

Investigation of the Effect of Frailty Levels of Elderly Patients on their Recovery Status after General Surgery

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Abstract Aim/Objective: The level of frailty increases in the elderly population. It is known that preoperative frailty may cause negative consequences in the postoperative period. This study aimed to determine the effect of preoperative frailty level on postoperative recovery of elderly patients undergoing surgery in general surgery clinics. **Material and Method:** The research is descriptive - cross-sectional type. The study was conducted between September 1 Eylül, 2021, and October 31, 2022. The study population consisted of 242 patients aged 65 and over who underwent surgery in the General Surgery Clinic. The study sample consisted of 97 patients selected by random sampling method. "Patient Information Form," "Edmonton Frail Scale (EFS)," and "Postoperative Recovery Index (PoRI)" were used for data collection. Data were collected in 3 stages: preoperatively, postoperatively, and after discharge. In the first stage, patient information form and EFS were applied in the preoperative period. In the second stage, PoRI was performed between 24-48 hours in the postoperative period. In the third stage, the PoRI was re-administered at the time of the patient's first visit to the outpatient clinic (on average 1-2 weeks later). Face-to-face and telephone interviews were used to collect the data. Data were evaluated in the IBM Statistics (SPSS) 25.0 program. Quantitative data in the study were shown as number, percentage, mean, and standard deviation values. Kolmogorov Smirnov test, One-Way ANOVA, Mann-Whitney U test, Kruskal Wallis test, and Shapiro Wilk test were applied when necessary. Cronbach's Alpha value was 0.784 for the Edmonton Frailty Scale, and the Postoperative Recovery Index was 0.950 in the first and 0.941 in the second measurement. All ethical permissions were obtained. **Results:** The mean age of the patients included in the study was 70.82 ± 6.47 years. It was found that 54.7% of the patients were male, and 90.3% were not working. In the Edmonton Frail Scale's measurements, approximately 73.1% of the elderly patients were found to be frail, although their level was different. In the study, PoRI mean1 = 2.9 ± 0.99 in the first 48 hours and PoRI mean2 = 2.0 ± 0.74 in the post-discharge control time. There is a significant difference between EFS and PoRI- 1st and EFS and PoRI- 2nd measurements. It was found that patients with higher mean EFS had more difficulty in recovery. As the patients' frailty level increased, difficulties were identified in improving psychological, physical, nutritional, and general symptoms. When EFS and sociodemographic characteristics were compared, it was observed that elderly individuals with low income had higher rates of frailty. **Conclusion:** Research results show that the level of frailty present before surgery delays recovery in the postoperative period. Patients aged 65 years and older also have a significantly high level of frailty. In this context, it would be appropriate to conduct frailty screening with measurement tools to determine the level of frailty in the preoperative period for elderly patients and to evaluate the care to be applied accordingly. In this way, frailty, an inhibiting factor in front of recovery, can be managed and will constitute evidence for objective consideration.

Key Words Postoperative Recovery, Frailty, General Surgery, Elderly

1. Introduction

The proportion of the elderly population in the total population exceeding 10% indicates the population's aging. The population aged 65 and over increased by 22.5% in the last five years. In 2020, it became 7 million 953 thousand 555 people. The proportion of the world's elderly population in

the total population increased from 8.2% in 2015 to 9.5% in 2020 (TÜİK, 2020). The most negative consequence of population aging is the increase in clinical frailty in the elderly population [1].

Frailty is a state of weakness characterized by an age-related reduction in physiological reserve and function in

multiple organ systems, leading to an increased risk of adverse outcomes. The level of frailty of older patients affects their recovery. The primary goal of healthcare professionals is to eliminate and treat the disease. However, the holistic approach all healthcare professionals advocate needs to be addressed [1]. Measuring frailty is important to predict risks and to help diagnosis and care planning in elderly patients [2]. The level of frailty in the elderly population affects the healing process of patients, especially after surgical intervention, leading to unfavorable results in recovery [3], [4].

Increasing life expectancy in society has led to an increase in the burden of health care. The health needs of an increasingly aging population have affected medical or surgical treatment processes. Surgical interventions, especially in the treatment of elderly individuals, cause an increase in morbidity and mortality rates [5], [6]. Contrary to what is known, geriatric surgical patients require more specialized evaluation than traditional preoperative evaluations. Because their physiologic vulnerability increases with age [7].

