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Beyond Conventional Nutritional Markers: Dynapenia and GLIM-Defined Malnutrition Represent Distinct Clinical Dimensions in Oncology Patients

Serhat Mert Tiril

mert.tiril@gmail.com

Health Science University

Güldan Kahveci

Health Science University

Hande Nur Erölmez

Health Science University

Ekmel Burak Özşenel

Health Science University

Mehmet Tayfur

Health Science University

Sema Basat

Health Science University

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Abstract

Purpose

This study evaluated the relationship between GLIM-defined malnutrition and dynapenia (reduced handgrip strength), and determined the degree of overlap between structural and functional nutritional indicators in oncology patients.

Methods

This single-centre, cross-sectional study enrolled 81 adult oncology patients. Malnutrition was diagnosed using GLIM criteria. Handgrip strength was measured with a calibrated dynamometer and classified by sex-specific EWGSOP2 cut-offs. Nutritional risk was assessed with NRS-2002. Between-group comparisons, Spearman correlation, and univariable logistic regression were performed.

Results

Mean age was 60.21 ± 12.14 years. Dynapenia was present in 46 patients (56.8%), GLIM phenotypic weight loss in 51 (62.9%), and NRS-2002 score ≥ 3 in 24.7%; only 11.1% fulfilled all three criteria simultaneously. Despite largely normal conventional nutritional parameters, a substantial proportion met GLIM malnutrition criteria. CRP was significantly higher ($p = 0.028$) and total lymphocyte count lower ($p = 0.005$) in dynapenic patients; albumin did not differ ($p = 0.424$). Handgrip strength correlated negatively with CRP ($r = -0.226$; $p = 0.044$) and positively with total lymphocyte count ($r = 0.299$; $p = 0.007$). No association was found between dynapenia and cancer type ($p = 0.24$).

Conclusion

Concordance between GLIM phenotypic criteria and dynapenia is limited in oncology patients. Structural and functional dimensions of nutritional status are complementary but distinct. Integrating handgrip strength into routine oncological assessment may improve detection of functional frailty beyond conventional nutritional screening.

1. Introduction

Malnutrition is a clinically significant and highly prevalent condition in oncology patients, with well-documented adverse effects on treatment tolerance, quality of life, functional status, and overall survival. In response to the longstanding need for a standardized diagnostic framework, the Global Leadership Initiative on Malnutrition (GLIM) developed a consensus-based model that integrates phenotypic and etiological criteria. The most recent update to this framework endorses a two-step approach consisting of initial nutritional risk screening followed by confirmatory diagnostic assessment, incorporating

phenotypic criteria—namely unintentional weight loss, low body mass index (BMI), and reduced muscle mass—alongside etiological criteria including reduced dietary intake and disease burden or systemic inflammation (1).

The diagnostic performance and prognostic relevance of the GLIM criteria in cancer populations have attracted considerable scientific interest. Systematic reviews confirm that GLIM-based assessment achieves acceptable diagnostic accuracy and performs comparably to PG-SGA in adult cancer patients (2,3). The etiological criterion of systemic inflammation within GLIM has been independently associated with survival in advanced cancer (9,10), underscoring the central role of inflammatory burden in cancer-related malnutrition.

A critical consideration in clinical practice is that conventional nutritional parameters—including serum albumin, body weight, mid-upper arm circumference, and calf circumference—are routinely employed as proxies for nutritional status in oncology settings. However, these parameters may remain within normal ranges even in patients who meet formal diagnostic criteria for malnutrition according to the GLIM framework. This discordance between apparently reassuring conventional indicators and GLIM-defined malnutrition has important clinical implications: it suggests that reliance on traditional markers alone may result in the systematic underdiagnosis of malnutrition in oncology patients. In other words, patients whose routine clinical parameters appear normal may still harbor clinically significant malnutrition when rigorously assessed using the GLIM criteria. This observation underscores the importance of structured, criterion-based nutritional assessment beyond conventional screening parameters.

