IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# Prevalence Of Sarcopenia In Geriatric Population

[1]Mrs.S.Sharmila, [2]Dr.Senthil Selvam.P, [3]Zeenath, [4]Ms.M.Reabeakkal

[1]Research Scholar, Assistant Professor [2]Professor and Head of Department, [3]Student, [4]Assistant Professor
[1]VISTAS, Sathyabama Institute of Science and Technology, [2] School of Physiotherapy, VISTAS, [3]School of Physiotherapy, VISTAS, [4]Hindustan Institute of Technology and Science

*Abstract:*
BACKGROUND: Sarcopenia, a progressive loss of skeletal muscle mass, strength, and function, is associated with aging, disease, or inactivity and increases the risk of falls, fractures, disability, and mortality. A systematic review and meta-analysis by Fanny Petermann Rocha (2021) revealed that the prevalence of sarcopenia and severe sarcopenia varies significantly depending on diagnostic criteria, underscoring the need for standardized guidelines to ensure consistent comparisons across populations.
AIM AND OBJECTIVE: The aim of the study is to analyse the prevalence of sarcopenia among the geriatric population using SCAR-F questionnaire and to determine prevalence of sarcopenia using bio impedance analysis.
METHODOLOGY: The prevalence of sarcopenia was assessed in 200 older adults aged 50–80 years over a four-week period using a convenience sampling method. The study was conducted at selected clinics and participants' homes. Inclusion criteria comprised willing, lean older adults, while individuals with psychological disorders, recent surgeries, or traumatic injuries were excluded. Sarcopenia assessment was performed using the SARC-F questionnaire in combination with Bioelectrical Impedance Analysis (BIA).
RESULT: Sarcopenia prevalence was highest (89%) among individuals aged 80–90 years. Age was significantly associated with sarcopenia, whereas gender showed no significant relationship. SARC-F scores demonstrated a strong correlation with age and muscle strength, with all predictors except gender reaching statistical significance.
CONCLUSION: The findings of this study demonstrate a significant association between age and sarcopenia prevalence, underscoring the importance of early screening and intervention. Results support the use of the SARC-F questionnaire and Bioelectrical Impedance Analysis (BIA) as practical tools for preliminary assessment of sarcopenia.

**KEY WORDS:** Sarcopenia, Skeletal Muscle Mass, Bio electrical impedance analysis, SARCF Questionnaire.

## I. Introduction

Sarcopenia is a progressive condition characterized by the loss of skeletal muscle mass and strength. Although traditionally associated with aging, evidence now indicates that sarcopenia can begin before the age of 60[(1)]. The term "sarcopenia" is derived from the Greek words *sarx* (flesh) and *penia* (loss). It was first coined by Irwin H. Rosenberg in 1989 to describe the progressive loss of muscle mass associated with aging, highlighting its contribution to frailty and disability. Over time, the concept has evolved to encompass not only muscle mass but also muscle strength and function, forming the basis of current diagnostic criteria and guiding interventions in geriatric health [(2)]. Over time, its definition has evolved to include both muscle mass and strength loss [(3)], Sarcopenia has been officially recognized as a disease under the International Classification of Diseases (ICD-10: M62.84). It is defined as a progressive and generalized loss of skeletal muscle mass, strength, and function. This formal classification facilitates accurate diagnosis, coding, and clinical management, highlighting sarcopenia as a distinct medical condition rather than a normal consequence of aging [4]. Although the World Health Organization (WHO) has not established a specific definition for sarcopenia, the condition is recognized by other authoritative bodies. The European Working Group on Sarcopenia in Older People (EWGSOP) defines sarcopenia as the presence of low skeletal muscle mass accompanied by either low muscle strength or impaired physical performance. Contributing factors include aging, physical inactivity, and malnutrition. Sarcopenia is associated with serious health consequences, including an increased risk of falls, fractures, and disability, and can substantially reduce quality of life in older adults. Early detection and intervention are therefore critical. Management strategies typically involve resistance exercise, nutritional support, and, in selected cases, pharmacological interventions. Understanding the multifactorial causes underlying the high prevalence of sarcopenia in geriatric populations is essential for developing effective prevention and treatment approaches [5,6,7,8]. Worldwide Prevalence: Sarcopenia, characterized by age-related declines in muscle mass and function, demonstrates considerable variation in prevalence across different countries. In China, reported prevalence rates among older adults range from 10.1% to 20% [9]. In India, the prevalence of sarcopenia is estimated to range from 11% to 21%, influenced by factors such as poor nutrition and limited access to healthcare. In Japan, approximately 9.9% of individuals aged 60 years and older are affected. Prevalence data from the USA and UK vary depending on the diagnostic criteria used, with studies reporting rates of 10% to 15% among community-dwelling older adults. These regional differences underscore the importance of developing context-specific strategies for the prevention and management of sarcopenia. Accordingly, the present study aims to assess the prevalence of sarcopenia in the geriatric population [10].

