

Review Article

Geriatric Nutrition: Preventing Frailty and Sarcopenia

Yashi Singhal*

Geetanjali Medical College and Hospital, Udaipur

Received: 10 Feb 2026 - Accepted: 2 March 2026 - Published: 30 March 2026

Abstract

Frailty and sarcopenia are major geriatric problems associated with increased morbidity, disability, and mortality. Nutrition plays a pivotal role in their prevention and management. This review highlights the pathophysiology of frailty and sarcopenia, the role of macronutrients and micronutrients, and evidence-based dietary strategies to promote healthy aging. Various studies have shown impact of calorie restriction and resistance exercises on prevention of muscle mass. Similarly certain nutrients such as protein, vitamin D, omega 3 fatty acids, vitamin C, vitamin E, selenium, magnesium, calcium have shown a positive impact in maintain lean body mass and strength. Therefore, diet and exercise play a major role in prevention of frailty and sarcopenia in elderly population.

Keywords: Geriatric, Nutrition, Frailty, Sarcopenia, Muscle mass, Muscle strength.

*Correspondence

Yashi Singhal

Geetanjali Medical College & Hospital, Udaipur - 313003, Rajasthan, India

Email: yashisinghal26@gmail.com

Citation for the paper: Singhal Y. Geriatric Nutrition: Preventing Frailty and Sarcopenia. International Journal of Nutrition & Lifestyle 2026; 6(1): 30 -33. DOI: 10.69859/ijnl.2026.v6i1004



Copyright: © 2026 by the authors. Licensee: Research Thrive Publications. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Introduction

The global ageing population has led to a rise in age-related conditions, particularly frailty and sarcopenia. Frailty is characterised by reduced physiological reserve, while sarcopenia refers to progressive loss of skeletal muscle mass and strength with ageing or due to some disease condition. Both conditions increase vulnerability to falls, hospitalisation, and poor quality of life. Nutrition, alongside physical activity, is a cornerstone in the prevention of these fatal conditions of geriatric population.^{1,2}

As the global geriatric population is increasing, there is a tremendous need to improve the health and independence of the entire geriatric population, while also working to increase life expectancy.³

Pathophysiology

- **Frailty:** Frailty is multifactorial, involving chronic inflammation, hormonal changes, and reduced energy metabolism. Weight loss is one of the important diagnostic criteria for frailty.
- **Sarcopenia:** It is driven by anabolic resistance, mitochondrial dysfunction, and inadequate protein intake for long duration of life span.

Both of these conditions are linked with decreased cognitive and functional capabilities, increased disease burden and dependency.

Research Methodology

Studies were extracted from Google Scholar, PubMed Central, NCBI and other internet archives for the last 20 years, i.e. from 2006 – 2026. These included randomised control trials, meta – analysis, systematic reviews, narrative reviews, etc. Studies were categorised into different subheadings as shown below:

Review of literature on role of nutrition in preventing frailty and sarcopenia in the elderly

Nutrition plays a very important role in the prevention of frailty and sarcopenia, which is proven by a number of studies.

Energy Intake: As frailty is associated with weight loss, adequate energy intake is very important to prevent weight loss. Energy-giving nutrients are carbohydrates, proteins, and fat. There are lot of studies that show that high intake of simple sugars was associated with high prevalence of frailty (Chuy et al 2022, Struijk et al 2020).^{4,5} Supplementation with high-energy dairy fat was associated with an improved functional capacity in a study done by Tylner et al. 2016.⁶

Protein Intake

- Adequate protein (1.0–1.2 g/kg/day) is essential to maintain muscle mass.
- Leucine-rich proteins (e.g., dairy, soy, legumes) stimulate muscle protein synthesis. Studies have shown that L-leucine supplementation (1.2 g/day) is associated with improved weight, muscle strength and functional capacity (Abe et al. 2016).⁷ Many studies didn't find any significant change in muscle strength with protein supplementation on exercise.⁸

Vitamin D

- Deficiency is common in older adults.
- Adequate vitamin D improves muscle strength and reduces fall risk. A randomised control trial with vitamin D-deficient elderly, a supplementation of 150 Kcal/ day with 800 IU vitamin D and 20 g whey protein with exercises contributed to an improvement in muscle mass and muscle strength.⁹ There are many studies showing significant improvement in appendicular skeletal muscle mass after HMB supplementation, leucine supplementation, high protein diet in combination with exercise, exercise alone or diet modification alone.