The Society for Perioperative Assessment and Quality Improvement (SPAQI) has recommended that the perioperative assessment of elderly patients requiring elective major surgery include a frailty screening [8], [9]. In a systematic review of elderly patients aged 65 years and older hospitalized for surgery and critical illness, the prevalence of frailty ranged from 19% to 62% [6], [10]. The impact of frailty on outcomes after elective surgery is increasingly being described in hospital and community-based studies [6]. A study by [4] in elderly patients undergoing cholecystectomy showed that emergency surgery was associated with poor outcomes in the elderly patient group and that elective surgery may be a safe option for frail patients [11].

Deciding on a major surgical intervention is difficult due to additional comorbidity in the elderly population. Differences in preoperative physical and cognitive status may affect postoperative outcomes, functional recovery, and quality of life of patients [12]. In frail individuals undergoing surgery, outcomes such as intensive care unit admission rates, prolonged hospital stay, increased postoperative delirium, post-discharge readmission rates, other complications, and increased mortality are more common [6].

It is also observed in the literature that preoperative frailty may lead to negative results in the postoperative period [1], [6]. In this context, this study aimed to determine the effect of preoperative frailty level on the postoperative recovery status of elderly patients undergoing surgery in the general surgery clinic.

2. Material and Method

A. Study Design

The research is descriptive - cross-sectional type. The study was conducted between September 1 Eylül 2021 and 31 October 2022.

B. Aim and Research Question

The aim of this study was to determine the effect of preoperative frailty level on postoperative recovery of elderly patients undergoing surgery in general surgery clinics.

C. Sample and Context (Sample Size Calculation)

The study population consisted of 242 patients aged 65 and over who underwent surgery in the General Surgery Clinic. The research data were selected using a random sampling method. The study sample consisted of 97 patients who volunteered to participate and complied with the study's limitations.

D. Inclusion and Exclusion Criteria

1) Inclusion criteria

- 1) 65 years of age or older
- 2) To agree to participate in the research
- 3) Open to communication and cooperation
- 4) To undergo elective general surgery

2) Exclusion Criteria

- 1) Under 65 years of age
- 2) Unanswered questions in the research scale
- 3) The patient has any disease that may affect thought processes and decision-making ability (dementia, psychological disorder, etc.)

E. Data Collection and Instruments

"Patient Introduction Form," "Edmonton Frail Scale (EFS)," and "Postoperative Recovery Index (PoRI)," developed in line with the relevant literature, were used for data collection.

1) Patient Introduction Form:

The form consisted of 18 questions and included information on the patients' age, gender, educational status, marital status, employment status, occupation, socio-economic status, having children, place of residence, chronic disease status, previous surgical experience, previous hospital stay (at least one night), diagnosis of the disease, type of surgery, and current length of hospital stay.

Edmonton Frail Scale (EFS): The EFS was developed by [13] in Canada. The scale's validity and reliability study was conducted in Turkey by [14]. The scale consists of a total of 11 items. The minimum total score is zero, and the maximum score is 17. An increase in the total score indicates an increase in the severity of frailty. EFS frailty score consists of five levels: No Frailty, Apparently Vulnerable, Mild Frailty, Moderate Frailty, Severe Frailty [13], [14].

Postoperative Recovery Index (PoRI): PoRI was developed by [15] to measure the quality of recovery in patients in the early postoperative recovery period (approximately 30 days following surgery) [15]. The validity and reliability study of the scale was conducted in Turkey [16]. Psychological symptoms, physical activities, general symptoms, bowel symptoms, and appetite symptoms can be evaluated with

this measurement tool, which reflects various self-reports of patients [16]. The scale, translated into Turkish literature as 25 items, is a self-assessment-type scale. The three different scales are the 5-point Likert type. For the first four questions, one of the options "never," "occasionally," "some of the time," "most of the time," and "always" is expected to be marked. The answers to items 5-12 are "never," "somewhat limited," "somewhat limited," "significantly limited," and "extremely limited." In the remaining items, the extent of discomfort is expressed as "not at all," "somewhat uncomfortable," "partially uncomfortable," "significantly uncomfortable," and "extremely uncomfortable." For the PoRI score, the scores of the items included in the sub-dimensions are summed, their arithmetic averages are taken, and the sub-dimension score is determined. For the total score of the index, all 25 items are summed, and the arithmetic mean is taken. High scores from the index indicate that postoperative recovery is difficult, and low scores indicate that postoperative recovery is easy [15], [16].

