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A SELECTION OF TEN READINGS ON TOPICS RELATED TO 2025 DISTANCE LEARNING COURSE: MUSCLES MATTER: UNCOVERING THE ROLE OF MUSCLES IN HEALTH AND DISEASE

FPSC127 – SATURDAY, 8 MAR 2025 2.00pm-5.30pm
All are available as free full text

Selection of readings made by A/Prof Goh Lee Gan

READING 1 – POSITIVE EFFECTS OF RESISTANCE EXERCISE TRAINING

Verstraeten LMG,[1] Spoelstra T,[1] Maier AB,[1,2,5,6] Reijnierse EM,[2,3] Meskers CGM.[4] The impact of mobility limitations on geriatric rehabilitation outcomes: Positive effects of resistance exercise training (RESORT). J Cachexia Sarcopenia Muscle. 2024 Oct;15(5):2094-2103. PMID: 39236305.

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ABSTRACT

BACKGROUND: Regaining walking ability is a key target in geriatric rehabilitation. This study evaluated the prevalence of walking ability at (pre-)admission and related clinical characteristics in a cohort of geriatric rehabilitation inpatients; in inpatients without walking ability, feasibility and effectiveness of progressive resistance exercise training (PRT) were assessed.

METHODS: Inpatients within RESORT, an observational, longitudinal cohort of geriatric rehabilitation inpatients, were stratified in those with and without ability to walk independently (defined by Functional Ambulation Classification (FAC) score ≤2) at admission; further subdivision was performed by pre-admission walking ability. Clinical characteristics at admission, length of stay, and changes in physical and functional performance throughout admission were compared depending on (pre-)admission walking ability. Feasibility (relative number of PRT sessions given and dropout rate) and effectiveness [change in Short Physical Performance Battery, FAC, independence in (instrumental) activities of daily living (ADL/IADL)] of PRT (n=11) in a subset of inpatients without ability to walk independently at admission (able to walk pre-admission) were investigated compared with usual care (n=11) (LIFT-UP study).

RESULTS: Out of 710 inpatients (median age 83.5 years; 58.0% female), 52.2 percent were not able to walk independently at admission, and 7.6 percent were not able to walk pre-admission. Inpatients who were not able to walk independently at admission had a longer length of stay, higher prevalence of cognitive impairment and frailty and malnutrition risk scores, and a lower improvement in independence in (I)ADL compared with inpatients who were able to walk at both admission and pre-admission. In LIFT-UP, the relative median number of PRT sessions given compared with the protocol (twice per weekday) was 11 out of 44. There were no dropouts. PRT improved FAC (P=0.028) and ADL (P=0.034) compared with usual care.

CONCLUSIONS: High prevalence of inpatients who are not able to walk independently and its negative impact on independence in (I)ADL during geriatric rehabilitation highlights the importance of tailored interventions such as PRT, which resulted in improvement in FAC and ADL.

READING 2 – FUNCTIONAL DEPENDENCY IS STRONGLY ASSOCIATED WITH POSITIVE SARC-F SCREEN AMONG OLDER ADULTS AT THE ED

Chong E,[1,2] Goh EF,[2] Lim WS.[2,3] Functional Dependency as a Marker for Positive SARC-F Screen among Older Persons at the Emergency Department. Ann Geriatr Med Res. 2024 Dec;28(4):401-409. PMID: 38952333.

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ABSTRACT

BACKGROUND: Functional dependency may serve as a marker for positive SARC-F screen (Strength, Assistance with walking, Rise from a chair, Climb stairs, and Falls) among older adults at the Emergency Department (ED). We compared functional dependency between SARC-F- (<4) and SARC-F+ (≥4) groups at the ED.

METHODS: A secondary analysis of cohorts from two quasi-experimental studies among patients aged ≥65 years old presenting to the ED of a 1,700-bed tertiary hospital. We compared both groups for baseline characteristics using univariate analyses and performed multiple linear regression to examine the association between Modified Barthel Index (MBI) and Lawton's instrumental activities of daily living (IADL) against SARC-F, and binary logistic regression to examine the associations between individual ADL domains and SARC-F+. We compared the area under receiver operating characteristic curves (AUC) to detect SARC-F+ for MBI, IADL, frailty, age, cognition, and comorbidity.

