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EXPERT OPINION

An Indian Consensus on Sarcopenia: Epidemiology, Etiology, Clinical Impact, Screening, and Therapeutic Approaches

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Abstract: The burden of sarcopenia in India continues to be of significant concern. Its diagnosis is challenging due to the lack of standardized cutoffs for assessing muscle strength, quantity, and function among Indians. This consensus aims to identify features of sarcopenia in Indians and provide culturally relevant recommendations for its management. An expert panel from diverse medical specialties across India arrived at a consensus using the modified Delphi method. The panel recommended that a baseline handgrip strength (HGS) cutoff value of <27.5 kg in males and 18.0 kg in females be defined as low muscle strength for the Indian population. All patients with comorbidities should be screened for sarcopenia. In people with sarcopenia, resistance exercise and nutrition with specialized nutrients such as protein, beta-hydroxy-beta-methylbutyrate (HMB), and micronutrients for at least 3 months were recommended as key interventions.

Keywords: dynamometer, muscle strength, medical nutrition therapy, sarcopenia, handgrip strength

Introduction

Sarcopenia, or muscle loss, is a generalized skeletal muscle disorder with significant clinical implications. Until recently, sarcopenia was considered a geriatric syndrome characterized by age-related decline in muscle mass. However, secondary sarcopenia may result from other causal factors, unrelated to advancing age.[1] Therefore, early diagnosis of sarcopenia is essential to optimize treatment outcomes. The understanding of sarcopenia has evolved over time, shifting from a sole focus on muscle mass to include diminished muscle strength and function as key diagnostic criteria.[2,3] Irrespective of the definitions, sarcopenia is independently associated with a poor quality of life, risk of fractures and falls, and mortality.[4–6] Sarcopenia has also been linked to various comorbidities, including congestive heart failure, chronic respiratory diseases, chronic liver diseases, diabetes, chronic kidney disease, and malignancy. Consequently, lifestyle changes, proper diet and physical activity are important in managing sarcopenia across various conditions.[7]

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Box 1 Global and Regional Prevalence of sarcopenia

Global: A 2023 meta-analysis reported that the prevalence of sarcopenia varied across studies and definitions, with estimates suggesting it affects 10%–16% of the elderly globally.
Asian: In a recent meta-analysis (2025), the prevalence of sarcopenia among community-dwelling older adults was 16.5%.
Indian: A cross-sectional study from 2024, reported a sarcopenia prevalence rate of 28% in individuals aged 35–70 years.

Note: Data from these studies.[8–10]

What is Known?

Box 1 shows the prevalence of sarcopenia across various regions.[8–10]

In a recent 2024 review, Alhmly et al analyzed the various definitions for sarcopenia across regions. The common measures for muscle mass in the European Working Group on Sarcopenia in Older People (EWGSOP) 2018 and the Asian Working Group for Sarcopenia (AWGS) 2019 include appendicular lean mass index and height squared (ALM/Ht²), with men <7.0 kg/m² and women <5.4 to 5.5 kg/m² (by dual-energy X-ray absorptiometry [DXA]).[11] The EWGSOP 2018 sets handgrip strength (HGS) thresholds at <27 kg for men and <16 kg for women, whereas AWGS 2019 at <28 kg for men and <18 kg for women.[11] In addition, the regional and ethnic differences between the West and Asia arise from unique anthropometric features and cultural or lifestyle distinctions.[11]

Although DXA is reliable for measuring skeletal muscle mass, due to its high cost and limited availability in South Asia, the South Asian Working Action Group on SARCOpenia (SWAG-SARCO) 2022 considers alternate measurements such as calf circumference (CC) (≤33 cm in females and ≤34 cm in males) or mid upper-arm circumference (MUAC) for muscle mass measurements.[12] It further recommends an HGS cutoff value of <27.5 kg for men and <18 kg for women.[12] However, no significant differences are seen in gait speed cutoffs (≤0.8 m/s to ≤1.0 m/s) suggested by the various working groups.

Figure 1 presents key highlights from diverse sarcopenia working groups.[11,12]

The Need for Recommendations From the Indian Perspective

Although international guidelines provide evidence-based support, they lack population specificity and flexibility.[13] The actual burden of sarcopenia remains underestimated and consequently undertreated, especially in lower- and middle-income countries (LMICs). This can be attributed to the cutoffs used for determining prevalence.[3,14]

Diagnostic equipment, such as hand dynamometers, is largely unavailable in clinical settings, particularly in LMICs, contributing to underdiagnosis.[15] In general, Asians have smaller body sizes, lower muscle mass, and higher adiposity than their Western counterparts.[12,16] Particularly, Indian diets are primarily cereal-based and are relatively low in protein quality.[14] Lower socioeconomic status is associated with malnutrition and a higher risk of sarcopenia, especially among

