



# Evaluation of Causes and Outcomes of Domestic Falls of the Patients Aged 65 and Over

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## Abstract

**Introduction:** To describe the characteristics of the elderly patients admitted to the emergency department (ED) due to domestic falls concerning the causes and outcomes of the accident.

**Methods:** This study included all consecutive elderly patients admitted to the ED within two months due to domestic falls. Descriptive analyses regarding demographics, history, and clinical findings were performed.

**Results:** In this study, 159 elderly patients were admitted with falls in the study period, while 73 patients had exclusion criteria. Mean age was 76.7±7.1 and 68.4% (n=59) were female. 81.2% of the patients were diagnosed with soft tissue injuries. Sixteen patients with fractures were older than patients without fractures (p=0.016). "Trip and fall" was the most common mechanism (n=37, 43.5%).

**Discussion and Conclusion:** Although a majority of domestic falls in the elderly result in simple injuries, fractures occur in older patients, patients with smoking habits and/or alcohol use, or on routine use of medicines.

**Keywords:** Domestic accident; domestic falls; emergency department; elderly; fall risk.

Nowadays, parallel to the developments in technology and medicine, people's life span is getting longer, which leads to an increase in the elderly population. According to the World Health Organization data, while the number of people aged 65 and over in developing countries was 524 million in 2010, it is estimated that this number will increase approximately by three times in 2050 to reach 1.5 billion<sup>[1]</sup>. It has been estimated that 7.68% of Turkey's population of 76,481,847 people in 2013 aged 65 and over will increase to 17.3% in 2050<sup>[2, 3]</sup>.

Fall from a height may be defined as the person's sudden fall on the ground or to a lower level than the level where

he is, without any intentional movement, a health problem, i.e., a stroke or an external force, such as a car crash<sup>[4, 5]</sup>. Falling is a common condition in the elderly<sup>[2]</sup>. While the annual fall rate per capita is 30-40% in healthy people aged 65 and over, this rate rises to 50% in people living in care centers. For people over 75, the annual rate of falling climbs to 50 percent. People who had fallen at least once in the past year have a fall rate of around 60 percent<sup>[6, 7]</sup>.

Two-thirds of the accidents, which are the most common cause of death following cardiovascular disease, cancer, stroke, cerebrovascular disease and lung disease in the elderly, occur after the fall incidents<sup>[8]</sup>. Falls in the elderly cause

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loss of movement and independence in 20-30% of these individuals and serious injuries in 10% of them<sup>[9]</sup>. In people aged 60 years and older, 10% of emergency admissions and 6% of emergency hospitalizations arise from falls, and fractures related to falls are responsible for 5-10% of these hospitalizations<sup>[10]</sup>. In a large-scale study performed in the elderly who applied to the emergency service due to a fall injury, it was observed that 2.2% of these patients died<sup>[11]</sup>.

In a study, the findings showed that 25-75% of the elderly who lived in a healthy community and had a hip fracture due to a fall could not return to their functional status they had before the accident<sup>[12]</sup>.

It has been indicated that the falls occur mostly in and around the house, and the majority of domestic falls arise from the conditions in the house<sup>[13]</sup>. It has been reported that one-third or half of the domestic falls arise from carpets, rugs, wet surfaces, problematic floors, steps, non-fixed furniture and objects, poor lighting, and the majority of the houses have an environmental risk associated with falls, and these factors increase the risk of falling 3-4 times<sup>[14-19]</sup>.

It has been reported that most of the physical environmental predisposing factors for falls are correctable, the correction of home security conditions significantly reduces the incidence of falls and related injuries eventually contributing to the reduction of health costs<sup>[20-22]</sup>. The aim of these arrangements is to reduce the number of recurrent falls, the risk of disease and death<sup>[10, 23]</sup>.

In our country, it has been stated that there is a need for some architectural arrangements to be made in areas carrying risk of fall for the elderly, such as door widths, thresholds and height of the toilet seat to enable the elderly to move independently in and outside the home, such as the garden<sup>[14]</sup>.

## Materials and Methods

This study was conducted retrospectively on patients who were admitted to the Health Sciences University Haydarpaşa Numune Training and Research Hospital (HNEAH) Emergency Medicine Clinic within two months between 03.15. 2017 and 05.15. 2017 in accordance with the inclusion criteria.

Using the ICD 10 diagnostic coding system, patient data were accessed. The demographic information of the patients, systemic diseases, whether they lived alone at home, their marital status, history of systemic disease(s), drug use, and smoking habits were noted in the previously prepared data collection form. Then, the parts of the house where the elderly experienced falls were divided into two parts as

areas with wet floors, such as the bathroom, kitchen, and other parts of the house. The existence of causes of falling incidents, as stumbling and dizziness was, questioned. In addition, the patient's hospitalization or discharge status because of the fractures developed due to a fall was noted.