RESULTS: SARC-F+ patients were older (86.4±7.6 years), predominantly female (71.5%) and frail (73.9%), more dependent on walking aids (77.2%), and had lower premorbid MBI (median 90.0 [interquartile range 71.0-98.0]) and IADL (4.0 [2.0-5.0]) (both p<0.001). MBI (β=-0.07, 95% confidence interval [CI] -0.086 to -0.055) and IADL (β=-0.533, 95% CI -0.684 to -0.381) were significantly associated with SARC-F. Dependency in finances (odds ratio [OR]=14.7, 95% CI 3.57-60.2, p<0.001), feeding (OR=12.4, 95% CI 1.45-106, p=0.022), and stair-climbing (OR=10.49, 95% CI 4.96-22.2, p<0.001) were the top three functional items associated with SARC-F. MBI (AUC=0.82, 95% CI 0.77-0.84) and IADL (AUC=0.78, 95% CI 0.72-0.84) showed superior discrimination for SARC-F+ compared to other measures (AUC=0.58-0.70).

CONCLUSION: Functional dependency is strongly associated with positive SARC-F screen among older adults at the ED. This highlights the need for increased vigilance, especially in the presence of dependency in relevant domains such as managing finances, feeding, and stair-climbing.

READING 3 – GERIATRIC SYNDROMES ARE HIGHLY PREVALENT AT ADMISSION TO GERIATRIC REHABILITATION, WITH A MEDIAN OF FIVE CO-OCCURRING SYNDROMES

Verstraeten LMG,[1] Kreeftmeijer J,[1] van Wijngaarden JP,[2] Meskers CGM,[3] Maier AB.[4] Geriatric Syndromes Frequently (Co)-Occur in Geriatric Rehabilitation Inpatients: Restoring Health of Acutely Unwell Adults (RESORT) and Enhancing Muscle Power in Geriatric Rehabilitation (EMPOWER-GR). Arch Phys Med Rehabil. 2024 Oct;105(10):1854-1861. PMID: 38851557.

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ABSTRACT

OBJECTIVE: To determine the prevalence and co-occurrence of common geriatric syndromes in geriatric rehabilitation inpatients.

DESIGN: Restoring Health of Acutely Unwell Adults (RESORT) and Enhancing Muscle Power in Geriatric Rehabilitation (EMPOWER-GR) are observational, longitudinal cohorts.

SETTING: Geriatric rehabilitation.

PARTICIPANTS: Geriatric rehabilitation inpatients (N=1,890 and N=200).

INTERVENTIONS: Not applicable.

MAIN OUTCOME MEASURES: Geriatric syndromes included polypharmacy, multimorbidity (Cumulative Illness Rating Scale), cognitive impairment, depression (Hospital Anxiety and Depression Scale/Geriatric Depression Scale), malnutrition (Global Leadership Initiative on Malnutrition), functional limitation (Katz index), falls, physical frailty (Fried), and sarcopenia (European Working Group on Sarcopenia in Older People 2).

RESULTS: Inpatients in RESORT (R) (N=1,890, 56% females) had a median age of 83.4 years (interquartile range [IQR], 77.6-88.4) and in EMPOWER-GR (E) (N=200, 57% females) of 79.8 years (IQR, 75.0-85.9). Polypharmacy (R, 82.2%; E, 84.0%), multimorbidity (R, 90.4%; E, 85.5%), functional limitation (R, 96.0%; E, 76.5%), and frailty (R, 91.8%; E, 92.2%) were most prevalent. Most inpatients had ≥5 geriatric syndromes at admission in both cohorts (R, 70.0%; E, 72.4%); few inpatients had only one (R, 0.4%; E, 1.5%) or no geriatric syndrome (R, 0.2%; E, 0.0%). Geriatric syndromes did not occur in isolation (without other syndromes), except for multimorbidity (R, 1%; E, 5%), functional limitation (R, 3%; E, 2%), falls (R, 0%; E, 4%), and frailty (R, 2%; E, 5%), which occurred in isolation in some inpatients; sarcopenia did not.

CONCLUSIONS: Geriatric syndromes are highly prevalent at admission to geriatric rehabilitation, with a median of five co-occurring syndromes. Implications for diagnosis and intervention potential should be further addressed.