METHODOLOGY:
Study type: Observational study
Sampling Method: Convenient sampling method
Sample size: 200 geriatric subjects
Study duration: The study done for 4 weeks
Study setting: Yash physio therapy clinic, Kalaivani old age home and Sri poorana maha meru trust
INCLUSION CRITERIA:

- Participant willing for the study.
- Age: 50-80 years.
- Both older adults.
- In this study it includes the thin geriatric adults.

EXCLUSION CRITERIA:

- Psychological distress patient
- Any recent cardiac surgery
- Previous surgery of cervical spine of upper limb
- Recent trauma and head injury

OUTCOME MEASURES:

- SARC-F Questionnaire.
- Bio electrical impedance analysis (BIA)

PROCEDURE
A total of 200 participants was recruited for this study based on predefined inclusion and exclusion criteria. Prior to participation, all subjects provided written informed consent. Each participant underwent a preliminary evaluation, which included the collection of demographic data and assessment of muscle wasting in the geriatric population. Muscle wasting was evaluated using the SARC-F questionnaire and bioelectrical impedance analysis (BIA). The collected data were subsequently analyzed using appropriate statistical methods.

**SARC-F Questionnaire**

The SARC-F questionnaire is a simple and widely used screening tool for sarcopenia. It consists of five self-reported items that assess functional limitations related to muscle strength, physical performance, and risk of falls. The questionnaire is completed by the participants and provides a rapid method to identify individuals at risk of sarcopenia in clinical and research settings.

**Bioelectrical Impedance Analysis (BIA)**

Bioelectrical Impedance Analysis (BIA) is a non-invasive and widely used technique for assessing body composition, particularly skeletal muscle mass (SMM), fat mass (FM), fat-free mass (FFM), and total body water (TBW). It plays a crucial role in the diagnosis and monitoring of sarcopenia, a condition characterized by age-related loss of muscle mass and function.
BIA operates by passing a low-level electrical current through the body and measuring the impedance encountered. Impedance is influenced by body composition: muscle, with a high water and electrolyte content, conducts electricity efficiently, whereas fat exhibits lower conductivity. Two key components are measured:

1. **Resistance (R):** Reflects the opposition to electrical flow, primarily influenced by fat and body fluids.

2. **Reactance (Xc):** Reflects cell membrane integrity and skeletal muscle mass.

The **phase angle (PA)**, derived from resistance and reactance, serves as an additional marker, with lower values indicating poor muscle quality and compromised nutritional status. BIA is widely employed in sarcopenia assessment due to its ability to provide a reliable estimate of skeletal muscle mass in clinical and research settings.

PATIENT PREPARATION AND BIA MEASUREMENT

**Preparation of the Participant:**

Prior to assessment, participants were instructed to fast for at least 2–4 hours. They were advised to avoid alcohol, caffeine, and strenuous exercise for 12–24 hours before the measurement. Participants were asked to empty their bladder and remove any metallic objects, such as rings or watches, that could interfere with the measurement. During the test, participants stood in a neutral, relaxed posture.

**Device Setup:**

The BIA device was powered on, and the participant’s profile was selected if previously recorded. For new participants, demographic data including age, gender, height, and weight were entered into the device.

**Measurement Procedure:**

Participants stood barefoot on the foot electrodes and held the hand electrodes with arms slightly extended forward, ensuring no contact with the body. They were instructed to maintain good posture and remain still throughout the measurement. The device was then activated to send a low-level, painless electrical current through the body. The device displayed body composition parameters, including skeletal muscle mass (SMM), body fat percentage, and body mass index (BMI). Skeletal muscle mass values were recorded and compared with standard cutoff values to assess sarcopenia.