Parallel to the evolving understanding of malnutrition, dynapenia—defined as the age- or disease-related loss of muscle strength in the absence of concurrent muscle mass reduction—has emerged as a functionally important marker in oncology practice. Handgrip strength measured by dynamometry has been established as a feasible and reproducible assessment method in clinical settings (7). Prior studies have demonstrated that handgrip strength correlates with skeletal muscle mass (5), predicts chemotherapy-related toxicity (6), and is significantly associated with markers of both functional and nutritional status (8). These findings collectively suggest that muscle strength assessment may reflect not only structural muscle loss but also broader clinical vulnerability in oncology patients.

Despite this evidence, the relationship between GLIM-defined malnutrition and dynapenia remains incompletely characterised. GLIM phenotypic criteria focus on weight loss, BMI, and muscle mass, whereas dynapenia captures functional muscle performance. Since mass and strength do not necessarily decline in parallel, the degree of clinical overlap between these constructs is uncertain and has not been systematically established.

Against this background, the present study evaluated the association between GLIM-defined malnutrition and dynapenia in oncology patients, and determined the degree of overlap between GLIM phenotypic components and objectively measured functional muscle strength loss.

2. Materials and Methods

2.1. Study Design and Participants

This study was designed as a single-center, cross-sectional, observational investigation. Consecutive adult patients (≥18 years of age) with a confirmed cancer diagnosis who were under active follow-up in the medical oncology unit were prospectively enrolled during the study period. Eligibility required the ability to perform handgrip strength measurement and the availability of complete clinical and laboratory data. A total of 81 patients who fulfilled these criteria were included in the final analysis.

2.2. Data Collection

Demographic characteristics, clinical features, anthropometric measurements, and laboratory parameters—including serum albumin, C-reactive protein (CRP), and leukocyte count—were systematically recorded for all participants. All anthropometric assessments were performed in accordance with standardized clinical protocols. Nutritional risk was screened using the Nutritional Risk Screening 2002 (NRS-2002) tool.

Malnutrition was diagnosed according to the GLIM criteria, which require the concurrent presence of at least one phenotypic and at least one etiological criterion. Phenotypic criteria applied in this study included unintentional weight loss and low BMI. Given that all patients had active malignant disease, the criterion of disease burden was considered universally fulfilled as the etiological criterion.

2.3. Handgrip Strength Assessment

Muscle strength was assessed using a calibrated hydraulic hand dynamometer, administered by a trained nutrition nurse and the attending physician following a standardized measurement protocol. During testing, patients were seated upright in a chair with back support, with the shoulder in a neutral position, the elbow flexed at 90°, and the forearm in a neutral position. Measurements were obtained from the dominant hand. Three consecutive trials were performed with adequate rest intervals between measurements, and the mean of the three values was used for analysis. Handgrip strength was analyzed both as a continuous variable (kg) and as a categorical variable representing the presence or absence of dynapenia.

2.4. Statistical Analysis

All statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were reported as frequencies and percentages for categorical variables, and as mean ± standard deviation or median (minimum–maximum) for continuous variables, depending on the distribution of data. Between-group comparisons were conducted using appropriate parametric or non-parametric tests based on normality assessment. Correlations between continuous variables were evaluated using Spearman's rank correlation coefficient. Factors associated with dynapenia were

examined by univariable logistic regression analysis. A two-tailed p-value of less than 0.05 was considered statistically significant.

3. Results

A total of 81 oncology patients were included in the analysis. The mean age was 60.21 ± 12.14 years (median 63; range 23–83). Mean body weight was 73.53 ± 14.15 kg (median 73; range 32–107 kg), mean height was 168.30 ± 9.37 cm (median 170; range 142–192 cm), and mean BMI was 25.93 ± 4.49 kg/m² (median 26.1; range 14.2–39.8). Baseline demographic, anthropometric, nutritional, and laboratory characteristics of the study population are summarized in Table 1.

Baseline characteristics are summarised in Table 1. Despite largely normal conventional nutritional parameters — including serum albumin (mean 40.13 ± 6.18 g/L), mid-upper arm circumference, and calf circumference — a substantial proportion of patients met GLIM malnutrition criteria.

