

Inflammatory Potential of the Diet and Risk of Sarcopenia and its Components

Amir Bagheri

Tehran University of Medical Sciences

Sanaz Soltani

Tehran University of Medical Sciences

Rezvan Hashemi

Tehran University of Medical Sciences

Ramin Heshmat

Tehran University of Medical Sciences

Ahmadreza Dorosty Motlagh

Tehran University of Medical Sciences

Ahmad Esmailzadeh (✉ a-esmailzadeh@tums.ac.ir)

Tehran University of Medical Sciences

Research

Keywords: Dietary Inflammatory Index, Sarcopenia, Muscle Mass, Muscle Strength, Gait Speed

Posted Date: July 27th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-47897/v1>

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Version of Record: A version of this preprint was published on November 28th, 2020. See the published version at <https://doi.org/10.1186/s12937-020-00649-2>.

Abstract

Background: Despite huge evidence on the link between dietary inflammatory index (DII) and several chronic conditions, limited data are available about the association of DII and sarcopenia. This study aimed to examine the relationship between inflammatory potential of the diet (as measured by DII) and sarcopenia and its components among community-dwelling elderly population.

Methods: This population-based cross-sectional study was performed in 2011 among 300 elderly people (150 men and 150 women) aged ≥ 55 years, who were selected using cluster random sampling method. Dietary assessment was done using a pre-tested food frequency questionnaire. Energy-adjusted DII was calculated based on earlier studies. Sarcopenia and its components were determined based on the European Working Group on Sarcopenia (EWGSOP) definition.

Results: Mean age of study participants was 66.7 ± 7.7 y. Subjects in the highest tertile of DII were more likely to be older ($P=0.02$). The prevalence of sarcopenia ($P=0.016$) and abnormal muscle mass ($P=0.041$) was significantly higher among subjects in the top tertile compared with those in the bottom tertile of DII. After adjustment for potential confounders, those with the highest DII were 2.18 times (95% CI: 1.01-4.74) more likely to have sarcopenia than those with the lowest DII. With regard to components of sarcopenia, subjects in the top tertile of DII had not significantly greater odds of abnormal muscle mass (OR: 1.38; 95% CI: 0.72-2.63), abnormal handgrip strength (OR: 0.97; 95% CI: 0.49-1.89), and abnormal gait speed (OR: 1.61; 95% CI: 0.84-3.08) than those in the bottom tertile.

Conclusions: In conclusion, a diet with more pro-inflammatory potential was associated with a greater odd of sarcopenia. Further studies are required to confirm these findings.

Introduction

Sarcopenia is described as a geriatric syndrome determined by wasting muscle mass in addition to reduced muscle strength and/or physical performance [1]. Although sarcopenia is common in older adults, it can also occur early in life [2]. It is prevalent in 1 to 29% of the elderly population and 68% for individuals living in residential care settings, and is associated with higher rates of falls, decreased function, high mortality rates, and increased probability of hospitalization [3, 4].

Inflammation is a major risk factor for several conditions in the elderly. Inflammatory cytokines lead to rapid muscle wasting, eventually stimulate protein catabolism and suppress muscle synthesis [5]. Dietary factors have been shown to contribute to inflammation [6]. High intakes of fruits and vegetables [7], and also specific nutrients such as fiber [8], omega-3 fatty acids [9], vitamin E [10], and vitamin C [11] were associated with lower concentrations of circulating inflammatory markers. To determine the inflammatory potential of the whole diet, Dietary Inflammation Index (DII) has been designed and validated against circulating levels of inflammation [12, 13]. This dietary index has linked with several cancers, metabolic diseases, and fractures [14–16]. Two longitudinal cohort studies have also shown that higher DII scores were associated with a higher incidence of frailty [17] and decreased appendicular

lean mass [6]. Given the limited studies on the association of inflammatory potential of the diet with muscle health, along with the great differences in dietary intakes, lifestyle factors and body composition of people in the Middle East with those in Western countries, this cross-sectional study aimed to investigate the relationship between DII with sarcopenia in an Iranian population.

