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# Investigation of Frailty, Dependence, Fall Risk Levels, and Influencing Factors in Elderly Individuals

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**ABSTRACT**

The fragility, dependency and fall risk levels of the elderly are quite high. Physiological changes brought about by aging may cause recurrent falls in elderly individuals, and their quality of life may be negatively affected due to falls. This study was planned to examine fragility, dependence, fall risk, levels of protective behavior against falling, and the affecting factors in the elderly.

The cross-sectional, descriptive, and correlational study was carried out with 200 elderly individuals who were admitted to the osteoporosis outpatient clinic of a university hospital. Data collection was done through Elderly Individual Information Form developed by the researchers, the Edmonton Frail Scale, the Barthel Index, the Itaki Fall Risk Scale, and the Fall Behavioral Scale for Older People.

The mean age of the elderly who participated in the study was 72.07±6.76 years, 79.5% of the participants were female, 68% were primary school graduates, and 93.0% were retirement pensioners. The mean score of Edmonton Frail Scale was 6.06±2.92, Barthel Index was 94.85±12.57, Itaki Fall Risk Scale was 9.85±0.31, and Fall Behavioral Scale for Older People was 2.89±0.46. Many socio-demographic and fall-related risk factors specific to elderly individuals had an effect on the related scale scores ($p < 0.05$).

The elderly individuals were moderately frail, slightly dependent on others in performing their life activities, had a high risk of fall, and had moderate protective behavior against falls.

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## Introduction

Aging is defined as a period of life accompanied by various diseases due to the negative progression of morphological, bio-physiological, and psychosocial changes [1]. The rate of the elderly population aged 65 and over has increased by 13.4% in the last five years, and the proportion of the elderly population among the total population is 9.1%. As per population projections, it is predicted that the proportion of the elderly population will be 12.9% in 2030, 16.3% in 2040, 22.6% in 2060, and 25.6% in 2080. The proportion of the elderly population exceeding 10% of the total population is an indicator of the aging of the population [2].

"Frailty syndrome" is a condition that frequently occurs with the decline in physiological reserve in body systems as a result of aforementioned problems seen in the elderly [3]. Frailty is defined as a geriatric syndrome that describes all the negative health outcomes such as decrease in physiological reserves, stress intolerance, slowness, weakness, low physical activity, burnout, and decrease in body mass index with biological aging and can result in death . While the incidence of geriatric frailty syndrome is 20%–30% in individuals aged 75 and over, it rises to 30%–45% in those aged 85 years and older. Although the incidence of frailty syndrome increases with age, it is more common in women and the elderly with low socio-economic status [4-7]. Frailty syndrome negatively affects the life activities and functional independence of elderly individuals have stated that control of the fragility level of elderly individuals can maintain their independence and their quality of life at optimal level [7]. Therefore, early identification of the frailty level is crucial for planning effective interventions to manage this geriatric condition and reduce health costs [8-10].

It is very important to be able to perform life activities (LA) and basic movement-related functions (walking, climbing stairs, getting up from where they are, etc.) without help in reducing the level of frailty and supporting the independence of the elderly. However, aging-related deterioration in cardiovascular, musculoskeletal and

neuromuscular structures with aging causes a decrease in the ability of the elderly to perform their LA independently have reported that the degree of dependence increases with increasing age [11,12]. Yüce and Kavak have stated that the level of dependency increases with increasing age and that increasing level of dependency in performing LA also increases the risk of fall [13]. Especially, falls are more common in elderly individuals with weakness, inability to move, incontinence, insomnia, confusion, depression, and vision problems [14].

**Aims**

This study was planned to examine fragility, dependence, fall risk, levels of protective behavior against falling, and the affecting factors in the elderly. The following study questions were established in this regard:

**Research Question 1:** What are the fragility, dependence, fall risk, and protective behavior levels of elderly individuals?

**Study Question 2:** What are the factors affecting the fragility, dependence, fall risk, and fall protective behavior levels of elderly individuals?

## Materials and Methods

**Study Design**

The study was cross-sectional, descriptive, and correlational.

