RESEARCH

THE RELATIONSHIP BETWEEN FRAILTY AND SARCOPENIA IN OLDER ADULTS WITH CANCER

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Abstract

Introduction: The objective of this study was to determine the prevalence of and factors affecting frailty and sarcopenia and to investigate the relationship between these two conditions.

Materials and Methods: This cross-sectional, descriptive study included 204 geriatric cancer patients who were admitted to the Chemotherapy Day Unit of a university hospital and who met the study's inclusion criteria. The Descriptive Characteristics Questionnaire, Modified Charlson Comorbidity Index, and Edmonton Frail Scale were used as data collection tools. A body composition analyzer, a hand dynamometer, a stopwatch, a stadiometer, and a tape measure were used to determine the presence of sarcopenia.

Results: The prevalence of frailty was found to be 12.26%. The mean Edmonton Frail Scale score was significantly positively correlated with age and significantly negatively correlated with the number of years of education. It also had a significant relationship with gender and living-alone status. The prevalence of sarcopenia, on the other hand, was found to be 6.4%, and the presence of sarcopenia was found to be significantly related to age, living-alone status, and smoking status. The presence of sarcopenia significantly affected the level of frailty, increasing it 5.3-fold.

Conclusion: Our study results reveal the importance of assessing older adults with cancer for geriatric syndromes and for determining their risk factors. To reduce the negative health outcomes and to provide individualized care, it is important to assess individuals in terms of frailty and sarcopenia before deciding on the treatment and care methods to employ.

Keywords: Frailty; Sarcopenia; Neoplasms; Prevalence; Nursing.

INTRODUCTION

Frailty is an important geriatric syndrome that leads to adverse health outcomes among older adults with cancer, and its presence should be determined through a comprehensive geriatric assessment (1). In a systematic review about the prevalence of frailty including 2,916 individuals, 43% were determined to be pre-frail and 42%, frail (2). In a study conducted in Turkey, 17.8% of the patients aged > 65 years and diagnosed with hematological cancer were pre-frail whereas 42.2% were frail (3). Furthermore, it has been reported that more than half of the cancer patients in a study were pre-frail or frail and therefore had higher risks of chemotherapy intolerance, postoperative complications, and mortality (2).

Considered one of the major causes of frailty, sarcopenia is another geriatric syndrome that can cause adverse health outcomes in older adults with cancer older adults with cancer (4, 5). Studies conducted on older adults have reported that sarcopenia occurs in 30.1% of gastric cancer patients (6), and in 15% of colorectal cancer patients (7).

The presence of sarcopenia in patients with cancer causes various adverse clinical presentations. A systematic review showed that the presence of sarcopenia in patients before treatment increases the postoperative complications and the risk of toxicity caused by chemotherapy, and is associated with poor survival (8).

Considering all the foregoing, before deciding to make older patients with cancer receive chemotherapy, healthcare professionals must evaluate them for frailty and sarcopenia, often referred to as "the calm before the storm." This is decisive in predicting and preventing the development of chemotherapy-induced toxicity and in reducing the adverse health outcomes. Although evaluating patients for sarcopenia and frailty is considered time-consuming, these evaluations are more effective in terms of both resources and time compared to the management of a possible complication. Before deciding on a treatment modality, assessment of the physiological condition of the patient and planning the appropriate treatment and care is an approach that supports positive health outcomes. Healthcare professionals must consider age-related changes and patients at risk (9).

A literature review showed that although there have been studies that reported the presence of sarcopenia and frailty in different groups, few studies have evaluated the relationship between the two in the same group of cancer patients. Moreover, no studies have been conducted in Turkey on this topic. As sarcopenia is considered one of the major causes of frailty, determining its effect on the presence of frailty will help guide health professionals, especially nurses, in planning individual care, and will help them make more informed clinical decisions. It will also help reduce the adverse health outcomes for older adults with cancer. Thus, this study was conducted to determine the prevalence of frailty and sarcopenia and the sociodemographic factors affecting them, and to examine the relationship between these two variables in individuals aged ≥ 65 years who had recently been diagnosed with cancer.