Materials And Methods

Participants

This population-based cross-sectional study was performed from May to October 2011 in Tehran, Iran. The detailed report on the sampling method and data collection procedure has been published previously [18]. Totally, 300 elderly people (150 men and 150 women) were enrolled by the use of cluster random sampling method in district 6 of Tehran. The head of each cluster was selected based on a ten-digit postal code. We registered individuals aged ≥ 55 years, with the ability to move without crutches, walker or assistive devices and those without any active cancers (based on self-reported data). People with artificial limbs or limb prostheses and those with a history of the debilitating disease (e.g Congestive Heart Failure) were not included.

Dietary intake assessment

Usual dietary intakes of the study participants was assessed using a 117-item Food Frequency Questionnaire (FFQ); the validity and reliability of this questionnaire was reported in previous studies [18, 19]. The questionnaire consisted of a list of foods with a specific portion size. Participants were able to report their consumption frequency based on daily, weekly or monthly basis for each food item. The questionnaire was filled by a trained nutritionist through face-to-face interview. After completing the FFQ, the frequency of each food item was converted to grams per day considering the household measures of portion sizes. Daily energy and nutrients intake of each participant was calculated by using Nutritionist IV software with a modified food composition database based on the US Department of Agriculture.

Construction of Dietary Inflammatory Index: We used Shivappa et al.'s method to compute the Dietary Inflammatory Index (DII).[12] DII score was calculated using 29 food items because some parameters suggested in the original scoring method were not available in our dataset in Iran. Food parameters included: energy, carbohydrate, fat, protein, fiber, cholesterol, mono-unsaturated fatty acids (MUFAs), polyunsaturated fatty acids (PUFAs), saturated fats (SFAs), cobalamin, pyridoxine, folic acid, niacin, riboflavin, thiamin, vitamin A, C, D, E, b-carotene, zinc, selenium, magnesium, iron, caffeine, pepper, onion, garlic and green/black tea. We used residual method to obtain the energy-adjusted amounts for all nutrients [20]. Then, to get z-score, we subtracted the "standard global mean" from the quantity of food and divided it by the "global standard deviation". Standard global means and SDs for each food parameter were obtained from Shivappa et al [12]. To decrease skewness, this value was converted to a centered percentile score. Then, we multiplied this score by the effect score for each of the food items obtained from Shivappa et al [12]. Finally, to compute a total DII score, we summed DII score obtained from all food items. A greater DII score showed pro-inflammatory diet.

Assessment of Sarcopenia

Based on the European Working Group on Sarcopenia (EWGSOP) definition,[21] sarcopenia was determined by considering the combination of both low muscle mass and low muscle function (either strength or performance). The muscle mass was measured as the ratio of an individual's total lean mass of legs and arms (also named Appendicular Skeletal Muscle or ASM) [22] to their squared height ($ASM/height^2$). ASM was calculated with a DXA scanner (Discovery W S/N 84430). Based on EWGSOP, low muscle mass was considered as the amount of muscle mass less than 5.45 (kg/m^2) for women and 7.26 (kg/m^2) for men [21].

We used a handgrip test to measure muscle strength. The handgrip test was assessed by a pneumatic instrument that is a squeeze bulb dynamometer (c7489-02 Rolyan) calibrated in pound per square inch (psi). The handgrip strength (maximum voluntary contractions) was calculated three times for each right and left hand with a 30-second rest in between measurements. We used the average measurements of the participants' both hands as their muscle strength. Sex and age-specific cutoff points recommended by Merckies et.al was then used to identify low muscle strength [23]. To measure muscle performance, a 4-Meter walk gait speed test was applied [21]. Participants who had gait speeds less than 0.8 m/s were recognized as low muscle performance [21].