**Place and Time of Study**

The study was carried out on elderly individuals who were admitted to the outpatient follow-up unit (Osteoporosis Polyclinic) in the physical therapy and rehabilitation unit of a university hospital between December 2018 and June 2019. Individuals aged 65 and over who could read and write and communicate verbally and in writing were included in the study. Two-hundred elderly individuals who met the sampling criteria and agreed to participate in the study within the specified date range were included.

**Data Collection Tools**

**Elderly Individual Introduction Form:** This form developed by the researchers and consisted of questions that may affect the socio-demographic data of the elderly individuals and their frailty, dependence, and fall risk levels. In addition, analysis results of laboratory tests such as Ca, vitamin D, and parathyroid hormone (pTH) levels were obtained from the follow-up file of the elderly individuals.

**Edmonton Frail Scale:** The scale was developed by Rolfson et al. to determine frailty in elderly individuals, and the Cronbach alpha coefficient was found to be 0.62 [15]. The Turkish validity and reliability study of the scale was conducted by Aygör, and the Cronbach's alpha coefficient was found to be 0.75 [16]. The scale consists of 11 questions evaluating cognitive status, general health status, functional independence, social support, medications, nutrition, status, and functional performance in the elderly. The scores obtained from the scale are evaluated in the range of 0–20 points. The results are evaluated according to the frailty analysis score. Scoring: 0–4 = not frail; 5–6 = vulnerable; 7–8 = mild frailty; 9–10 = moderate frailty; and ≥11 = severe frailty.

**Barthel Index:** The index developed by Mahoney and Barthel in 1965 was modified by Shah et al. (1992) [17]. The Turkish version of the index was modified [18]. In the Turkish validity and reliability study of the original scale, the Cronbach's alpha reliability coefficient of the index was found to be 0.93 [18]. This scale consists of 10 items that assess the mobility status, including feeding, personal toileting, bathing, dressing and undressing, getting on and off a toilet, bladder control, bowel control, wheelchair/bed transfer, ambulation (walking or wheelchair mobility), and going up and down stairs ranging 5–15 points (between 0–15 points with 5-point increments according to the question). The main purpose of the assessment using this scale is to determine the level at which the individual performs these activities independently without any physical or verbal help. In this scale, where the obtained score is between 0 and 100, a high score indicates that the patient is independent and can perform daily activities on their own (0–20 points: fully dependent, 21–61 points: highly dependent, 62–90: points moderately dependent, 91–99 points, mildly dependent, and 100 points: fully independent) [18,19].

**Itaki Risk Reduction Scale:** The Itaki Fall Risk Scale was developed by the Republic of Turkey Ministry of Health Performance Management and Quality Improvement Directory. The scale is a result of studies aimed at developing a system specific to the country for the prevention of patient falls, which is a part of the "Patient Safety" practices in health quality standards [20-22]. The Itaki Fall Risk Scale is used to question 19 risk factors (8 items major risk factors and 11 items minor risk factors) that cause patient falls. In the scale, 1 point is associated with minor risk factors and 5 point is associated with major risk factors. A total score between 0 and 4 points indicates low risk; 5 points and above are considered high risk [20,21].

**Fall Behavioral Scale for Older People:** The scale was developed by Clemson, Cuming, and Heard (2003), and the Turkish version was developed by Uymaz and Nahcivan [23]. This scale consists of 30 items and 10 sub-dimensions. According to the findings of the validity and reliability study of the scale in the original language, Cronbach's Alpha coefficient was 0.84, alpha coefficient of subscales was 0.10, and alpha coefficient was 0.81. Content validity index was 0.93, and test–retest correlation was 0.94 [22]. In the Turkish version of the scale, the content validity index was 0.94, the Cronbach's alpha coefficient was 0.90, and item total score correlations were between $r = 0.23$ and $r = 0.70$ ($p = 0.01$) [23]. The self-report scale is intended to identify the behaviors and awareness levels of the elderly to protect themselves from potential falls. The statements in the scale question the behavior patterns of elderly individuals in terms of domestic life, lighting and vision, use of shoes, and outdoor and daily life. Each statement is a 4-point Likert-type scale, scored from 1 to 4. "Never" is 1 point, "sometimes" is 2 points, "usually" is 3 points, and always is 4 points. The lowest and highest possible score that can be obtained from the total scale and its subscales is between 1 and 4, and high scores from the scale indicate the individual's safe/protective behaviors regarding falling, while low scores indicate risky behaviors [22].