4. Omega-3 Fatty Acids

- Anti-inflammatory properties support muscle health.
- Found in fatty fish, flaxseed, and walnuts. One RCT presented a positive outcome in muscle mass and functional capacity of older adults while supplementation with n-3 fatty acid obtained from fish oil that contained eicosapentaenoic acid (EPA) – 1.34 g and docosahexaenoic

acid (DHA) – 1.07 g. Xu et al. 2022. Siemaszko et al. (2015) and Timraj et al. (2023) studied the impact of omega 3 supplementation on muscle strength and found a significant improvement in the same.¹⁰⁻¹²

5. Antioxidants & Micronutrients

- Vitamins C, E, and selenium reduce oxidative stress. Sahni et al. (2021)¹³ showed reduced loss in hand grip strength and gait speed after supplementation with carotenoid intake. Similarly impact of selenium, vitamin C and vitamin E supplementation was studied on muscle mass and functional capacity in the elderly, but results were inconsistent.
- Calcium and magnesium support bone and muscle function. Scott et al. (2010)¹⁴ found increased intake of phosphorus, zinc and magnesium on dual energy X-ray assessed appendicular lean body mass.

Dietary Strategies

- **Mediterranean Diet:** Rich in fruits, vegetables, whole grains, and healthy fats; associated with reduced frailty risk. This diet is anti-inflammatory and rich in antioxidants and omega 3 fatty acids.
- **Protein Distribution:** There should be an even distribution of the protein across meals to maximize synthesis.
- **Supplementation:** Vitamin D and protein supplements may benefit high-risk individuals.

Integration with Lifestyle

Not only diet, but the overall lifestyle pattern is important in the prevention and treatment of frailty and sarcopenia. There are various lifestyle factors, such as exercise, sleep, a positive attitude, willpower, and hygiene, apart from diet, that play a very important role.

- **Exercise:** Resistance and aerobic training synergize with nutrition to prevent sarcopenia. Short physical Performance Battery test was improved with the combined protein and exercise intervention in the study done by

Yoshimura et al. 2025.¹⁵ Resistance exercises have been found to improve muscle strength. Sardeli et al. (2018)¹⁶ presented a positive outcome on muscle prevention in obese individuals who were on resistance exercise and calorie-restricted diets.

- **Multidisciplinary Approach:** Combining diet, exercise, and medical management yields the best outcomes.

Challenges & Future Directions

There are a number of challenges that need to be addressed while answering the question of improving the health status of the geriatric population. There is a limited awareness among older adults about nutritional needs. There is a need to make personalised nutrition based on genetics and gut microbiota. More randomised controlled trials are required to establish optimal dietary interventions in this direction.

Conclusion

Nutrition is a modifiable factor in preventing frailty and sarcopenia. Adequate protein, vitamin D, omega-3 fatty acids and antioxidant intake, combined with physical activity, can significantly improve health outcomes in older adults. Early intervention and tailored strategies are essential to promote healthy aging.

References

1. JAMDA. Nutritional and Pharmacological Interventions for Sarcopenia in Older Adults: Systematic Review and Meta-Analysis. *J Am Med Dir Assoc.* 2026; 27(3): 106038.
2. World Health Organization. Decade of Healthy Ageing: Nutrition and Ageing. WHO Technical Report. 2025.
3. ESPEN Guidelines on Clinical Nutrition in Geriatrics. *Clin Nutr.* 2025.
4. Chuy V, Gentreau M, Artero S. et al. Simple Carbohydrate Intake and Higher Risk for Physical Frailty Over 15 Years in Community-Dwelling Older Adults. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 2022; 70: 10–18.

