 15].

GI tolerance of ONS has not been widely studied. Limited evidence suggests a satisfactory profile. The most commonly reported ONS side effects include diarrhoea, loss of appetite, nausea, undesirable weight gain,16 and vomiting.20 Although these observed side effects were mild, they resulted in non-compliance ranging from 0-28%.Greater understanding of compliance, palatability and tolerance of ONS in humans will direct specific nutritional interventions and stimulate research to address malnutrition [16- 23].

The aim of this study was to explore compliance, palatability and tolerance of a product range of nutritionally complete oral nutritional supplements in healthy volunteers. The methodology used complied with standardised clinical safety requirements outlined in Directive 2001/20/EC for the conduct of acceptability studies of medicinal products prior to human use [24].

Methods

Aims

This study aimed to record Compliance, Palatability and GI Tolerance of six nutritionally complete ONS products (Nualtra®, Limerick, Ireland) in healthy volunteers.

Recruitment

The study was conducted by Eolas International1, a market research company that specialises in sensory and laboratory research in the food sector. It complied with best practice for acceptability studies; thus ethical approval was not required in this jurisdiction. Healthy volunteers were recruited by telephone over a 3-week period and assigned to one of seven predetermined groups (Groups A-G) in a non-randomised manner. The population selected for recruitment was predominately over sixty-five to reflect those most commonly prescribed ONS.

A minimum of 20 participants with a low/low-normal body mass index (BMI) (range: 16-20kg/m2) were recruited to each volunteer group.1 Those with diabetes, or taking dietary replacement or enhancement products were excluded.

A fixed standardised fee was paid to all participants according to current ethical procedures in the study jurisdiction.

Consent

Participation was entirely voluntary and participants could withdraw at any time. Before the study, all participants completed a standard questionnaire to confirm that they were

* Eolas Sensory Research Laboratory, 1703 Euro Business Park, Little Island, Cork in good health and signed a disclaimer with regard to potential side-effects.

Intervention

Six ONS products (Table 1) from a single manufacturer were tested for Palatability (Group A only), Compliance (Groups B-G), and GI Tolerance (Groups B-G).

Table 1: Oral Nutritional Supplements Tested.

	Product	Flavour	Volume	Nutritional Content
1	Milkshake	Vanilla	125ml*	300kcal/12g protein/36g carbohydrate/12g fat- plus complete range of vitamins & minerals ****
2	Milkshake	Strawberry		
3	Milkshake	Vanilla	200ml **	300kcal/20g protein/30 carbohydrate/11.2g fat- plus complete range of vitamins & minerals *****
4	Milkshake	Strawberry		
5	Dessert	Vanilla	125g ***	225kcal/12.5g protein/23.5g carbohydrate/9g fat- plus complete range of vitamins & minerals ******
6	Dessert	Strawberry		

*Altraplen Compact®
**Altraplen Protein®
***Nutricrem®
****Altraplen Compact: Mono & disaccharides: Vanilla 7.9g/100ml, Strawberry 8.3g/100ml
Polysaccharides: Vanilla 20.9g/100ml, Strawberry 20.5g
Sucrose: Vanilla 3.6g/100ml, Strawberry 4.05g/100ml
Lactose: <0.5g/100ml for both flavours
*****Altraplen Protein: Mono & disaccharides: 4.6g/100ml for both flavours
Polysaccharides: 10.4g/100ml for both flavours
Sucrose: 0g/100ml for both flavours
Lactose: <0.1g/100ml for both flavours
******Nutricrem: Mono & disaccharides: 9.7g/100g for both flavours
Polysaccarides: 9.1g/100g for both flavours
Saccharose: 8g/100g for both flavours
Lactose: <0.5g/100g for both flavours

Palatability

Group A formed two sensory panels (N=10 volunteers each). Participants had no formal sensory test training beforehand. They received four hours of basic sensory test training during which the key attributes to be evaluated were explained. ONS sensory testing for palatability was completed mid-morning on three occasions over a period of 7 consecutive days in a sensory research laboratory (Eolas Laboratory, Cork, Ireland): Day 1 (Immediate Overall Liking), Day 3 (Interim Overall Liking) and Day 7 (Final Overall Liking). The higher the palatability scores the more acceptable the product. The six ONS were scored for "appearance", "smell", "taste", "aftertaste", "texture" and "overall liking" on a 9-point hedonic scale (1= dislike extremely; 9= like extremely). Participants cleansed their palate with water and dry crackers between samples (Table 1). International Organisation for Standardisation (ISO) Sensory Analysis Guidelines were adhered to during the tests [25].