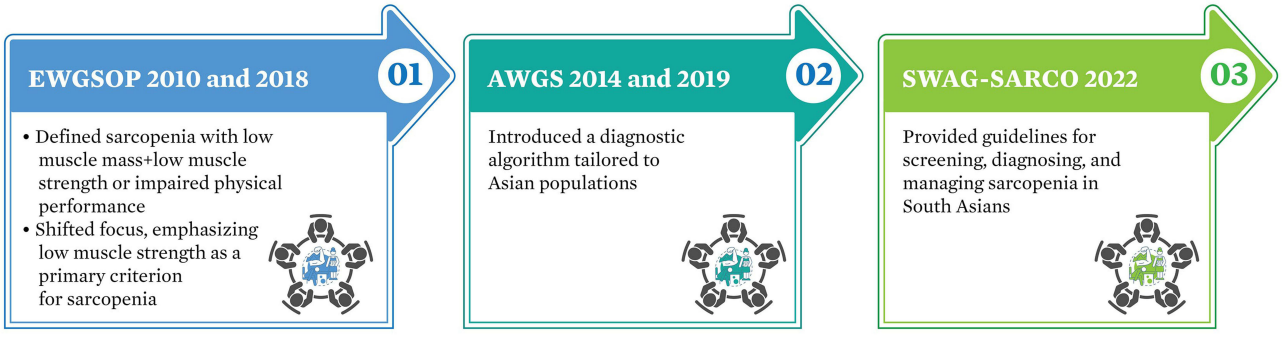

Figure 1 Exploring sarcopenia: Key highlights from diverse working groups on sarcopenia. Data from these studies.[11,12]
Abbreviations: AWGS, Asian Working Group on Sarcopenia; EWGSOP, European Working Groups on Sarcopenia in Older People; SWAG-SARCO, South Asian Working Group on SARCOpenia; 5-CST, 5-chair stand test.

rural participants.[16] The Kerala Diabetes Prevention Program found body mass index (BMI), a globally used obesity indicator, to be inadequate for the Indian population.[17] The Lancet Commission 2025 highlights the insufficiency of BMI-based obesity diagnosis in a global context, proposing body fat measurements and health symptoms to be included.[18] The cutoffs for metabolic syndrome in India are different from those of other countries.[17] The available literature on the prevalence and diagnosis of sarcopenia in India is scarce and is based on cutoffs for Caucasian individuals.[3] The agenda of this expert panel was to develop clinical recommendations specifically applicable to Indian patients with sarcopenia (Figure 2).

Materials and Methods

A consensus was developed by a panel of 13 eminent subject-matter experts from various specialties such as endocrinology, general medicine, pulmonology, intensive care, geriatric medicine, dietetics, oncology, and sports medicine from India. The experts were selected based on their leadership roles in prestigious organizations, as presidents and secretaries of national and international societies, for their significant influence in shaping healthcare practices. Many have made research contributions, with numerous PubMed-indexed publications, editorial roles, and authorship of academic texts on topics such as endocrinology, geriatrics, diabetes, and critical care, with some focusing on rural healthcare, sports medicine, oncology, and nutrition. The steps followed for the consensus development have been summarized in Figure 3. A total of 45 consensus statements were framed, as presented in Supplementary Table 1.

Figure 2 Breaking new ground: The distinctive novelty of this consensus.

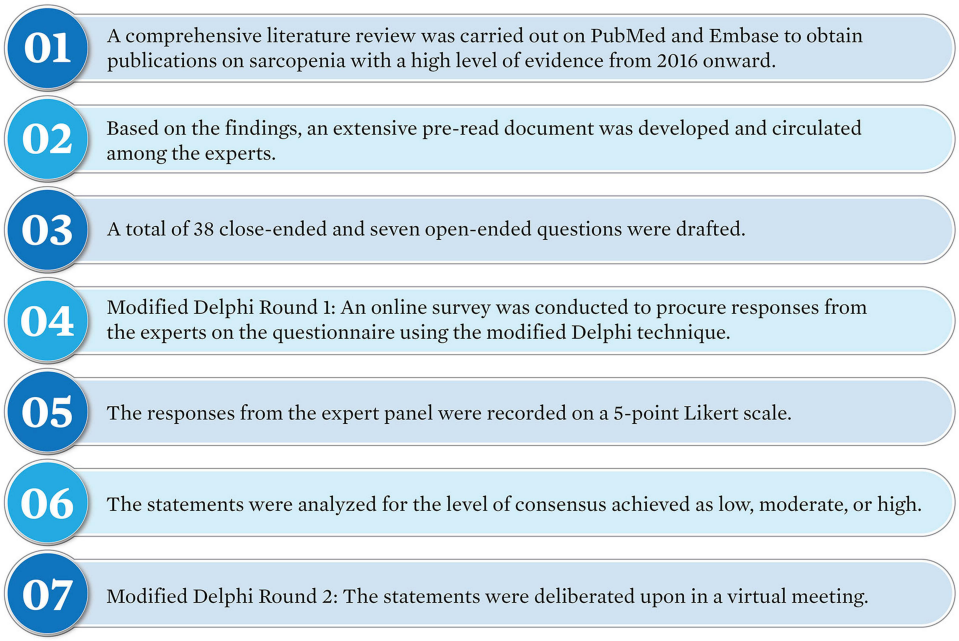

Figure 3 From concept to consensus: Tracing the development steps. The criteria used to determine the level of agreement are as follows: High: When ≥75% of the participants agree/disagree with a statement. Moderate: When 55%–74% of the participants agree/disagree with a statement. Low: When <55% of the participants agree/disagree with a statement.