READING 4 – IN GERIATRIC REHABILITATION, BODY WEIGHT INCREASED IN PATIENTS WITH UNDERWEIGHT BUT DECREASED IN PATIENTS WITH NORMAL/OVERWEIGHT AND OBESITY

Hettiarachchi J,[1] Pacifico J,[1] Verstraeten LMG,[2] Reijnierse EM,[3] Meskers CGM,[4] Maier AB.[5] Body Weight and Composition Changes in Geriatric Rehabilitation Are Dependent on Sarcopenia and Malnutrition: RESORT. J Am Med Dir Assoc. 2024 Aug;25(8):105030. PMID: 38782039.

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ABSTRACT

OBJECTIVES: Body weight and muscle mass loss following an acute hospitalisation in older patients might be influenced by malnutrition and sarcopenia among other factors. This study aimed to assess the changes in body weight and composition from admission to discharge and the geriatric variables associated with the changes in geriatric rehabilitation inpatients.

DESIGN: RESORT is an observational, longitudinal cohort.

SETTING AND PARTICIPANTS: Geriatric rehabilitation inpatients admitted to geriatric rehabilitation wards at the Royal Melbourne Hospital, Melbourne, Australia (N=1,006).

METHODS: Changes in body weight and body composition [fat mass (FM), appendicular lean mass (ALM)] from admission to discharge were analysed using linear mixed models. Body mass index (BMI) categories, (risk of) malnutrition (Global Leadership Initiative on Malnutrition), sarcopenia (European Working Group on Sarcopenia in Older People), dependence in activities of daily living (ADL), multimorbidity, and cognitive impairment were tested as geriatric variables by which the changes in body weight and composition may differ.

RESULTS: A total of 1,006 patients [median age: 83.2 (77.7-88.8) years, 58.5% female] were included. Body weight, FM (kg), and FM% decreased (0.30 kg, 0.43 kg, and 0.46%, respectively) and ALM (kg) and ALM% increased (0.17 kg and 0.33%, respectively) during geriatric rehabilitation. Body weight increased in patients with underweight; decreased in patients with normal/overweight, obesity, ADL dependence, and in those without malnutrition and sarcopenia. ALM% and FM% decreased in patients with normal/overweight. ALM increased in patients without multimorbidity and in those with malnutrition and sarcopenia; ALM% increased in patients without multimorbidity and with sarcopenia.

CONCLUSIONS AND IMPLICATIONS: In geriatric rehabilitation, body weight increased in patients with underweight but decreased in patients with normal/overweight and obesity. ALM increased in patients with malnutrition and sarcopenia but not in patients without. This suggests the need for improved standard of care independent of patients' nutritional risk.

READING 5 — IN COMMUNITY-DWELLING OLDER ADULTS, SELF-REPORTED LOW PROTEIN INTAKE AND LOW WEEKLY PA IS ASSOCIATED WITH HEIGHTENED RISK FOR SARCOPENIA, PARTICULARLY IN OLDER WOMEN

Stoodley IL,[1,2] Berthon BS,[1,2] Scott HA,[1,2] Williams EJ,[1,2] Baines PJ,[1,2] Knox H,[1,2] Wood S,[1,2] Wood LG,[1,2] Paradzayi B,[1] Cameron-Smith D.[3] Protein Intake and Physical Activity Levels as Determinants of Sarcopenia Risk in Community-Dwelling Older Adults. Nutrients. 2024 May 2;16(9):1380. PMID: 38732628.

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ABSTRACT

Community screening for sarcopenia is complex, with barriers including access to specialised equipment and trained staff to conduct body composition, strength, and function assessment. In the current study, self-reported dietary protein intake and physical activity (PA) in adults ≥65 years were assessed relative to sarcopenia risk, as determined by body composition, strength, and physical function assessments, consistent with the European Working Group on Sarcopenia in Older People (EWGSOP) definition. Of those screened (n=632), 92 participants (77% female) were assessed as being at high risk of developing sarcopenia on the basis of dietary protein intake ≤1 g/kg/day [0.9 (0.7-0.9) g/kg/day] and moderate intensity physical activity <150 min/week. A further 31 participants (65% female) were defined as being at low risk, with both protein intake [1.2 (1.1-1.5) g/kg/day] and PA greater than the cutoff values. High-risk participants had reduced % lean mass [53.5 (7.8)% versus 54.8 (6.1)%, p<0.001] and impaired strength and physical function. Notably, high-risk females exhibited greater deficits in lean mass and strength, with minimal differences between groups for males. In community-dwelling older adults, self-reported low protein intake and low weekly PA is associated with heightened risk for sarcopenia, particularly in older women. Future research should determine whether early intervention in older adults with low protein intake and PA attenuates functional decline.