**Application of study**

Study data were collected one-on-one by the nurse researcher in the training room of the institution. Informed consent to participate in the study was obtained from the elderly individuals who were waiting in line for examination in the relevant polyclinic to participate in the study. The questions in the data collection form were read by the nurse researcher, and the elderly individual was asked to state/mark the answer that was appropriate for them. The nurse researcher, as a registered nurse is a doctorate student on the fundamentals of nursing, and with a total of 5 years' experience from 18-years clinical experience is in the rehabilitation department. The completion of data collection forms took 30–45 minutes.

### Analysis of Data

Descriptive statistics (mean, standard deviation, and percentage distributions) were used in the evaluation of the data in the study. Independent samples t-test was used to compare parameters with normal distribution between groups in the case of two groups, and one-way ANOVA was used in between-group comparison of more than two groups. The results were evaluated at the 95% confidence level, at the significance level ($p < 0.05$).

### Ethical Consideration

Permission to conduct this research was received from the XXX University Hospital Ethics Committee (Number: September 24, 2018/81509) and XXX University Hospital (Number: 104438). Prior the study, all patients were informed of the purpose of the research and were assured of their right to refuse to participate or to withdraw from the study at any stage.

### Results

Table 1 shows the socio-demographic characteristics of the elderly individuals participating in the study. Their mean age was 72.07±6.76 years, 79.5% were female, 68% were primary school graduates, and 93.0% were retirement pensioners. Furthermore, 74% of the elderly individuals lived with a family member (spouse, children, etc.), 61.5%, lived in an apartment with no elevator, 89.5% had children, and 92.4% had frequent contact with their children (Table 1).

**Table 1: Socio-Demographic Characteristics of Elderly Individuals (n = 200)**

| Socio-Demographic Characteristics | n | % |
|---|---|---|
| Gender | | |
| Female | 159 | 79.5 |
| Male | 41 | 20,5 |
| Mean age, years, (min–max) | 72,07±6,76 (60–93) | |
| Educational status | | |
| literate | 3 | 1,5 |
| Primary education | 136 | 68.0 |
| High school | 28 | 14,0 |
| University | 33 | 16,5 |
| Source of income | | |
| Retirement pension | 187 | 93,0 |
| Savings, interest, rent | 3 | 1,5 |
| Salary of spouse | 7 | 3,5 |
| Support of the child–relative | 1 | 0,5 |
| 65 age pension | 2 | 1 |
| Living with relatives | | |
| Alone | 52 | 26,0 |
| Yes (spouse, children, etc.) | 148 | 74,0 |
| Having children | | |
| Yes | 179 | 89,5 |
| No | 21 | 10,5 |
| Number of children (average) | 2.91±1.94 | |
| Contact status with children | | |
| Frequently | 166 | 92,7 |
| Rare | 11 | 6,1 |
| I am not seeing | 2 | 1,11 |
| Feature of the house | | |
| One-story house, detached house | 32 | 16,0 |
| Elevator available | 45 | 22,5 |
| No elevator available | 123 | 61,5 |

Table 2 shows the characteristics of the elderly individuals participating in the study regarding the risk factors associated with falls. It was determined that 69.5% had a chronic disease, and more than half (73.4%) of those with chronic diseases had hypertension. More than half (74.5%) had regular medication, 67% wore glasses, and 18% had eye surgery (Table 2).