Discussion

Epidemiology of Sarcopenia

What Is the Burden of Sarcopenia in India?

Among the elderly (≥60 years of age) in India, primary sarcopenia has a prevalence of 39.2%.[14]

Grade of Recommendation (GOR): 3b; Level of Agreement (LOA): High

The Sarcopenia-Chandigarh Urban Bone Epidemiological Study demonstrated that muscle mass is lower in Indians across all age groups than in Caucasians; hence, using Western cutoffs can overestimate the prevalence of sarcopenia in India.[3]

Sarcopenia is also highly prevalent in individuals with various comorbidities, as illustrated in Figure 4.[14,19–24]

What Is the Relationship Between Sarcopenia and Normal-Weight Obesity (NWO)?

NWO, a commonly encountered phenotype in South Asia, is associated with an increased risk of sarcopenia.[25]

GOR: 3b; LOA: High

Excessive body fat and a normal BMI are characteristics of NWO.[26,27] An observational study showed that being in the NWO category meant a 22-fold higher risk of sarcopenia in males and 25-fold higher risk in females.[25] The term sarcopenic obesity has been used for reduced muscle mass and increased body fat.[28,29] A meta-analysis revealed the global prevalence of sarcopenic obesity in older adults to be 11%.[30]

Clinical Pearl

The prevalence of primary sarcopenia in India ranges from 14.2% to 39.2% in adults.[4,31]

Nearly one-fourth of patients with sarcopenia have accompanying obesity.[2]

Definition of Sarcopenia

What Is the Definition of Sarcopenia That Is Relevant to the Indian Population?

Sarcopenia is a syndrome defined as a decrease in muscle function, strength, or mass.[12]

GOR: 1a; LOA: High

Different working groups on sarcopenia have proposed definitions for sarcopenia using various criteria, cutoff values, and diagnostic algorithms over the years.[32] The definition of sarcopenia by SWAG-SARCO, which is particularly relevant for South Asia, equally emphasizes muscle strength, function, and mass.[12]

Handgrip strength (HGS) is a reliable and simple method to assess muscle strength.[33]

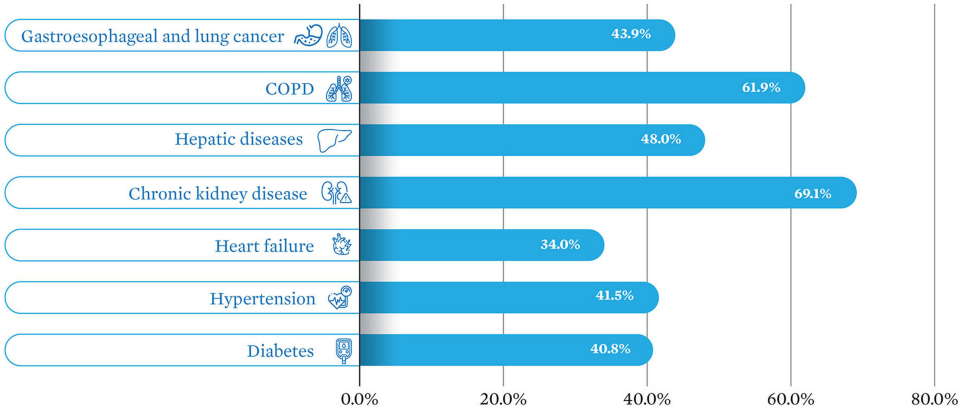

Figure 4 Prevalence of sarcopenia in patients with various comorbidities. Data from these studies.[14,19–23,24]
Abbreviation: COPD, Chronic obstructive pulmonary disease.

Clinical Pearl

Sarcopenia is defined as a decrease in any two of the following—muscle function, strength, or mass.

Etiopathogenesis of Sarcopenia

What are the Risk Factors Associated With Sarcopenia?

A sedentary lifestyle, chronic inflammation, and poor nutritional status are contributing factors to sarcopenia.[1,34]

GOR: 1a/2b; LOA: High

Primary sarcopenia is physiological, whereas secondary sarcopenia could be attributed to multiple factors, namely diseases, poor lifestyle, inactivity, and malnutrition/obesity. In 2022, Verma et al showed a high sarcopenia prevalence of 46.7% in adults who led a sedentary lifestyle.[27,35]

The panel also opined that low muscle strength/mass is based on protein–calorie intake and vitamin D levels in childhood. The experts also mentioned that prolonged hospitalizations and poor diet after the usage of certain drugs, such as statins, are important contributing factors to sarcopenia.

