

# DETERMINING THE RELATIONSHIP BETWEEN POSTOPERATIVE PAIN AND THE RISK OF FALLS IN OLDER ADULTS



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## Summary

**Introduction:** Pain and falling are substantial components of older adults' life. Despite the presence of several plausible mechanisms for pain to contribute to falling, very few studies have investigated this relationship in older adults. This study was designed to determine the relationship between falls associated and postoperative pain in surgical patients aged over 65 years.

**Material and methods:** This cross sectional and descriptive study was conducted at a public hospital between January and June, 2018. The study population consisted of postoperative patients aged 65 years and over, hospitalised in the Urology, General Surgery, and Orthopaedic clinics between the study dates. After demographic knowledge was collected, the Itaki Fall Risk Scale and Visual Analogue Scale were used for the risk of falling and pain level assessments, respectively.

**Results:** The mean age of the participants was 72.14 ±8.85 years. A statistically significant relationship was observed between pain levels and the risk of falling in the postoperative period ( $p = 0.000$ ). The risk of falling increased in line with pain levels. Patients who were single ( $p = 0.01$ ), who had no social security ( $p = 0.002$ ), and with chronic disease had a significantly higher risk of falling ( $p = 0.003$ ).

**Conclusions:** Pain in older adults may increase the risk of falling after surgery. In clinical and academic studies, it is recommended that pain assessments be included in older adults for the risk of postoperative fall.

**Key words:** aged, falls accidental, nurses, postoperative pain, risk factors, physical therapists.

## Introduction

Falls and associated injuries have a considerable impact on older adults' physical, mental, and social health. The mean reported prolongation of hospital stay is 12.3 days, and hospital costs may rise by up to 61% in the event of a fall [1]. Although the risk of falling is present in every environment, falls are most common in the hospital setting, and 50% of inpatients are at risk [2]. In terms of the main risk factors for falls, demographic factors such as age under five years and over 65 years are particularly significant. The presence of psycho-cognitive disorders, cerebrovascular disease, incontinence, postural hypotension, obesity, reduced lower extremity muscle strength, balance and vision disorders, use of walkers, and risky drug use are among the factors implicated in the risk of falls for surgical patients [3]. Both acute and chronic pain, especially among individuals over 65 years of age, is particularly reported to trigger falls [3-5]. The relationship between pain and a fall in surgical patients has not been clari-

fied yet. The reason for this is that the vast majority of pain studies involve older adults living in the community [6].

The lack of correlation between pain and fall risk in surgical patients limits the discussions. However, in studies conducted in older adults living in the community, it is a more important fall risk factor than the factors such as pain, cognitive capacity, depression, and sedative drug use. Periodic evaluation of pain is important in hospitalised older adults [7]. The questioning of pain, especially in individuals with a history of falls, may reduce the risk of falling. In order to appropriate training and risk evaluation for pain before and after surgical procedures is reported to reduce the incidence of complications such as in-hospital falls and to shorten length of hospital stay [8]. According to NANDA International, individuals over 65 years old are at risk of falls in the postoperative period, and nurses should perform careful observations, as well as age-based planning [9]. However, the criterion standard multifactorial interventions to reduce falls have had relatively limited success,

which may be because some important risk factors remain elusive. One important and potentially significant risk factor that appears to be continually overlooked is pain. For example, the American and British Geriatric Societies provide detailed guidance on the assessment of individuals at risk of falls, but there is no specific mention of the importance as a falls risk factor. This is surprising for a number of reasons. First, pain is associated with mobility deficits, impaired gait, and balance deficits, all of which are well established internal risk factors for falls. Second, pain is very common in older people, with up to 76% of older people in the community experiencing it. It is likely that pain has not been identified as a risk factor for falls because of the relative dearth of research specifically investigating the association of pain and falls in older people [4, 9]. While there have been comparatively few authors primarily investigating this, in 2015 Doré *et al.* demonstrated that the presence of severe chronic knee pain was associated with increased risk of multiple falls [10]. More recently, Leveille *et al.* also established that chronic pain was associated with a significantly increased risk of falls [9]. A recent review that investigated common risk factors for falls in community-dwelling older adults did provide some consideration of the influence of pain with falls. The authors established that pain was associated with an increased risk of single falls and multiple falls. However, the results were overshadowed by a focus on other risk factors. While this study provides a useful insight, its generic focus means that it was unable to provide a detailed exploration of the association of pain and falls, and this is warranted [4, 9].

