Acta Scientific NUTRITIONAL HEALTH (ISSN:2582-1423)

Volume 10 Issue 1 January 2026

Review Article

The Malnutrition–Sarcopenia–Dysphagia Triad: A Vicious Cycle and Its Nutritional Interventions

Sreemathy Venkatraman*

Chief Clinical Dietitian, Trustwell Hospitals, Bangalore, India

***Corresponding Author:** Sreemathy Venkatraman, Chief Clinical Dietitian, Trustwell Hospitals, Bangalore, India.

Received: November 17, 2025

Published: December 18, 2025

Abstract

The coexistence of malnutrition, sarcopenia, and dysphagia creates a self-perpetuating clinical cycle associated with frailty, hospitalization, aspiration pneumonia, increased morbidity, and reduced quality of life. Malnutrition accelerates skeletal muscle loss, including the muscles involved in mastication and swallowing, contributing to dysphagia. Sarcopenia independently weakens swallowing musculature and delays swallow initiation, further reducing oral intake. Dysphagia then leads to restricted food choices, inadequate protein–energy intake, and dehydration. Early screening and integrated interventions—including energy-dense diets, protein optimization, texture modification, oral nutritional supplements, micronutrient support, and exercise-based rehabilitation—are essential to break this cycle and preserve functional independence in older adults.

Keywords: Malnutrition; Sarcopenia; Dysphagia; Older Adults; Nutrition Therapy; Swallowing Disorders

Introduction

Malnutrition, sarcopenia, and dysphagia commonly coexist in older adults and in individuals with chronic disease, frailty, or hospitalization. When combined, these conditions create a vicious cycle in which each condition exacerbates the others. Malnutrition leads to reduced muscle mass and contractile strength, diminishing functional reserve. Sarcopenia weakens the tongue, suprahyoid muscles, and pharyngeal constrictors, contributing to impaired bolus propulsion, delayed swallow initiation, and compromised airway protection. Dysphagia restricts dietary intake, prolongs feeding time, and increases the risk of aspiration, leading to further malnutrition. Interrupting this cycle requires early identification and targeted nutrition-focused interventions.

Pathophysiology of the triad

Malnutrition weakens skeletal muscle throughout the body, including the swallowing musculature. Protein–energy deficits reduce muscle fibre size, impair neuromuscular transmission, and decrease contractile efficiency. Sarcopenia further compounds this through age-related anabolic resistance, decreased motor unit recruitment, and loss of type II muscle fibres. Older adults with sarcopenia demonstrate significantly lower tongue pressure, slower oral transit time, and higher rates of pharyngeal residue and aspiration. Dysphagia contributes to inadequate nutritional intake through avoidance of difficult-to-swallow foods, fear of choking, and reduced appetite. Texture-restricted diets, although essential for safety, are often low in protein and energy density unless carefully planned. When all three conditions coexist, the risk of hospitalization, dependency in activities of daily living, and mortality increases sharply.

Table 1: The Malnutrition–Sarcopenia–Dysphagia Triad: Mechanisms and Clinical Impact.

Condition	Key Mechanisms	Effect on Swallowing	Clinical Consequences
Malnutrition	Protein–energy deficit; micronutrient deficiencies	Weakness of tongue and suprahyoid muscles; reduced swallow pressure	Weight loss, frailty, impaired immunity
Sarcopenia	Age-related loss of muscle mass and strength; anabolic resistance	Reduced tongue pressure, delayed swallow initiation, poor laryngeal elevation	Aspiration, prolonged meal times, functional decline
Dysphagia	Impaired oral and/or pharyngeal phase; delayed swallow trigger	Avoidance of solid textures; reduced intake and hydration	Rapid worsening of malnutrition and dehydration
Triad interaction	Each component worsens the others in a feedback loop	Progressive compromise in swallow safety and efficiency	High morbidity, hospitalization, loss of independence

