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Fall From Height Cases of Pediatric Intensive Care Unit and The Curfew of the COVID-19 Period Possible Effects on it

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Background/Purpose: To investigate whether the curfew of the COVID-19 pandemic influences the fall from height cases in children's age group.

Methods: This study was conducted in the Pediatric Intensive Care Unit (PICU) of University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Turkey between 01 January 2017 and 01 January 2022. This study enrolled 39 males (35.1%) and 72 females (64.9%) aged 4.4 ±4.1 years.

Results: The findings indicate that when the school precautions existed, the number of fall cases who were admitted to PICU decreased 10-fold. Additionally, when the general precautions were performed, the number of fall cases who were admitted to PICU decreased 31,8%. On the other hand, the logistic regression model, which was established to predict the independent factors of higher fall cases among all of the fall cases admitted to PICU, was found to be significant. Falling from the 'storey of building', which is one of the variables included in the analysis, contributed significantly to the model and was in a 54.4-fold significant relationship with High Falls (above 4.57 meters). While pneumocephalus injury was associated with High Falls 9.2 times, pneumothorax was associated 15.9 times.

Conclusion: Our results have three implications. First, it was presented that above 4,57 meter falls cause more severe injuries than lower falls. Second, injury patterns, social parameters, epidemiological differences, required prevention equipment, and education of caregivers of fall cases were revealed. Third, the influences of the curfew on the COVID-19 pandemic were discussed.

Keywords: Fall, Fall from Heights, Pediatric Intensive Care Unit, The COVID-19 Pandemic

Çocuk Yoğun Bakım Ünitesinde Tedavi Gören Yüksekten Düşme Vakaları ve Covid-19 Kısıtlamalarının Bu Durum Üzerindeki Muhtemel Etkileri

ÖZET

Amaç: COVID-19 pandemisinde uygulanan sokağa çıkma yasağının çocuk yaş grubundaki yüksekten düşme vakalarını etkileyip etkilemediğini araştırmak.

Gereç ve Yöntemler: Bu çalışma 01 Ocak 2017 - 01 Ocak 2022 tarihleri arasında SBÜ, Bursa Yüksek İhtisas Eğitim ve Araştırma Hastanesi Çocuk Yoğun Bakım Ünitesi (ÇYBÜ)'nde yapılmıştır. Bu çalışmaya 4,4 ±4,1 yaşında 39 erkek (%35,1) ve 72 kız (%64,9) hasta dahil edilmiştir.

Bulgular: Bulgular, okul önlemleri alındığında ÇYBÜ'ye başvuran düşme vakalarının sayısının 10 kat azaldığını göstermektedir. Ayrıca genel önlemler alındığında ÇYBÜ'ye başvuran düşme vakası sayısı %31,8 azalmıştır. Öte yandan ÇYBÜ'ye başvuran tüm düşme olguları içinde yüksek düşme olgularının bağımsız faktörlerini yorumlamak için kurulan lojistik regresyon modeli anlamlı bulunmuştur. Analize dahil edilen değişkenlerden biri olan 'bina katından düşme' modele anlamlı katkı sağlamış ve Yüksekten Düşmeler (4,57 metre üzeri) ile 54,4 kat anlamlı bir ilişki içinde olmuştur. Pnömosefali yaralanması istatiksel olarak Yüksekten Düşme ile 9,2 kez ilişkilendirilirken, pnömotoraks 15,9 kez ilişkilendirilmiştir.

Sonuç: Sonuçlarımızın üç etkisi vardır. İlk olarak 4,57 metreden yüksekten düşmelerin, alçaktan düşmelere göre daha ağır yaralanmalara neden olduğu sunuldu. İkinci olarak, yaralanma paternleri, sosyal parametreler, epidemiyolojik farklılıklar, gerekli koruyucu ekipman ve düşme vakalarının bakım verenlerinin eğitimi ortaya konulmuştur. Üçüncüsü, sokağa çıkma yasağının COVID-19 salgını üzerindeki etkileri tartışılmıştır.

Anahtar Kelimeler: COVID-19 Pandemisi, Çocuk Yoğun Bakım Ünitesi, Düşme, Yüksekten Düşme.