Studies that explore the association between pain and the risk of falling offer valuable information for clinicians working with older people. However, according to systematic review and meta-analyses, most of these studies focused on musculoskeletal (foot pain and fall etc.) and common pain. For this reason, especially in the clinic, the pain that occurs after a traumatic intervention (such as being acute) and its relationship with the fall is rare.

To address this, we set out to conduct this study to investigate the association between pain and falls. The purpose of this study was to determine the relationship between postoperative pain experienced by patients in surgical clinics and the risk of falling, and to emphasise the necessary precautions.

## Material and methods

A cross-sectional and descriptive study was conducted at a public hospital in Turkey between January and June, 2018. The study population consisted of postoperative patients aged 65 years and over hospitalised in the Urology, General Surgery, and Orthopaedic clin-

ics between the study dates. Individuals were reached through a randomised sampling method. The sample of the study also formed the study universe. The study included 243 older adults in clinics. After inclusion and exclusion criteria assessments the sample size was 202 patients.

Study inclusion criteria are determined as follows: adults hospitalised at the hospital surgical units; having undergone surgical procedure for treatment; the ability to cooperate regarding effectively understanding and performing the study evaluation methods and scales; no hearing or vision problems; volunteer participation, and being at least 65 years old. Study exclusion criteria were determined as follows: patients in late postoperative period; lacking the ability to cooperate regarding effectively understanding and performing the study evaluation methods and scales ( $n = 15$ ); having hearing and vision problems; and unwilling or unable to provide informed consent for participation ( $n = 26$ ).

Data were collected using a patient information form, the Itaki Fall Risk Scale, the Visual Analog Scale (VAS), and at face-to-face interviews with patients on postoperative day 2.

### Patient information form

This consisted of 13 questions in two sections. The first section was intended to elicit patients' sociodemographic characteristics (such as age, educational background, marital status, and occupation), while the second elicited disease-related characteristics (such as smoking and the presence of chronic disease).

### Itaki Fall Risk Scale

The Itaki Fall Risk Scale was published by the Turkish Ministry of Health Department of Performance Management and Quality Improvement in 2011. It consists of 19 items including risk factors for patient falls. The risk factors are categorised as major and minor; minor risk factors being scored one, and major risk factors being scored five. Two risk levels are determined, low and high, based on total scores. Total scores  $< 5$  are evaluated as low risk, and total scores  $\geq 5$  as high risk. The requisite precautions can then be taken. The scale consists of a total of 19 risk factors: 11 minor and eight major [11].

### Visual Analog Scale

The Visual Analog Scale (VAS) was developed to measure individuals' subjective assessment of their pain levels. It has been used in many studies to assess the severity of pain and has been found to be reliable and valid. It was explained to the participants that the number 0 in the scale means "I do not feel any pain,"

whereas the number 10 means "I feel the most severe pain." The intensity of pain increases with the increase in the number value. The subjects were then asked to mark a number from 0 to 10 to express their pain intensity level [12, 13].

### Statistical analysis

Descriptive statistics of variables are calculated as mean  $\pm$  standard deviation, and as frequencies (counts and percentages). The normality assumption of the parametric tests was evaluated by Kolmogorov-Smirnov test. One-way ANOVA was used to compare the participants' mean Itaki Fall Risk Scale scores among patients' educational status. Paired samples *t*-test was used to compare the participants' mean Itaki Fall Risk Scale scores among patients' genders, marital status, social security, and chronic diseases. The relationship between the variables was assessed using Pearson correlation analysis. The statistical significance level for all analyses was set as  $p < 0.05$ . SPSS for Windows was used to analyse the data (ver. 18.0, SPSS Inc., Chicago, IL, USA).

### Results

The mean age of the patients in the study was 72.14  $\pm$  8.85 years, and they comprised 61.4% female and 38.6% male. Primary school graduates constituted 42.6% of patients, and 59.4% had a chronic disease.

Additionally, 27.7% patients were treated in the Orthopaedic Clinic, 12.6% in the Urology Clinic, and 59.7% in the General Surgery Clinic. Analysis of the Itaki Fall Risk Scale scores revealed that 79.3% of patients were in the high-risk group ( $\geq 5$  pts), and 20.7% were in the low-risk group (0-4 pts).