In the light of the information received about the mechanism of falling, patients falling due to stumbling (trip and fall mechanism) were included in Group A. Patients who fell down because of dizziness, nausea, and loss of balance were included in Group B.

Patients aged 65 years and over living in their home, not in a nursing home with complete medical records and stated that falling incident happened at home without any external force as being pushed by someone else, and not related to acute myocardial infarction (AMI), cerebrovascular accident (CVA) were included in this study.

Patients under the age of sixty-five years, cases where the incident occurred outside the home borders, people who did not live in a home environment and stayed in a nursing home, patients who fell because of an external force, such as being pushed, by someone else, patients who fell due to a pathological condition, such as CVA, and AMI, patients with missing data were excluded from this study.

The data of the cases included in this study were entered into the SPSS program. The data of the patients were analyzed comparatively. For the comparison of categorical data, 2 x2 table and  $\chi^2$ , for the comparison of averages t-test was used. P-value of <0.05 was considered to be statistically significant.

## Results

A total of 159 patients aged 65 years or over were admitted to the HNEAH Emergency Medicine Clinic of Health Sciences University between 03.15. 2017 and 05.15. 2017 due to falls occurred within the two months. It was determined that nine patients were residing in nursing homes, 31 patients fell outside home, 21 patients fell due to a condition, such as CVE, seven patients had inadequate medical records, one patient was pushed by someone else, and three patients fell down the stairs. In this way, a total of 73 patients were excluded from this study. Eighty-five patients who complied with the study criteria were included in this study.

The socio-demographic and clinical characteristics of the patients included in this study are given in Table 1. Only 5.9% of the cases were hospitalized, others were discharged after the emergency room, and other physical examinations were completed.

When the patients included in this study were examined

**Table 1.** Descriptive socio-demographic and clinical features of the elderly patients who were presented to the emergency service because of a fall from a height

Variables	Data of Subgroups	
Mean ( $\pm$ SD) age	Mean $\pm$ SD 76.7 $\pm$ 7.1	
Age category	<80 (n; %) 51; 60	$\geq$ 80 (n; %) 34; 40
Gender	Female (n; %) 59; 69.4	Male (n; %) 26; 30.6
With whom he/she is living?	Alone (n; %) 13, 15.3	Spouse/partner/family (n; %) 72; 84.7
Marital status:	Married (n; %) 37; 43.5	Single/separate/divorced (n; %) 48; 56.5
History of surgery	Yes (n; %) 39; 45.9	No (n; %) 46; 54.1
History of systemic disease	Yes (n; %) 51; 60	No (n; %) 34; 40
Long-term drug use	No (n; %) 27; 31.8	Use of at least one drug (n; %) 58; 68.2
Habits of smoking/alcohol use	Yes (n; %) 27; 31.8	No (n; %) 58; 68.2
Number (%) of falls within the previous year (n; %)	None: 51; 60 Once : 22; 25.9 Twice: 8; 9.4 Thrice: 4; 4.7	
The part of the home where the fall incident happened (n; %)	Kitchen: 18; 21.2 Bathroom: 29; 34.1 Bedroom: 15; 17.6 Hall: 14, 16; 5 Other: 9; 10.6	
Causes of falls	Dizziness: 36; 42.4 Stumbling: 37; 43.5 Faintness 1; 1.2 Loss of balance: 11; 12.9	
Relevant diagnoses made	Soft tissue trauma: 69; 81.2 Hip fracture: 3; 3.5 Extremity fracture: 6; 7.1 Vertebra fracture: 6; 7.1 Nasal fracture: 1; 1.2	
Outcomes (hospitalization/discharge)	Discharged (n; %) 80; 94.1	Hospitalization/surgery (n; %) 5; 5.9

according to the number of drugs they used regularly, 16 (18.8%) of 85 patients with available data were using one drug, and 42 (49.4%) of them multiple drugs, while 27 (31.8%) patients were not using any drug.

Patients who had a history of falling at least once in the past year had statistically significantly higher rates of fracture when compared with the patients without a previous history of fracture (32.3% and 9.8%, respectively chi-square=6.78, p=0.009). The patients who had a habit of smoking and alcohol use had a history of falling in the

last year similar to patients who had not such habits (chi-square=0.03, p=0.84 31.3% and 29.4%, respectively chi-square=0.03, p=0.84).