Chronic Low-Grade Inflammation Is Associated With Various Comorbidities Such as Diabetes Mellitus, Chronic Respiratory Diseases, Cardiovascular Diseases, etc., Contributing to the Development of Sarcopenia

GOR: 1a; LOA: High

Chronic inflammation associated with comorbidities accelerates skeletal muscle damage leading to secondary sarcopenia.[35]

Sarcopenia in patients with chronic kidney disease was shown to seriously worsen clinical prognosis.[36] It also led to a 39% greater risk of incident cardiovascular disease (CVD) in comparison to those without sarcopenia.[37]

Sarcopenia Has a Bidirectional Relationship with Many Diseases

Sarcopenia has been recognized as one of the major contributing factors for frailty and may both be the cause and consequence of diabetes mellitus and impact the outcome of chronic obstructive pulmonary disorder (COPD).[7,38]

GOR: 2a/1a; LOA: High

The expert panel recognized the bidirectional relationship between sarcopenia and chronic diseases such as diabetes mellitus[39] and COPD.[38] Age, duration of diabetes, and diabetes-related complications could be risk factors for sarcopenia.[40]

Clinical Pearl

Chronic inflammation, in association with comorbidities, advances skeletal muscle loss, consequently precipitating secondary sarcopenia.

Clinical Features and Impact of Sarcopenia in Cancer and Critically Ill Patients

What are the Outcomes of Cancers With Accompanying Sarcopenia?

Sarcopenia is associated with poor outcomes in cancer and increases the risk of complications.[41]

GOR: 1a/1b; LOA: High

The all-cause mortality rates in patients with breast cancer and hepatocellular cancer with sarcopenia were significantly higher than those without sarcopenia. Patients with digestive tract cancer and sarcopenia demonstrated increased risks of postoperative complications and a prolonged hospitalization compared to those without sarcopenia.[41]

Impact of Sarcopenia on Critically Ill Patients

Critically ill patients in the intensive care unit (ICU) lose approximately 2% of skeletal mass per day during the first week of admission and have a higher risk of mortality.[42,43]

GOR: 1a; LOA: High

A meta-analysis revealed a 48% prevalence of ICU-acquired sarcopenia.[42] Critically ill patients diagnosed with sarcopenia face a 2.28-fold higher risk of mortality than patients without sarcopenia.[42]

Clinical Pearl

Sarcopenia is associated with an increased risk of all-cause mortality in patients with cancer and those who are critically ill.

Screening and Diagnosis of Sarcopenia

As suggested by the pool of evidence, sarcopenia shows a high prevalence in comorbid conditions, and the expert panel strongly recommended screening for sarcopenia in all patients with comorbidities.[7,39,44]

What are the in-Office Tests for Sarcopenia Assessment in Clinical Practice?

Simple measurements such as the CC or MUAC for muscle mass, HGS for muscle strength, and gait speed or 5-CST (5-chair stand test) for muscle function are quick and reliable in-office measurements/tests for assessing sarcopenia.[1,12,45–47]

GOR: 3b; LOA: High

Several proxy anthropometric measurements for sarcopenia assessments, namely MUAC and CC, show a good correlation with BMI.[48] An MUAC ≤28.6 cm in men and ≤27.5 cm in women was indicative of low muscle mass.[49]

A concordance analysis for bioelectrical impedance analysis (BIA), anthropometry, and DXA demonstrated that CC showed 100% specificity for DXA-defined appendicular skeletal mass.[45] The recommended cutoffs for CC by SWAG-SARCO are ≤34 cm for males and ≤33 cm for females.[12]

Grip strength (GS) is a rapid and reliable test for sarcopenia and can effectively predict adverse outcomes (Table 1).[1,12,46,47] Low muscle strength defined as <27.5 kg in males and <18.0 kg in females is recommended.[3,12] Handgrip dynamometers are recommended widely for measuring GS.[50] Innovations such as digital dynamometers have exhibited commendable validity and reliability in the measurement of isometric HGS in the general population.[51]

The strength, assistance with walking, rising from a chair, climbing stairs, and falls (SARC-F) questionnaire is a quick tool for bedside screening for sarcopenia.[52,53] Gait speed can predict adverse outcomes in sarcopenia.[1] The 5-CST test demonstrates high reliability in assessing lower limb strength, balance, and mobility in healthy elderly and those with pathologies, as indicated by relative inter-rater reliability scores ($p<0.001$).[54]

What Is the Role of Nutritional Assessment in Patients With Sarcopenia?