MATERIALS AND METHOD

Study Design and Sample

This study was a cross-sectional study of 204 patients aged ≥ 65 years who were admitted to the Chemotherapy Day Unit of a University Hospital within the period from December 2018 to April 2019. Included in the study were (1) people who had been diagnosed with a hematologic or oncologic malignancy (other than skin cancer) within the month before the commencement of the study and (2) people who had not received any prior cancer treatment other than surgery. Excluded from the study were people who (1) had a cognitive disease, (2) had communication problems, and (3) had mobilization problems, the last because they could not perform walking tests and undergo body analysis.

Patients using pacemakers were also excluded from the study because the use of a body analyzer is contraindicated in persons with a pacemaker. Five patients met the exclusion criteria and five patients declined participation in the study. In the retrospective power analysis performed using the G*Power program after the end of the study, the power of the study was found to be 97%.

Data Collection and Tools

A questionnaire was filled out by the researcher after conducting face-to-face interviews with the individuals who had agreed to participate in the study. Measurements were done to determine the presence of sarcopenia, and the measurement results obtained were recorded. It took the researcher 10–15 min to accomplish the questionnaires and to complete the measurements.

Descriptive Characteristics Questionnaire

The sociodemographic and clinical characteristics of the patients were obtained (i.e., gender, age, occupation, education level, living-alone status, income, diagnosis, comorbid diseases, surgical treatments, and smoking and alcohol consumption) (3).

Modified Charlson Comorbidity Index

This is a scoring system developed to measure the disease burden and 1-year mortality risk. This index includes comorbid diseases. The minimum score is 0 and the maximum score is 37. In this index, the total score is calculated by adding 1 point for every decade above the age of 40 (10).

Edmonton Frail Scale (EFS)

This scale was developed by Rolfson et al. to define frailty (11). The scale consists of nine frailty domains and 11 items. The domains are functional independence, general health status, functional performance, cognition, social support, mood, medication use, continence, and nutrition. Its validity and reliability in a Turkish sample had been confirmed by Aygör et al. (12), who reported a Cronbach alpha value of 0.75. The "Timed Up and Go Test" is used to evaluate functional performance, and the "Clock Drawing Test" is used to evaluate cognition. The responses to the questions are scored with 0, 1, and 2 points. The EFS scale has a 0–17 score range. The patients are categorized as follows: 0–4 points, "not frail"; 5–6 points, "defenseless in appearance (pre-frail)"; 7–8 points, "slightly frail"; 9–10 points, "moderately frail"; and ≥ 11 points, "severely frail."

Measurements for Determining Sarcopenia

The European Working Group on Sarcopenia in Older People (EWGSOP) diagnostic criteria were used. According to these criteria, decreased muscular strength and/or walking speed together with decreased muscle mass is evaluated as sarcopenia. Sarcopenia is categorized as pre-sarcopenia, sarcopenia, or severe sarcopenia. To determine the presence of sarcopenia in this study, muscle strength assessment was performed using the hand dynamometer, muscle performance assessment was performed using the 4 m walk test, and muscle mass assessment was performed through calf diameter and bioimpedance measurements (13). The walking speed was determined by recording the time that it took the patient to cover 4 m by walking (in seconds), and < 0.8 m/s was determined as the cut-off. The patients were instructed to remain in the sitting position, with their forearm in elbow flexion, and to squeeze the dynamometer with their dominant hands to the extent that they could, three times. The average of the measured values was calculated and used for further evaluation. A grip strength of < 20.0 kg in women and < 30.0 kg in men was evaluated as low grip strength (13). The calf diameter was measured in the sitting position, with the feet kept free, and a < 31 cm diameter was considered to show low muscle mass. Muscle mass was

