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Determination of Frailty and Malnutrition Status and Risk Factors in Elderly Surgical Patients

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ABSTRACT

Objective: To determine the frailty and malnutrition status and risk factors of elderly patients undergoing surgery. **Material and Methods:** The study is descriptive and cross-sectional. Data were collected using the Patient Identification Form, FRAIL Scale, and Mini Nutritional Assessment (MNA) test. Data were evaluated by SPSS 23.0. **Results:** The mean age of the patients was 70.03±5.74; 47.9% underwent orthopedic surgery. In this study, 63.6% of the patients were frail and 10.7% were malnourished. It was determined that women, patients with chronic diseases, those using medication, and patients who were mobilized with assistive device or immobile before surgery were more fragile. Patients with poor preoperative nutritional status stayed in the intensive care unit after surgery, had higher ASA scores and longer hospital stays. It was determined that preoperative mobilization level and ASA score had a significant effect on frailty status, while American Society of Anesthesiologists score and body mass index had a significant effect on nutritional status. **Conclusion:** This study showed that frailty is common in elderly patients undergoing surgery and more than half of the patients were at risk of malnutrition. These results emphasize the importance of evaluating the frailty and nutritional status of patients before surgery.

Keywords: Elderly Patients, Frailty, Malnutrition, Nutritional Risk Assessment, Surgical Patients.

Yaşlı Cerrahi Hastalarının Kırılganlık ve Malnütrisyon Durumlarının ve Risk Faktörlerinin Belirlenmesi

ÖZ

Amaç: Cerrahi uygulanan yaşlı hastaların kırılganlık ve malnütrisyon durumlarının ve risk faktörlerinin belirlenmesidir. **Yöntem:** Araştırma, tanımlayıcı ve kesitsel niteliktedir. Veriler, Hasta Tanılama Formu, FRAİL Ölçeği, Mini Nütrisyonel Değerlendirme (MNA) testi ile toplandı. Veriler, SPSS 23.0 ile değerlendirilmiştir. **Bulgular:** Araştırmaya dahil edilen 140 hastanın yaş ortalaması 70.03±5.74 olup; %47.9'una ortopedik cerrahi uygulanmıştır. Hastaların %63.6'sı kırılgan ve %10.7'sinde ise malnütrisyon olduğu belirlenmiştir. Ameliyat öncesi beslenme durumu kötü olan hastalar ameliyat sonrası yoğun bakımda kaldığı, ASA skorlarının yüksek ve hastanede kalış sürelerinin daha uzun olduğu belirlenmiştir. Ameliyat öncesi mobilizasyon düzeyi ve ASA skorunun kırılganlık durumu üzerinde; ASA skoru ve beden kitle indeksinin ise beslenme durumu üzerinde anlamlı bir etkiye sahip olduğu belirlenmiştir. **Sonuç:** Bu çalışma, cerrahi uygulanan yaşlı yetişkinlerde kırılganlığın yaygın olduğu ve hastaların yarısından fazlasının malnütrisyon riski altında olduğu gösterilmiştir. Bu sonuçlar, ameliyat öncesi hastaların kırılganlık ve beslenme durumlarının değerlendirilmesinin önemli olduğunu vurgulamaktadır.

Anahtar Kelimeler: Yaşlı Hastalar, Kırılganlık, Malnütrisyon, Beslenme Risk Değerlendirmesi, Cerrahi Hastalar.