Figure 1: Patient using BIA

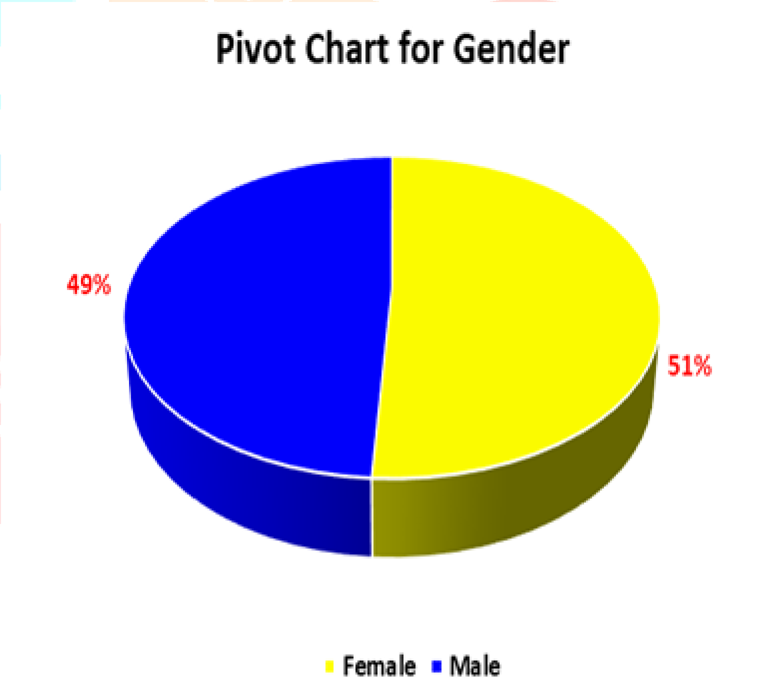
Figure 2: Patient with BIA

## RESEARCH METHODOLOGY

STASTICAL ANAYASIS

Descriptive Statistics: There are 200 samples collected in this study. Of the total samples, 51% (102) are females and 49% (98) are males.

GRAPH 1




In this study, the age group has been categorized into 4 groups for further analysis. Of the total sample, 24% (48) samples belong to Age 50 – 60 grouped as 1, 32% (64) belongs to Age 60 – 70 grouped as 2, 32% (64) belongs to 70 – 80 grouped as 3 and 12% (24) belongs to above 80 grouped as 4.

GRAPH 2

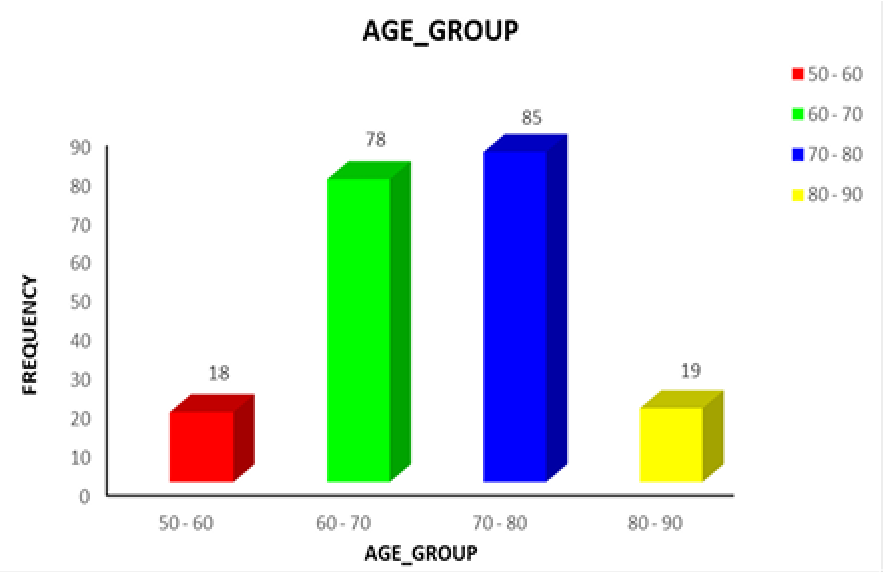



TABLE 1

| AGE_GROUP \ RISK | LOW | HIGH |
|---|---|---|
| 50 - 60 | 13 (72%) | 5 (28%) |
| 60 - 70 | 35 (45%) | 43 (55%) |
| 70 - 80 | 26 (31%) | 59 (69%) |
| 80 - 90 | 2 (11%) | 17 (89%) |

The data indicate that the prevalence of sarcopenia is highest among individuals aged 80–90 years, with an observed prevalence of 89%. This finding suggests that adults aged 80 years and above are particularly susceptible to sarcopenia compared to younger age groups. Overall, the results demonstrate a marked increase in sarcopenia prevalence with advancing age, highlighting the need for close monitoring and early intervention in older adults to mitigate muscle loss and associated functional decline.