READING 6 – PERIOPERATIVE MANAGEMENT OF SARCOPENIA IN PATIENTS UNDERGOING MAJOR SURGERIES IN SINGAPORE IS BENEFICIAL

Koh FH,[1] Yan CCK,[1] Foo FJ,[1] Chew LMY,[2] Wong N,[2] Yap D,[2] Ng S,[2] Kow AWC,[3] Ng J,[3] Tan MY,[4] Lee DJK,[4] El Yeong H,[4] Au-Yong APS,[5] Darmawirya P,[6] How KY,[6] Ng DH,[6] Jayachandran B,[7] Maier A,[8] Chew STH.[9] Perioperative management of sarcopenia in patients undergoing major surgeries in Singapore: a modified Delphi consensus. Int J Surg. 2024 Aug 1;110(8):4552-4558. PMID: 38701514.

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ABSTRACT

BACKGROUND: Ageing population is a worldwide phenomenon with a correspondingly higher proportion of older patients being treated in the hospital setting. Sarcopenia, which increases with age, has serious negative implications on health, hospitalisation, and overall postoperative recovery. There is no mutual consensus on perioperative management of sarcopenia in surgical patients in Singapore. The purpose of this study is to create greater clarity pertaining to the recognition of sarcopenia, the application of assessment criteria of sarcopenia, and perioperative management of surgical patients in Singapore.

METHODS: A modified Delphi consensus consisting of a panel of experts from Singapore forming a multidisciplinary team, including surgeons, geriatricians, anaesthesiologists, physiotherapists, and dieticians. Eight recommendations were proposed by the steering committee. Literature search from MEDLINE, Embase, and Scopus for articles up till June 2023 were performed to support recommendation statements. The expert panel voted on agreement to recommendation statements and graded the level of evidence supporting each statement through surveys to achieve consensus, set at 85 percent *a priori*.

RESULTS: The panellists underwent two rounds of anonymised, independent voting before reaching consensus for all eight statements. After the first round, seven statements reached consensus, including the corresponding grading for level of evidence. The statement that did not achieve consensus was revised with supporting literature and after the second round of survey, all eight statements and level of evidence reached consensus, completing the Delphi process. These eight statements covered themes to (1) encourage the identification of sarcopenia, (2) guide preoperative, and (3) postoperative management of sarcopenia.

CONCLUSION: With the varying approaches in perioperative management, poor understanding of and identification of sarcopenia can result in suboptimal management of sarcopenia in surgical patients. Given the abundance of evidence linking beneficial impact on recovery and postoperative complications with prudent management of sarcopenia, it is imperative and urgent to achieve awareness and consensus.

READING 7 – URGENT NEED FOR COMMUNITY-WIDE TARGETED INTERVENTIONS TO PROMOTE MUSCLE HEALTH

Gupta P,[1,2] Man REK,[1,2] Fenwick EK,[1,2] Lamoureux EL,[1,2,11] Vu TA,[2] Tay L,[3] Yee Sien N,[4] Ng D,[5] Frederick KHX,[6] Yong EL,[7] Chew STH.[8-10] The prevalence patterns and risk factor profiles of poor muscle health and its associated components in multiethnic older Asians: The PIONEER study. J Cachexia Sarcopenia Muscle. 2024 Aug;15(4):1376-1387. PMID: 38646827.

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ABSTRACT

BACKGROUND: We aim to determine the multiethnic patterns of the prevalence and associated factors of poor muscle health and its associated components in older Chinese, Malays, and Indian Asian adults.