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INTRODUCTION

During the next ten years, the population of people aged 60 years or over worldwide is projected to grow by 38 per cent, outnumbering youth (Ghebreyesus, 2021). With the aging population, the rate of surgery in this population will increase. It is difficult to define surgical risk in the elderly. Age alone is not sufficient to define surgical risk. Chronic diseases, American Society of Anesthesiology (ASA) score, Charlson comorbidity score, Lee's Revised Cardiac Risk Index are the parameters that are frequently used together with age (Richards et al., 2018). With demographic aging, frail elderly will constitute the majority of patients undergoing surgery (Greenstein & Gorczyca, 2019; Watt et al., 2018). Frailty is a prevalent and crucial geriatric syndrome characterized by age-associated declines in physiologic reserve and function across multiorgan systems (Gleason et al., 2017). Affects 70% of older adults living in the community; increases risk of functional loss and dependency (Zhang et al., 2020). In a systematic review and meta-analysis conducted by Panayi et al. 65% of 683,487 patients undergoing surgery in different branches were found to be frail (Panayi et al., 2019). The presence of frailty in elderly patients has been shown to predict postoperative mortality, complications and prolonged length of stay (Cooper et al., 2016; Lin et al., 2016; Watt et al., 2018).

Nutritional status is an crucial factor in optimizing surgical outcomes and preventing postoperative complications (Hirsch et al., 2021; Thomas et al., 2016). Patients undergoing surgery are at increased risk of malnutrition for many reasons, including the pathological process associated with the condition requiring surgery, the inflammatory nature of the surgery, and decreased intake and delayed return of bowel function due to preoperative and postoperative fasting (Gillis & Wischmeyer, 2019). In clinical nutrition, inadequate nutrition is used synonymously with malnutrition. Malnutrition in patients undergoing surgery has been shown to be associated with an increased risk of surgical site infections, delayed wound healing, increased lenght of hospital stay, higher readmission rates, sepsis, and increased mortality and costs (Geurden et al., 2015; Gn et al., 2021; Kamath et al., 2017; Kishawi et al., 2020; Mahakalkar et al., 2014a; Thomas et al., 2016; Yuwen et al., 2017). Despite these negative consequences of malnutrition, it is stated that it is not adequately diagnosed and continues to affect 50% of hospitalized patients (Williams & Wischmeyer, 2020).

Frailty and nutritional status are important factors affecting postoperative recovery. Despite its prevalence and impact, especially frailty are often overlooked in routine perioperative evaluations. Body Mass Index (BMI) is frequently used in patient evaluation. But, it is not a sufficient parameter alone in the assessment of nutritional status (Gastelurrutia et al., 2011). In older surgical patients, the assessment of frailty and nutritional status before surgery has become increasingly important to identify patients whose outcomes may improve with early intervention, to modify treatment options, to evaluate preoperative recovery expectations, and to optimize prognosis, treatment, and care processes (Cooper et al., 2016; Gleason et al., 2017; Watt et al., 2018). In our country, there is no study that includes patients undergoing surgery in different branches and evaluates frailty and nutritional status together and investigates risk factors. In this context, this study was conducted to determine the frailty and malnutrition status and risk factors of elderly patients undergoing surgery. Questions of the research;

- What are the preoperative frailty levels of elderly patients undergoing surgery?
- What is the preoperative nutritional status of elderly patients undergoing surgery?
- What are the factors affecting the frailty status of elderly patients undergoing surgery?
- What are the factors affecting the nutritional status of elderly patients undergoing surgery?

MATERIALS AND METHODS

Study type

This descriptive and cross-sectional study was conducted in the orthopedics and traumatology, general surgery, and brain and neurosurgery wards of Balıkesir University Health, Practice and Research Hospital and Balıkesir State Hospital between November 2023 and August 2024.

Study group

Out of 140 elderly patients who had surgery in the general surgery, orthopedics and traumatology, neurosurgery wards of an university and a state hospital and who met the sampling criteria were included in the research sample. Inclusion criteria for the study were; being 60 years of age or older, having undergone surgery, being able to understand and speak Turkish, having orientation to person, place and time, not having hearing and speech problems, and participating in the study voluntarily. Exclusion criteria for the study were; having a neurological (such as dementia/Alzheimer's) and psychiatric (such as schizophrenia) medical diagnosis affecting cognitive status, and having undergone minor surgery (e.g., mass excision with local anesthesia, correction of carpal tunnel syndrome, arthroscopy, etc.).