Falling is a common phenomenon worldwide. However, data on fall cases who were treated in the Pediatric Intensive Care Unit (PICU) are scarce. Additionally, the influences of curfew during the COVID-19 period on such cases were not completely evaluated. The term 'Fall' refers to an injury to a person after landing on the floor after falling or jumping from a high place such as a building, ladder, etc. (1). The Accidental fall is a significant cause of morbidity and mortality in children. Falls are in seventh place in terms of global injury deaths to children (2). In the USA, Fall From Heights (FFH) cases are 2.81 per 100.000 population, annually (3). The crude mortality rate of falls was 9.55 per 100.000 population in China (4). In the USA, FFH is the fourth common cause of trauma-related deaths (5). In 2008, 43 children deaths caused by accidental falls were declared by the goverment in Turkey (6). Although fall-related injuries in children generate a significant health burden, the risk factors for these injuries have not been determined in a regular and comprehensive way. Our study identifies injury patterns and medical and social parameters of fall cases admitted to PICU.

After the first COVID-19 case emerged in China on 01.12.2019, the infection began to spread to the whole World and became a pandemic. The pandemic measures involving the closure of schools and curfews were declared as of 21.03.2020 in Turkey and worldwide. The pandemic lockdown was performed between 29/04/2020 and 17/05/2021 in Turkey. Along with the curfew, individuals under the age of 20 were completely prohibited from leaving their homes (7). Covid-19 Pandemic (C19P) affected almost every edge of the health system in the last two years. The goal of this study was to reveal the effects of the C19P lockdown period involving restrictions on fall cases in the pediatric age group. It is also aimed at drawing attention to epidemiologic data of fall cases. Our goal is to show the significant risk of pediatric accidental falls.

Material and Methods

Our study was approved by Bursa Yuksek Ihtisas Training and Education Hospital Ethics Committee (No:2011-KAEK-25 2022/06-04). While conducting this study, the 1975 Helsinki report and subsequent revisions were considered. A review was performed of the cohort of 111 children who suffered from falling injuries and were admitted to the PICU of University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Turkey between 01/01/2017 and 01/01/2022. Children admitted due to superficial injuries were not included in the dataset. Our study does not involve many patients evaluated in the Emergency Department (ED) and discharged home. All patients were enrolled retrospectively.

We were inspired by a study which reported that falling from above 15 feet (4.57 meters) has important implications for pediatric emergency care (8). Therefore, we found this approach appropriate to design our study. We classified our cases as low falls (LF) (below 4.57 meters) and high falls (HF) (> or =4.57 meters). In the current study, one case was reported as an intentional fall. The rest of the cases were accepted as unintentional or accidental cases.

The data could not be obtained as coded with the International Classification of Diseases-10th Revision (ICD-10) trauma codes. Because when we began to search for fall cases via health records, it was figured out that so many inappropriate diagnostic terms were used for such cases. For this reason, the medical history of all trauma cases who underwent treatment in PICU was read one by one. Follow-up data of the cases were as much achieved as available in medical records. After that, the decision was made whether the patient was a fall case. Therefore, our study comprehends all of the fall cases who were admitted to the PICU of our hospital. The information was obtained by reviewing the patient files. Patients who had incomplete or missing data were excluded from the study because there was no facility for communication via post or telephone to the patient due to logistic causes. One case had autism, and one suffered from development disorder and was excluded from the study. The patient information was collected, including the medical status and epidemiological information. With regard to fall, the time, place, mechanism of the fall, and diameters of height were collected. Trauma findings were documented and referred to body parts.

Standard diameters were determined according to the hospital district's legal, authorized, and valid parameters. The building height of a standard flat is 3.2 m according to the municipality building by-law of the city (Table-1). The diameter of the caregiver arms in Turkish society as 1.1 m (Average length of human thorax-foot) was taken from an anthropometric research (9). Falling heights were calculated by using these data.

