International Journal of
**Active & Healthy Aging**

https://ndpapublishing.com/index.php/ijaha

# Evaluation of Fall from High Cases and Trauma Due to Fall from High in Terms of Mental Health

**Şeyda ÖZTUNA*[1] and Cihangir IŞIK[2]**

[1,2]Balıkesir Atatürk City Hospital, Department of Forensic Medicine, Balıkesir

**Keywords**
Forensic Case
Mental Health
Trauma
Fall from Height

**ABSTRACT**

**Purpose:** The aim of the study is to evaluate the cases of falling from height and the traumas caused by falling from height from a psychological perspective.

**Materials and Methods:** Cases of falls from height who applied to Balıkesir Atatürk City Hospital Forensic Medicine Polyclinic and for whom a forensic report was issued, and the trauma data resulting from the fall in these cases were retrospectively examined. The data were obtained from the records in the individuals' medical files and evaluated as numbers and percentages using the descriptive statistical method.

**Results:** It was found that the majority of cases of falls from height were male and were seen in all age groups. It has been determined that the most number of falls occur in July. Traumatic brain lesion occurring after a fall was in the first place in the cases. In the examination of bone fractures, it was determined that multiple fractures were more common in the cases.

**Conclusion:** We think that it is necessary to conduct similar studies on the subject in different provinces of our country, to consider individuals in different developmental periods, including children, young people, adults and the elderly, and to obtain a general picture of the risk factors in falls from heights. Examining the situations that may affect falls from height will also encourage the planning and implementation of primary protective practices.

## 1. INTRODUCTION

Height is generally defined as places that exceed waist length or cannot be reached in one step [1,2]. Falls from height are categorized as accident and suicide origin 2,3]. According to the World Health Organization report, falling from height ranks first among non-fatal accidents [4] and second among fatal accidents [4,5]. Every year, many people around the world lose their lives due to falls. It is stated that people over the age of 65, those between the ages of 15-29 and those under the age of 15 are more affected by falls from height. Falls are considered an important public health problem because they can have economic and social effects such as death, disability, loss of work and power [4]. It is stated that the age of the cases, the height of the fall, the characteristics of the ground, the impact area on the body, and the pathologies that may occur in the injured organ(s) affect the morbidity and mortality rates [2-6].

Studies show that falling from heights is common. For this reason, health professionals have important roles in carrying out studies to prevent falls from heights, monitoring people at risk in the society, reporting these cases to official channels, providing training on falls from heights and increasing public awareness. As a result, considering that the current study will be limited to Balıkesir Atatürk City Hospital, we think that it will be important to conduct similar studies in different provinces of our country, to consider individuals in different developmental periods, including children, young people, adults and the studies have been conducted recently on the examination of risk factors in falls from heights, we

***Corresponding author**

Şeyda ÖZTUNA (e-mail: *eydaoztuna@gmail.com)

**How to cite this article**

Öztuna, Ş. and , Işık, C. (2019). Evaluation of Fall from High Cases and Trauma Due to Fall from High in Terms of Mental Health. *Int. J. Act. Health Aging, 1(1):21-26.*

**Research Article /** DOI: 10.5281/zenodo.10450370

anticipate that evaluating a situation that is so prone to morbidity and mortality from a mental health perspective will be useful in solving the issue.

## 2. MATERIALS AND METHODS

The population of the study consisted of individuals who applied to the Forensic Medicine Polyclinic between November 2021 and September 2023, and the majority of them were cases of falling from height. In order to contribute to the field by collecting data in a short time with existing information, the data of 54 cases of falls from height, for which annual and forensic reports were prepared at Balıkesir Atatürk City Hospital Forensic Medicine Polyclinic between November 2021 and September 2023, were retrospectively arranged. Data including gender, age, accident location, falls, evidence of traumatic lesions, falls from height and bone fracture fragments by months were obtained from the medical files of the diseases. Participant provided informed consent, with the volunteer form covering research details, risks, benefits, confidentiality, and participant rights. Studies involving humans were approved by the local ethics committee. The research strictly adhered to the ethical principles of the Declaration of Helsinki, prioritizing participant's rights and well-being in design, procedures, and confidentiality measures.

### 2.1. Statistical Analysis

The analysis of the data was evaluated as number-percentage using the SPSS 22 program.