The sample size was determined as 125 patients based on the number of independent variables (22), Cohen's medium effect size of 0.30, significance value of 0.05 and 90% power and using the online calculation tool (https://www.danielsoper.com/statcalc/calculator.aspx?id=1). At the end of the research, the sample power was calculated by performing a power analysis with the G* Power software version 3.1.9.4 programme. In the power analysis performed by taking into account the difference between the mean frailty scores according to gender in patients undergoing surgery. The results of this post-hoc analysis indicated that

with an effect size (d) of 0.58 and alpha error probability of 0.05, the power of the study was 0.89.

Dependent and independent variables

The independent variables of this research are age, gender, presence of chronic disease, use of medication and number of medications, Body Mass Index (BMI), smoking use, dietary, preoperative and postoperative nutritional support status, preoperative mobilization status, length of hospital stay (day), preoperative and postoperative blood values (albumin, total protein, hemoglobin). The dependent variables are frailty and malnutrition status.

Procedures

Data were collected using the Sociodemographic-Clinical Characteristics Form, FRAIL Scale, and Mini Nutritional Assessment (MNA) test.

Sociodemographic-Clinical Characteristics Form

The form prepared by researchers in line with the literature includes questions regarding age, gender, diagnosis, surgery, presence of chronic disease, use of medication and number of medications, BMI, smoking use, dietary, preoperative and postoperative nutritional support status, preoperative mobilization status, preoperative and postoperative blood values (albumin, total protein, hemoglobin) (Hogan, 2018; Jiao et al., 2020; Mahakalkar et al., 2014b; Setiati et al., 2019; Venianaki et al., 2021).

Frail Scale

The scale was developed by Morley et al. (2012) and adapted to Turkish by Hymabaccus Muradi (2017). It allows evaluation by questioning the patient's fatigue status, resistance, mobility, weight loss and other diseases. The FRAIL scale, consisting of 5 items, receives 0 or 1 points according to the answers given by the patients, and a total of 0 points is evaluated as non-frail, 1-2 points as pre-frail and those who score >2 are considered frail (Morley et al., 2012; Muradi, 2017). The Cronbach Alpha Internal Consistency coefficient of the scale was calculated as 0.787 (Muradi, 2017). In this study, the Cronbach alpha internal consistency coefficient of the scale was found to be 0.89.

Mini Nutritional Assessment (MNA)

It was developed in 1994 by the collaboration between the University of Toulouse, the Faculty of Medicine of New Mexico and the Nestle Research Center in Switzerland (Vellas et al., 2006). It consists of 4 sections and 18 items: anthropometric assessment (BMI, weight, arm and calf circumferences); general assessment (lifestyle, medication, mobility, depression and dementia symptoms); brief nutritional assessment (number of meals, food and fluid intake, autonomy in nutrition) and subjective assessment (self-perception of health and nutrition). The MNA classifies elderly patients as having normal nutritional status (≥ 24), at risk of malnutrition (between 17-23.5) or malnourished (<17) (Sarıkaya et al., 2015). Its importance in evaluating geriatric nutrition is great and patients are classified correctly by 78% (Guigoz, 2006). The most important feature of the test is that it can detect the risk of malnutrition before severe changes occur in body weight and serum albumin levels when the MNA value is between 17-23.5. The Turkish validity and reliability was performed by Sarıkaya et al.; sensitivity and specificity were determined as 92% and 86%, respectively (Sarıkaya et al., 2015).

Data Collection

Data were collected by face-to-face interviews with inpatients aged 60 and over who were admitted to surgical wards and scheduled for surgery. Data such as patients' blood values, ASA scores, and length of hospital stay were obtained from the hospital information system.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 23.0 (released 2016; Armonk, NY: IBM Corp.) Descriptive data were evaluated with number, percentage, mean, and standard deviation. Skewness and kurtosis values (+2 and −2) were used to assess the normality of data distributions (George & Mallery, 2010). Oneway Anova test was used in the comparison of quantitative data showing normal distribution between groups, and Tukey HDS test and two-group independent t test was used in determining the group causing the difference. Kruskal Wallis test was used in the comparison of parameters not showing normal distribution between groups, and Mann Whitney U test was used in determining the group causing the difference and in two-group evaluations. Pearson and Spearman correlation analyses were used to evaluate the relationships between variables. Multiple linear regression analysis was used to determine the effect of factors on frailty and malnutrition. The significance level was determined as $p<0.05$.