Assessment of other variables

Information about general characteristics of participant including age, sex, socio-economic status, medical history, medication use, smoking habits, and alcohol consumption were collected by a pre-tested questionnaire. The physical activity level in this study was examined by a trained interviewer using the short form of the International Physical Activity Questionnaire (IPAQ), its validity has previously been examined [19]. Measures of physical activity for each participant was expressed as metabolic equivalent-hour per week (MET-h/week) based on IPAQ's guideline [24]. Weight was measured using a digital scale while participants were minimally clothed. Height was measured by a wall tape meter in standing position without shoes. Waist circumference was measured in the middle of the lower rib margin and iliac crest while participants were stand up and normally breathe. Weight (kg) divided by height squared (m^2) was used to calculate body mass index (BMI).

Statistical analysis

Subjects were classified according to the tertiles of DII score. We compared the general characteristics of study participants across tertiles of DII score using Chi-square for categorical variables and ANOVA for continuous variables. Age- sex-, and energy-adjusted dietary intakes of participants were computed using General Linear Model and compared using ANCOVA across tertile categories of DII score. Multivariable logistic regression was conducted to find the relationship between inflammatory potential of the diet and odds of sarcopenia. In these analyses, we controlled for several confounders. First, we adjusted the association for age (continuous), sex (male/female) and energy intake ($kcal/d$). Then, further controlling was done for physical activity (MET-h/wk), smoking (yes/no), alcohol consumption (yes/no), medication

use (statin, corticosteroid, estrogen, testosterone), and positive history of chronic disease (yes/no). In all these analyses, the bottom tertile was considered as the reference category and the odds ratio for sarcopenia in other categories was calculated. To evaluate the linear trend across tertiles of the DII score, we considered the tertile categories as an ordinal variable in the models. All analyses were done using SPSS (version 26). P values were considered significant at < 0.05 .

Results

General characteristics of study participants across tertile categories of DII score are provided in Table 1. Subjects in the highest tertile were more likely to be older and less likely to be female than those in the lowest tertile of the DII score. There were no other significant difference between the lowest and highest tertiles of DII in terms of mean BMI and distribution of participants in terms of alcohol use, smoking, medication use and disease history.

Table 1
 Characteristics of study participants in tertile categories of DII score*

	Tertiles of DII score			<i>p</i> [†]
	T ₁ (n = 100)	T ₂ (n = 100)	T ₃ (n = 100)	
Age (y)	66.55 ± 7.47	65.47 ± 7.01	68.37 ± 8.31	0.02
BMI (kg/m ²)	27.58 ± 4.32	26.91 ± 3.64	27.64 ± 4.60	0.39
Physical activity (MET-h/w)	1481.55 ± 1464.81	1170.93 ± 1098.09	1231.10 ± 1663.12	0.26
Female (%)	62	51	40	0.008
Alcohol use (%)	9	17	14	0.243
Smoking (%)	7	14	17	0.093
Medical history				0.739
Yes (%)	15	18	19	
No (%)	85	82	81	
Drug history				
Sexual hormone use (%)	6	1	2	0.090
Statin use (%)	43	32	35	0.248
Corticosteroid use (%)	2	3	3	0.879
*All values are mean ± SD, unless indicated; †ANOVA for continuous variables and Chi-squared test for categorical variables.				
DII: Dietary Inflammatory index				

Table 2 presents age-, gender- and energy-adjusted dietary intakes of study participants across tertile categories of DII. Individuals in the highest tertile of DII had higher intakes of SFA, and lower intake of protein, iron, magnesium, zinc, thiamine, riboflavin, niacin, vitamin B6, b-carotene, vitamin A, vitamin C, dietary fiber, folate, pepper, onion, and garlic compared with those in the lowest tertile.

