**Demographic Features of Fall-Related Trauma in Geriatric Population in the Emergency Department: 5 Years Experience**

Acil Servise Düşme Nedenli Travma Nedeniyle Başvuran Yaşlı Populasyonun Demografik Özellikleri: 5 Yıllık Deneyim

*Erdem Türkseven1, Can Öner1\*, Engin Ersin Şimşek1*

**ABSTRACT**

**Introduction:** Life expectancy increases throughout the world and it was estimated that in 2020 nearly 12% of the Turkish population will be categorized as elderly. Trauma, especially falls are important cause of admission to emergency departments for elderly. This study evaluates the demographical profile of fall-related emergency admissions of elderly for 5 years. **Method:** This study is a retrospective cross-sectional study, carried out in elderly patients (≥65 years) admitted to the emergency department between January 2013 to 31 December 2017. A fall is defined as a situation coded as E880-E888 in ICD9 and W00-W19 in ICD 10 in an electronic database. 460 admissions met these inclusion criteria. All of the demographical data were obtained from hospital records. **Results:** The rate of emergency admission due to fall related trauma was %1.3 and this rate increase up to 11.84% in older patients group. The mean age of the group was 74.8±7.5 years, and most of the patients have at least one underlying disease. Most of the falls take place outside from home, summer and daytime. Only 1 death occurred due to falls. **Conclusion:** Falls and related injuries are an important public health problem due to growing elderly population. In conclusion, nearly 1 in 6 elderly admitted to the emergency department due to falls, and this rate is expected to increase. Preventive measures must be taken to reduce these falls and related injuries and epidemiological data should be gathered regularly and methodologically.

**Key words:** Falls, trauma, elderly

**ÖZET**

**Giriş:** Yaşam beklentisi tüm dünyada artmaktadır, 2020 yılında Türk toplumunda yaşlı oranının %12 civarında olacağı tahmin edilmektedir. Travmalar özellikle düşmeler yaşlı bireylerin acil servise başvuruları için önemli bir nedendir. Bu çalışmada 5 yıl boyunca acil servise düşme nedenli olarak başvuran yaşlıların demografik özellikleri değerlendirilmiştir. **Yöntem:** Mevcut geriye dönük kesitsel çalışma Ocak 2013-Aralık 2017 tarihleri arasında acil servise başvuran yaşlılar (≥65 yaş) ile yürütülmüştür. Çalışmada düşme elektronik veri tabanına ICD 9 kodlarına göre E880-E888 ve ICD 10 kodlarına göre W00-W19 arasında kodlanan tanılar olarak kabul edilmiştir. Veri tabanından elde edilen 460 hasta çalışmanın örneklemini oluşturmuştur. Tüm demografik veriler hastane kayıtlarından elde edilmiştir. **Bulgular:** Acil servise başvurular içinde sadece %1,3 yer tutan travma olgularının oranı yaşlı hasta grubunda %11,84’e yükselmektedir. Grubun yaş ortalaması 74,8±7,4 yıldır, hastaların çoğunda altta yatan bir hastalık bulunmaktadır. Düşmelerin büyük çoğunluğu ev dışında, yaz mevsiminde ve gündüz gerçekleşmiştir. Düşme nedenli sadece 1 ölüm gerçekleşmiştir. **Sonuç:** Düşme ve ilişkili yaralanmalar artan yaşlı nüfus nedeni ile önemli bir halk sağlığı sorunu olarak karşımıza çıkmaktadır. Sonuç olarak her 6 yaşlıdan 1’i düşme nedenli olarak acil servise başvurmaktadır, bu oranların artacağı düşünülmektedir. Düşme oranlarını azaltıcı önleyici önlemlerin alınması ve sistemli ve düzenli olarak epidemiyolojik verilerin toplanması yararlıdır.

**Anahtar kelimeler:** Düşme, travma, yaşlı

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1 Kartal Dr Lütfi Kırdar Eğitim Araştırma Hastanesi Aile Hekimliği Kliniği, İSTANBUL

\***Address for Correspondence / Yazışma Adresi:** Oner C. Dr Lutfi Kırdar Kartal Eğitim ve Araştırma Hastanesi Büyükada Ek Hizmet Binası Lalahatun Cad No 42, Büyükada-İSTANBUL-TÜRKİYE, E-mail: trcanoner@yahoo.com

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**INTRODUCTION**

Life expectancy increases throughout the world. As a result geriatric population also dramatically increases in developed countries as well as Turkey. In our country, there are approximately 7 million individuals aged 65 years and over which represents 8.5% of total population and expected to raise 12.2% in 2020.1 Elderly have many health problems like chronic diseases, cognitive impairment, and musculoskeletal disorders.