Ethical approval

This study conducted in accordance with the Helsinki Decleration Principles. The study protocol was approved by an University Health Sciences Non-Interventional Research Ethics Committee (Date: 13.06.2023 and Decision No: 2023/58;). Permission was acquired from the hospital (Date: 26.10.2023 and Decision No: 309814; Date: 03.11.2023 and No: 312691). All participants were informed about the research and written and verbal consent was obtained.

RESULTS

The mean age of the participants was 70.03±5.74; 67.1% (n=94) were female, 95.7% (n=134) were married.

Patients of 47.9% (n=67) underwent orthopedic surgery (knee/hip arthroplasty, Proximal Femoral Nail, etc.), 27.9% (n=39) general surgery, and 24.3% (n=34) neurosurgery. 80.7% had chronic diseases, and 23.6% stayed in the intensive care unit after surgery (Table 1).

Of the patients in the study, 28.6% (n=40) were pre-frail and 63.6% (n=89) were frail. In the nutritional status assessment, 55% (n=77) were at risk of

malnutrition and 10.7% (n=15) were malnourished (Table 2).

It was found that women, patients with chronic diseases, those using medication, and patients who were mobilized with assistive devices or immobile before surgery had statistically higher FRAIL Scale scores ($p<0.05$).

MNA scores of patients who remained in intensive care after surgery were statistically significantly lower ($p<0.05$; Table 1).

It was determined that there was a positive correlation between the patients' FRAIL scale score and the number of medications (r=.264); and the ASA score (r=.397; $p<0.05$); and length of hospital stay (r=.187 p=0.035; Table 1). It was determined that there was a negative correlation between the patients' FRAIL scale score and the preoperative (r=-.229) and postoperative (r=-.235) hemoglobin levels ($p<0.05$; Table 1).

It was found that there was a low level negative correlation between the MNA score and the length of hospital stay (r=-.298) and the ASA score (r=-.286).

Table 1. Evaluation of frailty and nutritional status of patients according to sociodemographic and clinical characteristics.

