ÖZGÜN ARAŞTIRMA ORIGINAL RESEARCH

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# EVALUATION OF FALL CASES PRESENTING TO THE EMERGENCY DEPARTMENT

## ACİL SERVİSE BAŞVURAN DÜŞME OLGULARININ DEĞERLENDİRİLMESİ

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## Öz

### Giriş

Travma dünya genelinde ölümlerin başlıca nedenlerindendir. Bunlardan düşme künt travma grubunda değerlendirilmekte ve trafik kazalarından sonra 2. Sırada yer almaktadır. Çalışmamızda hastanemiz acil servisine düşme nedeniyle başvuran travma hastalarının demografik özelliklerini ve sonuçlarını belirleyerek ileriye yönelik uygulanacak önleyici programlar için ışık tutacak verilerin elde edilmesini sağlamayı amaçladık.

### Gereç ve Yöntem

Ocak 2016-Mayıs 2017 tarihleri arasında acil servise düşme nedeniyle başvuran 1433 vaka retrospektif olarak incelendi. Olguların cinsiyet, yaş, düşme mekanizması, etkilenen vücut bölgesi, hasta sonlanımı kaydedildi. Kategorik değişkenler için istatistiksel karşılaştırılmalarda ki kare analizinden yararlanıldı ve tanımlayıcı istatistikler frekans (%) olarak gösterildi. P<0.05 olduğu durumda istatistiksel olarak anlamlı kabul edildi.

### Bulgular

Çalışmaya alınan 1433 vakanın 836 (%58,3)'sı erkek ve tüm vakaların yaş ortalaması 30,7 (±25,4) yıl olarak hesaplandı. Yaş gruplarına göre dağılım incelendiğinde en fazla başvuru 559 (%39) ile 0-18 yaş grubunda olduğu görüldü. 1433 vakanın 307 (%21,4)'sinin bir kliniğe yatırıldığı saptandı ve yatırılan vakaların yaş ortalaması 43,57 (±29,4) yıl ile taburcu edilen vakaların yaş ortalamasından daha yüksek bulundu (p<0.001). Yaş grupları arasında en fazla yatış oranının 115 (%45,3) hasta ile 60 yaş üzerinde olduğu görüldü. Vakaların düşme şekilleri incelendiğinde 834 (%58,2) kişi ile aynı seviyeden düşmeler en fazla hasta sayısına sahip grubu oluşturduğu görüldü. Düşme sonucu etkilenen vücut bölümlerine bakıldığında 599 (%41,8) ile en fazla yaralanma extremite yaralanması iken multitravma hastalarının yatış oranı (%52,6) en yüksek olarak hesaplandı.

### Sonuç

Travmalar içerisinde önemli bir yere sahip olan düşme vakalarının azaltılmasında toplumun bu konuda bilinçlendirilmesi, acil tıp hekimlerine gerekli eğitimin verilmesi ve önüne geçebilecek önleyici tedbirlerin alınması gerekliliği vurgulanmaktadır.

**Anahtar Kelimeler :** Acil servis, düşme, travma

## Abstract

### Objective

Trauma is one of the main causes of deaths throughout the world. Falls, a type of trauma are considered among blunt traumas and rank 2nd after traffic accidents. In our study, we aimed to provide data that would offer insights for preventive programs that would be implemented in the future, by determining the demographic characteristics and results of trauma cases with a history of falling who had presented to the emergency department of our hospital.

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**Material and Method**
A total of 1433 cases who presented to the emergency department between January 2016 and May 2017 due to a fall were evaluated retrospectively. The cases gender, age, mechanism of injury, affected body part and outcome parameters were recorded. Chi-square analysis was utilized during statistical comparisons of categorical variables, and descriptive statistics were presented in frequencies (%). P<0.05 was considered statistically significant.