Table 1 shows the mean Itaki Fall Risk Scale scores in terms of various socio-demographic characteristics. There was also a significant difference between marital status and total mean fall risk scores, with single patients scoring higher ( $p = 0.01$ ). Patients without social security had significantly higher Fall Risk Scale scores than those with social security ( $p = 0.002$ ). Older adults with chronic disease also had a significantly higher risk of falling ( $p = 0.003$ ) (Table 1). No statistically significant difference was observed between patients' gender, educational background, and risk of falling ( $p > 0.05$ ).

In terms of major and minor risk factors, the most common minor risk factor was the presence of chronic disease, while the most common major risk factor was a balance disorder during walking (Table 2).

The patients' mean VAS score was 4.88  $\pm$  2.80. Analysis of patients' risk of falling and pain levels revealed a statistically significant relationship between them ( $p = 0.000$ ). The risk of falling increased in line with pain levels. When the Itaki Fall Risk Scale scores were compared in terms of age, we observed a statistically significant relationship between age and mean fall risk scores, the risk of falling increasing with age ( $p = 0.000$ ) (Table 3).

**Table 1.** Mean Itaki Fall Risk Scale scores by patients' descriptive characteristics

Categories	<i>n</i>	%	Mean $\pm$ standard deviation	<i>p</i>
Age (year)			72.14 $\pm$ 8.85 (min = 65, max = 93)	
Gender				0.612
Female	124	61.4	9.83 $\pm$ 5.95	
Male	78	38.6	9.21 $\pm$ 6.07	
Educational background				0.095
Illiterate	12	5.9	7.83 $\pm$ 2.99	
Literate	54	26.7	10.78 $\pm$ 6.83	
Primary School	86	42.6	7.98 $\pm$ 5.77	
High School	38	18.8	12.32 $\pm$ 4.55	
University	12	5.9	10.67 $\pm$ 9.07	
Marital status				0.01
Married	128	63.4	8.56 $\pm$ 5.91	
Single	74	36.7	11.77 $\pm$ 5.62	
Social security				0.002
Yes	140	69.3	8.54 $\pm$ 5.97	
NA	62	30.7	12.62 $\pm$ 4.87	
Presence of chronic disease				0.003
Yes	120	59.4	11.02 $\pm$ 5.62	
NA	82	40.6	7.48 $\pm$ 5.92	

**Table 2.** Distribution of factors affecting patients' fall risks

Itaki Fall Risk Scale	Yes n (%)	No n (%)
Minor risk factors		
Age over 65	202 (100)	–
Unconsciousness	4 (2)	198 (98)
History of falling within the last month	64 (31.7)	138 (68.3)
History of chronic disease	110 (54.5)	92 (45.5)
Requiring physical support while standing/walking	90 (44.6)	112 (55.4)
Urinary/faecal continence disorder	24 (11.9)	178 (88.1)
Weak sight	42 (20.8)	160 (79.2)
Use of more than four drugs	90 (44.6)	112 (55.4)
Less than three care devices attached to the patient	44 (21.8)	158 (78.2)
No/non-functioning bed railings	6 (3)	196 (97)
Physical obstacles in walking areas	14 (6.9)	188 (93.1)
Major risk factors		
Unconsciousness or non-cooperation	2 (1)	100 (99)
Balance problems while walking	70 (34.7)	112 (65.3)
Dizziness	44 (21.8)	158 (78.2)
Orthostatic hypotension	12 (5.9)	190 (94.1)
Visual impairment	12 (5.9)	190 (94.1)
Physical disability	8 (4)	194 (96)
Three or more care devices attached to the patient	2 (1)	200 (99)
Risky drug use within the previous week	56 (27.7)	146 (72.3)