Compliance & Gastrointestinal Tolerance

Six groups (B, C, D, E, F & G) (N=20-23 per group) tested one ONS serving daily for Compliance and GI Tolerance for thirty days (standardised requirement in acceptability studies - European Parliament and Council 2001).

Each group was assigned a single ONS in one flavour only:

- Group B: Vanilla Milkshake (Altraplen Compact®) 125ml/300kcal/12g protein
- Group C: Strawberry Milkshake (Altraplen Compact®) 125ml/300kcal/12g protein
- Group D: Vanilla Milkshake (Altraplen Protein®) 200ml/300kcal/20g protein
- Group E: Strawberry Milkshake (Altraplen Protein®) 200ml/300kcal/20g protein
- Group F: Vanilla Dessert (Nutricrem®) 125g/225kcal/12.5g protein
- Group G: Strawberry Dessert (Nutricrem®) 125g/225kcal/12.5g protein

All six ONS products contained a complete range of essential macro- and micronutrients, with minor variation between products.

Participants in each Compliance and Tolerance group were given a 30-day supply of the assigned product. They did not choose the flavour. They were asked to consume one full serving each day at home either before or between meals in addition to their usual dietary intake.

They completed a daily compliance paper diary for thirty days to record the ONS volume ingested each day; 1) Full; 2) Three Quarters; 3) Half; 4) None. They were encouraged to consume the products at their personal preferred temperature (chilled, room temperature or heated). Participants recorded the consumption temperature and whether the product was consumed unmodified or mixed with other food. The consumption of normal diet was not measured. Participants were not under direct supervision during the study, but were phoned on Days 1, 3 and 5 to prompt accurate data recording.

During the first seven days, participants also completed daily GI symptom ratings for abdominal discomfort, altered bowel habit, bloating/distension, burping/flatulence/regurgitation, and nausea/vomiting. These are listed for monitoring and reporting by the UK Government Advisory Committee on borderline Substances (Appendix 5). A researcher telephoned each participant on Days 1, 3 and 7 to ensure symptom assessments were completed. Symptom frequency, duration and severity were recorded [26].

Data Analysis and Protection

Microsoft Excel Software (Seattle, Washington, USA) was used to generate descriptive statistics. Mean palatability rating, percentage compliance and intolerance episodes were calculated. Mean onset and duration of side effects onset and duration was also determined. Free text comments were collated and reviewed. Each participant was assigned a study number to ensure confidentiality. No individually identifiable data was collected.

Results

Volunteer Characteristics

One hundred and fifty four healthy volunteers participated (n=20 in Palatability Study; n=134 in Compliance/GI Tolerance Study). 50% were male. 75% (n=115) were >65 years.

Palatability

All products and flavours were found to be acceptable (Table 2). The mean Palatability Rating (1-9) for all six products was 6 (SD +/-1.5). All products scored well on Day 1 and remained stable or improved over time (Days 3 and 7). Product texture was described as "smooth", "creamy", "palatable" and "nice".

Compliance

Compliance was high. ≥90% of participants consumed the assigned volume of all six products for thirty consecutive days. The remainder consumed half or more (Table 3). The Compact ONS had the highest individual product compliance.

Table 2: Palatability Over 7 Consecutive Days.

Product	Average Rating per Time-point (Range 1-9)		
	Day 1	Day 3	Day 7
Milkshake: 125ml/300kcal/12g protein			
Strawberry (n=23)	6	6	6
Vanilla(n=23)	6	6	6
Milkshake: 200ml/300kcal/20g protein			
Strawberry (n=23)	6	6	7
Vanilla (n =20)	7	7	7
Dessert: 125g/225kcal/12.5g protein			
Strawberry (n=23)	6	7	7
Vanilla (n=22)	6	7	7

Table 3: Compliance Over 30 Consecutive Days.