**Table 2: Risk Factors Associated With Falls in Elderly Individuals (n = 200)**

| Risk Factors Associated with Falls | N | % |
|---|---|---|
| Having a chronic disease | | |
| Yes | 139 | 69,5 |
| No | 61 | 30,5 |
| Regular medication use | | |
| Yes | 51 | 25,5 |
| No | 149 | 74,5 |
| Wearing glasses | | |
| Yes | 134 | 67,0 |
| No | 66 | 33,0 |
| Having eye surgery | | |
| Yes | 36 | 18,0 |
| No | 164 | 82,0 |
| History of fall in the past year | | |
| Yes | 71 | 35,5 |
| No | 129 | 64,5 |
| Number of falls* (average) | 2,45± 2,05 (1–5) | |
| Use of auxiliary equipment | | |
| Yes | 67 | 33,5 |
| No | 133 | 66,5 |
| Walking tools (n = 67) | | |
| Walking stick | 54 | 80,6 |
| Walker | 12 | 17,9 |
| Crutches | 1 | 1,5 |
| Presence of previous fracture | | |
| Yes | 67 | 33,5 |
| No | 133 | 66,5 |
| Fracture time (n = 67) | | |
| In the past year | 5 | 7,4 |
| 1–9 years | 32 | 47,8 |
| ≥10 years | 15 | 22,4 |
| ≥20 years | 15 | 22,4 |
| Foot range | 18,44±5,55 | |
| Step length | 28,45±7,96 | |
| Timed Up and Go test (sec) (min–max) | 18.00±16.17 sec (6–180) | |
| Pth level (mean) | 54.51±21.36 pg/ml | |

| | |
|---|---|
| Vitamin D; 25-hydroxycholecalciferol (mean) | 25.41±12.10 ng/ml |
| Ca level (average) | 9.27±0.40 mg/dl |

Moreover, 64.5% of the elderly individuals did not have a history of fall in the last year, and those who had a fall had experienced it more than once (2.45 ± 2.05 times). Besides, 66.5% of the elderly who participated in the study did not use assistive equipment for walking. Among the assistive device users, the most used equipment was walking stick (80.6%); 66.5% of them had no history of fracture, and the fracture mostly developed in a period of 1–9 years (47.8%) as a result of fall (80.6%). The mean range of both feet in the normal stand position of the elderly individuals was 18.44 ± 5.55, the step length was 28.45 ± 7.96, and the mean of Timed Up and Go tests was 18.00 ± 16.17 sec. In the laboratory tests of the elderly, the mean pTH Level was 54.51 ± 21.36 pg/mL, vitamin D (25-hydroxycholecalciferol) level was 25.41 ± 12.10 ng/mL, and the mean Ca level was 9.27 ± 0.40 mg/dL (Table 2).

The distribution of the mean scores of the elderly individuals participating in the study is shown in Table 3 according to the scales. The mean score of Edmonton Frail Scale was 6.06 ± 2.92, Barthel Index was 94.85 ± 12.57, Itaki Fall Risk Scale was 9.85 ± 0.31, and Fall Behavioral Scale for Older People was 2.89 ± 0.46.

**Table 3: Mean Scores of Elderly Individuals on the Levels of Frailty, Dependence, and Fall Risk (n = 200)**

| Scales | Min | Max | Mean | SS |
|---|---|---|---|---|
| Edmonton Frail Scale | 0 | 14 | 6,06 | 2,92 |
| Barthel Index | 20 | 100 | 94,85 | 12,57 |
| Ittaki Fall Risk Scale | 1 | 21 | 9,85 | 0,31 |
| Fall Behavioral Scale for Older People | 1,53 | 5 | 2,89 | 0,46 |

The comparison of the mean scores of the individual characteristics of the elderly who participated in the study regarding dependency and fall risk levels are given in Table 4. No significant difference was found between the socio-demographic characteristics of the individuals participating in the study and the Edmonton Frailty Scale. However, there was a statistically significant difference between the gender, living with a relative, having a child, and the Barthel Index score of the elderly individuals ($p < 0.05$). Accordingly, it was observed that older individuals with female sex, living alone, and having children were found to have higher mean Barthel Index scores than the other groups (Table 4).