Since poor nutritional status and prognosis in patients with sarcopenia are strongly associated with comorbidities, nutritional assessment must be performed as a part of standard patient care.[55,56]

GOR: 1a; LOA: High

The SarcoPhAge study demonstrated an approximately 4-fold increased risk of developing sarcopenia/severe sarcopenia due to malnutrition.[55] The Yishun Health study conducted in Singapore (in individuals aged 21–90 years) revealed that nutritional risk/malnourishment doubles or triples the odds of developing sarcopenia, and favorable Mini Nutritional

Table 1 Diagnostic Cutoffs for Clinical Assessment for Sarcopenia Assessment in India

	Gait Speed	Grip Strength	5-CST	Calf Circumference
Males	≤0.8 m/s	<27.5 kg	≥12 s	≤34 cm
Females	≤0.8 m/s	<18 kg	≥12 s	≤33 cm

Note: Data from these studies.[1,12,46,47]
Abbreviation: 5-CST, 5-chair stand test.

Assessment parameter scores for food intake and BMI are positively linked with increased muscle mass and HGS ($p<0.05$).[56] There was a broad consensus among the experts that nutritional assessment should be routinely recommended in sarcopenia.

What Imaging Tools Can Be Utilized to Screen and Diagnose Sarcopenia?

Imaging tests such as computed tomography (CT), magnetic resonance imaging (MRI), ultrasound (USG), DXA, or BIA may be conducted based on need and affordability.[1,45,57]

GOR: 1a; LOA: High

Although MRI and CT have been traditionally considered gold standards in noninvasive muscle mass assessments, their availability and affordability limit their utility in clinical settings.[1,12] DXA is a useful tool with the advantages of low radiation exposure, affordability, and a fairly accurate estimation of body composition.[45] BIA is based on prediction equations, and further studies are required to validate the equations for specific populations.[1,45] The experts proposed USG as a good investigative modality besides the GS test for sarcopenia. A study on intra-rater and inter-rater reliability of ultrasound to quantify muscles in older adults or clinical populations showed that intraclass correlation coefficient (ICC) scores for reliability ranged from 0.26 to 1.00.[57] It was also shown to be a valid method for muscle assessment, with ICC scores ranging from 0.92 to 0.999. Its high availability and low radiation exposure make it a practical tool for quantifying muscle mass.

The FRAX® tool can assess various clinical risk factors for osteoporotic fractures, which can be influenced by sarcopenia, as both conditions can coexist and exacerbate each other's effects on musculoskeletal health.[12,58]

Which Muscle Is Most Suitable for Ultrasound Imaging in the Evaluation of Sarcopenia?

The rectus femoris and the psoas muscles are suitable alternatives for ultrasonographic assessment of sarcopenia.[59–61]

GOR: 3a/3b; LOA: High

Rectus femoris assessment is a promising method for the evaluation of sarcopenia, as it is easily accessible. However, clear protocols are necessary for the assessment.[59] Psoas muscle measurements could be a surrogate measure.[60,61] Most experts agree that the rectus femoris is the most suitable muscle for ultrasound. However, some experts expressed mixed opinions on the utility of the psoas muscle, as it is a minor muscle and fails to represent overall sarcopenia.[1]

Lacunae for Sarcopenia Screening in India

The experts reiterated the knowledge gap and the need for separate screening questionnaires for primary and secondary sarcopenia in India. They emphasized the need for specific guidelines on anthropometric measurement points and cutoffs to avoid ambiguity. Some experts suggested developing simplified ICU-specific screening questionnaires. They also endorsed the idea of a self-reporting questionnaire for people with sarcopenia.

Clinical Pearl

All patients with comorbidities should be screened for sarcopenia.[7,39,44]

- A baseline HGS strength cutoff value of <27.5 kg in males and <18.0 kg in females can be defined as low muscle strength for the Indian population.[3]
- A gait speed of 0.8 m/s suggests poor physical performance in adults aged over 60.[3]
- A cutoff value of ≥12 seconds in the 5-CST may be considered poor physical performance in individuals with sarcopenia.[32]
- Cutoff values for CC are <34 cm for males and <33 cm for females.[12]
- USG of the rectus femoris is a practical imaging tool for the assessment of sarcopenia in clinical practice.[59]

Monitoring of Sarcopenia

What Is the Recommended Frequency of Monitoring in Patients With Sarcopenia?

Monitoring after diagnosis of sarcopenia should be done at least once in 3–6 months in symptomatic patients.

GOR: Expert Opinion; LOA: High

The experts also thought that initial assessments every 6 months for symptomatic patients (reduced GS, slow walking) followed by annual monitoring would be helpful. They mentioned that early monitoring that shows positive changes would encourage compliant patients to continue with their treatment. They opined that initial monitoring at 3 months would be preferable in acute sarcopenia.

What Is the Role of Biomarkers in Sarcopenia Monitoring?

The commonly used biomarkers for sarcopenia are total protein, hemoglobin, vitamin D, uric acid, magnesium, calcium, triglycerides, testosterone and estrogen, creatine phosphokinase, C-reactive protein, and erythrocyte sedimentation rate. The choice of biomarkers for monitoring patients with sarcopenia is at the discretion of the treating physician.[12]

Clinical Pearl

In symptomatic patients, the monitoring of sarcopenia should be done at least once in 3–6 months.