**Results**
Of the 1433 cases who were included in the study, 836 (58.3%) were male, and the mean age of all cases was calculated as 30.7 (±25.4) years. When the distribution of the cases into age groups was examined, the 0–18 year old age group had the maximum number of cases presenting with 559 (39%) cases. It was found that 307 (21.4%) of the cases werehospitalized. The mean age of the hospitalized cases, 43.57 (±29.4), was higher than the discharged cases (p<0.001). The maximum hospitalization rate among the age groups was 115 (45.3%) cases in the group with cases over 60 years of age. When the mechanism of injury of the cases were examined, it was seen that the group of people falling from the same level constituted the highest number of cases, 834 (58.2%) people. Considering the body parts affected by a fall, the maximum number of injuries involved 599 (41.8%) cases with an extremity injury. The hospitalization rate of multi-trauma cases with a 52.6% was calculated as the highest rate.

**Conclusion**
In order to reduce cases of falls that constitute a significant portion of traumas, it is emphasized that it is necessary to raise awareness of the community in this regard, to train emergency medicine physicians, and to take preventive measures for circumstances that can be prevented.

**Keywords:** Emergency department, fall, trauma

## Introductıon

Trauma is one of the main causes of deaths throughout the world. It is the leading cause of deaths under the age of 35 in the U.S. and covers about 10% of all deaths (1). Traumas are divided into two groups as blunt and penetrating traumas in terms of their mechanisms. Events such as falls, traffic accidents, and assaults are categorized into the blunt traumas group, whereas firearms and sharp object injuries are categorized into the penetrating traumas group (2). Although the frequency and shape of them throughout the whole world vary, the most common cause of traumas in our country is the falls after traffic accidents (3). In order to reduce the rates of mortality resulting from trauma, it is of great importance to clarify the causes affecting mortality in terms of both the systematics of approach to trauma cases and the development of protective/preventative methods. Recent studies involve the determination of trauma deaths that can be prevented and introduction of measures that can be taken (4)

In this study, we aimed to determine the measures that could be taken by investigating the clinical and demographic characteristics of fall cases presenting to our emergency department who constitute a significant portion of trauma cases.

## Material and Methods

From among the cases admitted to the emergency department between 01/01/2016 and 05/01/2017, those who had been coded as “a fall” (W19) according to the coding system of ICD-10 (International Statistical Classification of Diseases and Related Health Problems) were reviewed retrospectively within the scope of the study. Patient files were accessed using archive records. The cases whose files could not be accessed, those with incomplete files, those who were admitted as a result of a motor vehicle accident and those who fell as secondary to an organic disease were excluded from the study. Of the cases involved in the study, the gender, age, mechanism of injury (a fall from the same level, a bicycle, a ladder, a tree, ±1 meter, or >1 meter), affected body part (head/neck, thorax, abdomen/pelvis, vertebrae, extremities or multi-trauma) and outcome status (discharge/hospitalization) were recorded. The cases with two and more affected body parts were considered as multi-trauma.

The IBM SPSS Statistics 20.00 Statistical program was used for statistical calculations. The normality of the distribution of quantitative data was examined using the Kolmogorov Smirnov test. In the statistical comparisons of variables that were normally distributed, independent samples t-tests were used, and descriptive statistics were shown in the form of mean±standard deviation. In the statistical comparisons of variables that were not normally distributed, Mann Whitney U tests were used, and descriptive statistics were shown in the form of mean±standard deviati-

on. Chi-square analysis was utilized during statistical comparisons of categorical variables and descriptive statistics were presented in frequencies (%). P<0.05 was considered statistically significant.

## Results

A total of 1433 cases, 836 (58.3%) males and 597 (41.7%) females, were included in our study. The mean age of all cases was calculated as 30.7 (±25.4) years, that of male cases was 28.7 (±24.0) years and that of female cases was 33.4 (±26.9) years.
Considering the distribution of the number of cases according to age groups, it was seen that the group with the highest number of admitted cases (n=559) was the 0–18 age group and the group with the lowest number of cases (n=94) was the 50–59 age group. The distribution of cases by age groups is shown in figure 1.