A positive and significant correlation was found between the mean age of the elderly individuals participating in the study and the mean Itaki Fall Risk score ($p < 0.05$). In addition, there was a statistically significant difference between education status, living with a relative, having children, the characteristics of the house, and the mean score of Itaki Fall Risk ($p < 0.05$). It was observed that the mean of Itaki scores of the elderly individuals who were literate and graduated from high school, living alone, not having children, and living in a single-story detached house were higher (Table 4).

A positive and significant correlation was found between the mean age of the elderly individuals participating in the study and the mean scores of the Behavior Scale for Older People ($p = 0.001$). A significant difference was also noted between the characteristics of the house of elderly people and the mean score of Behavior Scale for Older People ($p < 0.05$). The elderly individuals living in a single-story detached house had higher mean scores of Behavior Scale for Older People than the others (Table 4).

**Table 4: Comparison of the Individual Characteristics and the Mean Scores of Frailty, Dependence, and Fall Risk Levels of Elderly Individuals (n = 200)**

| Socio-demographic characteristics | Edmonton Frail Scale | F/t, p* | Barthel Index | F/t, *p** | Ittaki Fall Risk Scale | F/t, p* | Fall Behavioral Scale for Older People | F/t, p |
|---|---|---|---|---|---|---|---|---|
| Gender* | 5,95±2.93 | 0,659 0,418 | 95,22±11,76 | 3,542 0,05 | 1,89±0,31 | 0,122 0,727 | 2,89±0,41 | 1,239 0,267 |
| Female | | | | | 1,90±0,30 | | 2,88±0,40 | |
| Male | 6,46±2,88 | | 93,41±15,38 | | | | | |
| Mean age, years, (min–max)** | -0,039 0,585 | | -0,101 0,157 | | 0,142 0,045 | | 0,241 0.001 | |
| Education status*** | | | | | | | | |
| Literate | 6,00±2,00 | | 93,33±11,54 | | 2,00±0,00 | | 3,03±0,11 | |
| Primary education | 6,05±2,94 | 0,565 0,639 | 94,92±12,54 | 0,117 0,950 | 1,91±0,28 | 4,888 0,003 | 2,92±0,48 | 0,934 0,425 |
| High school | 5,53±3,06 | | 95,71±9,40 | | 2,00±0,00 | | 2,86±0,47 | |
| University | 6,51±2,79 | | 93,93±15,29 | | 1,89±0,30 | | 2,78±0,43 | |
| Living with relatives* | | 1,108 0,294 | | 5,758 0.017 | 1,96±0,19 | 16,348 0,000 | 3,00±0,49 | 0,038 0,847 |
| Alone | 6,53±2,69 | | 96,53±8,49 | | 1,87±0,33 | | 2,85±0,45 | |
| Yes (spouse, child etc.) | 5,90±2,98 | | 94,17±13,77 | | | | | |
| Having a child* | | 0,680 0,795 | 94,38±13,12 | 9,860 0,002 | | 3,763 0,044 | 2,91±0,47 | 0,038 0,846 |
| Yes | 6,00±2,92 | | | | 1,88±0,31 | | 2,74±0,09 | |
| No | | | 98,81±4,44 | | 1,95±0,21 | | | |
| House characteristics** | | 0,346 0,708 | 92,34±14,31 | 0,765 0,466 | 2,00±0,00 | 3,199 0,04 | | 3,443 0,04 |
| One-story house, detached house | 6,03±2,74 | | 95,55±9,24 | | 1,82±0,38 | | 3,05±0,50 | |
| Elevator available | 5,75±3,00 | | | | | | 2,89±0,43 | |
| No elevator available | 6,17±2,94 | | 95,24±13,14 | | | | 2,85±0,46 | |

*Independent Samples Test, **Pearson Correlation Test, ***ANOVA Test

The comparison of the risk factors related to falls and the mean scores of frailty, dependency, and fall risk levels of the elderly individuals participating in the study are presented in Table 5. A statistically significant difference was perceived between regular medication use and the Edmonton Frailty Scale mean scores of the elderly individuals participating in the study ($p < 0.05$). The Edmonton Frailty Scale mean scores of the elderly individuals using regular medication were higher (Table 5).