Chi- Square Test:

The Chi-Square test of independence is a statistical method used to determine whether there is an association between two categorical variables. In other words, it tells us whether the variables are independent or related to each other.

- To check the independency between Gender and the risk:

TABLE 2

| GENDER \ RISK | LOW | HIGH | TOTAL |
|---|---|---|---|
| FEMALE | 43 | 59 | 102 |
| MALE | 33 | 65 | 98 |
| TOTAL | 76 | 124 | 200 |

Interpretation: As the p-value (0.2758) is greater than the significant level 0.05, there is no reason to reject the null hypothesis. Hence, we conclude that there is no association between Gender and the risk of

Sarcopenia. In other words, both the categorical variables, Gender and Risk of Sarcopenia are independent and are not related to each other.

- To check the independency between Age Group and Risk.

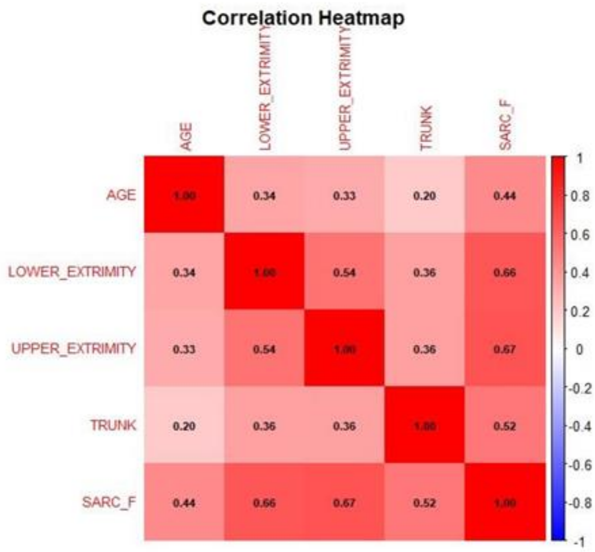
TABLE 3

| AGE_GROUP \ RISK | LOW | HIGH | TOTAL |
|---|---|---|---|
| 50 - 60 | 13 | 5 | 18 |
| 60 - 70 | 35 | 43 | 78 |
| 70 - 80 | 26 | 59 | 85 |
| 80 - 90 | 2 | 17 | 19 |
| TOTAL | 76 | 124 | 200 |

Interpretation: As the p-value (0.0003) is less than the significant level 0.05, we reject the null hypothesis. Hence, we conclude that there is an association between Age Group and the risk of Sarcopenia. In other words, both the categorical variables, Age Group and Risk of Sarcopenia are dependent and are related to each other.
Correlation: Correlation is used to measure the association between the two quantitative variables. The two main types of correlation are positive and negative. Correlation ranges from -1 to +1. Variables with correlation values closer to +1 indicate a strong positive relationship, while values closer to -1 indicate a negative relationship. Weak or no correlation is observed when values are near
Output:

```
> correlation
                      AGE LOWER_EXTRIMITY UPPER_EXTRIMITY     TRUNK    SARC_F
AGE             1.0000000       0.3443226       0.3282452 0.2041074 0.4405013
LOWER_EXTRIMITY 0.3443226       1.0000000       0.5439031 0.3628157 0.6599322
UPPER_EXTRIMITY 0.3282452       0.5439031       1.0000000 0.3641952 0.6670018
TRUNK           0.2041074       0.3628157       0.3641952 1.0000000 0.5227411
SARC_F          0.4405013       0.6599322       0.6670018 0.5227411 1.0000000
```

From the above output, it is observed that
• The correlation between Age and SARC-F is 0.4405. This shown that there is a positive correlation between the two variables.
• The correlation between lower extremity and SARC-F is 0.6599, indicating a moderate to strong positive correlation. As lower extremity increases, the SARC-F score tends to increase as well. This suggests that individuals with higher lower extremity strength are more likely to have higher SARC-F scores.
• The correlation between upper extremity and SARC-F is 0.667, indicating a moderate to strong positive correlation. As upper extremity increases, the SARC-F score tends to increase, which shows the individuals with higher lower extremity strength are more likely to have higher SARC-F scores.
• The correlation coefficient of 0.5227 reflects moderate positive relationship between the variables Trunk and SARC-F scores.
Heatmap:
Heatmaps is used to visualize feature importance, where each column represents a feature, and the colours represent their importance scores. This helps in identifying the most relevant features for a specific task.