Variables	N (%)	Frail Scale		Mini Nutritional Assessment	
		Mean ± SD	Test statistics p	Mean ± SD	Test statistics p
Age ($\bar{x}$ ± SD)	140(100.00)	70.03±5.74	r=-0.068 p=0.425		r=0.036 p=0.759
BKİ ($\bar{x}$ ± SD)	140 (100.00)	26.16±4.66	r=0.08 p=0.346		r=0.263 p=0.024
Sex					
Female	94 (67.1)	2.86±0.99	t=2.437 p=0.018	20.79±4.60	t=-1.019
Male	46 (32.9)	2.28±1.45		21.92±4.47	p=0.312
Presence of chronic disease					
Yes	113 (80.70)	2.78±1.16	t=2.460 p=0.015	21.05±4.08	t=-.933
No	26 (18.60)	2.15±1.19		22.26±5.86	p=0.354
Use of medication					
Yes	122(87.10)	2.76±1.14	U=761.00	20.96±4.41	U=269.00
No	18(12.90)	2.06±1.34	p=0.029	22.33±5.31	p=0.129
Smoking					
Yes	10 (7.10)	2.40±1.26	U=558.00 p=0.437	18.25±4.64	U=-77.50
No	130(92.90)	2.69±1.18		21.35±4.53	p=0.133
Preoperative mobilization status					
Independent	73 (52.1)	2.29±1.29	U=1632.50	20.94±5.48	U=644.50
Mobilized with auxiliary equipment/ Immobilized	67 (47.9)	3.09±0.90	p=0.000	21.41±3.59	p=0.679
Dietary					
Yes	84 (60.00)	2.74±1.18	t=0.811	20.36±5.34	t=-1.626
No	56 (40.00)	2.57±1.20	p=0.419	22.05±3.41	p=0.109
Preoperative nutritional support					
Yes	9(6.4)	2.56±1.23	U=551.50	15.75±8.65	U=176.50
No	131(93.6)	2.68±1.19	p=0.736	21.50±4.11	p=0.127
Postoperative nutritional support					
Yes	18(12.9)	2.61±1.24	U=1065.00	16.57±7.87	U=138.00
No	122(87.1)	2.68±1.18	p=0.830	21.67±3.85	p=0.073
Postoperative intensive care stay					
Yes	33 (23.60)	2.82±1.26	t=0.809 p=0.420	18.31±5.79	t=-2.392
No	107 (76.40)	2.63±1.17		21.98±3.85	p=0.027
ASA Score (min-max/ $\bar{x}$ ± SS) [a]	2.11±0.84		r= 0.397. p=0.000		r=-0.286 p=0.013
Number of medications used[a]	2.90±2.45		r= 0.264 p=0.002		r=-0.119 p=0.313
Preoperative albumin [a]	39.68±5.89		r=-0.124 p=0.145		r= .471 p=0.00
Postoperative Albumin [a]	33.20±5.17		r=-0.030 p=0.724		r=0.366 p=0.001
Preoperative Hemoglobin [a]	12.33±1.52		r=-0.229 p= 0.007		r= .483 p=0.000
Postoperative Hemoglobin [a]	10.74±1.53		r=-0.235 p=0.005		r=0.511 p=0.000
Preoperative total protein [b]	65.66±8.82		r=-0.025. p=0.768		r= 0.166 p=0.157
Postoperative total protein[b]	56.04±7.57		r=-0.011 p= 0.901		r=0.231 p=0.047
Length of hospital stay (day)[b]	6.53±3.62		r=.187* p=0.035		r=-0.298 p=0.010
MNA[a]	21.18±4.56		r= .045 p=0.596		

t: Independent Samples t-Test; U: Mann Whitney U Test; a: Pearson correlation analysis; BMI: Body Mass Index; ASA: American Society of Anesthesiologists; MNA: Mini Nutritional Assessment; SD: Standard deviation; *p<0.05

It was found that there was a positive, moderate correlation between MNA score and BMI (r=.263), preoperative (r=.471) and postoperative (r=.366) albumin, and preoperative (r=.483) and postoperative (r=.511) hemoglobin. In addition, it was determined that there was a low level negative correlation between the MNA score and length of hospital stay (r=-.298) and a moderate level negative correlation with the FRAIL score (-.574) ($p<0.05$; Table 1).

Multiple linear regression analysis was performed to determine the contribution of factors associated with frailty status and variables with significant associations were included in the regression model. The model explained 22% of the total variance ($F=6.733$, $p < 0.05$). Among the independent variables included in the model, preoperative mobilization level ($\beta = -0.191$, $p = 0.019$) and ASA score ($\beta = 0.299$, $p = 0.001$) had a significant effect. These variables are statistically significant factors affecting the frailty status of elderly patients undergoing surgery (Table 3).

Table 2. Results of the Patients' Frailty Scale and Mini Nutritional Status Assessment Test.

	min-max	$\bar{x} \pm SS$
Frail Fragility Scale Score	0-5	2.67±1.19
MNA Score	5-28	21.18±4.56
	n	%
Frailty Situations		
Not Frail	11	7.9
Pre-Frail	40	28.6
Frail	89	63.6
MNA Category		
Normal nutritional status	48	34.3
Malnutrition risk	77	55
Malnutrition	15	10.7

Table 3. Factors Affecting Frailty (n=140).