Trauma is a frequently seen condition in emergency departments with the rate ranges between 7 to 20%.2 Because of the decline in activity by age, most of the trauma cases are seen in the young population. Only 5% of traumas in geriatric population results in a fracture or another serious outcome.3 On the other hand, the mortality rate of traumas in the elderly population is high. Trauma is the 5th most common cause of death in the geriatric age group.4 It was shown that 28% of trauma related deaths occur in people over 65 years of age.5 Although in young patients, trauma may have many different etiologies, in geriatric population nearly half of the trauma cases are due to falls.6 Elderly individuals, with the history of fall experience significant morbidity. Hospital stays are longer in elderly patients and they experience dramatically functional decline in activities of daily living both physical and social ones.7

There are some social factors related with the fall of older people. It was shown that one-third of geriatric population falls each year and the incidence increases with age. The incidence of all falls is 25% at age 70 and it increases up to 35% after age 75.8 Older females fall more than older men (36% vs 27%).9 Aoyagi et al reported the risk ratios of falls 2 times more in women than men.9 It was demonstrated that socioeconomic differences have modest effect on geriatric falls, but the rate of hospitalization is more in lower socioeconomic groups.11,12 Only 20% of falls occur at night, most of the falls take place at daytime and outside the home. The most frequent time of falls at night was between 9 pm and 7 am.13

The best and cost-effective management method for trauma in geriatric population is prevention. It was estimated that up to 30% of falls are preventable with a standardized multidisciplinary approach.14 Any type of prevention planning requires epidemiological data on trauma which can guide the development of precautions, in elderly patients. The aim of this study is to describe the demographical profile of fall-related emergency department admissions of elderly individuals.

**MATERIALS AND METHODS**

The present study was a retrospective cross-sectional study, carried out in elderly patients (≥65 years old) admitted to the emergency department between January 2013 to 31 December 2017. During this period total number of patient admitted to hospital is 54.257. Regardless of age, the number of trauma patients was 11.009. All of the cases below 65 years and who had trauma other than falls excluded from the study. A fall is defined as a situation coded as E880-E888 in ICD9 and W00-W19 according to ICD 10 in an electronic database. According to electronic database, 460 cases (% 0.84 of all emergency admissions and %4.1 of admissions due to trauma patients) included. All of the demographical data were obtained from hospital records. One hundred forty-nine patients were excluded from the study because of the missing data (Figure 1) and the data of 311 cases were analyzed.

The study was approved by the local ethic committee. Data were analyzed by SPSS version 21. Quantitative data are reported as the mean and standard deviation and qualitative ones are reported as frequency and percentage. Comparisons were made with the χ2 test. Statistical significance was accepted as p<0.05.

**RESULTS**

Between the dates 1.01.2013- 31.12.2017 there were total of 54.257 admissions to the emergency department. Trauma cases in all age groups were 11.009 (20,3%). The emergency admissions due to trauma in years were shown in Figure 1. Trauma related admission rates ranges between 3.9 – 13,5% during this time. It reached maximum level at year 2016. On the other hand, admission rates of elderly to the emergency department show a stable increase between 2014-2017 from 8,6% to 18,2%. Elderly trauma rates within the total trauma cases reaches its maximum level (16,4%) in 2017 (ranges between 9,9 and 16,4% within years). Moreover, elderly fall related trauma rates within total elderly admissions also show a wavelike pattern and ranges between 4,1-13,6 %.

In Table 1, baseline characteristics of study cases were summarized. The mean age of the group was 74.8±7.5 years, and most of the patients have at least one underlying diseases. Orthopedic diseases are more frequent in females (p=0,012). Most of the falls occurred outside from home, in summer and there is no significant difference between genders. Women fall at night whereas men at day time (p=0,016). Only 1 death occurs due to falls (Table 2).

**Figure 1. Emergency admissions, trauma and fall cases in annual bases**

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| **Table 1.** **Baseline characteristics of the patients** | | | | |
|  | Male  (n=116)  % (n) | Female  (n=195)  % (n) | Total  (n=311)  % (n) | P value |
| Age (Mean±SD) | 74,01±7,28 | 75,60±7,24 | 74,80±7,46 | 0.0681 |
| 65-69 | 33,6 (39) | 21,5 (42) | 26,0 (81) | 0.7352 |
| 70-74 | 25,0 (29) | 27,2 (53) | 26,4 (82) |
| 75-79 | 18,1 (21) | 22,6 (44) | 20,9 (65) |
| >80 | 23,3 (27) | 28,7 (56) | 26,7 (83) |
| Underlying disease | 87,7 (85) | 88,9 (145) | 87,4 (230)\* | 0,6742 |
| DM | 40,0 (34) | 35,9 (52) | 37,4 (86) | 0,0872 |
| HT | 76,4 (65) | 77,2 (112) | 76,9 (177) | 0,6292 |
| Orthopedic diseases | 4,7 (4) | 11,7 (17) | 9,1 (21) | **0,0122** |
| Neurologic diseases | 21,2 (18) | 17,25 (25) | 18,7 (43) | 0,9852 |
| Other | 61,2 (52) | 60,0 (87) | 60,4 (139) | 0,0752 |

\*48 cases has no records about underlying diseases 1 Analyzed with student t test