measured using a body composition analyzer, and was determined using the following formula developed by Janssen et al. (14) based on the bioimpedance values: skeletal muscle mass (kg) = (height^2/R×0.401)+(gender×3.825)+(age×−0.071)+5.102. The following values are accepted and placed in the formula: body resistance at 50 Hz (R), height in centimeters, gender value 0 for women and 1 for men, and age in years. The muscle mass index (MMI = muscle mass/height^2) was calculated by dividing the muscle mass in kilograms (kg) by the height in meters (m) to prevent the muscle mass from changing according to the height. MMI < 8.87 kg/m^2 in men and MMI < 6.42 kg/m^2 in women were considered to show low muscle mass (15).

Data Analysis

Data analysis was performed by the researcher using the SPSS 22.0 program. The normality of variable distribution was evaluated using the Shapiro–Wilk test, and as the data were not normally distributed, non-parametric techniques were used. Number, percentage, and mean and standard deviation (mean ± SD) were used for descriptive analyses. The EFS score was used for the frailty variable in the analysis. For logistic regression analysis, the patients were categorized according to their EFS scores: a score of < 7 points was considered not frail and a score of ≥ 7 points was considered frail. According to the results of the sarcopenia evaluation, the patients were categorized as sarcopenia and non-sarcopenia patients and were included in the analysis as dichotomous data. The patients with sarcopenia and severe sarcopenia were evaluated as sarcopenia patients while the others were evaluated as non-sarcopenia patients.

The Mann–Whitney U, Kruskal–Wallis, and chi square tests were used to compare frailty and sarcopenia and to determine the differences in the patients' sociodemographic characteristics. All the statistical analyses were based on a significance level of p ≤ 0.05 (16). The relationships of the mean EFS score with age, number of years of education, and mean Charlson Comorbidity Index score were tested using Spearman correlation analysis. For the correlation strength, r = 0.05–0.30 signifies a weak or insignificant correlation; r = 0.30–0.40, a weak–moderate correlation; r = 0.40–0.60, a moderate correlation; r = 0.60–0.70, a high correlation; r = 0.70–0.75, a very high correlation; and > 0.75–1.00, a perfect correlation (16).

Ethical Considerations

Study approval was obtained from the Non-Interventional Research Ethics Committee (approval date: 07.09.2017; approval no. 3512-GOA and 2017/21-04). Verbal and written consent to participate in the study was obtained from each patient.

RESULTS

The mean patient age was 70.70 (±5.71) years. The mean number of years of education was 7.47 (±4.42) years. Of all the patients, 57.4% were male, 73.5% were retired, 87.3% lived with their family, 77% had an income equal to their expenses, 77.9% stated that they were not smokers, and 82.4% stated that they were non-alcohol consumers. Most of the patients had lung cancer (25.5%), followed by colon cancer (11.3%) and breast cancer (10.3%). Cancers such as pancreas, liver, kidney, bladder, cervix, and uterus were less common (total of 21.1%) and were thus categorized as "other cancers." Of all the patients, 79.4% had not undergone a surgical treatment before chemotherapy. The average Charlson Comorbidity Index score of the patients was 3.75 (±1.75) points (Table 1).

Of the patients, 12.26% were categorized as being frail (8.33%, mildly frail; 3.43%, moderately frail; and 0.5%, severely frail) and 14.74% as being pre-frail. The mean EFS score of the patients was 3.35 (±2.35), with 0 and 11 points being the lowest and highest scores, respectively. A weak but significantly positive correlation was found between age and

Table 1. Patients' Descriptive Characteristics (n = 204)