Dependent variables: Edmonton Frailty Scale score and Postoperative Recovery Index mean scores.

Independent variable: Descriptive characteristics of the patients (age, gender, educational status, marital status, marital status, having children, employment status, income-expenditure status, presence and number of chronic diseases, past surgical experience, previous hospitalization, diagnosis of the disease, duration of the disease, type of surgery, current length of hospitalization).

E. Data Collection Process

Face-to-face and telephone interviews were used to collect data. Data were collected in 3 stages: preoperatively, postoperatively, and after discharge. In the first stage, patient information form and EFS were applied in the preoperative period. In the second stage, PoRI was performed between 24-48 hours in the postoperative period. In the third stage, the PoRI was re-administered at the time of the patient's first visit to the outpatient clinic (on average 1-2 weeks later). Patients who could not be reached at the outpatient clinic were interviewed by phone. Data collection was 5 minutes for each interview.

G. Data Analysis

Data were evaluated in the IBM Statistics (SPSS) 25.0 program. Quantitative data in the study were shown as number, percentage, mean, and standard deviation values. Shapiro Wilk test was used for normal distribution of the measurement data, One-Way ANOVA was used for statistical analysis of normally distributed data, Kruskal Wallis test was used for multiple comparisons, and Mann-Whitney U test was used for pairwise comparison of the measurement data. Cronbach's Alpha value was 0.784 for the Edmonton Frailty Scale, and the Postoperative Recovery Index was 0.950 in the first and 0.941 in the second measurement.

Edmonton Frailty Scale	Frequency	Percent
0-4 (No Frailty)	26	26,8
5-6 (Apparently Vulnerable)	17	17,5
7-8 (Mild Frailty)	26	26,8
9-10 (Moderate Frailty)	11	11,3
11 and more (Severe Frailty)	17	17,5
Total	97	100,0
	X ± SD	Median (Min. – Maks.)
Total	17,71 ± 3,88	18 (11-27)

Table 1: Edmonton frailty scale score

3. Results

The mean age of the patients included in the study was 70.82 ± 6.47 years. It was found that 54.7% of the patients were male, 90.3% were not working, and 90.7% had children. The income of 53.6% of the patients was equal to their expenditures, while 32% had low income. It was found that 76.3% of the patients had chronic diseases, and 75.3% of these patients had at least two chronic diseases. It was found that 47.4% of the patients had gastrointestinal system surgery, and 28.9% had hepatopancreatobiliary surgery. While 77.3% of the patients had surgical experience, 84.5% had been hospitalized before and 36.1% of the patients had been hospitalized for 4-10 days or more.

The mean frailty scale score of the patients participating in the study in the preoperative period was 17.71±3.88 (Min. 11 - Max. 27). According to Table 1, 26.8% of the patients were "no frailty" (EFS score 0-4), 17.5% were "apparently vulnerable" (EFS score 5-6), 26.8% were "mild frailty" (EFS score 7-8), 11.3% were "moderately frailty" (EFS score 9-10), and 17.5% were "severe frailty" (EFS score ≥ 9) (Table 1). Approximately 73.1% of elderly patients were found to be frail despite their different levels.

In the study findings, PoRI-1st measurement = 2.9 ± 0.99 in the first 48 hours and PoRI-2nd measurement = 2.0 ± 0.74 in the post-discharge control time. When the scores in the averages are evaluated, the improvement in the postoperative period progresses in a positive direction.

In Table 2, there is a significant difference between EFS and PoRI- 1st measurement and EFS and PoRI- 2nd measurement. It is clearly seen in Table 2 that patients with higher EFS averages had more difficulty in recovery.