Screening and assessment

Early detection is crucial to prevent progression of the triad. Malnutrition is commonly assessed using the Mini Nutritional Assessment–Short Form (MNA-SF), Nutrition Risk Screening 2002 (NRS-2002), or the Global Leadership Initiative on Malnutrition (GLIM) criteria, which combine phenotypic (weight loss, low BMI, reduced muscle mass) and aetiologic (reduced intake, inflammation) indicators. Sarcopenia screening tools include the SARC-F questionnaire, handgrip strength, chair rise test, and assessment of muscle mass using bioelectrical impedance analysis (BIA) or dual-energy X-ray absorptiometry (DXA). Dysphagia risk is initially identified using simple tools such as the Eating Assessment Tool (EAT-10) and bedside swallow screening, followed by instrumental evaluations such as video fluoroscopic swallow study (VFSS) or fibreoptic endoscopic evaluation of swallowing (FEES) when indicated.

Table 2: Screening Tools for Early Detection of the Triad.

Condition	Tool	What It Measures	Typical Cut-off/Comment
Malnutrition	MNA-SF	Appetite, weight loss, BMI, functional status	<8 suggests malnutrition
Malnutrition	NRS-2002	Disease severity and intake	≥3 indicates risk
Sarcopenia	SARC-F	Strength, walking, chair rise, falls	≥4 indicates risk
Sarcopenia	Handgrip strength	Muscle strength	Low grip by sex-specific thresholds
Dysphagia	EAT-10	Self-reported swallowing difficulty	≥3 suggests dysphagia
Dysphagia	Bedside swallow screen	Cough, wet voice, swallow safety	Abnormal screen → VFSS/FEES

Nutritional interventions

Protein optimisation is central to the management of sarcopenic dysphagia. Older adults with swallowing difficulties typically require 1.2–1.5 g/kg/day of high-quality protein, distributed evenly over meals to maximise muscle protein synthesis. Leucine-rich proteins, including whey, dairy, soy, and pulses, strongly stimulate anabolic pathways. Energy requirements generally range from 25–30 kcal/kg/day, and meals should be fortified using healthy fats, milk powders, nut pastes, and modular protein to achieve targets without excessive volume. Texture-modified diets must be planned carefully using the International Dysphagia Diet Standardisation Initiative (IDDSI) framework to ensure both safety and nutrient density, especially at Levels 4–6.

Oral nutritional supplements (ONS) are often necessary when oral intake remains below 60–70% of requirements. High-protein, energy-dense, and IDDSI-appropriate supplements help fill intake gaps. Formulations enriched with β-hydroxy β-methylbutyrate

(HMB) may support muscle preservation and recovery in sarcopenic patients. Micronutrient deficiencies—particularly vitamin D, vitamin B12, magnesium, and zinc—are frequent in this population and may contribute to muscle weakness and impaired neuromuscular function. Structured hydration plans using thickened fluids, flavoured drinks, and gel-based products are required to maintain adequate fluid intake while protecting airway safety.

Exercise and rehabilitation

Nutrition alone cannot reverse sarcopenic dysphagia; physical rehabilitation is essential. Speech-language pathologists guide targeted swallowing exercises such as effortful swallow, chin tuck against resistance (CTAR), Shaker exercise, and expiratory muscle strength training (EMST), which strengthen tongue, suprahyoid, and pharyngeal muscles and improve airway protection. Whole-body resistance training—including chair rises, sit-to-stand practice, resistance band exercises, and handgrip strengthening—supports global functional improvement. When combined with adequate protein intake, these interventions maximise muscle protein synthesis and functional recovery.

Multidisciplinary management

Effective treatment of the malnutrition–sarcopenia–dysphagia triad requires coordinated multidisciplinary care. Dietitians design nutrient-dense, texture-appropriate meal plans and monitor weight, intake, and biochemical markers. Speech-language pathologists evaluate swallowing safety, recommend IDDSI levels, and deliver rehabilitative exercises. Physiotherapists and occupational therapists provide resistance training and support mobility and independence in daily activities. Geriatricians and primary physicians address comorbidities, rationalise medications, and manage symptoms such as reflux or dry mouth that may worsen dysphagia. Caregiver education is crucial to ensure that safe feeding techniques, posture, and diet prescriptions are followed consistently in home and institutional settings [1-5].