Table 1. Baseline demographic, anthropometric, nutritional and laboratory characteristics of the study population (N=81)

Variable	Value
Age (years), mean ± SD / median (min–max)	60.21 ± 12.14 / 63 (23–83)
Body weight (kg), mean ± SD / median (min–max)	73.53 ± 14.15 / 73 (32–107)
Body mass index (BMI, kg/m²), mean ± SD / median (min–max)	25.93 ± 4.49 / 26.1 (14.2–39.8)
Dynapenia, n (%)	
- Reduced muscle strength	46 (56.8)
- Absent	35 (43.2)
GLIM n (%)	
- Weight loss	51 (62.9)
- Reduced muscle strength	3 (3.7)
- Weight loss + low BMI	4 (5.0)
- Weight loss + reduced muscle strength	1 (1.2)
- Absent	22 (27.2)
- Disease burden	81 (100)
Duration of weight loss (months), mean ± SD / median (min–max)	6.99 ± 4.53 / 6 (1–24)
Amount of weight loss (kg), mean ± SD / median (min–max)	8.48 ± 9.49 / 6 (0–39)
Handgrip strength, 1st measurement, mean ± SD / median (min–max)	24.62 ± 9.46 / 23.6 (7.5–53.1)
Handgrip strength, 2nd measurement, mean ± SD / median (min–max)	24.70 ± 9.49 / 23.55 (7.50–51.1)
Handgrip strength, 3rd measurement, mean ± SD / median (min–max)	24.38 ± 9.58 / 24 (7.1–50)
Mean handgrip strength, mean ± SD / median (min–max)	24.62 ± 9.41 / 24.033 (7.5–51.4)
Mid-upper arm circumference (cm), mean ± SD / median (min–max)	29.22 ± 4.12 / 28 (17–38)
Calf circumference (cm), mean ± SD / median (min–max)	35.90 ± 4.38 / 36 (22–45)
Oral nutritional supplement use (units/day), mean ± SD / median (min–max)	0.23 ± 0.71 / 0 (0–4)
Serum albumin (g/L), mean ± SD / median (min–max)	40.13 ± 6.18 / 41 (16–51)
C-reactive protein (mg/L), mean ± SD / median (min–max)	19.83 ± 36.95 / 6.99 (0.10–222)

Total lymphocyte count (×10⁹/L), mean ± SD / median (min–max)	1.68 ± 0.83 / 1.51 (0.30–3.76)
NRS-2002 score, mean ± SD / median (min–max)	2.69 ± 1.16 / 3 (1–5)

SD: standard deviation; BMI: body mass index; GLIM: Global Leadership Initiative on Malnutrition; NRS-2002: Nutritional Risk Screening 2002; MUAC: mid-upper arm circumference; CRP: C-reactive protein.

Values are presented as mean ± standard deviation and median (min–max) for continuous variables, and n (%) for categorical variables. Dynapenia was defined as low handgrip strength according to sex-specific cut-offs. GLIM phenotypic criteria include unintentional weight loss and low BMI. All patients met the etiologic GLIM criterion due to active cancer (disease burden/inflammation). NRS-2002: Nutritional Risk Screening 2002.

Table 2. Distribution of cancer diagnoses according to dynapenia status

Diagnosis	Dynapenia (n=46) n (%)	No Dynapenia (n=35) n (%)	p
GIS cancers	16 (34.8)	18 (51.4)	
Lung cancer	13 (28.3)	10 (28.6)	
Breast cancers	3 (6.5)	0 (0.0)	
Other Solid Tumors	12 (26.1)	6 (17.1)	
Hematological Malignancies	2 (4.3)	1 (2.9)	
Total	46 (100)	35 (100)	0.24

*Pearson Chi-square test

No statistically significant difference in cancer diagnosis distribution was observed between dynapenic and non-dynapenic patients (Pearson chi-square $\chi^2=5.48$; df=4; p = 0.24), as detailed in Table 2.