Prevention and Management of Sarcopenia

What Measures and Interventions are Considered Effective in the Prevention and Management of Sarcopenia?

A minimum 12-week program of resistance exercise combined with nutritional supplementation can be recommended for the prevention and management of sarcopenia.[62]

GOR: 1a; LOA: High

Findings of a systematic review and meta-analysis of older adults diagnosed with sarcopenia revealed that resistance training, with or without nutritional support, and a combination of resistance, aerobic, and balanced training were the most effective for improving quality of life. Nutritional supplements with exercise showed a greater impact on HGS than exercise alone.[63] Balance training can also assist individuals with sarcopenia in preserving stability during their routine activities and other tasks, thereby decreasing the likelihood of falls.[64]

Vitamin D supplementation along with beta-hydroxy-beta-methylbutyrate (HMB) enhanced muscle parameters in older adults, even when they did not engage in a physical exercise program.[65] The NOURISH study (N=652) was a multicenter, double-blind, placebo-controlled trial. In the COPD subgroup (n=214) of malnourished adults aged ≥65 years, participants received either standard-of-care plus high-protein-HMB (HP-HMB) (n=109) or standard-of-care with a placebo supplement (n=105). The dosage was two servings per day (1.5 g of calcium-HMB), initiated within 3 days of hospital admission (baseline), and continued for up to 90 days after discharge. The supplementation of HP-HMB resulted in an approximately 71% lower mortality risk at 30, 60, and 90 days compared to the placebo. Furthermore, it led to a notable enhancement in HGS, an increase of +1.56 kg vs −0.34 kg ($p=0.0413$) from discharge to day 30, an increase in body weight from baseline to hospital discharge (0.66 kg vs −0.01 kg, $p<0.05$), and improvements in blood nutritional biomarker concentrations.[66] In hospitalized older adults supplemented with HP-HMB, a reduced 90-day mortality was seen due to congestive heart failure, acute myocardial infarction, pneumonia, or COPD.[67] A systematic review of 15 randomized controlled trails (N=2137) evaluating the effect of HMB or supplements with HMB showed improved muscle strength in addition to mass in various clinical groups, with a small–moderate effect size.[68] In adults aged ≥65 years in Singapore, the SHIELD study found that nutritional supplements containing HMB and vitamin D significantly improved outcomes over 6 months compared to the placebo group. The intervention group showed significantly higher survival rates without hospital readmission along with increased weight gain, MUAC, and BMI compared to the placebo group throughout the study.[34] Specialized nutrients such as calcium beta-hydroxy-beta-methylbutyrate (Ca-HMB), when used in the range of 1.5 to 3 g/day along with exercise, have been found to enhance muscle parameters in older adults.[34,66–71]

Table 2 Specialized Nutrients in Medical Nutrition Therapy (MNT) for the Management of Sarcopenia[12,38,69,73]

Nutrient	Action	Dosage
Protein (including whey)	Improved muscle mass, muscle strength, and physical performance	1–1.2 g/kg body weight
Essential amino acids (leucine)	Improved muscle mass and synthesis of basal muscle protein	2.5–2.8 g per meal
Calcium	Regulation of muscle health and increased lean muscle mass	1000–1200 mg/day
Vitamin D	Enhanced muscle strength and performance and decreased risk of fractures	800–1000 IU/day
Creatine	Increased lean mass and muscle strength	20 g/day
Omega-3 fatty acids	Increased lean muscle mass and walking speed	2 g/day
Vitamin C	Antioxidant	45–90 mg/day
Magnesium	Preserving muscle mass and preventing oxidative damage	300 mg/day for men and 270 mg/day for women
Probiotics	Production of short-chain fatty acids and amino acids to regulate homeostasis in skeletal muscle	400 μg/day

Note: Data from these studies.[12,38,69,73]
Abbreviation: IU, International units.

Growing evidence indicates that the supplementation with omega-3 polyunsaturated fatty acids yields positive effects in older adults with sarcopenia. Numerous studies have demonstrated the anti-inflammatory properties of omega-3 fatty acids (eicosapentaenoic acid and docosahexaenoic acid) leading to an augmentation in muscle protein. Administering 2 g/day for 6 months resulted in increased lean muscle mass, improved walking speed, and an increase in HGS and thigh muscle volume.[38] Creatine enhances muscle strength, physical performance, and muscle mass. Its impact is evident when augmented by resistance training, as it increases the availability of energy during exercise.[12] Table 2 lists other nutrients that have been studied in the management of sarcopenia.[12,38,69,72] Additional data are required on these nutrients to arrive at a definitive recommendation.