Product	Total Volume Consumed Total (% Participants)		
	Full serving	Three-quarter serving	Half serving
Milkshake: 125ml/300kcal/12g protein			
Strawberry (n=23)	91%	6%	3%
Vanilla (n=23)	96%	4%	0%
Milkshake: 200ml/300kcal/20g protein			
Strawberry (n=23)	90%	4%	6%
Vanilla (n=20)	90%	4%	6%
Dessert: 125g/225kcal/12.5g protein			
Strawberry (n=23)	93%	2%	5%
Vanilla (n=22)	90%	3%	7%

Table 4: Gastrointestinal Symptom Occurrences Over 7 Consecutive Days.

	SYMPTOMS				
	Abdominal Discomfort N (Episodes)	Altered Bowel Habit N (Episodes)	Bloating/ Distension N (Episodes)	Burping/Flatulence/ Regurgitation N (Episodes)	Nausea/ Vomiting N (Episodes)
MILKSHAKE: 125ml/300kcal/12g protein					
Strawberry (N=23)	2 (3)	5 (9)	4 (11)	9 (18)	3 (11)
Vanilla (N=23)	1 (1)	1 (2)	5 (6)	4 (10)	2 (2)
MILKSHAKE: 200ml/300kcal/20g protein					
Strawberry (N=23)	4 (5)	6 (9)	4 (7)	6 (11)	2 (3)
Vanilla (N=20)	1 (1)	2 (5)	4 (10)	2 (3)	0 (0)
DESSERT: 125g/225kcal/12.5g protein					
Strawberry (N=23)	2 (2)	4 (9)	3 (4)	6 (15)	1 (3)
Vanilla (N=22)	4 (7)	5 (8)	5 (6)	9 (13)	1 (3)
TOTAL SYMPTOMS Total N=134 Total Evaluations = 938	14 (19)	23 (42)	25 (44)	36 (70)	9 (22)

N = Participants who experienced the symptom at any time during the 7 test days
Total number of episodes in brackets.s

When the prescribed volume was not consumed, the identified reasons for non-compliance were abdominal fullness, bloating, constipation and taste fatigue.

Across the range of six products, most (77%) consumed the ONS chilled, the remainder at room temperature. While participants could mix the product with other foods and liquids, most (93%) did not. Those who did usually added ONS to breakfast cereals, cream, fruit, milk, porridge, smoothies, toast or yogurt.

Tolerance

The five GI symptoms evaluated by 134 participants daily for the first 7 days resulted in 938 evaluations. The ONS were well tolerated with mild GI symptoms in a minority. In rank order of prevalence, burping/flatulence/regurgitation occurred most frequently at 4%, followed by bloating and distension (3%), altered bowel habit (2.5%), abdominal discomfort (1.5%) and finally nausea/vomiting (1%) (Table 4). Reported symptoms were mild in nature and ranged from 'no discomfort' to 'slight discomfort'. The mean time to symptom onset after ingestion was 62 minutes (SD +/- 44), while mean duration was 103 minutes (SD +/- 61).

Discussion

Compliance, Palatability, and Tolerance of a range of six nutritionally complete ONS products were examined in 154 healthy volunteers with a low/low-normal BMI. Compliance was high for all products over thirty days and remained consistent irrespective of flavour, product, texture or volume. Self-report and limited supervision of the data collection may have influenced these results.

These results compare favourably with previous studies. A systematic review of ONS compliance, examined thirty-three studies conducted in the community setting and found a mean non-compliance rate of 19%. In our study the Compact ONS had the highest compliance, perhaps due to a smaller volume as seen in previous studies. Most participants consumed the six products chilled. Participants were not permitted to choose their preferred product or flavour. This contrasts with clinical practice where flavours are usually individually selected. Self-selection by flavour might have further increased Compliance and Palatability ratings.