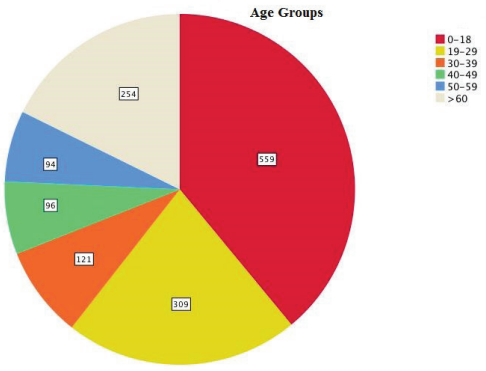


**Figure 1.** Distribution of cases according to age groups

We found that 1126 (78.8%) of the cases included in the study were discharged from the emergency department, and 307 (21.4%) were hospitalized. Of the discharged cases, 647 (57.5%) were male, 479 (42.5%) were female and the mean age was 27.1 (± 22.9) years. Among those who were hospitalized, there were 189 (61.6%) males, 118 (38.4%) females and the mean age was 43.5 (±29.4) years. The mean age of the hospitalized cases was significantly higher than that of the discharged cases (p<0.001).

When the cases were considered according to the mechanism of injury, more than half of the cases who were included in the study, 834 (58.2%) cases, were admitted to emergency department due to a fall from the same level, while the minimum number of cases was 53 (3.7%), representing those who fell from a tree. Considering the hospitalization rates, however, cases who fell from a tree and those who fell from higher than 1 meter had significantly higher hospitalization rates than the other cases. The distribution of the cases according to the mechanism of injury and their comparison in terms of hospitalization are given in detail in Table 1.

The cases whose head, thorax, abdomen/pelvis, vertebral system, extremity injury were grouped separately. Also cases with more than two body parts were affected were grouped as a multi-trauma. The maximum number of cases presenting to the emergency department, 599 (41.8%) cases, was found to be in the extremity group, and the rate of hospitalization in the multi-trauma group was significantly higher than in other groups (Table 2).

**Table 1** Multiple comparison of cases in terms of hospitalization rates and according to nature of injury

| | NATURE OF INJURIY | | | | | | |
|---|---|---|---|---|---|---|---|
| | **SAME LEVEL** | **BICYCLE** | **LADDER** | **TREE** | **LOWER THAN 1 METER** | **HIGHER THAN 1 METER** | **Total** |
| **DISCHARGED** | 718[a] | 79[a b] | 120[a b] | 25[c] | 129[b] | 55[c] | 1126 |
| | 86.1% | 79.0% | 80.0% | 47.2% | 75.0% | 44.4% | 78.6% |
| **HOSPITALIZED** | 116[a] | 21[a b] | 30[a b] | 28[c] | 43[b] | 69[c] | 307 |
| | 13.9% | 21.0% | 20.0% | 52.8% | 25.0% | 55.6% | 21.4% |
| **Total** | 834 | 100 | 150 | 53 | 172 | 124 | 1433 |
| | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

*a,b,c: Groups that have no statistically significant differences are symbolized in the same letters

**Table 2** Comparison of the rates of discharge/hospitalization according to the affected area.

| | AFFECTED AREA | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | HEAD | THORAX | ABDOMEN/ PELVIS | VERTEBRAL SYSTEM | EXTREMITY | MULTI-TRAUMA | |
| DISCHARGED | 374[a] | 86[b] | 41[a b] | 97[a b] | 47[b] | 54[c] | 1126 |
| | 86.4% | 74.1% | 75.9% | 82.9% | 79.1% | 47.4% | 78.6% |
| HOSPITALIZED | 59[a] | 30[b] | 13[a b] | 20[a b] | 125[b] | 60[c] | 307 |
| | 13.6% | 25.9% | 24.1% | 17.1% | 20.9% | 52.6% | 21.4% |
| Total | 433 | 116 | 54 | 117 | 599 | 114 | 1433 |
| | 100% | 100% | 100% | 100% | 100% | 100% | |

*a,b,c: Groups that have no statistically significant differences are symbolized in the same letters

## Discussion

The majority of fall cases were found to be male cases in our study, consistent with the literature(5). The Major Trauma Outcome Study (MTOS) revealed that 71% of 80544 trauma cases were male, and 28% were female (6). In this regard, male cases were at a rate of 63.7% in the study of İçer et al. and 66.9% in the study of Al et al (7,8). As in all trauma cases, the fact that the rate of men in fall cases was greater than women can be explained as a result of the fact that men are more active in childhood and get more frequently involved in working places with high risk of trauma.