When EFS and PoRI scales were compared with sociodemographic data, it was found that there was a difference between EFS and income level (p=0.031) and having additional chronic diseases (p=0.007). When the demographic data of the patients were compared with the PoRI 1st and 2nd measurement scores, there was a difference between the Appetite Symptoms sub-dimension scores and the employment status of the patients for both measurements (p1=0.007, p2=0.0026). There is a significant difference between the type of surgery the patients underwent and the 1st measurement Physical Activities sub-dimension, 1st measurement Bowel Symptoms sub-dimension and 2nd measurement Bowel Symptoms sub-dimension (p1=0.011, p1=0.0002, p2=0.00011, respectively)(Table 2).

	PoRI- 1st measurement	X ± SD	Median (Min. – Max.)	Test Statistic	P	PoRI- 2nd measurement	X ± SD	Median (Min. – Max.)	Test Statistic	P
EFS Score	Psychological Symptoms	2,3 ± 1,02	2,3 (1-5)	13,826	0,008a	Psychological Symptoms	1,4 ± 0,52	1,3 (1-3)	16,481	0,002
	Physical Activities	3,4 ± 1,29	3,5 (1-5)	23,634	0,0001a	Physical Activities	2,3 ± 1,03	2,1 (1-5)	30,455	0,0001
	Appetite Symptoms	2,6 ± 1,37	2,3 (1-5)	20,997	0,0001a	Appetite Symptoms	1,8 ± 1,00	1,3 (1-5)	10,767	0,029
	Bowel Symptoms	2,9 ± 1,31	3,0 (1-5)	7,866	0,097a	Bowel Symptoms	1,8 ± 0,97	1,4 (1-4)	7,382	0,117
	General Symptoms	3,0 ± 1,44	3,0 (1-5)	16,298	0,003a	General Symptoms	2,4 ± 1,23	2,0 (1-5)	11,017	0,026
	PoRI Total	2,9 ± 0,99	2,9 (1,12-5,00)	8,055	0,0001b	PoRI Total	2,0 ± 0,74	1,8 (1-4,24)	23,041	0,0001
a Kruskal Wallis Test b ANOVA						Kruskal Wallis Test				

Table 2: Comparison of frailty, PoRI-1st measurement and PoRI-2nd measurement total and sub-dimension scores

4. Discussion

The results of this study, conducted to determine the effect of preoperative frailty level on the postoperative recovery status of elderly patients undergoing surgery in general surgery clinics, were discussed in the literature.

The mean score of the frailty scale in the preoperative period of the patients participating in the study was 17.71±3.88, and 73.1% of the elderly patients were found to be frail despite their different levels. It was found that 26.5% of the elderly patients were vulnerable, 26.8% had mild frailty, 11.3% had moderate frailty, and 17.5% had severe frailty. Many studies on the level of frailty in different populations are noteworthy in the literature. In [17] study with elderly patients hospitalized in the neurosurgery clinic, the EFS score was 7.73±2.52 in the preoperative measurement and 7.57±1.88 in the postoperative measurement [17]. In the study of [14], who translated the Edmonton Frail Scale into Turkish, it was found that 24.6% of elderly individuals were vulnerable, 13.1% were mildly frail, and 10% were moderately frail [14]. In a study conducted [18] with patients aged 65 years and older who underwent elective surgery, 32% of patients were found to be moderately frail [18]. In a study [19] with patients with brain tumors, it was found that 74.6% of the preoperative frailty levels were not frail, 21.5% were moderately frail, and 3.8% were frail [19]. As can be seen in the literature, the fact that elderly patients are frail and that this study supported the level of frailty increases in the elderly population.

In a study with 382 patients who underwent PoRI, it was reported that there were difficulties in recovery in the postoperative period [16]. In [20] study with elderly patients undergoing major surgery in orthopedics and general surgery, it was found that postoperative recovery was tough on the third postoperative day [20]. In this study, it was found that postoperative recovery was very difficult in the first measurement (2.9 ± 0.99) and moderately difficult in the second measurement (2.0 ± 0.74). This shows that postoperative recovery is directly proportional to time. As time passes after the surgery, recovery improves, as in other studies. This is the natural and expected process of treatment. Being a young or elderly patient may only cause a change in the difficulties in the recovery process.