## 3. RESULTS

In the study, a total of 54 cases fell from height; 43 of them were men and 11 were women; It was determined that the average age was 45.78±22.6. The average fall height of the cases was found to be 13 feet. When the places where the accident occurred were evaluated, it was found that 28 of the cases rolled over at home and 26 of them fell from the balcony and roof.

In "Table 1", where fall cases are evaluated according to age groups, it is seen that the number of cases increases as age increases and 33 of the cases are over 50 years old.

**Table 1.** Age distribution of cases

| Age Groups | Number Of Cases | | |
|---|---|---|---|
| | Woman | Man | Total |
| 0-10 Age | 0 | 5 | 5 |
| 11-20 Age | 2 | 0 | 2 |
| 21-30 Age | 3 | 4 | 7 |
| 31-40 Age | 1 | 6 | 7 |
| 41-50 Age | 0 | 8 | 8 |
| 51-60 Age | 0 | 9 | 9 |
| 60+ Age | 5 | 11 | 16 |
| Total | 11 | 43 | 54 |

In "Table 2", where the distribution of falls from height cases throughout the year is evaluated, it is found that although falls occur throughout the year, they occur relatively more frequently in July.

**Table 2.** Monthly distribution of cases

| Mounth | Number |
|---|---|
| January | 5 |
| February | 2 |
| March | 1 |
| April | 5 |
| May | 4 |
| June | 5 |
| July | 9 |
| August | 2 |
| September | 6 |
| October | 7 |
| November | 4 |
| December | 4 |
| Total | 54 |

In ''Table 3'', where the traumatic lesion findings are evaluated, it is seen that 25 of the cases had traumatic brain lesion, 3 had spinal cord injury, 5 had only lung lesion, 2 had blood vessel injury, 2 had traumatic heart findings, and the other 17 had internal internal injuries. Multiple traumatic lesions of organs are observed.

**Table 3.** Findings of traumatic lesion in cases of falling from a height

| | Number |
|---|---|
| Craniocerebra and medulla injury | 28 |
| Multiple organ injury | 17 |
| Cardio respiratory system injury | 9 |
| Total | 54 |

''In Table 4'', where the bone fractures of the cases are evaluated, it is seen that 26 patients had multiple fractures, 15 had isolated skull fractures, 5 had isolated lower extremity fractures, 3 had spine fractures and 5 had isolated upper extremity fractures.

**Table 4.** Bone fracture findings in cases

| | Number |
|---|---|
| **Multiple Fracture** | 26 |
| **Skull Fracture** | 15 |
| **Isolated Lower Extremity Fracture** | 5 |
| **Spine Fracture** | 3 |
| **Isolated Upper Extremity Fracture** | 5 |
| **Total** | 54 |

Abrasions, lacerations and other signs of blunt traumatic injury were commonly detected in external body examinations in 33 of all fall cases included in the study, and no traumatic findings were found in the external body examination of 21 cases.

## 4. DISCUSSION

In forensic science, falling from a height is categorized as an accident or suicide [3]. Gender, age, height of fall, characteristics of the ground, hitting a different place at the time of fall, first contact area of the body, presence of different diseases in the person, alcohol and drug use and mental state of the person are risk factors that may affect the prognosis as a result of falling from a height [7,8]. These risk factors may also affect healthcare professionals' ability to provide effective care to cases of falls from height [7,9].

### Examination of Gender and Age Situations of Falling from Height Cases

It is stated that cases of accidental falls from height are more common in men because they are more involved in physical work, work in relatively more dangerous jobs, and want to meet their personal needs (roof and television antenna repair) themselves [10-12]. It is stated that cases of falling for suicidal purposes are more common in women [11,13].

In the national and international literature, it is mentioned that the age factor is an important feature affecting mortality in cases of falls from height [14,19]. Studies indicate that falls from height are seen in different age groups [14-20] and that they result in more deaths in older ages [5,9,18]. Of the 54 cases included in the study, 43 were male; It was determined that the average age was 45.78±22.6. We can say that this situation may be caused by our sample size, the large number of men in the cases included in the study, and the occurrence of physical and mental comorbidities with increasing age.

### Examining the Fall Height of Falling from Height Cases

The height of the fall may enable the body to accelerate during the fall [5]. This may cause differences in the lesions occurring in the individual's body and cause mortality. Studies show that there are cases falling from high and low distances [7,12,21-23]. In studies, the average height of the fall is stated as 6 meters [7,8,10,15,22] in cases where falling from a height is an accident, and 10 meters ([10,11,18] in cases of suicide.