Variables	Mean ± SD
Age, y	70.70 ± 5.71
Education Year	7.47 ± 4.42
Charlson Comorbid Index Score	3.75 ± 1.75
Gender	**n (%)**
Male	117 (57.4)
Female	87 (42.6)
Household Status	
Living Alone	26 (12.7)
Living with family	178 (87.3)
Occupation	
Retired	150 (73.5)
Housewife	54 (26.5)
Income	
Higher than expenses	16 (7.8)
Equal to expenses	157 (77.0)
Lower than expenses	31 (15.2)
Smoking	
Yes	45 (22.1)
No	159 (77.9)
Alcohol Use	
Yes	36 (17.6)
No	168 (82.4)
Surgical Treatment	
Yes	42 (20.6)
No	162 (79.4)
Type of Cancer	
Lung	52 (25.5)
Colon	23 (11.3)
Breast	21 (10.3)
Non Hodgkin's Lymphoma	18 (8.8)
Multiple Myeloma	11 (5.4)
Prostate	10 (4.9)
Stomach	9 (4.4)
Pancreatic	9 (4.4)
Rectum	8 (3.9)
Other Cancers	43 (21.1)

the mean EFS scores of the patients ($r = 0.206$; $p = 0.003$). Conversely, a weak but significantly negative correlation was found between the number of years of education and the mean EFS scores of the patients ($r = -0.153$; $p = 0.029$). The mean EFS score was significantly different by gender ($p = 0.037$) and living-alone or living-with-family status ($p = 0.016$) but not by occupation, income, disease diagnosis, reception or non-reception of surgical treatment, and cigarette and alcohol consumption or non-consumption ($p > 0.05$) (Table 2).

In this study, the prevalence of sarcopenia was found to be 6.4%, with 4.9% of the patients having sarcopenia and 1.5% having severe sarcopenia. Furthermore, 3.4% of the patients had pre-sarcopenia. The presence of sarcopenia significantly differed by age ($p = 0.021$), living-alone or living-with-family status ($p = 0.014$), and smoking or non-smoking status ($p = 0.010$) (Table 3) but not by gender, number of years of education, occupation, income, disease diagnosis, reception or non-reception of surgical treatment, and alcohol consumption or non-consumption.

Logistic regression analysis was performed to determine the predictive level of sarcopenia for the presence of frailty. The results showed that the presence of sarcopenia increased frailty 5.3-fold, thereby significantly affecting the level of frailty (odds ratio = 5.344; 95% confidence interval, 1.594–17.912; $p = 0.012$) (Table 4).

DISCUSSION

Factors Affecting the Prevalence of Frailty

The prevalence of frailty in this study was 12.26%, which is on the lower side of the range reported in the literature. Studies have shown that the prevalence of frailty varies from 6% to 86% among older adults with cancer (2, 3). This difference in prevalence across the studies may be attributable to the differences in the measurement methods used for determining frailty. Furthermore, the previous

Table 2. Frailty Scale Scores of Patients According to their Descriptive Characteristics (n = 204)

Variables	Mean ± SD	*P*-value
Age, y	-	**.003**[a]
Education Year	-	**.029**[a]
Charlson Comorbid Index Score	-	.713[a]
Gender	% and (n)	**.037**[b]
Male	2.98 ± 2.00	
Female	3.85 ± 2.70	
Household Status		**.016**[b]
Living Alone	4.34 ± 2.39	
Living with family	3.20 ± 2.35	
Occupation		.083[b]
Retired	3.16 ± 2.23	
Housewife	3.88 ± 2.62	
Income		.832[c]
Higher than expenses	3.25 ± 2.67	
Equal to expenses	3.35 ± 2.35	
Lower than expenses	3.38 ± 2.27	
Smoking		.341[b]
Yes	2.97. ± 2.07	
No	3.45 ± 2.43	
Alcohol Use		.083[b]
Yes	2.66 ± 1.86	
No	3.50 ± 2.43	
Surgical Treatment		.422[b]
Yes	3.50 ± 2.22	
No	3.31 ± 2.39	
Type of Cancer		.186[c]
Lung	2.90 ± 1.82	
Colon	3.39 ± 3.10	
Breast	2.57 ± 1.74	
Non Hodgkin's Lymphoma	3.44 ± 2.59	
Multiple Myeloma	3.09 ± 1.57	
Prostate	2.60 ± 1.50	
Stomach	4.33 ± 2.29	
Pancreatic	5.11 ± 2.47	
Rectum	3.62 ± 2.61	
Other Cancers	3.83 ± 2.72	