Participants liked all products consistently over the seven days irrespective of the ONS flavour, product, texture (milkshake or dessert) or volume (125ml; 200ml or 125g). No one flavour or product was significantly more palatable than another. Over seven days tolerance was high with a few mild symptoms and minor discomfort recorded. Typically symptoms were uncommon, intermittent, had a rapid onset and short duration. Participants also consumed their usual diet plus the ONS during the study and this may have contributed to some GI

symptoms like abdominal discomfort or bloating/distension. Some (5-8%) mixed the product with other foods, most often fruit or cereals. All six nutritionally complete ONS in various flavours were well tolerated and therefore may offer the opportunity to improve overall dietary intake. Offering a choice of service temperature (chilled/ room temperature/ warmed) may also improve palatability. Palatability is a key driver of nutritional intake. Older adults seem to prefer flavour enhanced foods. While no studies investigated sensory variety in ONS, the European Society for Parenteral and Enteral Nutrition (ESPEN) recommend a variety of flavours, temperature and consistency to achieve increased energy and nutrient intake [27- 29].

This study examined a limited number of nutritionally complete ONS products from a single manufacturer for Palatability, Compliance and Tolerance in healthy volunteers who were independent and community dwelling. Results therefore may not be generalisable to specific patients groups or settings especially those with altered taste, dysphagia or fluid restrictions. Tolerance might have been worse if used in higher volumes, but no previous studies have addressed this question. Compliance diaries and tolerance questionnaires were self-administered in the home. Nevertheless this mimics the routine clinical situation for ONS use.

In clinical practice, people may take ONS for months or years and consume several servings daily. In this study participants consumed one serving per day for 30 days. Results therefore might not reflect the taste fatigue that might occur with more frequent consumption or over longer timeframes. The hedonic scale used is not validated and self-report diaries and symptom self-assessments may be unreliable and influence results. ONS consumption was not directly supervised, so over-/underestimation was not monitored. Energy intake, nutritional status/risk and weight gain were not recorded and thus nutritional outcomes not assessed. Standardised payments may have influenced results.

Future studies should examine ONS Compliance, Palatability and Tolerance in specific patient groups where malnutrition is common (e.g. cancer) and over extended periods of time, where appropriate. Specific nutritional outcomes should be evaluated to ascertain the impact of ONS on prevention or reversal of malnutrition.

Conclusions

Compliance rates and Palatability scores were uniformly high and sustained over thirty days for a range of six nutritionally complete ONS in volunteers with normal/low normal BMI. Non-compliance appeared unrelated to the specific ONS product as it did not vary across products despite different volumes. GI side effects were uncommon, mild and of short duration. These specific ONS seem to be a palatable, acceptable and well-tolerated way to support nutrition in adults.

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Conflict of interest

This work was supported by Nualtra Ltd, National Technology Park, Limerick, Ireland. Prof Declan Walsh is a non-executive director of Nualtra ltd.

References

1. World Health Organisation (2006) BMI Classification; Global Database on Body Mass Index. [View Article]
2. Cederholm T, Bosaeus I, Barazzoni R, Bauer J, Van Gossum A, et al. (2015) Diagnostic criteria for malnutrition: An ESPEN Consensus Statement. *Clinical Nutrition* 34: 335- 340. [View Article]
3. Medical Nutrition International Industry (2012) Oral nutritional supplements to tackle malnutrition: a summary of the evidence base. *3rd version Brussels: MNI*. [View Article]
4. Fearon K, Strasser F, Anker SD, Bosaeus I, Bruera E, et al. (2011) Definition and classification of cancer cachexia: an international consensus. *Lancet Oncology* 12: 489- 495. [View Article]
5. Von Haehling S, Anker SD (2010) Cachexia as a major underestimated and unmet need: facts and numbers. *Journal of Cachexia Sarcopenia and Muscle* 1: 1– 5. [View Article]
6. Baldwin C, Spiro A, Ahern R, Emery PW (2012) Oral Nutritional Interventions in Malnourished Patients with Cancer: A Systematic Review and Meta-Analysis. *Journal of the National Cancer Institute* 104: 371- 385. [View Article]
7. Ravasco P (2005) Aspects of taste and compliance in patients with cancer. *European Journal of Oncology Nursing* 9: S84- 91. [View Article]
8. Bastow MD, Rowling J, Allison SP (1983) Undernutrition, Hypothermia, and Injury in Elderly Women with Fractured Femur: An Injury Response to Altered Metabolism? *The Lancet* 321: 143- 146. [View Article]
9. Hubbard GP, Elia M, Holdoway A, Stratton RJ (2012) A systematic review of compliance to oral nutritional supplements. *Clinical Nutrition* 31: 293- 312. [View Article]
10. Brown B, England R, St-John J, Taylor V, Manderson C, et al. (2013) The likings and preferences of people with thoracic cancer for oral supplement drinks. *e-SPEN Journal* 8: 55- 58. [View Article]
11. Gosney M (2003) Are we wasting our money on food supplements in elder care wards? *Journal of Advanced Nursing* 43: 275- 280. [View Article]
12. Simmons SF, Patel AV (2006) Nursing home staff delivery of oral liquid nutritional supplements to residents at risk of unintentional weight loss. *Journal of the American Geriatric Society* 54: 1372-6. [View Article]
13. Bolton J, Abbott R, Kiely M, Alleyne M, Bell S, Stubbs L, et al. (1992) Comparison of three oral sip-feed supplements in patients with cancer. *Journal of Human Nutrition and Dietetics* 5: 79- 84. [View Article]
14. Poustie VJ, Watling RM, Ashby D, Smyth RL (1999) Taste preference for oral calorie supplements in children with cystic fibrosis, healthy children and healthy adults. *Journal of Human Nutrition and Dietetics* 12: 301-306. [View Article]