In this study, the average fall height of the cases was found to be a maximum of 13 meters, similar to the literature. The reasons for suicide, which is considered a choice in coping with problems, may be diverse. Since these reasons differ from person to person and from society to society, we think it is necessary to investigate the reasons that lead a person to suicide. A mental illness that feeds the individual's suicidal ideation, intense anxiety, stress, somatic complaints, the presence of psychosocial factors, internal life history, and lack of anger control can be listed as the reasons for this situation. However, this can be explained as an accidental fall from a height, which may occur as a result of carelessness, lack of safe behavior skills and failure to take preventive measures.

### Examination of the Location Situations Where Falling from High Accidents Most Frequently Occur

In studies examining falls from height, stairs, roofs and trees are stated as the most common places to fall [10,22]. In the study, the most common places where accidents occurred were found to be houses in 28 of the cases and balconies and roofs in 26 cases. We believe that injuries and deaths resulting from falling from heights are preventable. It is stated that measures taken at home reduce fall-related injuries requiring medical intervention by 70% [25]. Therefore, within the scope of preventive measures, it can be thought that factors such as lack of education, low social awareness, workers working in high places not paying attention to safety rules and lack of supervision by the authorities increase the number of falls from houses, balconies and roofs.

### Distribution of Falling from Height Cases by Month

There are studies that fall from height is more common in summer and spring [26]. In this study,

it was found that although falls from height were encountered throughout the year, they occurred relatively frequently in July. We think that it may be related to people's habit of sleeping on unprotected balconies and roofs, especially in the summer when the weather is hot, and the increase in physical activity seen in hot seasons. Since the study is descriptive, we foresee that conducting different studies based on our findings may be useful in determining preventive and protective measures.

### Bone Fracture Situation in Cases of Falling from a Height

Many bone fractures may occur in different parts of the body as a result of falling from a height [8,9,22]. Although some studies state that there is no bone fracture as a result of falling from a height [8,16], bone fracture(s) are an expected finding in falls from a height, and skull bone fractures are the most common [11,14,15,22].

When bone fractures were evaluated in the study, it was found that 26 of the cases had multiple fractures. It can be said that the increase in the height of the fall, the ground structure, hitting more than one place during the fall, and the individual's alcohol and substance use status before the fall are effective.

### Traumatic Lesion Finding in Cases of Falling from a Height

In some studies where traumatic lesion findings were evaluated in cases of falling from a height, the most common cause of death was head trauma, intracranial hemorrhage and brain contusion, and the cause of death due to multiple vital organ lesions ranked second [9,11,13,17,18,20]. In studies evaluating deaths due to chest trauma, it was found that cases fell from places such as stairs, roofs and trees [10,16,21,22]. There are also similar results regarding spleen and liver lesions [3,7,9,15-17].

It is emphasized that the primary cause of head trauma is falling from a height [27,28]. Similar to the literature, in this study, the region where trauma is most commonly seen is the head. Multiple organ injuries ranked second. Due to the different age groups in the cases included in the study, this can be interpreted as cranial bone structure, different head-body ratio, and differences in thermoregulation [29].

## 5. CONCLUSION

In the study, it was determined that some descriptive data differences could be guiding in determining and implementing measures to prevent falls from heights. According to the findings of our research, we predict that conducting different studies and implementing the following measures may be useful in solving falls from height.

- According to our findings, since falls from height are common at home, on balconies and on the roof, safety precautions should be taken in the home environment and environmental risk factors should be identified and individuals should be made aware of this issue,
- Since the height of falls was determined in our study analysis result, multifaceted, qualitative studies should be carried out in order to define the reasons that lead individuals to suicide and the needs by adopting an individual approach,
- In our study where the age factor was examined, it was determined that the risk factors for falls from height in all age groups should be determined, fall prevention programs should be designed, the effectiveness of these programs should be evaluated, and functional losses such as decrease in strength and power, lack of movement in the arms and legs, decrease in the ability to maintain balance and walking speed, especially for the older age period. taking protective measures, taking into account the possibility that
- Our study found that cases of falling from heights were relatively high in July, and that preventive public health measures should be implemented and accident prevention studies should be carried out for those living in rural areas, especially in hot weather.
- When the gender factor is evaluated in line with our study data, the negative effects of problems such as economic, cultural, migration and war on public mental health, intolerance in individuals, anger uncontrollability, roles attributed to men and women, stress coping mechanisms and communication skills can be identified and appropriate health promotion programs can be planned.
- Mortality and morbidity severity of trauma in falls from height depends on the speed of impact, the injured organ and the pathologies developing in the injured organs [30]. Considering our study finding that the most common area of trauma after falling is the head,
- While a significant portion of traumas occurring after falling from a height show full recovery without leaving sequelae, in some cases, disability may occur because anatomical or