Bold values indicate significant associations ($p < .05$). a = Spearman Correlation, b = Mann-Whitney U, c = Kruskal-Wallis

Table 3. Sarcopenia Findings of Patients According to their Descriptive Characteristics (n = 204)

Variables	Non-sarcopenia	Sarcopenia	*P-value*
	Mean ± SD	**Mean ± SD**	
Age, y	70.48 ± 5.69	73.92 ± 5.26	**.021[a]**
Education Year	7.41 ± 4.40	8.30 ± 4.83	.415[a]
Charlson Comorbid Index Score	3.73 ± 1.74	4.15 ± 1.99	.424[a]
	n (%)	**n (%)**	
Gender			.751[b]
Male	109 (93.2)	8 (6.8)	
Female	82 (94.3)	5 (5.7)	
Household Status			**.014[b]**
Living Alone	21 (80.8)	5 (19.2)	
Living with family	170 (95.5)	8 (4.5)	
Occupation			.760[b]
Retired	140 (93.3)	10 (6.7)	
Housewife	51 (94.4)	3 (5.6)	
Income			.573[b]
Higher than expenses	14 (87.5)	2 (12.5)	
Equal to expenses	148 (94.3)	9 (5.7)	
Lower than expenses	29 (93.5)	2 (6.5)	
Smoking			**.010[b]**
Yes	38 (84.4)	7 (15.6)	
No	153 (96.2)	6 (3.8)	
Alcohol Use			1.00[b]
Yes	34 (94.4)	2 (5.6)	
No	157 (93.5)	11 (6.5)	
Surgical Treatment			.147[b]
Yes	37 (88.1)	5 (11.9)	
No	154 (95.1)	8 (4.9)	
Type of Cancer			
Lung	49 (94.2)	3 (5.8)	.447[b]
Colon	20 (87.0)	3 (13.0)	
Breast	21 (100.0)	-	
Non Hodgkin's Lymphoma	17 (94.4)	1 (5.6)	
Multiple Myeloma	10 (90.9)	1 (9.1)	
Prostate	10 (100.0)	-	
Stomach	8 (88.9)	1 (11.1)	
Pancreatic	7 (77.8)	2 (22.2)	
Rectum	8 (100.0)	-	
Other Cancers	41 (95.3)	2 (4.7)	

Bold values indicate significant associations ($p < .05$). a = Mann-Whitney U, b = Chi-Square Test

Table 4. Determination of the Predictive Level of the Presence of Frailty for the Presence of Sarcopenia by Logistic Regression Analysis (n=204)

Variable						%95 CI	
B	SE	Wald	Df	Sig.	Exp (B)	Lower	Upper	
Sarcopenia	1.676	0.617	7.375	1	0.007	5.344	1.594	17.912
-2 Log likelihood	145.413	**Cox & Snell R**	0.031	**Nagelkerke R Square**	0.058			
Omnibus Tests								
Chi-square	6.352	**Df**	1	**Sig.**	0.012			

studies used different study inclusion criteria; there could have been differences in prevalence of frailty among the patients who were still under treatment, who had completed treatment, and who were hospitalized. Considering that hospitalization increases the risk of frailty, it is believed that outpatients have a lower risk of frailty, as observed in the present study. Additionally, in other studies, patients became more frail due to the side effects of the treatment (2, 17); as such, those who have not yet received treatment in our study are likely less to be frail than those who have received treatment.