A statistically significant difference was determined between the presence of chronic disease, regular medication use, history of fall in the last year, use of assistive devices, and the Barthel Index mean score ($p < 0.05$). The mean Barthel Index scores of the elderly individuals without chronic disease, regular medication use, history of fall in the last year, and who wear glasses and use assistive devices were higher. Moreover, a highly significant negative correlation was found between the mean of the Timed Up and Go tests and the mean Barthel Index point of the elderly individuals ($p < 0.000$) (Table 5).

A statistically significant difference was determined between the presence of chronic disease, regular medication use, eye surgery, history of fall in the last year, use of assistive devices, and the mean score of Itaki Fall Risk ($p < 0.05$). The mean of the Ittaki Fall Risk score was higher in the elderly individuals who did not have a chronic disease, had eye surgery, had a history of falling in the last year, and used assistive devices. In addition, a significant correlation was found between the means of step length (negative), Timed Up and Go tests (positive), and vitamin D levels (positive) and mean Itaki Fall Risk scores of elderly individuals ($p < 0.05$) (Table 5). A statistically significant difference existed between the eye surgery and the presence of fractures so far and the Fall Behavioral Scale

mean score ($p < 0.05$). The Fall Behavioral Scale for Older People mean scores of the individuals who had undergone eye surgery and had fractures in the past were higher. A significant negative correlation was found between the step length and the mean scores of the Fall Behavioral Scale of the elderly individuals ($p < 0.05$) (Table 5).

**Table 5: Comparison of Risk Factors Associated With Falls and Mean Scores of Frailty, Dependence, and Fall Risk Levels of Elderly Individuals (N = 200)**

| Risk factors associated with falls | Edmonton Frail Scale | F/t, p | Barthel Index | F/t, p | Itaki Fall Risk Scale | F/t, p | Fall Behavioral Scale for Older People | F/t, p |
|---|---|---|---|---|---|---|---|---|
| Having a chronic disease* | | | | | | | | |
| Yes | 6,16±2,74 | 2,399<br>0,123 | 94,36±13,46 | 4,077<br>0,041 | 1,87±0,32 | 8,483<br>0,001 | 2,92±0,48 | 0,320<br>0,573 |
| No | 5,81±3,49 | | 96,42±9,70 | | 1,95±0,21 | | 2,82±0,43 | |
| Regular medication use* | | | | | | | | |
| Yes | 6,12±2,77 | 2,504<br>0,01 | 94,46±13,30 | 2,203<br>0,03 | 1,89±0,30 | 0,453<br>0,502 | 2,93±0,48 | 0,505<br>0,478 |
| No | 5,86±3,34 | | 95,98±10,14 | | 1,88±0,32 | | 2,78±0,40 | |
| Wearing glasses* | | | | | | | | |
| Yes | 5,91±2,74 | 1,632<br>0,203 | 94,51±13,54 | 0,371<br>0,543 | 1,93±0,25 | 2,539<br>0,113 | 2,91±0,44 | 1,014<br>0,315 |
| No | 6,62±3,40 | | 92,50±11,97 | | 1,87±0,34 | | 2,83±0,50 | |
| Having eye surgery* | | | | | | | | |
| Yes | 5,69±2,38 | 1,384<br>0,241 | 97,22±8,89 | 5,878<br>0,012 | 2,00±0,00 | 27,199<br>0,000 | 3,00±0,47 | 3,749<br>0.050 |
| No | 6,14±3,04 | | 94,25±13,27 | | 1,87±0,33 | | 2,78±0,46 | |
| History of fall within the last year* | 6,18±3,04 | 0,593<br>0,442 | 92,95±14,48 | 8,493<br>0,004 | 1,93±0,25 | 6,138 | 2,93±0,45 | 0,010<br>0,921 |
| Yes | | | | | | | 2,86±0,47 | |
| No | 5,98±2,86 | | 96,01±11,26 | | 1,87±0,33 | | | |
| Number of falls**(average) | 0,049<br>0,490 | | -0,029<br>0,684 | | 0,099<br>0,165 | | 0,096<br>0,174 | |
| Use of auxiliary equipment* | | | | | | | | |
| Yes | 6,20±2,77 | 0,002<br>0,965 | 91,11±16,32 | 7,311<br>0,009 | 1,98±0,13 | 22,186<br>0,000 | 3,13±0,38 | 0,767<br>0,384 |
| No | 4,33±2,53 | | 83,33±24,61 | | 1,83±0,38 | | 2,90±0,40 | |
| Presence of previous fracture* | | | | | | | | |
| Yes | 6,53±3,00 | 0,124<br>0,725 | 95,59±12,50 | 0,735<br>0,392 | 1,91±0,28 | 1,039<br>0,309 | 2,90±0,34 | 15,141<br>0,000 |
| No | 5,83±2,85 | | 94,47±12,63 | | 1,88±0,31 | | 2,89±0,52 | |
| Foot range** | 0,025 | | -0,008<br>0,910 | | -0,029<br>0,687 | | -0,056<br>0,431 | |
| Step length** | 0,089<br>0,211 | | 0,067<br>0,347 | | -0,177<br>0,012 | | -0,170<br>0.016 | |
| Timed Up and Go test (sec) (min-max)** | -0,067<br>0,346 | | -0,516<br>0,000 | | 0,151<br>0,03 | | 0,129<br>0,069 | |
| pTH level (mean)** | 0,042<br>0,555 | | 0,119<br>0,093 | | -0,037<br>0,600 | | -0,036<br>0,615 | |