Table 2
Dietary intakes of study participants by tertile categories of DII score*

	Tertiles of DII score			<i>p</i> [†]
	T ₁ (n = 100)	T ₂ (n = 100)	T ₃ (n = 100)	
Energy (kcal/d)	2262 ± 92.36	2153 ± 92.05	2373 ± 92.93	0.25
Nutrients				
Carbohydrates (g/d)	368.32 ± 5.51	366.63 ± 5.50	363.12 ± 5.56	0.799
Proteins (g/d)	89.55 ± 1.78	86.98 ± 1.78	81.66 ± 1.80	0.008
Total fats (g/d)	58.15 ± 1.89	58.37 ± 1.89	61.33 ± 1.91	0.43
Cholesterol (mg/d)	194.32 ± 7.95	195.94 ± 7.94	218.16 ± 8.02	0.068
SFA (g/d)	16.72 ± 0.53	17.51 ± 0.53	19.24 ± 0.53	0.004
MUFA (g/d)	19.24 ± 0.83	18.88 ± 0.83	19.62 ± 0.83	0.824
PUFA (g/d)	14.02 ± 0.77	14.15 ± 0.77	14.65 ± 0.78	0.838
Fe (mg/d)	21.53 ± 0.32	20.08 ± 0.32	18.48 ± 0.32	< 0.001
Mg (mg/d)	483.76 ± 8.62	450.09 ± 8.61	385.48 ± 8.69	< 0.001
Zn (mg/d)	12.65 ± 0.28	12.62 ± 0.28	11.64 ± 0.28	0.022
Se (mg/d)	0.097 ± 0.003	0.097 ± 0.003	0.098 ± 0.004	0.965
Thiamine (mg/d)	2.31 ± 0.04	2.28 ± 0.04	2.09 ± 0.04	0.001
Riboflavin (mg/d)	2.56 ± 0.05	2.39 ± 0.05	2.20 ± 0.05	< 0.001
Niacin (mg/d)	21.91 ± 0.37	21.21 ± 0.37	20.16 ± 0.37	0.005

*All values are mean ± SE; energy intake is adjusted for age and sex, all other values are adjusted for age, sex and energy intake. †ANCOVA for all variables.

Table 2. Dietary intakes of study participants by tertile categories of DII score* (continue)

	Tertiles of DII score			<i>p</i> [†]
	T ₁ (n = 100)	T ₂ (n = 100)	T ₃ (n = 100)	
Vitamin B6 (mg/d)	2.97 ± 0.12	2.71 ± 0.12	2.14 ± 0.12	< 0.001
b-carotene (mcg/d)	3411.3 ± 97.60	2265.7 ± 97.51	1365.8 ± 98.44	< 0.001
Vitamin A (RE/d)	2468.6 ± 60.76	1709.5 ± 60.70	1244.9 ± 61.28	< 0.001

*All values are mean ± SE; energy intake is adjusted for age and sex, all other values are adjusted for age, sex and energy intake. †ANCOVA for all variables.

	Tertiles of DII score			<i>p</i> [†]
	T ₁ (n = 100)	T ₂ (n = 100)	T ₃ (n = 100)	
Vitamin C (mg/d)	355.26 ± 8.51	268.67 ± 8.50	201.12 ± 8.58	< 0.001
Vitamin E (mg/d)	9.69 ± 0.5	9.17 ± 0.5	9.40 ± 0.5	0.760
Vitamin D (mcg/d)	2.38 ± 0.19	1.85 ± 0.19	1.81 ± 0.19	0.069
Vitamin B12 (mcg/d)	4.78 ± 0.23	4.65 ± 0.23	4.23 ± 0.24	0.240
Folate (mcg/d)	617.99 ± 9.65	553.81 ± 9.64	458.84 ± 9.73	< 0.001
Dietary fiber (g/d)	36.18 ± 0.70	29.53 ± 0.70	24.24 ± 0.71	< 0.001
Pepper	25.59 ± 2.69	12.36 ± 2.69	7.17 ± 2.71	< 0.001
Onion	42.22 ± 3.17	32.53 ± 3.17	24.81 ± 3.20	0.001
Garlic	4.04 ± 0.51	2.09 ± 0.51	1.89 ± 0.51	0.006
Green/Black tea	757.89 ± 56.85	824.39 ± 56.80	754.70 ± 57.34	0.578
Caffeine	177.54 ± 11.93	182.46 ± 11.89	162.47 ± 11.98	0.477
*All values are mean ± SE; energy intake is adjusted for age and sex, all other values are adjusted for age, sex and energy intake. †ANCOVA for all variables.				