2Analyzed with chi-square test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 2.** **Baseline characteristics of the fall** | | | | | |
|  |  | Male  (n=116); % (n) | Female  (n=195);% (n) | Total  (n=311);% (n) | P value |
| Location of fall\* | Home | 28,7 (27) | 25,7 (38) | 26,9 (65) | 0,075 |
| Outside | 71,3 (67) | 74,3 (110) | 72,1 (177) |
| Month/ Season | Summer | 41,4 (48) | 51,7 (101) | 47,9 (149) | 0,200 |
| Autumn | 20,7 (24) | 23,2 (45) | 22,2 (69) |
| Fall | 24,1 (28) | 16,9 (33) | 19,6 (61) |
| Winter | 13,8 (16) | 8,2 (16) | 10,3 (32) |
| Day | Week days | 69,8 (81) | 76,4 (149) | 74,0 (230) | 0,138 |
| Weekend | 30,2 (35) | 23,7 (46) | 26,0 (81) |
| Time\*\* | 06-18 | 82,3 (79) | 73,0 (125) | 76,4 (204) | **0,016** |
| 18-06 | 17,7 (17) | 27,0 (46) | 23,7 (63) |
| Exposed area\*\*\* | Head | 24,1 (28) | 27,1 (53) | 26,0 (81) | 0,683 |
| U extremity | 42,2 (49) | 39,4 (77) | 40,5 (126) |
| L extremity | 27,5 (32) | 35,8 (70) | 32,7 (102) |
| Dorsal area | 12,0 (14) | 8,2 (16) | 9,6 (30) |
| Thoracic area and/ or abdomen | 8,6 (10) | 11,7 (23) | 10,6 (33) |
| Presence of fracture\*\*\*\* | Yes | 14,0 (16) | 14,4 (28) | 14,4 (44) | 0,454 |
| Result | Discharged | 75,0 (87) | 72,3 (141) | 73,3 (228) | 0,630 |
| Observed ≥8 hours | 3,6 (4) | 2,5 (5) | 2,9 (9) |
| Referral | 20,6 (24) | 25,2 (49) | 23,4 (73) |
| Death | 0,8 (1) | 0 | 0,04 (1) |

\* 69 data missing \*\* 44 data missing \*\*\* due to multiple trauma the total is > %100

\*\*\*\* 6 data missing Analyzed with chi-square test

**DISCUSSION**

Falls is one of the external causes of unintentional injury and frequently seen in elderly. In elderly population frequency of falls increases due to the morphologic and physiologic changes in organ systems resulting in reduced physical activity, muscle weakness, and imbalance. The results of falls may be severe. In this study, the demographical profile of elderly and baseline characteristics of falls was studied.

Our elderly patients’ admissions rate of falls ranges between 5% and 14% in annual bases. Recent studies were found that nearly 10% of all emergency department admissions of elderly were due to falls and it was expected to increase up to 40% in coming decades.15,16 In this study we found that most of the fall cases are women (%62.7) and the rate of cases does not increase with age. On the other hand, recent studies show that nearly 28 to 35% of older people over 65 years of age falls each year. This rates increase with age and reaches up to 32 to 42% in patients over 70 years of age.15 Contrary to our findings, there are also studies that showed a higher frequency of falls in men.17 This variation in age and gender is due to the lifestyle habits between the elderly and their environmental difference.5 The medical status of the elderly is directly related with falls. Elderly with diabetes, neurologic diseases,

incontinence, visual impairments and orthopedic problems are more likely to fall and have fall-related injuries.15 In our study, nearly all of the cases have at least one comorbidity.

Most of the falls occur in winter and during daytime.15,18 Hypothermia decrease reaction time of elderly and slow down motion. Especially pronounced changes in weather temperatures in winter increase the time spent in bed and sedentary behavior resulting deconditioning.15 On the other hand, we found that most of the falls occur outdoor, in summer, in weekdays and during daytime. This difference may be due to the location of our emergency department. Our department is in a touristic island so the population increases dramatically in the summer season and there is no motorized vehicle in the island.

In the present study most common sites of injury due to trauma were extremities and head. In concordance with our finding, most of the studies showed that the extremities, head, and neck is the most common sites of injury.15,19,20 Nearly 15% of all falls results in fractures. It was shown that approximately 10 to 20% of all falls result in fractures, and most of the fractures occur at home.15,21 Mortality rates are 6.4% in trauma-related emergency department admissions in elderly. Our mortality rates were very low compared with this rate (0.04%), because severely injured cases were transferred in a referral hospital.

Falls and related injuries are an important public health problem due to growing elderly population. In conclusion nearly 1 in 6 elderly admitted to the emergency department due to falls, and this rate is expected to increase. One in 10 fall cases result in fractures, most of the time extremities were common sites of injury. Preventive measures must be taken to reduce these falls and related injuries. Because of the cultural and environmental difference, epidemiological data should be gathered regularly and methodologically.

Small sample size, one-centered and retrospective design of the study was the limitations. Due to the retrospective design effect of co-morbidities, drugs, and the real outcome of falls cannot be evaluated because of the insufficiency of patient’s records.

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