Table 3. Comparison of inflammatory and nutritional biomarkers according to handgrip strength status (positive/negative)

	Handgrip Positive	Handgrip Negative	p
Albumin	38.86±7.90; 41.22 (16.01–51)	41.44±3.74; 41.23 (32.75–48.02)	0.424
CRP	25.39±38.03; 10.4350 (0.10–165.05)	14.41±35.96; 3.47 (0.10–222)	0.028
Total lymphocyte count	1.42±0.74; 1.37 (0.30–3.20)	1.94±0.83; 1.93 (0.33–3.76)	0.005

Handgrip positive was defined as low muscle strength (dynapenia) according to sex-specific cut-offs (e.g., <27 kg for men and <16 kg for women, EWGSOP2 criteria). Handgrip negative indicates values above these thresholds.

Sex-specific EWGSOP2 cut-offs were used to define low handgrip strength (dynapenia) (<27 kg for men, <16 kg for women). Patients were categorized as **dynapenia (handgrip positive)** or **normal muscle strength (handgrip negative)** accordingly.

As shown in Table 3, albumin did not differ significantly between dynapenic and non-dynapenic patients (38.86 ± 7.90 vs. 41.44 ± 3.74 g/L; p = 0.424). CRP was significantly higher (25.39 ± 38.03 vs. 14.41 ± 35.96 mg/L; p = 0.028) and total lymphocyte count significantly lower (1.42 ± 0.74 vs. 1.94 ± 0.83 $\times 10^9$/L; p = 0.005) in the dynapenia group.

Spearman correlation analysis demonstrated a significant negative correlation between handgrip strength and CRP (r = −0.226; p = 0.044) and a significant positive correlation between handgrip strength and total lymphocyte count (r = 0.299; p = 0.007). No significant association was observed between handgrip strength and serum albumin (p = 0.080) or NRS-2002 score (p = 0.183).

Between-group comparisons of anthropometric measurements revealed no significant differences according to dynapenia status: mid-upper arm circumference did not differ significantly between dynapenic and non-dynapenic patients (p = 0.818), nor did calf circumference (p = 0.410). These findings are consistent with the results of the univariable logistic regression analysis and further support the distinction between structural anthropometric markers and functional muscle strength.

Table 4. Univariable logistic regression analysis of factors associated with dynapenia

Variable	Comparison	OR	95% CI	p
Age	Per 1-year increase	0.997	0.961–1.034	0.872
Sex	Male vs. Female	0.649	0.246–1.714	0.383
Comorbidity	Present vs. Absent	2.375	0.888–6.349	0.085
Body weight (kg)	Per 1-kg increase	0.991	0.961–1.023	0.584
BMI (kg/m²)	Per 1-unit increase	1.060	0.957–1.173	0.263
NRS-2002 score	Per 1-point increase	0.678	0.452–1.017	0.060
Duration of weight loss (months)	Per 1-month increase	1.085	0.975–1.208	0.135
Amount of weight loss (kg)	Per 1-kg increase	0.960	0.915–1.008	0.103
Mid-upper arm circumference (cm)	Per 1-cm increase	1.021	0.917–1.136	0.711
Calf circumference (cm)	Per 1-cm increase	1.015	0.917–1.123	0.775
Oral nutritional supplement use (units/day)	Per 1-unit increase	0.755	0.399–1.428	0.387
Serum albumin (g/L)	Per 1-unit increase	0.931	0.856–1.011	0.090
CRP (mg/L)	Per 1-unit increase	0.995	0.988–1.002	0.429
Total lymphocyte count (×10⁹/L)	Per 1-unit increase	0.707	0.400–1.200	0.211

OR: odds ratio; CI: confidence interval; BMI: body mass index; NRS-2002: Nutritional Risk Screening 2002; CRP: C-reactive protein. Dynapenia was defined as low handgrip strength according to sex-specific EWGSOP2 cut-off values (<27 kg for men, <16 kg for women).

Univariable logistic regression identified no statistically significant predictor of dynapenia among the demographic, anthropometric, nutritional, and inflammatory variables examined (Table 4). Comorbidity showed a numerically higher, though non-significant, association (OR = 2.375; 95% CI: 0.888–6.349; p = 0.085); all other variables, including NRS-2002 score (p = 0.060) and serum albumin (p = 0.090), did not reach significance.