Independent variables	β	T	p	Tolerance	VIF
Preoperative mobilization status	-0.191	-2.373	0.019	0.865	1.156
ASA	0.299	3.271	0.001	0.670	1.493
Number of medications used regularly	0.043	0.499	0.619	0.736	1.360
Preoperative Hemoglobin	-0.108	-1.024	0.308	0.498	2.010
Postoperative Hemoglobin	-0.164	-1.544	0.125	0.492	2.034
Length of hospital stay (day)	-0.086	-1.072	0.286	0.866	1.155
BKİ	0.119	1.530	0.128	0.924	1.082
Adjusted R^2					0.224
F					6.733

BMI: Body Mass Index; ASA: American Society of Anesthesiologists; *P<0.05

Multiple linear regression analysis was performed to determine the contribution of factors related to nutritional status and variables with significant associations were included in the regression model. The model explained 22% of the total variance ($F=5.906$, $p<0.05$). Among the independent variables included in the model, ASA score ($\beta = -0.245$, $p = 0.002$) and BMI ($\beta = 0.187$, $p = 0.022$) had a significant effect. These variables are statistically significant factors affecting the nutritional status of elderly patients who underwent surgery (Table 4).

Table 4. Factors Affecting Nutritional Status (n=140).

Independent variables	β	T	p	Tolerance	VIF
ASA_score	-0.245	-3.137	0.002	0.919	1.088
Preoperative Albumin	0.172	1.314	0.191	0.326	3.063
Preoperative Albumin	-0.067	-0.501	0.617	0.312	3.202
Preoperative Hemoglobin	0.161	1.360	0.176	0.400	2.500
Postoperative Hemoglobin	0.059	0.517	0.606	0.431	2.323
Postoperative Total Protein	0.049	0.527	0.599	0.658	1.520
Length of hospital stay (day)	-0.038	-0.462	0.645	0.836	1.196
BKİ	0.187	2.326	0.022	0.864	1.158
Adjusted R^2					0.22
F	5.906				

BMI: Body Mass Index; ASA: American Society of Anesthesiologists; *P<0.05

DISCUSSION

This study examined frailty and malnutrition status and associated risk factors in elderly surgical patients. Our study shows that a large proportion of elderly patients undergoing surgery are at risk of frailty and malnutrition.

The mean frailty score of the patients 2.67±1.19 and 28.6% were pre-frail, while 63.6% were frail. It has been shown that 30% of patients over 50 years of age who underwent surgery for vertebral fragility fracture and 15.8% of patients who underwent surgery for spinal meningioma (n=3345) were fragile (Elsamadicy et al., 2023; Walters et al., 2016). Studies conducted with patient groups undergoing different types of surgeries have shown that frailty is prevalent in the literature (Birkelbach et al., 2019; Theriault et al., 2020). İn this study included patients over 60 years of age who underwent surgery and age is an important parameter for frailty, so this situation explains the high rate of frailty. Also, the study found that women, patients with chronic diseases, those using medication, and patients who were mobilized with assistive device or immobile before surgery were more fragile. Frailty is associated with biological age, wear and tear of the body, polypharmacy and the presence and accumulation of chronic health issues (Hogan, 2018; Jiao et al., 2020; Setiati et al., 2019). Findings in this study are consistent with the literature showing that frailty is often associated with more than one factor (He et al., 2019; Qin et al., 2023). A systematic review and meta-analysis by Gordon et al. showed that females were more frail than males for any age group (Gordon et al., 2017). In women, the higher prevalence of 'non-lethal' diseases that affect negatively on function and quality of life, the higher rates of reported disability, and changes in body composition with an increase in fat mass and an increased likelihood of metabolic syndrome, especially over 40, explain why women are more vulnerable (Gordon et al., 2017; Marques-Santos & de Oliveira, 2021).