The finding in this study is in agreement with that in the earlier studies: older age was associated with greater frailty (18). This finding can be attributed to the decreased physiological reserves, increased neuroendocrine system damage, skeletal muscle loss, and immune system deficiencies with advancing age. All these contribute to frailty. As such, our finding of increase in frailty rate with an increase in age is an expected outcome.

We also observed that the mean EFS scores of the patients in this study decreased as their number of years of education increased. There have been studies whose findings support this (18). Atakul and Akyar (3) reported that the individuals in their study who had attended only primary school were frailer than those who had received higher education. A higher level of education may affect the use of healthcare services, the adherence to treatment regimens, the engagement in more cognitive activities, and the improvement of self-care skills, thereby reducing the prevalence of frailty.

We likewise observed that as the mean Charlson Comorbidity Index scores of the patients in this study increased, their mean EFS scores also increased; however, no significant relationship was found between the two. Similarly, Atakul and Akyar (3) reported that the presence and number of comorbidities did not have a significant relationship with frailty in their study. The presence of comorbidities is a known risk factor for frailty, but the low mean Charlson Comorbidity Index scores of the patients in the present study suggest that the patients' comorbidities were not at a level that could pose a risk of frailty.

Another observation of ours was that the female patients in the present study were frailer than the male patients. In the study by Cohen et al. (18), the level of frailty did not significantly differ by gender, whereas in the study by Atakul and Akyar (3), it did. Studies have reported that women are frailer than

men because they have a higher percentage of fat tissue, are more easily affected by both biological and psychosocial factors, and have higher exposure to environmental factors owing to their longer lifespan (19). Considering this, our finding of women being frailer than men is an expected outcome.

Our patients' levels of frailty were associated with their living-alone or living-with-family status. Similarly, Cohen et al. (18) reported that the patients living alone in their study had significantly higher levels of frailty than the patients living with their family. These findings were further substantiated by Atakul and Akyar (3) in patients with cancer. It is believed that individuals living with their family have better physical and emotional social support than those living alone. Thus, the high prevalence of frailty among individuals living alone may be associated with their having less social support.

Like Cohen et al. (18), we did not find any significant relationship between disease diagnosis (cancer type) and the average EFS scores. Unlike in our study, however, in the study by Atakul and Akyar (3) on hematologic cancer patients, the patients with leukemia exhibited statistically high frailty levels. The inclusion of patients with all kinds of hematologic and oncologic malignancies in our study could have accounted for this difference.

Prevalence of Sarcopenia and the Factors Affecting It

The prevalence of sarcopenia in this study was 6.4%. The reported prevalence of sarcopenia among older adults with cancer differs from this (8); according to Otten et al. (20), the prevalence in their study was 27.1%. The inclusion of newly diagnosed patients in the Chemotherapy Day Unit could have affected the comparatively low rate observed in this study. The health status of the patients treated at the Chemotherapy Day Unit is believed to be better than that of the inpatients (20). The previous studies regarding sarcopenia in older patients were mostly conducted on patients with gastrointestinal cancers. Souza et al. (7) included patients with colorectal cancer in their study and reported that the prevalence of sarcopenia was 15% whereas Brougman et al. (21) reported a prevalence of 25% in the patients with colorectal cancer in their study. Huang et al. (6), in their study on older patients who had undergone surgery for gastric cancer, reported the prevalence of sarcopenia to be 30.1%; similarly, Fukuda et al. (22) reported 21.2% prevalence. In patients with gastrointestinal cancers, conditions such as cachexia and malnutrition can be observed, and these may lead to loss of muscle mass. The lower prevalence of sarcopenia in this study than in the aforementioned studies could have been due to the differences in the measurement tools that were used, in the types of cancer that were evaluated, in the sample characteristics, and in the clinical setting of the study (e.g., inpatient vs. outpatient clinic).