Overall, none of the variables examined emerged as a statistically significant independent predictor of dynapenia. Notably, conventional nutritional parameters — including body weight, BMI, mid-upper arm circumference, calf circumference, and serum albumin — showed no significant association with dynapenia, further supporting the conceptual distinction between structural nutritional indicators and functional muscle strength loss. These findings reinforce the premise that dynapenia represents a clinically distinct dimension that cannot be reliably predicted from standard nutritional or anthropometric assessments alone.

The Venn diagram illustrates the distribution and overlap of dynapenia, the GLIM phenotypic criterion of unintentional weight loss, and an NRS-2002 score ≥3 within the study population. Of the 81 patients, 46 (56.8%) had dynapenia, 51 (62.9%) met the GLIM phenotypic weight loss criterion, and 20 (24.7%) had an NRS-2002 score ≥3. Nine patients (11.1%) fulfilled all three criteria simultaneously, representing the clinically most vulnerable subgroup characterized by the coexistence of nutritional risk, phenotypic weight loss, and reduced muscle strength.

Notably, 16 patients (19.8%) presented with both dynapenia and weight loss despite an NRS-2002 score below 3, indicating that nutritional risk screening alone may not adequately capture the full burden of functional muscle strength loss and phenotypic malnutrition. These findings demonstrate that NRS-2002, handgrip strength assessment, and GLIM phenotypic criteria are complementary but only partially overlapping tools, and that dynapenia and weight loss may co-occur at clinically meaningful frequencies even among patients who do not meet the NRS-2002 risk threshold.

4. Discussion

The present study demonstrates that the clinical overlap between GLIM phenotypic criteria and dynapenia in oncology patients is limited, and that structural indicators of malnutrition do not consistently reflect functional muscle strength loss. Weight loss was identified in 62.9% of patients, dynapenia in 56.8%, and an NRS-2002 score ≥ 3 in only 24.7%; yet, as illustrated in the Venn diagram (Fig. 1), merely 11.1% of patients fulfilled all three criteria concurrently. This pattern of partial and asymmetric overlap constitutes the central finding of the present study and carries important implications for nutritional and functional assessment in oncology practice.

A particularly noteworthy finding is that conventional nutritional parameters — including serum albumin, body weight, mid-upper arm circumference, and calf circumference — were largely within normal limits, yet a substantial proportion of patients fulfilled GLIM malnutrition criteria. This discordance underscores a critical limitation of traditional assessment: reliance on conventional markers alone risks systematic underdiagnosis of malnutrition in oncology populations.

The GLIM framework incorporates phenotypic criteria (weight loss, low BMI, reduced muscle mass) and etiological criteria, but does not include functional muscle strength. The molecular pathophysiology of cancer cachexia — where tumour-derived inflammatory mediators augment catabolism and suppress

anabolic signalling (12) — may produce functional impairment without proportional structural muscle loss, partly accounting for the limited GLIM-dynapenia concordance observed here.

The capacity of screening tools to capture all dimensions of malnutrition is well-recognised as incomplete (13). PG-SGA has demonstrated superior sensitivity to NRS-2002 in some cancer populations (14). NRS-2002, developed using controlled clinical trial data (15), does not directly assess functional muscle performance — consistent with its markedly lower prevalence rate (24.7%) compared to dynapenia (56.8%) and weight loss (62.9%) in the present cohort.

The absence of between-group differences in mid-upper arm circumference ($p = 0.818$) and calf circumference ($p = 0.410$) between dynapenic and non-dynapenic patients is consistent with evidence that neuromuscular factors and impaired fibre quality affect muscle strength independently of muscle mass (16). The revised EWGSOP2 consensus similarly positions muscle strength as the primary diagnostic criterion, acknowledging that mass and function do not decline in parallel (17).