Interpretation: From the above output, it is to be noted that there is a positive correlation between Age, Lower Extremity, Upper Extremity and Trunk when compared to the variable SARC-F. This shows that SARC-F has strong relationship with the given independent variables.

Logistic Regression:

Regression is a common tool in statistics to test and quantify relationships between variables. The two most common regressions are linear and logistic regressions. A linear regression is used when the dependent variable is quantitative, whereas a logistic regression is used when the dependent variable is qualitative. In this study our target variable is a binary variable (whether the patient is having low risk or high risk depending upon the SCAR-F score). Hence Logistic regression is used to predict the probability of the dependent variable based on one or more predictor variables. The logistic regression equation is given by $logit(p) = \beta 0 + \beta 1x1 + \beta 2x2 + \beta 3x3 + \beta 4x4 + \beta 5x5$ where $\beta 0$, $\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$ $and$ $\beta 5$ are the regression coefficients and $xi$ 's are the predictor variables.

R-Output:

```
Coefficients:
                 Estimate Std. Error z value Pr(>|z|)
(Intercept)     -12.26825    2.39805  -5.116 3.12e-07 ***
AGE               0.05203    0.02573   2.022 0.043184 *
GENDERM           0.51893    0.36737   1.413 0.157785
UPPER_EXTRIMITY   0.12849    0.04278   3.003 0.002671 **
LOWER_EXTRIMITY   0.11420    0.03431   3.328 0.000875 ***
TRUNK             0.22535    0.07630   2.954 0.003141 **
```

Interpretation:

Here, the Estimate column represents the coefficients of the regression parameters ($\beta$ 0, $\beta$ 1, $\beta$ 2, $\beta$ 3, $\beta$ 4 $and$ $\beta$ 5) and the column Pr(>|z|) corresponds to the p-values. Since p-values for all the predictor variables except Gender are lesser than the significant level 0.05, we conclude that the independent variables Age, Upper Extremity, Lower Extremity and Trunk are significant to the model. This means, all the variables used in this study except Gender for the given data is associated with the risk of Sarcopenia.

## IV. RESULTS AND DISCUSSION

From **Table 1**, it was observed that the age group of 80–90 years exhibited the highest prevalence of sarcopenia, with an observed rate of 89%. This finding indicates that individuals aged 80 years and above are the most affected by sarcopenia compared to younger age groups. The data further demonstrate that the prevalence of sarcopenia increases substantially with advancing age, underscoring the importance of regular monitoring and preventive measures in the elderly population.

Based on **Output 1**, no significant association was found between gender and the risk of sarcopenia, as the p-value (0.2758) exceeded the level of significance ($p > 0.05$). This suggests that gender and the risk of sarcopenia are independent variables and are not statistically related.
In contrast, **Output 2** revealed a significant association between age group and the risk of sarcopenia. The p-value (0.0003) was less than the level of significance ($p < 0.05$), indicating that age group and sarcopenia risk are dependent variables. Thus, age plays a significant role in determining the likelihood of developing sarcopenia.
According to the **correlation analysis (Output 3)**, a positive correlation was observed between SARC-F scores and variables such as age, lower extremity, upper extremity, and trunk measurements. This suggests that the SARC-F score has a strong relationship with these independent variables, reflecting their collective contribution to muscle function and sarcopenia risk.
Finally, **Output 4** indicated that, except for gender, all predictor variables—age, upper extremity, lower extremity, and trunk—had p-values below the level of significance ($p < 0.05$). This finding confirms that these variables are statistically significant predictors within the model, further emphasizing their role in the assessment of sarcopenia risk.