For the statistical analyses, the SPSS 15v Chicago IL program was used. A significant p-value was allowed as $p<0.05$. In the presentation of qualitative data, frequency and percentage were used; in the presentation of the numeric data, mean value, standard deviation, median

value, and minimum and maximum values were used. Analyses of data normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) were performed due to heterogeneous distribution of averages Mann-WhitneyU, Chi Square test, and Fisher's Exact V test were used. Multivariable Analyses were performed in the second step because some variables are significant in the bivariate analyses at the 0.05 level and are also suitable for a binary Logistic Model.

Results

Epidemiologic characteristics

One hundred eleven accidental fall patients were admitted to the PICU of Bursa Yuksek Ihtisas Training and Research Hospital between 01.10.2017 and 01.01.2022. Of 55 patients the height of the fall was over 4.57 m. Four of them died as a consequence of FFH.

The most significant proportion of the cases who were admitted to PICU caused by a fall (57.6%) were preschool infants, followed by school-age children (19.8%)(Table-2). The most common falls are (47.72%) storey of a building (Table-2). The cases of 'Other Place of Falls' were; hitting a stone as a result of falling while standing, falling from a wall, falling into a water well, falling on a toy, and hitting his/her head. The majority of other falls (86.4) were significantly LF ($p < 0.001$).

No significant statistical relation was found between being a refugee in terms of HF and LF. The statistical calculations of mortality could not be made due to insufficient deaths. Two-thirds of the children's families lived in an urban area of the city, and one-third of the cases lived in rural areas and counties (Table-2). Almost one-third of cases were female. No significant gender differences were found (Table-2). The mean patient age was 4.4 years (0.1-16.2 years)(Table-3). 21.6 % of the children were refugees (Table-3). 3.6% (n=4) of all cases died (Table-4). Three of the falls were buffered by something: clotheslines, a ceiling of a car, and a branch of a tree. In one adolescent, attempted suicide was the cause of fall, accounting for 0.9% of the cases. In our study, we calculated that the mean voice of treatment of a case is 4756 ₺ (around US$221). A significant difference occurred between HF and LF cases in terms of the cost of staying in the PICU (table-4).

Factors Associated with Severity of Injuries

The logistic regression model, which was established to predict the independent factors of higher fall cases among all of the fall cases admitted to PICU, was found to be significant. Falling from the 'storey of building', which is one of the variables included in the analysis, contributed significantly to the model and was in a 54.4-fold significant relationship with HF (Table-5). While pneumocephalus injury was associated with HF 9.2 times, pneumothorax was associated 15.9 times (Table-5).

Medical care

The length of stay was recorded for all patients. The average hospital stay in the ward was 7,1 (1-42) days; in PICU was 5 (1-27) days (Table-3). Although infants (87.5) fall likelihood more LF, preschool children (62.5) tend to have HF (p=0.001). While the bed/armchair/couch/bunk bed (81.8) contributed significantly to more LF cases, the cases of falls from storey buildings (86.8) were significantly higher in HF (p=0.028 and p=0.001) (Table-2).

Patient Management

17,1 percent of the patients (n=11) required the surgery. Most of the cases require a multidisciplinary approach. In turn, 88 patients (79.2%) were consulted by Neurosurgery, and 23 patients (20.7%) were evaluated by Orthopedics (Table-4).

Mortality

Four patients died, each from trauma to the head. In addition, two fatalities resulted from falls from over 14.4 m. Due to the low number of victims, no association was calculated between the mortality and any variables.

Head Injuries

Eighty patients (72%) suffered a severe head injury; of these, 19 were brain contusions (Table 2). Pneumocephalus (78.9) was seen as significantly higher in HF rather than LF (p=0.005)(Table-2). The computed tomography (CT) study detected intracranial hemorrhage in 55 (49.5%) patients. Eighty patients (72%) suffered linear skull fracture; of these most common cranial bone which has a fracture line is occipital bone in 20 patients (25%)(Figure-1). Some patients had more than one bone involving a fracture line.

Thorax, Abdominal, and Extremity Injuries

Among thorax injuries, pneumothorax and lung contusion are found significantly higher in HF than in LF (p=0.001 and p=0.008) (Table-2). Liver damage, in turn, was the most frequent abdominal injury. As for extremity injuries, Upperextremity (80.0%) and pelvic fracture (100.0) injuries were significantly higher in HF rather than LF (p=0.011 and p=0.027).