Pro-inflammatory cytokines — including tumour necrosis factor-alpha, interleukin-1, and interleukin-6 — augment muscle protein catabolism and suppress anabolic signalling, contributing to functional impairment independent of structural muscle loss (19). The association between inflammatory markers and reduced muscle strength has been corroborated in large cohorts, where elevated CRP was independently associated with diminished handgrip strength (20).

Lymphopenia in the dynapenic subgroup suggests that reduced muscle strength may reflect not only nutritional deficit but also systemic immune compromise (21). The absence of a significant albumin-dynapenia association ($p = 0.424$) is mechanistically expected: albumin is a negative acute-phase reactant whose circulating level reflects inflammatory intensity rather than nutritional depletion per se (22, 23). The divergent behaviour of CRP and albumin in relation to handgrip strength in the present study validates this distinction and confirms that serum albumin is not a reliable surrogate for functional muscle performance.

Dynapenia was conceptualised to describe muscle strength loss independent of muscle mass, and has been positioned as an independent indicator of clinical frailty in chronic and malignant disease (24). The adverse impact of GLIM-defined malnutrition on clinical outcomes and survival has been comprehensively documented in systematic reviews, with the strength of this association confirmed in oncological contexts (25). In patients undergoing major abdominal surgery for gastrointestinal cancer, GLIM-confirmed malnutrition was prospectively shown to significantly increase the risk of postoperative complications (26). While these findings support the clinical validity of GLIM, the divergence between weight loss and dynapenia observed in the present study suggests that the addition of a functional dimension to GLIM-based malnutrition diagnosis may strengthen the comprehensiveness of prognostic models.

GLIM-defined malnutrition has been validated as a predictor of complications and survival in both ambulatory and surgical oncology settings (27, 28). Evidence that muscle mass and functional capacity

do not change in parallel (29), together with data linking reduced handgrip strength to survival in hepatocellular carcinoma (30), supports the independent prognostic value of functional muscle assessment. The Venn diagram (Fig. 1) illustrates this gap: 19.8% of patients had both dynapenia and weight loss despite an NRS-2002 score below 3, revealing a structural limitation of current screening algorithms in capturing functional frailty.

Taken together, the overlap between GLIM phenotypic criteria and dynapenia appears limited both statistically and clinically. The structural components of malnutrition — weight loss and low BMI — and functional muscle strength loss represent distinct yet complementary dimensions of the oncology patient's clinical profile that are not interchangeable. The findings supporting the relationship among inflammation, immune status, and muscle function indicate that dynapenia reflects not only nutritional insufficiency but also the systemic burden of disease. Future research should systematically examine the independent prognostic weight of dynapenia within GLIM-based malnutrition frameworks, the response to early functional interventions, and the impact of clinical protocols integrating both nutritional and functional assessment on patient outcomes, thereby contributing to the development of comprehensive evaluation strategies for oncology patients.

5. Limitations

The present study has several limitations that should be acknowledged when interpreting the findings. First, the single-centre, cross-sectional design precludes causal inference and limits the generalisability of the results to broader oncology populations. Second, the relatively modest sample size (n = 81) reduces statistical power, particularly for subgroup analyses, and the study may have been underpowered to detect associations of small effect size. Third, muscle mass was not objectively quantified using reference methods such as bioelectrical impedance analysis or computed tomography; consequently, the GLIM phenotypic criterion of reduced muscle mass could only be assessed through indirect anthropometric proxies, which may have contributed to the notably low prevalence of this criterion (3.7%) in the cohort. Fourth, dietary intake was not objectively measured, which may have resulted in underestimation of the etiological GLIM criterion of reduced food intake. Fifth, information on cancer stage, treatment type, and performance status was not incorporated into the analysis, and these factors represent potential confounders of both malnutrition and dynapenia. Future prospective, multicentre studies with larger sample sizes, objective muscle mass quantification, and comprehensive clinical characterisation are warranted to address these limitations and to further elucidate the relationship between GLIM-defined malnutrition and functional muscle strength in oncology patients.