METHODS: We included 2,199 participants (mean age ± SD: 72.9±8.3 years; 54.3% female) from the baseline assessment of the Population Health and Eye Disease Profile in Elderly Singaporeans (PIONEER; 2017-2022) cohort study. Poor muscle health was defined as the presence of either low muscle mass (DEXA), low muscle strength (handgrip strength), or low physical performance (gait speed). Its components include poor muscle function (low muscle strength and/or low physical performance without low muscle mass), pre-sarcopenia (low muscle mass only), and any sarcopenia (low muscle mass with low muscle strength and/or low physical performance). Sociodemographic, clinical, and lifestyle factors were assessed using biochemistry, clinical tests, and validated questionnaires. Regression models were utilised to evaluate the independent risk factors of poor muscle health and its components.

RESULTS: The national census-adjusted prevalence of poor muscle health (88%) was similar across the three ethnic groups. However, Chinese individuals had higher prevalence of pre-sarcopenia and any sarcopenia, and a lower prevalence of poor muscle function compared with Indians or Malays. We observed ethnic differences in modifiable risk factors (low physical activity, diabetes, osteoporosis, and obesity) of poor muscle health and its components. Although obesity was protective of pre-sarcopenia (RRR=0.19, 95% CI: 0.11, 0.36) and any sarcopenia (RRR=0.29, 95% CI: 0.18, 0.47) in the overall population and across ethnic groups, it was associated with 1.7 times (95% CI: 1.07, 2.67) the likelihood of poor muscle function in the entire population.

CONCLUSIONS: Almost 90% of community-dwelling Singaporeans aged ≥60 years have poor muscle health across the three ethnic groups with ethnic disparities in modifiable risk factors, highlighting an urgent need for community-wide targeted interventions to promote muscle health.

READING 8 – MORE THAN 1 IN 2 OLDER ADULTS ADMITTED TO A POST-ACUTE HOSPITAL IN SINGAPORE ARE SARCOPENIC

Tan You Mei C,[1,2] Ong Shuyi A,[1] Low LL,[1,2] Aw J,[1,2] Seah Si Ying S,[3] Xia Jiawen O,[3] Yanshan DL,[4] Koh SV,[4] Karthikeyan G,[4] Low XL,[5] Quek HY.[6] Prevalence and factors associated with sarcopenia among older adults in a post-acute hospital in Singapore. PLoS One. 2024 Jan 29;19(1):e0291702. PMID: 38285652.

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ABSTRACT

BACKGROUND: Sarcopenia is common in older adults worldwide, but its prevalence varies widely owing to differences in diagnostic criteria, population sampled, and care setting. We aimed to determine the prevalence and factors associated with sarcopenia in patients aged 65 and above admitted to a post-acute hospital in Singapore.

METHODS: This was a cross-sectional study of 400 patients recruited from a community hospital in Singapore. Data including socio-demographics, physical activity, nutritional status, cognition, clinical and functional status, as well as anthropometric measurements were collected. Sarcopenia was defined using the Asian Working Group for Sarcopenia 2019 criteria [AWGS2019].

RESULTS: Of the 383 patients with complete datasets, overall prevalence of sarcopenia was 54 percent while prevalence of severe sarcopenia was 38.9 percent. Participants with increased age, male sex, and a low physical activity level were more likely to be sarcopenic, while those with higher hip circumference and higher BMI of ≥27.5 were less likely to be sarcopenic. Other than the above-mentioned variables, cognitive impairment was also associated with severe sarcopenia.

CONCLUSIONS: More than 1 in 2 older adults admitted to a post-acute hospital in Singapore are sarcopenic. There is an urgent need to address this important clinical syndrome burden and to identify patients at risk of sarcopenia in post-acute settings in Singapore for early intervention.

READING 9 – SARC-CALF DEMONSTRATED SIGNIFICANTLY SUPERIOR DISCRIMINATORY ABILITY COMPARED TO SARC-F, MSRA-5, AND MSRA-7

Chua S,[1,2] Chia JQ,[1,2] Lim JP,[1,2] Chew J,[1,2] Lim WS.[1,2] Case-Finding for Sarcopenia in Community-Dwelling Older Adults: Comparison of Mini Sarcopenia Risk Assessment with SARC-F and SARC-CalF. Ann Geriatr Med Res. 2024 Mar;28(1):57-64. PMID: 38213035.