Sixty-nine cases were diagnosed with soft tissue trauma (STT) due to falls (81.2%), without any fracture or major complication. Fractures were detected in 16 patients (18.9%). The mean age of the patients with fractures was significantly higher than those without (80.5 $\pm$ 6.0 and 75.8 $\pm$ 7.1; respectively: p=0.016). Again, in patients with fractures, rates of single or multiple drug use on a regular basis were

higher than the patients diagnosed with SSTI, but this difference was not statistically significant ( $\chi^2=3.375$ ,  $p=0.066$ ). Although the section where the fall occurred was highly diverse in the houses, the patients were analyzed by dividing them into two groups, as patients falling in the wet (kitchen and bathroom) and other sections of the house. Forty-seven (55.2%) patients fell in wet sections and 38 (44.8%) in other sections of the house. The mean ages of the patients falling in the two sections were similar (76.7 and 76.6 years, respectively;  $p=0.96$ ). The mean rates of fracture diagnosis of the two groups were similar ( $\chi^2=1.06$ ,  $p=0.3$ ). The rates of domestic falls among both men and women were similar ( $\chi^2=1.54$ ,  $p=0.2$ ). Twenty-six cases (30.6%) had a habit of smoking or alcohol use, and 59 cases (69.4%) had not. Again, the rates of recurrent and non-recurrent fractures were similar (15.3% and 20.3%, respectively;  $\chi^2=0.29$ ,  $p=0.59$ ).

In the light of the information received about the fall mechanism, stumbling was the most common condition (Group A,  $n=37$ , 43.5%). Dizziness, feeling of faintness, loss of balance were considered as a single and the larger group (Group B,  $n=48$ , 56.5%). The rates of fracture diagnosis in Groups A and B were similar (16.2% and 20.8%, respectively;  $\chi^2=0.29$ ,  $p=0.58$ ). It was observed that the habits of smoking and alcohol use in Group A were encountered at a significantly lower rate than Group B (18.9% and 39.5%, respectively;  $\chi^2=4.2$ ,  $p=0.04$ ).

## Discussion

Elderly individuals do not live in risk-free and safe environments and become more prone to experience domestic falls as a result of inherent physiological changes and cognitive problems. Gillespie et al.<sup>[24]</sup> reported that 30% of the individuals aged 65 and over experienced falling incidents and related complications each year, and this rate was even higher in patients staying in nursing homes. Recently, Patel et al.<sup>[25]</sup> reported that one out of every three elderly suffers from falls every year, and 87% of the fractures in the elderly occur as a result of falls. It has been reported that the biggest risk factor for falling had a fall history. It is noted in the literature that the risk of falling can be significantly reduced by well-designed interventions focusing on high-risk individuals<sup>[22]</sup>.

In our country, any significant studies are not available regarding the subgroups vulnerable to a higher risk of falling, and the kind of interventions that may reduce this risk. In their study on the falling incidents and relevant risks in the elderly population in Trabzon, Güner et al. indicated that 51% of the patients had been using one or more medica-

tions, and almost half of them did not experience a falling incident in the past year. Besides, the bathroom and toilets were highly risky for the elderly<sup>[26]</sup>. These findings are largely compatible with those in our study. In our study, 55.2% of patients fell in wet sections of their homes. Approximately 2/3 of the patients were using one or more drugs.

In a systematic review, data were presented indicating that muscle strengthening, balance-enhancing training, discontinuation of psychotropic drugs, and insertion of a cardiac pacemaker when necessary could reduce the risk of falling<sup>[24]</sup>. Patel et al.<sup>[25]</sup> reported that the correction of vision problems, physiotherapy exercises, including balance, strength-enhancing, and gait training, and minimizing the use of sedative drugs reduced the risk of falling to a minimum. In fact, it has been revealed that the risk of falling in the elderly who should use anticoagulation, the risks of discontinuation of anticoagulation will need to be balanced with the risk of falling incidents.

In their study of 1172 patients, Stevens et al.<sup>[27]</sup> stated that falling in the bathroom caused more serious injuries than falling in other parts of the house. It is thought that this risk can be reduced by minor modifications, such as hand-lebars.

In our study, similar domestic fracture rates were detected in the bathroom, kitchen and other areas. In the future, healthier analyzes can be performed on this subject through larger-scale, multi-center studies.

The results we obtained in our study have many limitations to generalize the risk of falling to the entire elderly population. Since our was a single-centered trial, it did not include a detailed evaluation of patients using a scale, such as SF-36 Quality of Life Scale; rather it was a preliminary study and should be supported by multi-centered, population-based studies.

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**Conflict of Interest:** None declared.

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