6. Conclusions

The present study demonstrates that the concordance between GLIM phenotypic criteria and dynapenia in oncology patients is limited, and that structural indicators of malnutrition do not consistently reflect functional muscle strength loss. These two constructs represent complementary yet distinct clinical dimensions that are not interchangeable. The findings support a mechanistic relationship among

systemic inflammation, immune status, and muscle function, suggesting that reduced handgrip strength may serve not only as a marker of nutritional insufficiency but also as a potential indicator of broader systemic disease burden.

Notably, conventional nutritional parameters were largely within normal limits in this cohort, yet a substantial proportion met formal GLIM malnutrition criteria — underscoring the inadequacy of relying solely on traditional markers and the importance of structured criterion-based assessment.

Integration of handgrip strength assessment into routine oncological evaluation may improve early detection of functional frailty that conventional nutritional screening fails to capture. Future multicentre prospective studies are warranted to define the independent prognostic role of dynapenia within GLIM-based malnutrition frameworks.

Declarations

Author Contributions: Conceptualization, S.M.T. and G.K.; methodology, S.B. and E.B.Ö.; software, S.B. and S.M.T.; validation, H.N.E., M.T., and G.K.; formal analysis, S.M.T. and E.B.Ö.; investigation, G.K. and H.N.E.; resources, S.M.T., M.T., and G.K.; data curation, G.K. and H.N.E.; writing—original draft preparation, S.M.T. and G.K.; writing—review and editing, S.M.T., G.K., and H.N.E.; visualization, M.T. and E.B.Ö.; supervision, S.B., E.B.Ö., and M.T.; project administration, S.M.T. and H.N.E. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement: Written informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on reasonable request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

Conflicts of Interest: The authors declare no conflicts of interest.

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Figures

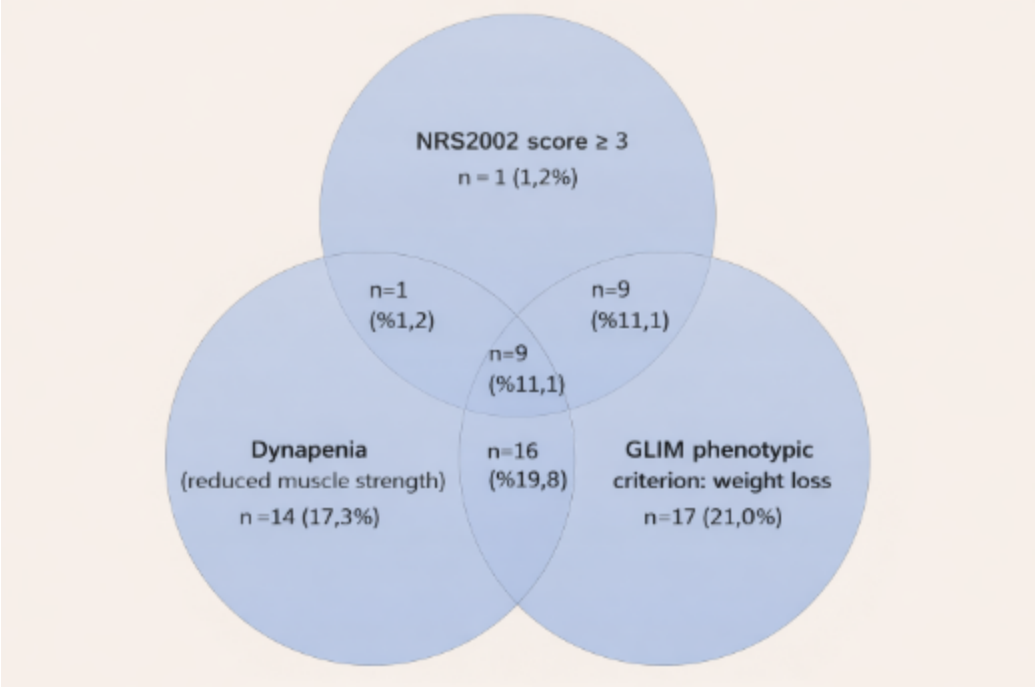


Figure 1

Overlap between dynapenia, GLIM phenotypic weight loss criterion, and NRS-2002 ≥3