Table-1.Standard Measures

Place	Altitude (m:meter)	Reference
Flat	3.2	https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=24623&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5
Stairs	0.175	https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=24623&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5
Sliding Fall	0	-
Caregiver arms in Turkish Society (Average length of human thorax-foot)	1.1741	Calis S, Calis C, Kocali K, et al. "18-65 Yaş arası kişilerin antropometrik verilerinin belirlenmesi üzerine bir alan araştırması: yükseköğretim kurumu uygulaması." Ergonomi 4.3 (2021): 147-161.
Bunk bed	1.86	https://www.ikea.com.tr/urun-katalogu/ikea-cocuk/8-12-yas/ranzalar-ve-karyolalar/20247982/svarta-ranza.aspx
Bed	0.66	https://www.ikea.com.tr/urun-katalogu/yatak-odalari/karyolalar/karyolalar/49009551/hemnesluroy-tek-kisilik-karyola.aspx
Baby car	1.03	https://www.kanzcocuk.com/kanz/bebek-arabasi/b-go-pratik-bebek-arabasi-fume/
Trampoline	0.215	https://www.decathlon.com.tr/p/fitness-trambolini-100/_/R-p-147480?mc=8558559
Armchair	0.45	https://www.ikea.com.tr/urun-katalogu/oturma-odalari/koltuklar/kumas-koltuklar/10438557/muren-yatar-koltuk.aspx
Chair	0.45	https://www.ikea.com.tr/urun-katalogu/yemek-odalari/sandalyeler/70103250/ingolf-sandalye.aspx
Slide/Swing	1.5	https://www.konak.bel.tr/ilan/2019-358781c.pdf

Table-2. The Possible Independent Factors Showing High Falls

Variables	HF (n/ %)	LF (n/ %)	p value
Head			
Linear fracture	42 (52.5)	38 (47.5)	0.318
Epidural hemorrhage	6 (30.0)	14 (70.0)	0.053
Subdural hemorrhage	10 (71.4)	4 (28.6)	0.080
Subarachnoid hemorrhage	10 (47.6)	11 (52.4)	0.844
Brain contusion	12 (63.2)	7 (36.8)	0.193
Pneumocephalus	15 (78.9)	4 (21.1)	**0.005**
Brain oedema	6 (75.0)	2 (25.0)	0.162
Thorax			
Pneumothorax	14 (87.5)	2 (12.5)	**0.001**
Hemothorax	3 (100.0)	0 (0.0)	0.118
Lung contusion	9 (90.0)	1 (10.0)	**0.008**
Rib fracture	4 (100.0)	0 (0.0)	0.057
Atelectasis	1 (25.0)	3 (75.0)	0.618
Extremities			
Lower extremity fracture	7 (77.8)	2 (22.2)	0.094
Upper extremity fracture	12 (80.0)	3 (20.0)	**0.011**
Pelvic fracture	5 (100.0)	0 (0.0)	**0.027**
Vertebral Fracture	3 (30.0)	7 (70.0)	0.321
Abdomen-pelvis			
Liver injury	5 (50.0)	5 (50.0)	1.000
Splenic injury	7 (77.8)	2 (22.2)	0.094
Kidney damage	0 (0.0)	2 (100.0)	0.495
Gender			
Male	18 (46.2)	21 (53.8)	0.598
Female	37 (51.4)	35 (48.6)	
Age			
Infant	2 (12.5)	14 (87.5)	**0.001**
Preschool	40 (62.5)	24 (37.5)	**0.001**
School	8 (36.4)	14 (63.6)	0.167
Adolescent	5 (49.5)	4 (44.4)	0.742
Cause of fall			
Suicide	1 (100.0)	0 (0.0)	0.495
Unintentional	54 (49.1)	56 (50.5)	
Place of fall			
Bed/armchair/couch/Bunk bed	2 (18.2)	9 (81.8)	**0.028**
Window	3 (60.0)	2 (40.0)	0.679
Lap	0 (0.0)	5 (100.0)	0.057
Tree	0 (0.0)	3 (100.0)	0.243
Storey of Building	46 (86.8)	7 (13.2)	**0.001**
Stairs	2 (28.6)	5 (71.4)	0.438
Domestic Furniture	0 (0.0)	1 (100.0)	1.000
Child park/sport	0 (0.0)	5 (100.0)	0.057
Baby Carriage	0 (0.0)	1 (100.0)	1.000
Other	3 (13.6)	19 (86.4)	**0.000**
Race			
Domestic	41 (47.1)	46 (52.9)	0.331
Foreign	14 (58.3)	10 (41.7)	
Place			
Urban	31 (43.1)	41 (56.9)	0.063
Rural	24 (61.5)	15 (38.5)	
Surgery/Conservative			
Surgery	11 (57.9)	8 (42.1)	0.424
Conservative	44 (47.8)	48 (52.2)	