Conclusion

The malnutrition–sarcopenia–dysphagia triad represents a critical clinical challenge that accelerates decline in older adults. Without proactive intervention, it leads to recurrent hospitalisations, loss of independence, and poor quality of life. With early screening, targeted nutrition therapy, adequate protein and energy intake, micronutrient support, exercise-based rehabilitation, and coordinated multidisciplinary care, this vicious cycle can be interrupted. Nutrition is not merely supportive but therapeutic, playing a central role in preserving swallow safety, muscle strength, and functional capacity in vulnerable populations.

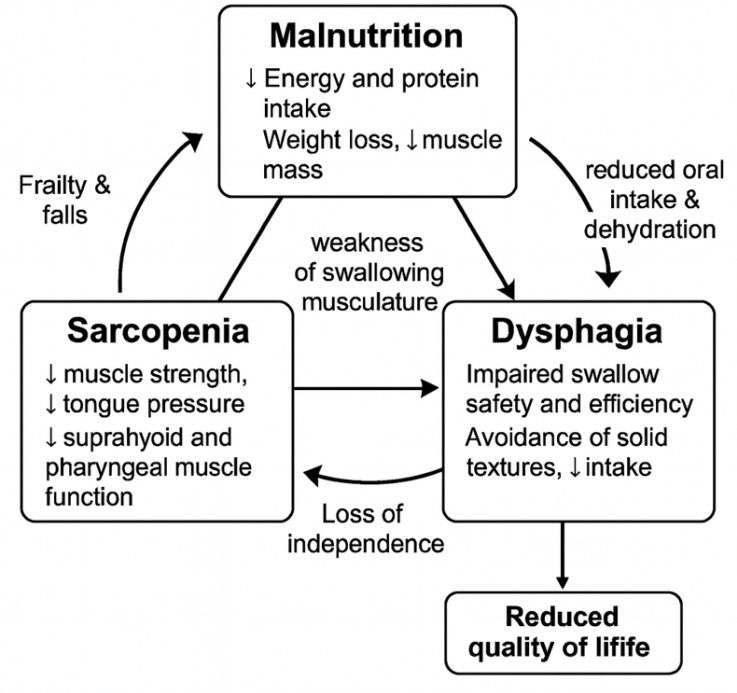

Figure 1: The vicious cycle linking malnutrition, sarcopenia, and dysphagia.

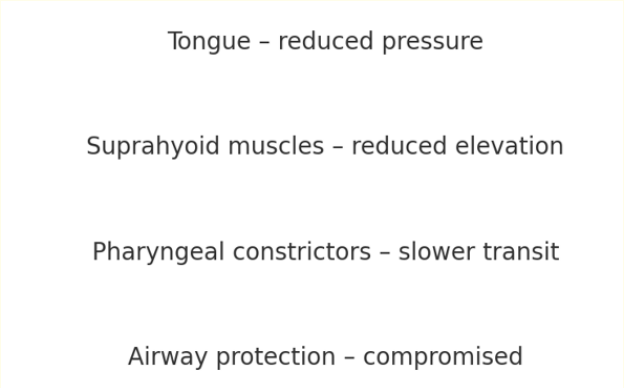

Figure 2: Swallowing muscles commonly affected in sarcopenic dysphagia.

Bibliography

1. Cruz-Jentoft AJ., *et al*. "Sarcopenia: revised European consensus on definition and diagnosis". *Age Ageing* 48.1 (2019): 16-31.

2. Cichero JAY., *et al*. "The International Dysphagia Diet Standardisation Initiative (IDDSI) framework: development and implementation". *Dysphagia* 32.2 (2017): 293-314.

3. Bauer J., *et al*. "Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PROT-AGE Study Group". *Journal of the American Medical Directors Association* 14.8 (2013): 542-559.

4. Chen LK., *et al*. "Asian Working Group for Sarcopenia: 2019 consensus update on sarcopenia diagnosis and treatment". *Journal of Cachexia, Sarcopenia and Muscle* 11.3 (2020): 459-471.

5. Wirth R., *et al*. "Oropharyngeal dysphagia in older persons—from pathophysiology to intervention: a review and summary of an international expert meeting". *Nutrients* 8.11 (2016): 1-16.