It has been found that as patients' frailty status increases, the number of medications and ASA scores and length of hospital stay increase, while their preoperative and postoperative hemoglobin levels decrease. It has also been shown that the ASA score has a significant impact on patients' frailty status. The ASA score is a risk tool that reflects the general health status of the patient. Frailty and the ASA score have complementary features that also emphasise different aspects of each other (Committe of Oversight, 2019; Li et al., 2021). When used together, they help predict surgical outcomes more accurately. Therefore, it is expected that they are positively related to each other and that the ASA score has an impact on frailty. Anemia is more commonly observed in frail patients due to factors such as chronic diseases, nutritional deficiencies and reduced physical activity. Therefore, it is considered a part of frailty syndrome, with both conditions being associated with an increased risk of morbidity and mortality (Cooper et al., 2016; Shander et al., 2023; Watt et al., 2018). Therefore, monitoring hemoglobin levels in the assessment of older surgical patients can be considered an important component in managing frailty. Frailty is associated with many physiological, functional and clinical factors that prolong hospital stay after surgery (Hogan, 2018; Jiao et al., 2020; Setiati et al., 2019). In this study and studies in the literature, frailty has been shown to increase length of hospital stay(Lin et al., 2016; Makary et al., 2010; Panayi et al., 2019).

Nutritional status in the elderly patients has important effects on both surgical outcomes and long-term health status. In our study, 55% of the patients were at risk of malnutrition and 10.7% were malnourished, shows that nutritional status is an important problem among elderly surgical patients. In addition, it has been shown that patients with worse preoperative nutritional status stayed in intensive care after surgery, had worse ASA scores and longer length of hospital stays. In the literature show that approximately 24-65% of patients undergoing major surgery, ranging in age from young to older adults, are malnourished or at risk of malnutrition (Geurden et al., 2015; Thomas et al., 2016). Also, malnutrition has been reported as a common condition among older surgical patients, adversely affecting the recovery process and increasing postoperative hospital length of stay and complication risks (Geurden et al., 2015; Gn et al., 2021; Kamath et al., 2017; Kishawi et al., 2020; Mahakalkar et al., 2014a; Thomas et al., 2016; Turhan Damar et al., 2021; Yuwen et al., 2017).

In this study, the ASA score and BMI were also identified as factors influencing nutritional status. Patients with high ASA scores often have multiple comorbidities that can impact food intake (e.g., dysphagia, gastrointestinal issues, loss of appetite) and nutrient absorption, potentially leading to malnutrition. A higher ASA score is associated with a worse nutritional condition (Venianaki et al., 2021). On the other hand, BMI is a simple tool which can be universally used, and lower BMI is an indicator of malnutrition (Cederholm, Jensen, Correia, Gonzalez, Fukushima, Higashiguchi, Baptista, Barazzoni, Blaauw, Coats, Crivelli, Evans, Gramlich, Fuchs-Tarlovsky, Keller, Llido, Malone, Mogensen, Morley, Muscaritoli, Nyulasi, Pirlich, Pisprasert, de van der Schueren, Siltharm, Singer, Tappenden, Velasco, Waitzberg, Yamwong, Yu, Gossum, et al.,2019) So, low BMI is a factor contributing to the deterioration of the nutritional status in older surgical patients.

Study Limitations and Strengths

The strength of the study lies in emphasizing the need to consider nutritional status and frailty in the evaluation of elderly surgical patients, which can provide a foundation for future research in this area. The limitation of the study is that the data obtained are limited to the surgical specialties and patient

group covered by the study. Since nutritional status and frailty play an important role in surgical processes, it is important to similarly evaluate elderly patients in other specialties, such as cardiothoracic surgery, urology, and plastic surgery.

CONCLUSION

Our study revealed a high prevalence of frailty among individuals aged 60 and older undergoing surgery, with over half of the patients identified as being at risk for malnutrition. In addition, it was determined that women, patients with chronic diseases, those using medication, and patients who were mobilized with assistive device or immobile before surgery were more fragile. Patients with worse preoperative nutritional status stayed in intensive care after surgery, had worse ASA scores and longer length of hospital stays. This study emphasizes the importance of evaluating frailty and nutritional status before surgery. Early identification of frailty and malnutrition may contribute to improved postoperative outcomes for patients.

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Conflict of Interest

The author declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Contributions

Plan, design: ÇK; **Material, methods and data collection:** ÇK, SÖ; **Data analysis and comments:** ÇK, SÖ; **Writing and corrections:** ÇK.

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Ethical Approval

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