| | | | | |
|---|---|---|---|---|
| Vitamin D; 25-hydroxycholecalciferol (mean)** | 0,048<br>0,498 | -0,030<br>0,671 | 0,140<br>0,04 | 0,013<br>0,852 |
| Ca level (mean)** | 0,034<br>0,630 | 0,068<br>0,341 | 0,076<br>0,282 | 0,022<br>0,760 |

*Independent Samples Test, **Pearson Correlation Test

## Discussion

Aging is a life stage in which health problems occur frequently as a result of bio-physiological and pathological changes. Owing to aging, the level of frailty increases and the functional independence of individuals in performing LA decreases [6,28]. In this context, the study was carried out to examine levels of frailty, dependence, fall risk, protective behavior against fall, and the affecting factors in the elderly.

**Study Question 1: The frailty, dependence, fall risk, and protective behavior levels against falls in elderly individuals**

It was determined that the majority of elderly individuals were female (79.5%), primary school graduates (68%), and lived on a pension (93.0%) (Table 1). Majority (74.5%) of the elderly individuals, more than half of whom had chronic diseases (69.5%), were on regular medication and used glasses (67.0%). Most of the elderly who were followed regularly in the osteoporosis outpatient clinic did not have a history of fall in the last year (64.5%) and did not use walking assistive devices (66.5%). On the other hand, it was found that assistive device users mostly make use of walking stick (80.6%) and had no previous history of fractures (66.5%). Laboratory results obtained from the patient file were found to be within the normal range (Table 2). These results show similarities with the socio-demographic characteristics of elderly individuals living in Turkey and other study results [2,28,29]. It is thought that the laboratory results of the elderly are within the normal range, and the absence of fracture history in the last year is due to their regular follow-up in the osteoporosis outpatient clinic. The mean score of Edmonton Frail Scale was 6.06±2.92, Barthel Index was 94.85±12.57, Itaki Fall Risk Scale was 9.85±0.31, and Fall Behavioral Scale for Older People was 2.89±0.46. The evaluation of scales applied to the elderly individuals participating in the study showed that they were moderately frail, slightly dependent in performing their LA, had a high risk of fall, and had moderate protective behavior against fall.

**Study Question 2: Factors affecting frailty, dependence, fall risk, and protective behavior levels in elderly individuals**

The socio-demographic characteristics of the elderly individuals included in the study did not affect the frailty level, while it was observed that the frailty levels of the elderly individuals who regularly use medication were higher ($p < 0.05$) (Table 4-5). In this study, factors affecting frailty may not have been observed as a positive result of regular outpatient follow-up. It is stated that the level of frailty increases with advanced age in their study conducted on 186 elderly individuals who were hospitalized in internal medicine and surgery clinics, determined that the elderly individuals were frail in the mild-to-moderate range (8.18 ± 3.4] and that the frailty scores increased with increasing age [6,23,27,28]. According to a systematic analysis study, advanced age, female gender, and low quality of life affect the level of frailty in Turkey [29]. Similar to our study results, it has been emphasized that regular medication use affects the level of frailty [30-33].