## Discussion

Our results indicated significant correlation between pain and the risk of falling in patients over 65 years old, who were hospitalised in the postoperative period, and this increased with age. In the literature there have been a limited number of studies on the relationship between falling and postsurgical pain, and these have usually focused on the field of orthopaedics, in which there is a known risk of falling in the postoperative period [14, 15]. Due to the limited number of studies and the heterogeneity in the assessment of pain, it was not possible to establish whether certain types (e.g. musculoskeletal pain), sites (e.g. back pain), or duration of pain (e.g. chronic) are particularly associated with an increased fall risk. Another study systematic review and meta-analysis conducted to explain the relation between falling and pain also reported an adverse association, due to the physiological and psychological effect caused by pain; however, studies on the subject are limited [4]. We observed a statistically significant relation between patients' risk of falling and pain levels ( $p = 0.000$ ). Patients' risk of falling increased in line with their pain level. We attributed this finding to the physiological and kinematic effects of pain on patients. In the older adults, the decrease in functional activity and the decrease in the risk of falling can be

seen because of the fear of moving or the desire to not move after the surgery. In the literature, high levels of kinesiophobia have been found in patients with surgery, which predisposes the patients to develop chronic pain and seriously affect functional outcomes and return to pre-surgery activity levels [16].

Various scales are used to evaluate the risk of falling among inpatients. The Itaki Fall Risk Scale is frequently employed to evaluate adult patients [17]. Numerous studies have emphasised that the great majority of inpatients are at risk of falling [1, 14]. Studies of individuals aged 65 years and over emphasise that the risk is higher in this age group, and that it increases with age [3, 14]. Analysis of the Itaki Fall Risk Scale scores in the study revealed that 79.3% of patients were in the high-risk group (scores  $\geq 5$ ), while 20.7% were in the low-risk group (scores 0-4), in agreement with the previous literature [11, 17].

**Table 3.** Correlation between the Itaki Fall Risk Scale and pain and age

Categories	Itaki Fall Risk	
Pain	<i>r</i>	0.593
	<i>p</i>	0.000
Age (years)	<i>r</i>	0.416
	<i>p</i>	0.000

When patients' Itaki Fall Risk Scale scores were compared in terms of age, we determined a statistically significant relationship between age and mean fall risk scores, the risk of falling increasing with age ( $p = 0.000$ ). This finding is in agreement with the previous literature and is thought to be associated with the fact that physical restriction worsens with age [1, 11, 13, 17].

One cross-sectional study of individuals aged 55 years reported that the risk of falling was affected by factors including gender, marital status, social security, educational background, income, and ethnicity, and it determined that married people had a lower risk of falling [18]. Another study aimed at determining the prevalence of falling among 68,629 older adults over 60 years of age in China and the factors affecting this also reported that falls were more common among women, single individuals, and subjects living in rural areas, with hip fracture being statistically significantly the most common injury type with advancing age [19]. In agreement with the previous literature, we also determined a significant relation between marital status and social security and mean total fall risk scores. Single patients with no social security scored significantly higher. We attributed this to being married providing social and physical support associated with a decrease in falls.

Ninety-two per cent of individuals over 65 years of age are reported to suffer from at least one chronic disease [20]. A positive correlation has been determined between falls and the presence of chronic disease, with chronic illnesses also increasing the risk of falling [21, 22]. A study of individuals aged 65 years and over with various chronic diseases in Canada reported that falls were mostly associated with hypertension and chronic obstructive pulmonary disease; proper management of chronic diseases has also been reported to reduce the risk of falling [21, 23]. In our study, older adults with chronic disease had a significantly higher risk of falling. This finding was also compatible with the previous literature. We think that physical and psychological disabilities caused by chronic disease also triggered the risk of falling.

It is observed that the individuals who are evaluated as the limitation of this study did not undergo psychological evaluation. It is also known that the hospital was also associated with anxiety and depression and the risk of falling in the remaining individuals [7, 24]. In future studies, it is recommended also to evaluate the psychological status when the risk of falling is examined in older adults. Another limitation of this study is the lack of a reliability and validity study of Itaki. However, according to Itaki, to differentiate high-risk patients and take the necessary precautions, a "Four Leaf Clover" figure is used in patients with high risk of falling at the hospital patient room door in our country. Itaki is the most popular and useful scale in Turkey.

## Conclusions

The strength of this study is that it tested the relationship between pain and the risk of fall, which is an important topic in hospitalised postoperative older adults. Our study findings show that pain experienced by patients over 65 years of age increased the risk of falling. We therefore recommend that nurses and physiotherapists identify at-risk patients and take the requisite precautions, and that these measures be included in institutional policies.

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