5. Struijk EA, Rodríguez-Artalejo F, Fung TT, Willett WC, Hu FB, Lopez-Garcia E. Sweetened Beverages and Risk of Frailty Among Older Women in the Nurses' Health Study: A Cohort Study. *PLoS Medicine*, 2020; 70: e1003453.
6. Tylner S, Cederholm T, Faxén-Irving G. Effects on Weight, Blood Lipids, Serum Fatty Acid Profile and Coagulation by an Energy-Dense Formula to Older Care Residents: A Randomized Controlled Crossover Trial. *Journal of the American Medical Directors Association*, 2016; 17: 275.e5–275.e11.
7. Abe S, Ezaki O, Suzuki M. Medium-Chain Triglycerides in Combination with Leucine and Vitamin D Increase Muscle Strength and Function in Frail Elderly Adults in a Randomised Controlled Trial. *Journal of Nutrition*, 2016; 146: 1017–1026.
8. Kuzuya M, Kanno Y, Arai H. et al. Nutritional Management Guidelines for Sarcopenia and Frailty 2025. *Geriatr Gerontol Int*. 2025.Englund DA, Kirn DR, Koochek A et al., Nutritional Supplementation with Physical Activity Improves Muscle Composition in Mobility-Limited Older Adults, the VIVE2 Study: A Randomised, Double-Blind, Placebo-Controlled Trial. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, 2017; 70: 95–101.
9. Xu D, Lu Y, Yang X. et al. Effects of Fish Oil-Derived n-3 Polyunsaturated Fatty Acid on Body Composition, Muscle Strength and Physical Performance in Older People: A Secondary Analysis of a Randomised, Double-Blind, Placebo-Controlled Trial. *Age and Ageing*, 2022; 51: afac274
10. Krzysińska-Siemaszkó R, Czepulis N, Lewandowicz M. et al. The Effect of a 12-Week Omega-3 Supplementation on Body Composition, Muscle Strength and Physical Performance in Elderly Individuals With Decreased Muscle Mass. *International Journal of Environmental Research and Public Health*, 2015; 12: 10558–10574.
11. Timraz A, Binmahfoz TJ Quinn, Combet E, Gray SR. The Effect of Long Chain n-3 Fatty Acid Supplementation on Muscle Strength in Older Adults: A Systematic Review and Meta-Analysis. *Nutrients*, 2023; 15: 3579.
12. Sahni S, Dufour AB, Fielding RA, Newman AB, Kiel DP, Hannan MT. et al. Total carotenoid intake is associated with reduced loss of grip strength and gait speed over time in adults: the Framingham offspring study. *American Journal of Clinical Nutrition*, 2021; 113 (2): 437-445, 10.1093/ajcn/nqaa288
13. Scott D, Blizzard L, Fell J, Giles G, G. Jones. Associations between dietary nutrient intake and muscle mass and strength in community-dwelling older adults: the Tasmanian older adult cohort study. *J. Am. Geriatr. Soc.*, 2010; 58 (11): 2129-2134.
14. Yoshimura Y, Matsumoto A, Inoue T, Okamura M, Kuzuya M. Protein Supplementation Alone or Combined with Exercise for Sarcopenia and Physical Frailty: A Systematic Review and meta-Analysis of Randomised Controlled Trials. *Archives of Gerontology and Geriatrics*, 2015; 131: 105783
15. Sardeli A, Komatsu T, Mori M, Gáspari A, Chacon-Mikahil M. Resistance Training Prevents Muscle Loss Induced by Caloric Restriction in Obese Elderly Individuals: A Systematic Review and Meta-Analysis. *Nutrients*, 2018; 10: 423.