

Impacts of High-Protein Oral Nutritional Supplements Among Malnourished Men and Women with Sarcopenia: A Multicenter, Randomized, Double-Blinded, Controlled Trial

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Objectives:

Evaluate the effects of 2 high-quality oral nutritional supplements (ONS) differing in amount and type of key nutrients in older adult men and women.

Methods:

- Multicenter, 24-week, prospective, double-blinded, controlled, 2-treatment parallel clinical trial.
- 330 participants completed the study. 38% men and 62% women 65 years and older (median age=77 years) from eight countries across Europe and North America with both malnutrition and sarcopenia.
 - Malnutrition was defined by the Subjective Global Assessment (SGA) rating of B (mild to moderate malnourishment) for all but one participant or C (severe malnourishment) for 1 participant in the experimental group.
 - Sarcopenia was defined as low grip strength (<20 kg women; <30 kg men) and/or low gait speed (<0.8 m·s⁻¹) in conjunction with low skeletal mass index.
 - o Severe Sarcopenia was defined as impaired gait speed (<0.8 m·s⁻¹) and impaired grip strength (<20 kg women; <30 kg men) (N=64).
 - o Mild-Moderate Sarcopenia was defined as impaired gait speed with normal grip strength (≥20 kg women; ≥30 kg men) (N=46) or normal gait speed (≥0.8 m·s⁻¹) with impaired grip strength (N=75).
- Participants in each of the 2 treatment groups drank 2–220 mL servings/day of an energy-rich (330 kcal/serving) ONS:
 - Control ONS (C_{ONS}) (N=165; 88% completion rate) contained 14 g protein, 11 g fat, 44 g carbohydrate, 147 IU vitamin D₃, and additional vitamins and minerals in varying amounts (Ensure Plus®*).
 - Experimental ONS (E_{ONS}) (N=165; 79% completion rate) contained 20 g protein, 11 g fat, 36 g carbohydrate, 499 IU vitamin D₃, 1.5 g CaHMB, and additional vitamins and minerals in varying amounts (Ensure® Enlive®*).
 - Participants were instructed to continue their usual diet (must contain a minimum of 0.8 g protein/kg body weight), physical activity, and lifestyle habits and to drink the ONS between meals.
- Participants were evaluated at baseline (week 0) and approximately every 6 weeks until the end of the 24-week intervention.
 - Compliance, dietary intake, medication changes, and adverse events were reviewed at each visit.
 - Weight, body composition (assessed by dual-energy x-ray absorptiometry–DXA), leg strength (maximum voluntary isokinetic peak torque–PT), grip strength (kg), and gait speed tests (m·s⁻¹) were assessed at baseline, 12, and 24 weeks.
 - The primary endpoint of this study was to determine the difference in leg strength (PT) between those receiving the CONS and those receiving the EONS.

Results:

- Baselines characteristics:
 - All participants had low skeletal muscle mass.
 - Median BMI was 26 kg/m², which indicates that most were not underweight.
 - 37 participants had both normal grip strength and normal gait speed at baseline, which does not meet the study definition of sarcopenia.
 - All but 1 subject was SGA rated B (mild to moderately malnourished); the remaining 1 subject was SGA rated C (severely malnourished).
- Both ONS groups demonstrated improved leg strength, muscle quality, grip strength, and gait speed from baseline with no differences between the C_{ONS} and E_{ONS} at 24 weeks.
- For those with severe sarcopenia (44%), there were no differences in strength improvements between treatment groups.

- Participants with mild-moderate sarcopenia with normal grip strength experienced differences in strength improvements at 12 weeks ($E_{ONS} > C_{ONS}$, $P=.032$).
- There were no treatment differences based on the severity of sarcopenia for either grip strength or gait speed.

Conclusions:

- ONS improved strength outcomes in malnourished older adults with sarcopenia as demonstrated by improved leg strength in both groups.
- In those with mild-moderate sarcopenia, but not severe sarcopenia, consumption of the E_{ONS} improved leg muscle strength and quality compared with the standard C_{ONS} at 12 weeks, but not at 24 weeks. This suggests that early intervention with an ONS is optimal and most effective.
- Muscle blood flow may be an important factor for the delivery of nutrients to the muscle in order for the nutrients to have an anabolic effect.
- The participants who benefited the most from the E_{ONS} were those who had mild-moderate sarcopenia with normal strength and impaired gait speed.
- The participants with impaired gait speed (and normal grip strength) and the participants with impaired grip strength (normal gait speed) each improved their impaired function, whether receiving the C_{ONS} or E_{ONS} .
- Exercise and additional diet intervention may be required to show significant improvements in severe sarcopenia with an E_{ONS} .
- Because there were many differences between the nutrient profiles of the ONS studied, no conclusion can be made about the benefits of any individual or combined macro- or micronutrients.
- Improvements in clinically relevant characteristics of sarcopenia can be achieved by a daily ONS.

Study summary prepared by Nestlé Health Science.

The complete study can be accessed at: [http://www.jamda.com/article/S1525-8610\(16\)30361-9/pdf](http://www.jamda.com/article/S1525-8610(16)30361-9/pdf)

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