15. Darman P, Karsegard VL, Nardo P, Dupertuis YM, Pechard C (2008) Oral nutritional supplements and taste preferences: 545 days of clinical testing in malnourished in-patients. *Clinical Nutrition* 27: 660- 665. [View Article]

16. Dennis M, Lewis S, Cranswick G, Forbes J (2005) Routine oral nutritional supplementation for stroke patients in hospital (FOOD): a multicentre randomised controlled trial. *Lancet* 365: 755- 763. [View Article]

17. Fiatarone MA, O'Neill EF, Ryan ND, Clements KM, Solares GR, et al. (1994) Exercise training and nutritional supplementation for physical frailty in very elderly people. *New English Journal of Medicine* 330: 1769-75. [View Article]

18. Hankins C (1996) Dietary supplementation with sustagen in elderly patients with fractured neck of femur. (Unpublished PhD Thesis) *Sydney University* [View Article]

19. Gazzotti C, Arnaud-Battandier F, Parello M, Farine S, Seidel L, et al. (2003) Prevention of malnutrition in older people during and after hospitalisation: results from a randomised controlled clinical trial. *Age Aging* 32: 321- 5. [View Article]

20. Eneroth M, Larsson J, Oscarsson C, Apelqvist J (2004) Nutritional supplements for diabetic foot ulcer: the first RCT. *Journal of Wound Care* 13: 230- 4. [View Article]

21. Vermeeren MAP, Wouters EFM, Geraerts-Keeris AJW, Schols AMWJ (2004) Nutritional support in patients with chronic obstructive pulmonary disease during hospitalization for an acute exacerbation, a randomised controlled feasibility trial. *Clinical Nutrition* 23: 1184- 92. [View Article]

22. Ovesen L (1992) The effects of a supplement which is nutrient dense compared to standard concentration on the total nutritional intake of anorexic patients. *Clinical Nutrition* 11: 154- 67. [View Article]

23. Price R, Daly F, Pennington CR, McMurdo ME (2005) Nutritional supplementation of very old people at hospital discharge increases muscle strength: A randomised controlled trial. *Gerontology* 51: 179- 85. [View Article]

24. European Parliament and Council (2001) Directive 2001/20/EC (Accessed online June 20th 2019). [View Article]

25. International Organisation for Standardisation (ISO) Standards Catalogue (2016) (Accessed 5th December 2018). [View Article]

26. UK Government Advisory Committee On Borderline Substances Appendix 5. [View Article]

27. Wren AM (2008) Gut and Hormones and Obesity. *Frontiers of Hormone Research* 36: 165- 181. [View Article]

28. Schiffmann SS, Warrick ZS (1993) Effects of flavour enhancement of foods for the elderly on nutritional status: food intake, biochemical indices, and anthropometric measures. *Physiology and Behaviour* 53: 395- 402. [View Article]

29. Volkert D, Bernerb YN, Berry E, Cederholm T, Coti-Bertrand, et al. (2006) ESPEN Guidelines on Enteral Nutrition: Geriatrics. *Clinical Nutrition* 25: 330- 360. [View Article]

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