The experts encouraged the use of specific protein-rich food/recipes indigenous to their region. They were also of the view that early nutritional interventions and mobilization in patients admitted to the ICU via active/passive physiotherapy would help minimize skeletal muscle loss.[73]

Role of Drugs in the Management of Sarcopenia

Albeit with limited evidence, some drugs including anabolic steroids, alendronate, angiotensin-converting enzyme inhibitors, myostatin inhibitors, growth hormone, hormone replacement therapy, and calcium supplementation have been proven useful in the management of sarcopenia. Improved muscle function and physical performance were observed in studies with these drugs as a therapeutic approach to sarcopenia. However, further data are needed to provide clear recommendations.[38,74,75]

Can Testosterone Be Recommended in the Management of Sarcopenia?

Testosterone has shown a positive association with muscle strength.[76] However, testosterone replacement therapy is linked to several adverse effects, including acne, gynecomastia, testicular atrophy, infertility, and liver toxicity among others.[77] The panel was guarded in their recommendation and suggested the inclusion of a disclaimer on the contra-indications of testosterone/estrogen when used in sarcopenia management.

Clinical Pearl

In people with sarcopenia, a combined intervention of resistance exercise and nutrition with specialized nutrients such as protein, HMB, and micronutrients for at least 3 months is recommended.[12,34,38,63,69,70,72,78,79]

Navigating the Future: Mapping the Path Ahead

A gap in knowledge exists regarding diagnostic cutoffs for sarcopenia assessment, the role of biomarkers in screening, and overall support strategies for sarcopenia in India.[12]

GOR: 1a; LOA: High

The diagnostic cutoffs and a practical algorithm for screening and managing sarcopenia in India have not yet been clearly defined. Simple, repeatable screening tools are desirable in clinical scenarios to identify patients predisposed to developing sarcopenia. Early diagnosis will lead to better functional outcomes and an eventual decrease in the sarcopenia burden in India. The experts were optimistic about the utility of artificial intelligence in sarcopenia. A pilot study was undertaken to assess the reliability and accuracy of measuring HGS between Squegg®, a smart dynamometer (handheld dynamometer with digital capabilities that facilitates Bluetooth connectivity to a mobile device, thereby enabling remote measurements), and a hydraulic hand dynamometer. Paired-samples *t*-tests showed no significant differences between the two devices. Intraclass correlation and Pearson correlations indicated good to excellent agreement.[80] Artificial intelligence could assist clinicians in accurate diagnosis, avoiding the need for expensive imaging modalities.[81] Due to a paucity of literature, further research is warranted in India. Figure 5 presents the algorithm for the diagnosis and management of sarcopenia.

Eight Commandments in the Diagnosis and Management of Sarcopenia

1. Approximately four out of 10 elderly adults and three out of 100 young adults suffer from sarcopenia in India.
2. A sedentary lifestyle, chronic inflammation, and poor nutritional status are contributing factors to sarcopenia.
3. Sarcopenia screening should be performed in all patients with comorbidities.
4. The handheld dynamometer is a reliable tool for measuring muscle strength. SARC-F questionnaire can be used as a bedside tool for the assessment of muscle loss.