## DISCUSSION

This study aimed to analyze the prevalence of sarcopenia among the geriatric population using the SARC-F questionnaire and Bioelectrical Impedance Analysis (BIA). A total of 200 older adults participated in the study, comprising 51% females (n = 102) and 49% males (n = 98). The participants were categorized into different age groups to facilitate a detailed analysis of sarcopenia prevalence trends.
The findings revealed that sarcopenia was significantly associated with increasing age, with the highest prevalence (89%) observed among individuals aged 80 years and above. This result is consistent with previous research highlighting the progressive decline of skeletal muscle mass and strength associated with aging (Rosenberg, 1989). The age-related rise in sarcopenia prevalence emphasizes the need for early screening and preventive strategies in older adults to reduce functional decline and frailty.
No significant association was observed between gender and sarcopenia risk ($p = 0.2758$), suggesting that both men and women are equally susceptible to sarcopenia. This finding aligns with the study by Shafiee et al. (2017), who reported that sarcopenia prevalence does not differ significantly between genders after adjusting for age and related risk factors. In contrast, a strong association was observed between age group and sarcopenia risk ($p = 0.0003$), confirming that advancing age is a primary determinant of sarcopenia, consistent with epidemiological evidence presented by Di Vincenzo et al. (2021).
Correlation analysis demonstrated a positive relationship between sarcopenia risk and variables such as lower extremity strength, upper extremity strength, and trunk stability. These findings suggest that diminished muscle strength in the limbs and trunk contributes significantly to mobility impairment and increased fall risk in the elderly, as supported by previous studies (Ida et al., 2018). Logistic regression analysis further confirmed that age, upper extremity, lower extremity, and trunk measurements were significant predictors of sarcopenia, in agreement with the European Working Group on Sarcopenia in Older People (EWGSOP2) guidelines (Cruz-Jentoft et al., 2019).
The present study utilized the SARC-F questionnaire and BIA as primary assessment tools. The SARC-F questionnaire, a simple and widely used screening instrument, is known for its high specificity but relatively low sensitivity (Erbas Sacar et al., 2021). The findings of this study reinforce prior evidence suggesting that while SARC-F is effective for initial screening, it should be supplemented with objective measures such as BIA for accurate diagnosis and monitoring of sarcopenia (Wu et al., 2016).
Overall, the study underscores the strong relationship between age-related physiological decline and sarcopenia risk, highlighting the value of combined functional and bioelectrical assessment methods for early identification and intervention among older adults.

## CONCLUSION

This study demonstrates a significant association between advancing age and the prevalence of sarcopenia, underscoring the importance of early screening and timely intervention in the geriatric population. The findings validate the utility of the SARC-F questionnaire and Bioelectrical Impedance Analysis (BIA) as effective preliminary tools for identifying individuals at risk of sarcopenia. Future research should aim to refine diagnostic criteria and develop targeted intervention strategies for high-risk groups to improve muscle health, functional independence, and overall quality of life among older adults.

## REFERENCES


1. Cruz-Jentoft, A. J., et al. (2010). Sarcopenia: European consensus on definition and diagnosis. Age and Ageing, 39(1) 412-423.
2. Rosenberg, I. H. (1997). Sarcopenia: origins and clinical relevance. The Journal of Nutrition, 127(5 Suppl), 990S-991S.
3. Cruz-Jentoft, A. J., et al. (2010). Sarcopenia: European consensus on definition and diagnosis. Age and Ageing, 39 412-423.
4. Anker, S. D., et al. (2016). Prevalence and prognostic importance of muscle wasting (sarcopenia) in patients with chronic heart failure. Journal of Cachexia, Sarcopenia and Muscle, 7, 500-509.
5. Cruz-Jentoft, A. J., et al. (2010). Sarcopenia: European consensus on definition and diagnosis. Age and Ageing, 39(4), 412-423.
6. Cruz-Jentoft, A. J., et al. (2010). Sarcopenia: European consensus on definition and diagnosis. Age and Ageing, 39(4), 412-423.
7. Petermann-Rocha, F., Chen, M., Gray, S. R., Ho, F. K., Pell, J. P., Celis-Morales, C., & Lara, J. (2021). Global prevalence of sarcopenia and severe sarcopenia: A systematic review and metaanalysis. Journal of Cachexia, Sarcopenia and Muscle, 12(5), 953-963.
8. Rosenberg, I. H. (1989). Summary comments: epidemiologic and methodologic problems in determining nutritional status of older persons. The American Journal of Clinical Nutrition, 50(5), 1231-1233.
9. Shafiee, G., Keshtkar, A., Soltani, A., Ahadi, Z., Larijani, B., & Heshmat, R. (2017). Prevalence of sarcopenia in the world: A systematic review and meta-analysis of general population studies. Journal of Diabetes & Metabolic Disorders, 16, 21.
10. Ida, S., Kaneko, R., Imataka, K., Murata, K., & Kaneko, M. (2018). Relationship between sarcopenia and falls in the elderly: A systematic review and meta-analysis. Journal of the American Medical Directors Association, 19(6), 501-507.