The prevalence of sarcopenia and its components across tertile categories of DII are shown in Table 3. Prevalence of abnormal muscle mass (described as muscle mass lower than 5.45 kg/m² for women and 7.26 kg/m² for men) and sarcopenia were significantly higher among subjects in the top tertile of DII than those in the bottom tertile. There were no significant differences between means of muscle mass, handgrip strength and gait speed across tertile categories of DII after adjusted for age, sex, and energy.

Table 3
Prevalence of sarcopenia and its components across tertile categories of DII score

	Tertiles of DII diet score			<i>P</i> *
	T ₁ (n = 100)	T ₂ (n = 100)	T ₃ (n = 100)	
Prevalence of components of sarcopenia				
Abnormal muscle mass (%) [†]	33	35	49	0.041
Abnormal hand grip strength (%) [‡]	38	28	30	0.276
Abnormal gait speed (m/s) (%) [§]	34	44	44	0.251
Sarcopenia (%)	14	13	27	0.016
Means of components				
Muscle mass [ASM/h ²] (kg)				
Crude	6.52 ± 1.02	6.61 ± 1.00	6.68 ± 0.94	0.526
Model ¹	6.65 ± 0.08	6.59 ± 0.08	6.58 ± 0.08	0.814
Hand grip strength (psi)				
Crude	10.31 ± 3.04	11.60 ± 3.88	11.21 ± 3.65	0.031
Model ¹	10.84 ± 0.23	11.42 ± 0.23	10.87 ± 0.23	0.145
Gait speed (m/s)				
Crude	0.86 ± 0.20	0.84 ± 0.23	0.82 ± 0.23	0.609
Model ¹	0.87 ± 0.02	0.83 ± 0.02	0.82 ± 0.02	0.327
*Obtained from ACNOVA for quantitative variables and chi-square for qualitative variables (P < 0.05 significant)				
[†] Muscle mass lower than 5.45 (kg/m ²) for women and 7.26 (kg/m ²) for men were considered abnormal ²¹ .				
[‡] Abnormal muscle strength was defined according previous study ²³ .				
[§] Gait speeds lower than 0.8 m/s were considered abnormal ²¹ .				
Model ¹ : Adjusted for energy, age and sex				

Findings from multivariable logistic regression analysis indicating the association between inflammatory potential of diet and odds of sarcopenia are presented in Table 4. In the crude model, we found that subjects in the highest tertile of DII had a higher likelihood of sarcopenia (OR: 2.27; 95% CI: 1.10–4.65)

compared with those in the lowest tertile. When we controlled for age, sex, and energy intake, participants with the greatest DII score had higher odds of sarcopenia (OR: 2.01; 95% CI: 0.96–4.19) than those with the lowest DII, however, this was not statistically significant. Further adjustments for other covariates revealed that subjects in the top tertile of DII were 2.18 times (95% CI: 1.01–4.74) more likely to have sarcopenia than those in the bottom tertile.