functional recovery cannot be achieved [31]. Therefore, we think that organizing awareness programs with a multidisciplinary approach will be useful in the solution phase of the problem, since the negative effects of falls from height concern not only the individual but also the society. We believe that conducting effectiveness analyzes after the implementation phase of the suggestions we presented in the conclusion of our study, evaluating national and international resources on the subject, and ensuring continuity may be important in preventing falls from heights.

## Conflict of Interest

No conflict of interest is declared by tehe authors. In addition, no financial support was received.

## Ethics Committee

Balıkesir Atatürk City Hospital Scientific Research Ethics Committee with the decision dated 16.10.2023 and numbered E-30041352-514.19.99-226967432.

## Author Contributions

Study Design, ŞÖ, CI; Data Collection, ŞÖ; Statistical Analysis, CI; Data Interpretation, AK; Manuscript Preparation, ŞÖ, CI; Literature Search, ŞÖ. All authors have read and agreed to the published version of the manuscript.

## REFERENCES


1. Öngel, K., Katırcı, E., Uludağ, H., Mergen, H., Uzun, E., & Kişioğlu, AN. (2008). Assesment of fall from high level patients according to publications. *The Journal of Medical Investigation s*;6(8):175-180
2. Yazkan, R., & Özsoy, IE. (2010). Adult, isolated chest injuries caused by falls from roofs in and around the city of Şanlıurfa. *The Journal of Academic Emergency Medicine;*9:155-157. [CrossRef]
3. Turk, EE. (2008). Fatal falls from height. In: Tsokos M editor. *Forensic Pathology Reviews. New Jersey: Humana Press;*25-36. [CrossRef]
4. WHO (World Health Organization). [updated 2012 October; cited 2014 August 15] Available from: www.who.int/mediacentre/factsheets/fs344/en
5. Petaros, A., Slaus, M., Coklo, M., Sosa, I., Cengija, M., & Bosnar, A. (2013). Retrospective analysis of free-fall fractures with regard to height and cause of fall. *Forensic Sci. Int*;226:290-295. [PubMed]
6. Eryılmaz, M., & Durusu, M. (2008). Fall from heights among adults. *Journal of Adnan Menderes University Medical Faculty*;9(2):29-32.
7. Schyma, C., Doberentz, E., & Madea, B. (2012). Fall from height-surprising autopsy diagnosis in primarily unclear initial situations. *Arch Kriminol*;229(5-6):179-188. [PubMed]
8. Atanasijevic, TC., Popovic, VM., & Nikolic, SD. (2009). Characteristics of chest injury in falls from height. *Legal Medicine;*11:5315-5317. [PubMed]
9. Liu, CC., Wang, CY., Shih, HC., Wen, YS., Wu, JJ., Huang, CI., Hsu, HS., Huang, MH., & Huang, MS. (2009). Prognostic factors for mortality following falls from height. *Injury;*40:595-597. [PubMed]
10. Peng, TA., Lee, CC., Lin, JC., Shun, CT., Shaw, KP., & Weng, TI. (2014). Fatal falls from height in Taiwan. *J Forensic Sci;*59(4):978-982. [PubMed]
11. İçer, M., Güloğlu, C., Orak, M., & Üstündağ, M. (2013). Factors affecting mortality caused by falls from height. *Ulus Trav Acil Cerrahi Derg;* 19(6):529-535. [PubMed]
12. Al, B., Yıldırım, C., & Çoban, S. (2009). Falls from heights in and around the city of Batman. *Ulus Travma Acil Cerrahi Derg;*15(2):141-147.
13. Shields, BJ., Burkett, E., & Smith, GA. (2011). Epidemiology of balcony fall-related injuries, united states, 1990-2006. *Am J Emerg Med.;* 29(2):174-180. [PubMed]
14. Kohli, A., & Banerjee, KK. (2006). Pattern of injuries in fatal falls from buildings. *Med. Sci. Law;*46(4):335-341. [PubMed]
15. Morimoto, S., Okaishi, K., Nakahashi, T., & Matsumoto, M. (2003). Prevention of hip fracture in the elderly. *Clin Calcium;*13:158-163. [PubMed]
16. Preuss, J., Padosch, SA., Dettmeyer, R., Driever, F., Lignitz, E., & Madea, B. (2004). Injuries in fatal cases of falls downstairs. *Forensic Sci. Int;* 141:121-126. [PubMed]
17. Thierauf, A., Preuss, J., Lignitz, E., & Madea, B. (2010). Retrospective analysis of fatal falls. *Forensic Sci. Int;*198:92-96. [PubMed]
18. Choi, JH., Kim, SH., Kim, SP., Jung, KY., Ryu, JY., Choi, SC., & Park, IC. (2014). Characteristics of intentional fall injuries in the ED. *Am J Emerg Med;*32(6):529-534. [PubMed]
19. İçer, M., Güloğlu, C., Orak, M., & Üstündağ, M. (2013). Factors affecting mortality caused by falls from height. *Ulus Trav Acil Cerrahi Derg;* 19(6):529-535. [PubMed]
20. Sunay, YM., Önder, T., Baydar, ÇL., & Küpeli, A. (2004). Evaluation of accidental fall from high cases who admitted to emergency service. 11th national Forensic Medicine Days Congress Book, 2004 Sep 29- Oct 3, Antalya, Turkey. *Council of Forensic Medicine;*119. [PubMed]
21. Gulati, D., Aggarwal, AN., Kumar, S., & Agarwal, A. (2012). Skelatal injuries foolowing unintentional fall from height. *Ulus Travma Acil Cerrahi Derg;*18(2):141-146. [PubMed]
22. Dickinson, A., Roberts, M., Kumar, A., Weaver, A., & Lockey, DJ. (2012). Falls from height: Injury and mortality. *JR Army Med. Corps;* 158123-127. [PubMed]
23. Türki EE., & Tsokos, M. (2004). Blunt cardiac trauma caused by fatal falls from height: an autopsy-based assessment of the injury pattern. *J Trauma;*57(2):301-30424. Özkan, S., Duman, A., Durukan, P., Avşaroğulları, L., İpekçi, A., & Mutlu, A.