When the PoRI sub-dimensions were examined, it was determined that patients who underwent elective general surgery experienced difficulties in almost all sub-dimensions for the first time in postoperative results. In contrast, moderate and fewer difficulties were experienced in the following

period. The PoRI 1st measurement physical activity total mean score was higher, while the PoRI 2nd measurement general symptoms sub-dimension mean score was higher (Table 2). The higher mean total physical activity score is evidence of difficulty performing physical activity in the early postoperative period. Although early mobilization is difficult for patients undergoing surgery, it is one of the most important factors affecting recovery. For this reason, the patient population, whether old or young, is tried to be mobilized quickly in the postoperative period. It has been reported that patients who underwent colorectal cancer surgery experienced more intense problems, such as physical strain and abnormal bowel function in the early postoperative period. However, these problems decreased and disappeared over time [21]. In parallel with this study, [22] reported that gastrointestinal oncologic surgery patients experienced physical and psychosociological problems that negatively affected postoperative recovery. In the follow-up of the recovery process in days, weeks, and years, it is seen that the comfort and physical mobility sub-dimensions of the quality of recovery are more effective [23]. In line with the reviewed literature, different results are obtained in different sub-dimensions of the postoperative recovery process for each patient population.

According to the results regarding the improvement between frailty and recovery, which was the main objective of this study, as the frailty level of the patients increased, it was observed that there were difficulties in recovery in PoRI 1st measurement and second measurement. As the frailty level of the patients increased, difficulties in recovery in psychological, physical, nutritional, and general symptoms were determined. On the other hand, intestinal symptoms were not affected by the level of frailty. A literature review revealed no studies in which EFS and PoRI were used together.

In a study examining the relationship between frailty level and quality of recovery in elderly patients hospitalized in a neurosurgery clinic, which is a frailty study on the recovery process, it was found that the patients were mildly frail in the preoperative and postoperative period, the well-being of the patients was negatively affected, and the quality of recovery decreased as the frailty status increased [17].

Comparisons between sociodemographic characteristics and the scales revealed some significance. When EFS and sociodemographic characteristics were compared, it was observed that the frailty rate of elderly individuals with low-income levels was higher. Similar findings were observed in a study conducted with elderly individuals [24]. In this

context, the difficulty in accessing health services and the inability of elderly individuals with low-income levels to perform healthy lifestyle behaviors lead to the development of frailty [25].

In the study, it was observed that patients who were not employed had difficulty in improving their nutritional status. This result may be attributed to two factors. Since unemployed individuals do not have any occupation to organize their lives and their attention is focused only on the disease, it can be thought that their stress may increase and cause a delay in recovery. In addition, low-income levels can also be considered a limitation in food access, which is a factor in recovery.

In this study, there was a significant relationship between the type of surgery and recovery, and it was found that patients who underwent GI surgery had difficulty in recovering physical activity and bowel symptoms. The results of the study are similar to those of the literature. It is emphasized that complications after such surgeries affect recovery [26]–[28].

This study found that as the number of chronic diseases increased, the level of frailty increased. In [17], the frailty levels of patients with chronic diseases were found to be higher [17]. It was reported that most elderly individuals in the study had at least one chronic disease [29]. As a result of a population study conducted in the UK, it was concluded that the presence of chronic disease increases the level of frailty in elderly female patients undergoing surgery [30]. As can be seen in this study, which has similar results to the literature, the level of frailty increases as the presence and number of chronic diseases increase.

5. Conclusion

Research results show that the level of frailty present before surgery delays recovery in the postoperative period. Patients aged 65 years and older also have a significantly high level of frailty. In this context, it would be appropriate to conduct frailty screening with measurement tools to determine the level of frailty in the preoperative period for elderly patients and to evaluate the care to be applied accordingly. In this way, frailty, an inhibiting factor in front of recovery, can be managed and will constitute evidence for objective consideration.

Ethical Considerations

This study was conducted in compliance with the principles outlined in the Declaration of Helsinki. Ethical permission for the study was obtained from the Non-Interventional Ethics Committee of İzmir Katip Çelebi University (Ethics Committee Approval Date: 26.08.2021-Decision no: 0385). Permission to use the EFS and PoRI was obtained from the corresponding author via email. Informed consent was obtained from the patients participating in the study.

Conflicts of Interest Statements

No conflicts of interest between the authors and / or family members of the scientific and medical committee members

or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

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