Table 4
Multivariable-adjusted odds ratios (95% CIs) for sarcopenia and its components across tertile categories of DII score

	Tertiles of DII diet score			<i>P trend</i>
	T ₁	T ₂	T ₃	
Sarcopenia				
N	100	100	100	
Crude	1	0.91 (0.40–2.06)	2.27 (1.10–4.65)	0.018
Model 1 [†]	1	0.91 (0.40–2.07)	2.01 (0.96–4.19)	0.051
Model 2 [‡]	1	1.01 (0.43–2.39)	2.18 (1.01–4.74)	0.035
Abnormal muscle mass [†]				
Crude	1	1.09 (0.60–1.96)	1.96 (1.10–3.46)	0.021
Model 1 [†]	1	0.99 (0.53–1.85)	1.46 (0.79–2.71)	0.219
Model 2 [‡]	1	0.98 (0.51–1.88)	1.38 (0.72–2.63)	0.312
Abnormal hand grip strength [‡]				
Crude	1	0.63 (0.35–1.15)	0.69 (0.38–1.25)	0.226
Model 1 [†]	1	0.69 (0.36–1.29)	0.98 (0.51–1.86)	0.901
Model 2 [‡]	1	0.66 (0.34–1.29)	0.97 (0.49–1.89)	0.902
Abnormal gait speed (m/s) [§]				
Crude	1	1.52 (0.86–2.70)	1.52 (0.86–2.70)	0.151
Model 1 [†]	1	1.88 (1.02–3.46)	1.78 (0.96–3.29)	0.064
Model 2 [‡]	1	1.81 (0.95–3.45)	1.61 (0.84–3.08)	0.157
[†] Model 1: Adjusted for age, sex and energy intake. [‡] Model 2: Further adjusted for physical activity, smoking, alcohol consumption, medication use (statin, corticosteroid, estrogen, testosterone), and positive history of disease (asthma, arthritis, myocardial infarction, cerebrovascular accident).				
[†] Muscle mass lower than 5.45 (kg/m ²) for women and 7.26 (kg/m ²) for men were considered abnormal ²¹ .				
[‡] Abnormal muscle strength was defined according previous study ²³ .				
[§] Gait speeds lower than 0.8 m/s were considered abnormal ²¹ .				

Furthermore, when the analyses were conducted for components of sarcopenia, we found that subjects in the top tertile of DII had a higher odds of abnormal muscle mass (OR: 1.96; 95% CI: 1.10–3.46) compared with those in the bottom tertile; however, this association disappeared when potential confounders were taken into account (OR: 1.38; 95% CI: 0.72–2.63). There was no significant association between DII and abnormal hand grip strength as well as abnormal gait speed after controlling for covariates.

Discussion

Our findings indicated that increased DII score, indicating a more pro-inflammatory diet, was associated with an increased odd of sarcopenia. This association remained significant even after adjustment for potential confounders. We failed to find any significant association between DII and components of sarcopenia including abnormal muscle mass, abnormal handgrip strength, and abnormal gait speed. To our knowledge, this is the first investigation investigating the association between the inflammatory potential of the diet and sarcopenia.

Sarcopenia has been classified as a disease since 2016 [25]. It is associated with mortality, disability, and fall [1]. Dietary factors can play an important role in maintaining muscle mass and muscle performance [26]. It seems that muscle deterioration during elderly period is caused by elevated inflammation [5]. To examine the inflammatory potential of the diet, DII has earlier been developed and validated [12, 17]. The use of this index has also been validated among Iranian population [27]. Studies demonstrate that a high level of inflammatory marker could increase the risk of sarcopenia [5]. We found a positive association between DII and odds of sarcopenia. Although some studies had reported the relationship between DII and muscle mass and muscle strength in children and adults, data on sarcopenia are limited. In a longitudinal cohort study in the US adults, DII was investigated in relation to frailty (defined as containing two of these criteria: weight loss, inability to rise from a chair 5 times, and poor energy). They reported that a higher DII score was associated with a higher incidence of frailty in men [17]. Findings from a study on 1,344 postmenopausal Korean women aged 50 years or older, revealed no significant association between higher DII score and osteosarcopenic conditions after adjustment for potential confounders [28]. Despite a positive association with sarcopenia, we failed to find any significant association between DII and individual components of sarcopenia including abnormal muscle mass, abnormal handgrip strength and abnormal gait speed. In a cross-sectional study on 466 Chinese children aged 6–9 years, the investigators reported an inverse association between high DII score and skeletal muscle mass in boys, but not in girls. They did not reach any significant association between DII and handgrip strength [29]. A prospective population-based study in Australia with 1099 men and women aged 50–79 years old revealed that higher DII score was not associated with a lower appendicular lean mass and handgrip strength after controlling for covariates [6]. It seems that additional information are required to shed light on the link between dietary inflammatory index and individual components of sarcopenia, given that there is a possible association between inflammation and sarcopenia, as indicated in a recent meta-analysis [5]. Low-grade chronic inflammation seems to predispose elderly people to muscle loss and dysfunction through affecting muscle proteolysis and myocyte apoptosis [30, 31].