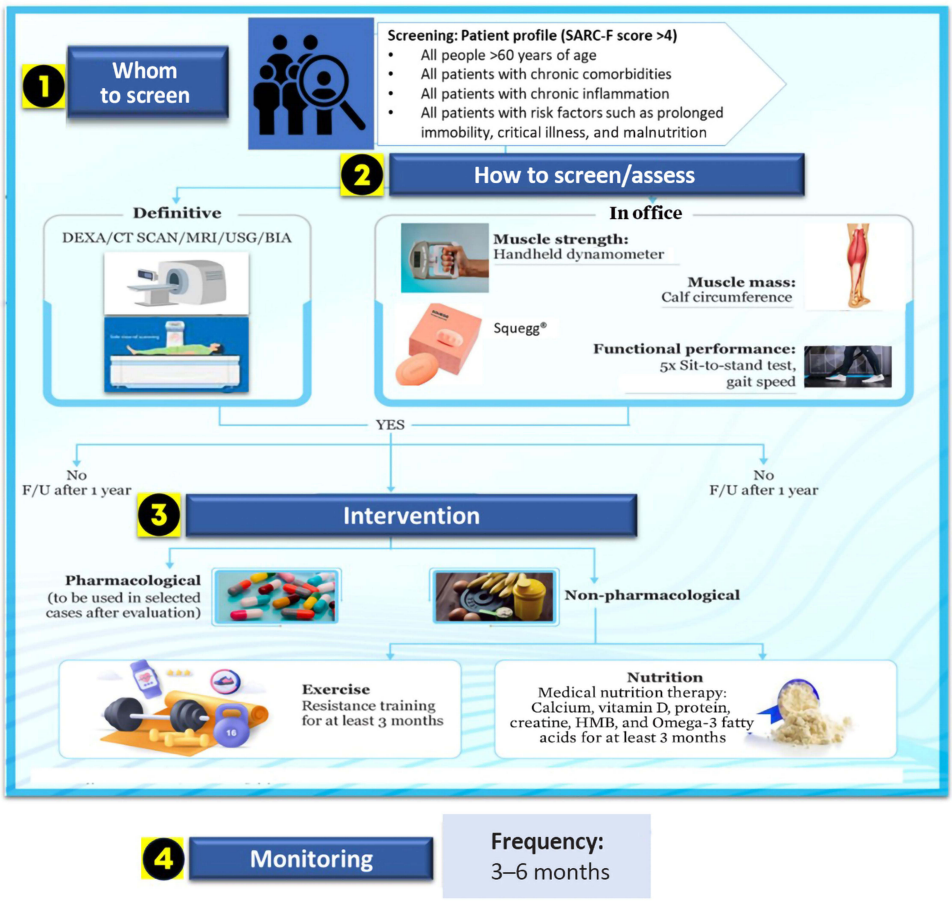

Figure 5 Algorithm for the screening, diagnosis, and management of sarcopenia.
Abbreviations: BIA, Bioelectrical impedance analysis; CT, Computed tomography; CPK, Creatine phosphokinase; CRP, C-reactive protein, ESR, Erythrocyte sedimentation rate; F/U, Follow-up; Hb, Hemoglobin; HMB, Beta-hydroxy-beta-methylbutyrate; MRI, Magnetic resonance imaging; USG, Ultrasonography.

5. Among Indians, cutoffs for HGS and other parameters are lower than the existing definitions of sarcopenia; hence, indigenous baseline HGS cutoffs of <27.5 kg in males and <18.0 kg in females can be defined as low muscle strength in the Indian population.
6. Medical nutrition therapy, including calcium, vitamin D, proteins, creatine, HMB, and eicosapentaenoic acid for at least 3 months, is beneficial in managing sarcopenia.
7. A minimum of 3 months of resistance training combined with oral nutritional supplementation can be recommended to prevent and manage sarcopenia.
8. The frequency for the monitoring of sarcopenia can be 3–6 months depending on the severity of symptoms.

The absence of region-specific guidelines poses challenges for sarcopenia assessment in India, resulting in inconsistencies in diagnosis and clinical management. This is the first Indian consensus to recommend diagnostic thresholds for muscle mass, strength, and physical function for the assessment of sarcopenia. It also proposes a comprehensive algorithm for screening, diagnosis, and management of sarcopenia tailored to the Indian population.

Conclusion

It is important to recognize the temporal variations in the Indian population when compared to the West. Due to differences in body types and genetic composition, it is necessary to adopt region-specific guidelines, particularly concerning sarcopenia indicators. This expert panel proposed suitable cutoffs for the Indian population to screen for sarcopenia, especially those with comorbidities. Swift diagnosis and intervention are crucial in managing sarcopenia. The handheld dynamometer has been suggested as a simple and reliable device to assess GS for clinical assessment. Measures such as physical activity and a protein-rich diet in at-risk populations, could play a key role in attenuating the progression of sarcopenia. Lifestyle modifications, including medical nutrition therapy and resistance exercise, were advocated as the mainstay in preventing and managing sarcopenia. Continued research is essential to further refine sarcopenia screening methods, treatment protocols, and regional guidelines, ensuring that they remain relevant to the evolving needs of the Indian population. By identifying current knowledge gaps, this expert panel offered a comprehensive set of recommendations for evaluating and managing sarcopenia in clinical practice in India (Figure 5).

Abbreviations

AWGS, Asian Working Group for Sarcopenia; BIA, Bioelectrical impedance analysis; BMI, Body mass index; Ca-HMB, Calcium beta-hydroxy-beta-methylbutyrate; CC, Calf circumference; COPD, Chronic obstructive pulmonary disorder; CT, Computed tomography; CVD, Cardiovascular disease; DXA, Dual-energy X-ray absorptiometry; EWGSOP, European Working Group on Sarcopenia in Older People; GOR, Grade of recommendation; GS, Grip strength; HGS, Handgrip strength; HMB, Beta-hydroxy-beta-methylbutyrate; HP-HMB, High-protein-HMB; ICC, Intraclass correlation coefficient; ICU, Intensive care unit; LMIC, Lower- and middle-income country; LOA, Level of agreement; MRI, Magnetic resonance imaging; MUAC, Mid-upper arm circumference; NWO, Normal-weight obesity; SWAG-SARCO, South Asian Working Action Group on SARCOpenia; USG: Ultrasound.

Data Sharing Statement

All data generated or analysed during this study are included in this article.

Author Contributions

All authors have made substantial contributions to this work, including conception, study design, execution, data acquisition, analysis, and interpretation and have all participated in the critical revision of the manuscript. All authors have agreed on the choice of the journal for submission, reviewed and approved all versions of the manuscript prior to submission, during revisions, upon final acceptance, and during the proofing stage. Furthermore, they accept responsibility and accountability for the content of the article.

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