(2010). Features of injuries due to falls from walnut trees. *Turk J Emerg Med;*10(2):51-54. [PubMed]
25. Runyan, C., Bangdiwala, S., Linzer, M., Sacks, J, & Butts, J. (1992). Risk factors for fatal residential fires. N Engl J Med;327(12):859-63. [PubMed]
26. Fitzınaurice, LS. (1992). Approach to mu/tiple trauma. in Barkin RM ed. Pediatric emergency medicine concepts and clinical practice. *San Diego, California: Mosby Year-Book;*173183.
27. Gelbard, R., Inaba, K., Okove, OT., Morrell, M., Saadi, Z., Lam, L., Talving, P., & Demetriades, D. (2014). Falls in the elderly: a modern look at an old problem. Am J Surg;249-253. [PubMed]
28. Das, D., Datta, PP., Das, M., De, S., Firdoush, KA., Sardar, T., Datta, D., Jana, TK., Ghosh, MK., Dutta, S., Nandy, SN., Sarkar, P., Santra, S., & De, C. (2013). Epidemiology of cervical spinal cord injury in eastern India: an autopsy-based study. *N Z Med J;*126(1377):30-40. [PubMed]
29. Masson, F., Thicoipe M, Mokni T, et al. Epidemiology of traumatic comas: a prospective population-based study. Brain Injury. 2003; 17: 279-293. [PubMed]
30. Demetriades, D., Murray, J., Brown, C., Velmahos, G., Salim, A., Alo, K., & Rhee, P. (2005). High-level falls: type and severity of injuries and survival outcome according to age. *J Trauma;*58:342-5. [PubMed]
31. Forensic Evaluation of Injury Crimes Defined in the Turkish Penal Code" guide. Access Date: 04.06.2023. Access link: Access date: 21 June 2023.