Therefore, it is logical to expect finding and association between inflammatory potential of the diet and sarcopenia and its components.

This study has several strengths. To our knowledge, this is the first study investigating the association between DII and odds of sarcopenia. Several potential confounders were controlled for in the current analysis. Furthermore, a validated FFQ was used for the assessment of dietary intakes. The main limitation of our study is its cross-sectional design, which prohibits getting a causal relationship. Another limitation is the misclassification of study participants and measurement error due to the use of the FFQ. To reduce the effect of these errors, we used energy-adjusted DII in our study. Because of the limited data on some components of DII such as n-3 and n-6 fatty acids, eugenol, thyme/oregano, saffron, turmeric, trans fat, ginger, rosemary, and flavonoids, we did not include them in the DII calculation that may have an impact on our results. Lastly, the study was conducted on a small sample from the limited area where the DEXA device was located, because of financial limitations and inadequate access to the DEXA device in Tehran (maximum 300 cases). Accordingly, the generalization of these results to the whole Iranian population should be done with caution.

In conclusion, we found that a diet with more pro-inflammatory properties was associated with a greater odd of sarcopenia. Future prospective studies are needed to confirm these results.

Abbreviations

DII

Dietary Inflammatory Index; OR:Odds Ratio; CI:Confidence Interval; SD:Standard Deviation; FFQ:Food Frequency Questionnaire; IPAQ:International Physical Activity Questionnaire; MET-h/week:Metabolic Equivalent-hours per week; BMI:Body Mass Index; SFA:Saturated Fatty Acid; MUFAs:mono-unsaturated fatty acids; PUFAs:polyunsaturated fatty acids; EWGSOP:European Working Group on Sarcopenia; ASM:Appendicular Skeletal Muscle; PSI:Pound per Square Inch.

Declarations

AUTHORS' CONTRIBUTIONS

AB, SS, RH, RH, ADM and AE contributed to the conception, design, data collection, statistical analyses, data interpretation, manuscript drafting, approval of the final version of the manuscript and agreed for all aspects of the work.

ACKNOWLEDGMENTS

We wish to thank all individuals who kindly participated in our study.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was approved by the Tehran University of Medical Sciences ethics committee. Initially, the aims of the study were explained to the participants and then all participants were requested to complete a written informed consent before data collection.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interests.

FUNDING

The financial support for this study comes from the Tehran Endocrine and Metabolism Research Center and the Tehran University of Medical Science.

AVAILABILITY OF DATA AND MATERIALS

The data are not publicly available.

AUTHOR DETAILS

¹Students' scientific Research Center, Tehran University of Medical Sciences, Tehran, Iran. ²Department of Community Nutrition, School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences, Tehran, Iran. ³Department of Geriatric Medicine, Ziaieian Hospital, Tehran University of Medical Sciences, Tehran, Iran. ⁴Chronic Diseases Research Center (CDRC), Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran. ⁵Obesity and Eating Habits Research Center, Endocrinology and Metabolism Molecular -Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran. ⁶Department of Community Nutrition, Isfahan University of Medical Sciences, Isfahan, Iran.

CONSENT FOR PUBLICATION

The data provided to the researchers did not include any personal information, and all participants were adults. Not applicable.

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