Table-3.Epidemiologic Data of the Cases

Parameter	Number
Age (year) (min-max, n±SD)	0.1-16.2, 4.4 ±4.1
Gender (male/female)	72 (64.9) / 39 (35.1)
Place (urban/rural area)	72 (64.9) / 39 (35.1)
Duration of stay in PICU (days) (min-max, n±SD)	1.0-27.0, 5.0 ±5.3
Duration of stay in inpatient care (days) (min-max, n±SD)	1.0-42.0, 7.1 ±8.2
Prognosis(death/injured)	4 (3.6) / 107 (96.4)
Race (local/immigrant)	87 (78.4) / 24 (21.6)
Range of fall (meter) (min-max, n±SD)	0.0-25.20, 6.1 ± 5.3

Table 5: Model for Fall From Height by Performed the Binary Logistic Regression Analyze

	B	p	O.R.	95 % Confidence Interval (O.R.)	
				Lower Limit	Upper Limit
Preschool	1.424	.070	4.155	.889	19.424
Storey of Building	3.997	.000	54.447	11.743	252.437
Pneumocephalus	2.221	.014	9.214	1.573	53.985
Pneumothorax	2.769	.018	15.935	1.619	156.811
Lung Contusion	1.133	.348	3.105	.291	33.104
Upper-extremity Fracture	.369	.742	1.446	.160	13.026
Pelvic Fracture	23.542	.999	<100	.001	<100.000

Table-4: Consequences of the Falls

Outcomes	HF* (n/ %)	LF** (n/ %)	p value
Prognosis			
Survive	53 (49.5)	54 (50.5)	1.000
Exitus	2 (50.0)	2 (50.0)	
Consultations			
Neurosurgery	47 (53.4)	41 (46.6)	0.112
Orthopedics	18 (78.3)	5 (21.7)	**0.002**
Ear, nose and throat	6 (75.0)	2 (25.0)	0.162
Ophthalmology	14 (70.0)	6 (30.0)	**0.043**
Other departments	3 (50.0)	3 (50.0)	1.000
Pediatric infectious diseases	2 (100)	0 (0)	
Pediatric neurology	4 (66,6)	2 (33,3)	
	Median (min-max)	**Median (min-max)**	
Cost (₺)	4756 (464-69953)	1857 (384-63911)	
Intensive Care (day)	4 (1-23)	2 (1-27)	**0.000**
Inpatient Care (day)	4 (1-42)	4 (1-37)	0.127

*Abbreviations: *HF:High Falls, **LF: Low Falls.*

Seasons and Daytimes

When the times of admission were evaluated, it was observed that 52.2% of the patients (n=58) presented between 22:00 and 03:00. The most common presentation daytime of fall cases to our center is found at 23:00 o'clock at night (Figure-2). Most of the falls occurred in summer (n=53, 47.7%, Figure-3). Almost three-quarters of the cases were seen in warm months of the year.

Lockdown of Covid19 Pandemic Effect

Surprisingly, when the school precautions existed, the number of fall cases who were admitted to PICU of our hospital decreased 10-fold (Figure-3). Additionally, when the general precautions were performed, the number of fall cases who were admitted to PICU of our hospital decreased 31.8% (Figure-3). A number of the cases were calculated separately in terms of school and general precautions. A considerable decrease was seen in terms of fall cases due to both general and school precautions for C19P. Primarily, school precautions reduced the number of fall cases almost 10-fold. However, during the period when schools were opened, the number of FFH cases was found to be 1.275 times higher than during the closed period (Figure-3).