The level of ability to perform LA (Barthel Index) of elderly individuals with advanced age (65 years or older age), who live alone at home, do not have children, do not have chronic diseases, do not use regular medications, use glasses, have no history of fall in the last year, use assistive devices, and have a shorter Timed Up and Go test scores was found to be higher than that of the other groups ($p < 0.05$) (Table 4-5). Gender difference in the elderly is an important determinant on functionality, and women's higher level of fulfillment of LA than men can be explained by the fact that women take an active role in domestic responsibilities at all ages in Turkey [34]. Kankaya and Karadokavan have found that age group, marital status, use of assistive devices, cohabitants, and income status significantly affect dependence level in their study of elderly individuals who are in the moderately dependent-to-completely independent range [35]. Other studies have also stated that the state of dependence increases with age [36-38].

In addition, advanced age, being literate, being a high school graduate, living alone at home, having no children and living in a one-story detached house, not having chronic diseases, undergoing eye surgery, history of fall in the last year, using an assistive vehicle, shorter step length and longer Timed Up and Go test score were found to be associated with higher levels of fall risk (Itaki Score) in elderly individuals ($p < 0.05$), (Tables 4, 5). It has been stated in studies that the risk of fall is higher in the group aged 65 and over [39-41]. In the study conducted in Turkey in a large sample group (n = 2721) female gender, advanced age, and the presence of a fall history were determined as important factors that increase the risk of fall in the elderly [42]. In addition, studies examining the relationship between the level of dependency in LA and the risk of falling have revealed that the presence of chronic disease affects these two variables negatively [43-45]. The inability to perform LA caused by deterioration in visual function, obstacles in the field of vision, inability to fulfill social LA as before, and the increase in chronic diseases with aging negatively affect quality of life [46]. In studies on falls in the elderly, it has been stated that vision loss in elderly individuals is a major variable inducing the risk of falling, leading to fear of fall and decreased quality of life [47,48]. In another study investigating falls in individuals with vision problems, it has been found that vision loss increases the risk of fall. The higher risk of fall in elderly individuals who underwent eye surgery and use assistive devices obtained in our study is in line with the relevant literature [21, 49,50].

Moreover, it was observed that elderly individuals with advanced age, living in a single-story detached house, who had previous eye surgery, fracture experience, and shorter step length had higher levels of developing protective behaviors against fall (Behavior Scale for Older People) ($p < 0.05$)., (Tables 4,5). Birimoğlu Okuyan and Bilgili have found higher levels of protective behavior against fall in female, in individuals aged 81 years and older, who are illiterate, have chronic disease, poor perception of physical health, fear of fall, and do not exercise regularly in their study conducted with elderly nursing home residents (n = 124) [51]. In a different study, it has been found that elderly individuals with low vision also had higher levels of protective behavior against fall [46].

## Conclusions

Identification of frailty, dependency, fall risk, protective behavior levels, and affecting factors in the elderly is essential for countries

with increasing elderly population and for caregivers. Failure to control these conditions may lead to recurrent falls in elderly individuals and their quality of life may be adversely affected due to falls. Therefore, nurses should identify the frailty, dependence, fall risk levels of the elderly, and the factors affecting them in the early period and plan supportive interventions for the development of necessary protective behaviors. These planned interventions may help to control the risk factors associated with falls, which cause high morbidity and mortality in advanced age. Such interventions may also increase the participation of elderly individuals in social life by creating appropriate outdoor and indoor environments. Furthermore, it is recommended to conduct modeling studies to examine the factors affecting fragility, addiction, fall risk, and protective behavior levels for elderly individuals. Experimental studies on the effectiveness of different nursing interventions on these factors should also be performed.

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