Many data can be found about the mean age of fall cases in the literature (5,8-10). In this regard, Yavuz et al. reported that the mean age of the cases was 26.6, and Gören et al. reported the mean age was 27.05 years (11,12). In our study, the mean age of the cases was calculated to be 30.7 years, and this value was close to the values in the literature. In studies in the literature, the average age of the cases with falls below 40 years of age can be explained by the increased exposure of the active population to the trauma.

When the literature was examined, one can see that trauma severities were evaluated over mortality rates in studies on trauma cases. In our study, the rate of hospitalization was used to determine the severity of traumas, as the rate of mortality was found to be too small to allow comparison statistically. The low number of mortalities was due to the fact that the study was designed only on fall cases, and the factors that caused mortality in trauma cases, such as traffic accidents and gunshot wounds, were excluded from the study. An important part of the cases presenting to the emergency departments with a history of falling from a height were discharged from the emergency departments (13). With respect to the literature on rates of hospitalization as a result of trauma, Pekdemir and his friends reported the rate of hospitalization as 11.1%, and Durdu et al. reported that the hospitalization rate was 14.5% (14,15). This rate was found to be 21.4% in our study. The fact that our hospitalization rate compared to these studies was high was considered to be due to the fact that cases who had to be hospitalized due to the need for operation and a multidisciplinary approach from the neighboring hospitals were being referred to our hospital because of its location.

In falls from a height, many factors determine the severity of injury. The height of a fall and the impact velocity are the two most important factors. According to the Advanced Trauma Life Support (ATLS), falls from height of more than 6 meters cause major traumas (16). Different studies have reported the average heights of falling from a height between 3 to 5 meters (5,7,8). In their study on trauma cases, Ateşçelik et al. reported that 826 cases that fell on a flat ground constituted the majority of cases (17). Similar to this, in our study, 836 (58.2%) cases who fell from the same level, constituted the majority of cases. However, the falls from a height higher than 1 meter ranked fourth with 124 (8.7%) cases. The fact that the statistical equivalent of mortality could not be calculated in our study was also supported by the fact that the fall heights in our study were found to be lower than those found in the data in the literature. The difference in fall heights was considered to be due to the fact that the studies were carried out in different regions. In the regions where Al et al. and İçer et al. have conducted their studies, falls from a height have been assumed

to increase due to people have a habit of sleeping on rooftops that do not have protection at night (7,8). Considering the rate of hospitalization according to mechanism of the injuries in our study, falling from higher than 1 meter with a rate of 55.6% had a higher rate compared to the other groups. This result is parallel to the literature and supported the effect of the height of falls on trauma.

In cases of fall, the trauma of a different body part or body parts is important in terms of mortality and morbidity (18). Moreover, when studies published in the literature are examined, it is seen that classifications and assessments according to injured organs and systems due to trauma based on falls from a height have an important place in the approach to such cases (18). When the body parts affected as a result of trauma are examined, Ünlü et al. have reported that the most frequently injured body part in trauma is the head (19). In the study of Akoğlu et al. have stated that the most frequently injured body part is extremities (20). In a study conducted by Durdu et al. have found that the most commonly injured parts are the upper extremities (44.8%) and head/neck (34.7%) (15). Our study showed similarities to other studies, and revealed that the most frequently affected body part were extremities with a rate of 41.8%, followed by the head with a rate of 30.2%. In many studies, however, injuries affecting multiple systems are more common than isolated injuries. In the study of Akoğlu et al. it was stated that multi-trauma cases were hospitalized at a rate of 37.8% (20). Considering our study, the number of cases who were hospitalized due to multi-trauma was found to be higher compared to the cases who were hospitalized due to isolated body traumas.

Mortality was not calculated and the comparisons were made over the rate of hospitalization due to the fact that within the trauma cases, only the fall cases were reviewed in our study, that there were data losses because the study was carried out retrospectively, and that there were a significant number of cases referred from the neighboring hospitals within the cases due to our hospital's being a third-step healthcare facility. These factors stand out as limiting factors in our study.

## Conclusion

The cases of falls are more common in the emergency medicine practice, especially in the younger male population. It would be a more appropriate approach for emergency physicians to proceed by predicting that the clinical would be more severe in cases of fall, who fall from a height of more than 1 meter and whose multiple body parts. We believe that more detailed information can be contributed to the literature through more comprehensive and prospective studies that can be planned in this manner.

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