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ABSTRACT

BACKGROUND: We compared the diagnostic performance of the short five-item and full seven-item Mini Sarcopenia Risk Assessment Questionnaire (MSRA-5 and MSRA-7) against the Strength, Assistance walking, Rise from a chair, Climb stairs, and Falls (SARC-F) and SARC-F with calf circumference (SARC-CalF) scales for sarcopenia in healthy community-dwelling older adults.

METHODS: We conducted a post-hoc cross-sectional secondary data analysis of a prospective cohort study, using data from 230 older adults (mean age 67.2±7.4 years, 92% Chinese, and 73% female) from the "Longitudinal Assessment of Biomarkers for characterisation of early Sarcopenia and Osteosarcopenic Obesity in predicting frailty and functional decline in community-dwelling Asian older adults Study" (GeriLABS-2) conducted between December 2017 and March 2019 in Singapore. We performed receiver operating characteristic curve analysis to ascertain the area under the curve (AUC) for sarcopenia diagnosis using the Asian Working Group for Sarcopenia 2019 consensus criteria. We applied the Delong method to compare the AUCs of the four instruments.

RESULTS: The MSRA-5 and MSRA-7 demonstrated poor diagnostic performance (AUC of 0.511, 95% confidence interval [CI] 0.433-0.589 and AUC of 0.526, 95% CI 0.445-0.606, respectively), compared to that in SARC-CalF (AUC of 0.739, 95% CI 0.671-0.808) and SARC-F (AUC of 0.564, 95% CI 0.591-0.636). The SARC-CalF demonstrated significantly superior discriminatory ability compared to that in the SARC-F, MSRA-5, and MSRA-7 (all $p<0.01$). The MSRA-5 demonstrated lower sensitivity (0.464) and specificity (0.597) than in the SARC-CalF (0.661 and 0.738, respectively), whereas the MSRA-7 had higher specificity (0.887) and lower sensitivity (0.145).

CONCLUSION: The poor diagnostic performances of the MSRA-5 and MSRA-7 in our study suggest limitations of self-reported questionnaires for assessing general and dietary risk factors for sarcopenia in healthy and culturally diverse community-dwelling older adults. Studies in different populations are needed to ascertain the utility of the MSRA for the community detection of sarcopenia.

READING 10 – DIETARY ADEQUACY WAS SIGNIFICANTLY ASSOCIATED WITH HIGHER HAND GRIP STRENGTH (HGS)

Huang J,[1] Shanmugam A,[1] Huang X,[1] Hilal S,[1,3] van Dam RM.[2] Association of diet quality with hand grip strength weakness and asymmetry in a multi-ethnic Asian cohort. Br J Nutr. 2024 Apr 14;131(7):1236-1243. PMID: 37990416.

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ABSTRACT
Hand grip strength (HGS) is an important diagnostic tool for sarcopenia and a reliable predictor for age-related chronic diseases and mortality. Interventions in nutrition have been shown as a low-cost strategy to maintain muscular strength and mass. However, there are limited data on the effect of diet on HGS in Southeast Asian populations.

This study aims to investigate the association of diet quality with HGS weakness and asymmetry in a multi-ethnic population in Singapore. This cross-sectional study used data from the Singapore Multi-Ethnic Cohort (n=1547). Dietary data were collected using a validated semi-quantitative FFQ and summarised as the Dietary Quality Index-International (DQI-I). HGS was calculated as the maximum value of six measurements from both hands. HGS weakness and asymmetry were defined using well-recognised criteria. Multivariable linear regression and logistic regression were utilised for continuous and binary outcomes, respectively, adjusting for age, sex, ethnicity, physical activity, and smoking status.

It was found that the highest quartile of DQI-I was significantly associated with higher HGS (β=1.11; 95% CI 0.41, 1.82; Pfor trend<0.001) and lower odds of HGS asymmetry (OR=0.71; 95% CI 0.53, 0.94; Pfor trend=0.035) and both HGS weakness and asymmetry (OR=0.50; 95% CI 0.32, 0.76; Pfor trend=0.004). Among the different components of DQI-I, only dietary adequacy was significantly associated with higher HGS (Pfor trend<0.001) and lower odds for both HGS weakness and asymmetry (Pfor trend=0.006).

Our findings support that DQI-I, an indicator of overall diet quality, can be used to provide dietary guidelines for prevention and management of muscle wasting, sarcopenia, and frailty.