In the present study, we found that the prevalence of sarcopenia increased with age. The results of several previous studies concur with this result of the present study (7, 20, 22). The finding of high prevalence of sarcopenia with an aging-related decrease in the physiological reserves in all body systems is thus an expected result.

No significant relationship between the mean Charlson Comorbidity Index score and the presence of sarcopenia was found in the patients in the present study, but the patients with sarcopenia exhibited higher mean Charlson Comorbidity Index scores than those without sarcopenia (Table 3). Otten et al. (20) reported that the number of comorbid diseases was significantly higher in the patients with sarcopenia in their study than in those without sarcopenia. The low prevalence of sarcopenia and the low comorbidity scores in this study could have led to the non-significance of the above relationship.

No significant relationship was found either between the gender of the patients and the prevalence of sarcopenia. However, among the patients with sarcopenia, the proportion of men was higher

than that of women. In the literature, sarcopenia prevalence has been reported to be significantly higher among men than among women (20, 22). This gender difference was reportedly associated with conditions such as higher smoking rates, lower activity levels, and higher lower-extremity disorder rates among men than among women (13).

The prevalence of sarcopenia in this study was higher among the individuals living alone than among those living with their families. No study in the literature has evaluated the presence of sarcopenia in older adults with cancer who are living alone. Having less social support and a sedentary lifestyle may result in nutritional problems in individuals living alone, which may account for the higher prevalence of sarcopenia among the patients living alone in this study.

The prevalence of sarcopenia was significantly higher among the smokers than among the non-smokers in this study. According to EWGSOP, smoking is a risk factor for sarcopenia (13). As such, our related study finding was an expected outcome.

No significant relationship was found between the disease diagnosis (cancer type) and the prevalence of sarcopenia. However, Shachar et al. (23) reported that when they analyzed the prevalence of sarcopenia by cancer type, they found the prevalence higher among the patients with gastrointestinal cancer. This result may be due to the malnutrition status resulting from the decreased nutritional intake or decreased nutritional absorption among gastrointestinal cancer patients.

Relationship between Sarcopenia and Frailty

Our study results show that the presence of sarcopenia in older adults with cancer significantly affects their frailty level. Similarly, in the studies conducted by Davies et al. (24) on older adults living in society and by Mccusker et al. (25) on older trauma patients, a relationship was found between the presence of sarcopenia and frailty. No study other than ours was found in which the relationship between the presence of sarcopenia and frailty was evaluated in the same geriatric oncology patients. Sarcopenia is the main cause of frailty and is defined as a phenomenon associated with frailty in terms of pathophysiological mechanisms, clinical results, treatment, and prevention methods (26). Thus, our finding that the presence of sarcopenia increases the level of frailty is an expected result.

A single-center study design and similar sample characteristics (e.g., living environment, physical conditions, and dietary habits) were among the limitations of the present study. Another limitation was that although the study had 97% power, the number of patients with each cancer type was inadequate to allow comparison.

In conclusion, the results of the present study reveal the importance of evaluating older adults with cancer in terms of geriatric syndromes and to determine their risk factors. All healthcare professionals working in clinics should evaluate older adults with cancer in terms of geriatric syndromes such as sarcopenia and frailty to reduce their adverse health outcomes and to determine the optimal therapeutic strategy in accordance with their physiological age, take precautions for risk factors, and plan their care and treatment individually. Our study is important in that it can increase health professionals' (especially nurses') awareness of sarcopenia and frailty and emphasizes the need for them to consider the patients' health status in terms of these before making clinical decisions concerning the patients. More studies on the topic of this study but conducted in multiple centers with a larger sample size and long-term follow-up for evaluating the post-treatment process are required. In addition, the use of the stratified sampling method according to cancer type while determining the risk factors for sarcopenia and frailty is recommended to increase the strength of the future studies. Revolutionary changes in cancer treatment in recent years make it necessary to plan studies on the changing toxicity profile.

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Conflict of Interest

The authors do not declare a conflict of interest.

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