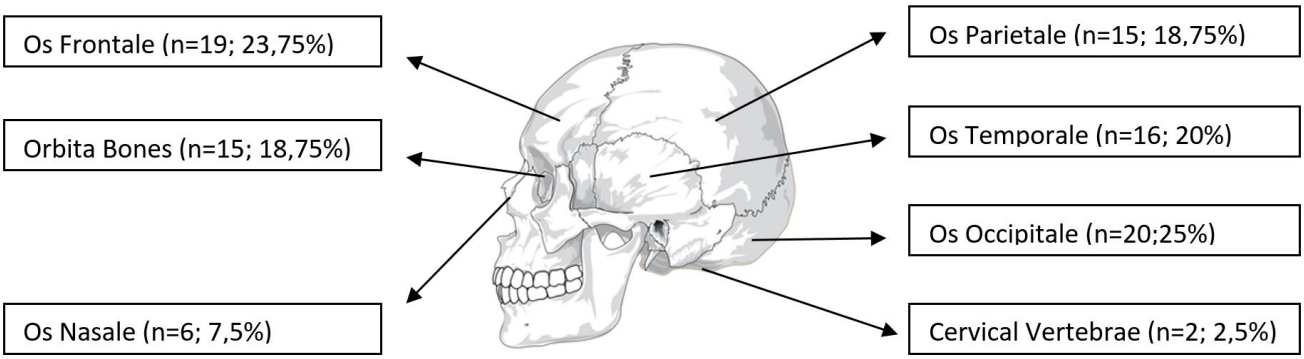

Figure 1. *Skull fractures in Our Cases*

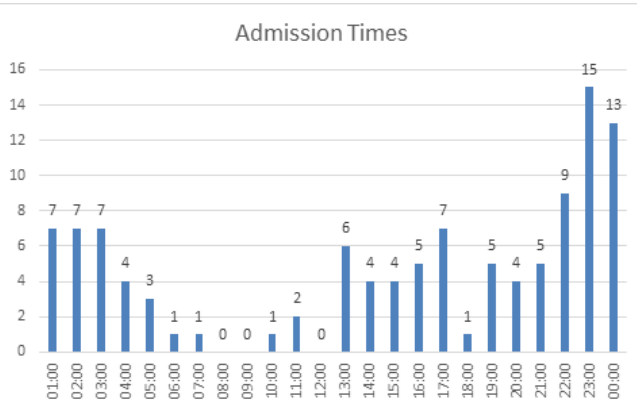

Figure 2. *Time of Admission of the Cases*

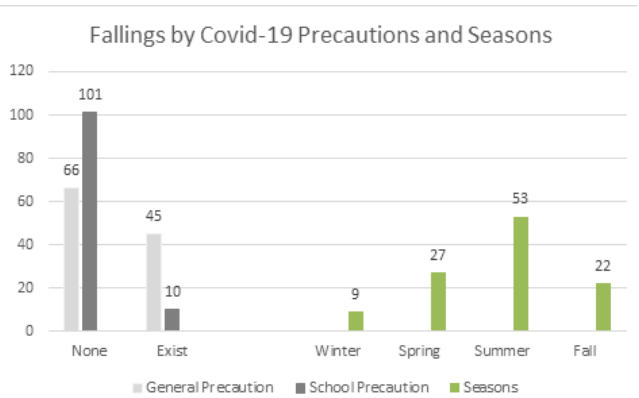

Figure 3. *Season of the Admission of the Cases*

Discussion

Similarly to our results, the fall of the height cases was more likely to be male (10)(12). A review revealed that preschool age, male gender, and poverty were found as higher risk factors for fall injuries (13). These findings are consistent with our results. Chaudhary et al. found that as age increases, the heaviness of the injury decreases (OR = 0.95, CI = 0.93–0.97) according to multinomial logistic regression models (14). Other researchers have reported that HF is more concerned with severe injuries than LF. For instance, Wang et al. suggested that the frequencies of emergency presentation, injury of nerve, fractures of spin, lower extremity, craniofacial, sternum, and rib, and early complications or associated injuries were significantly associated with the HF compared to LF (all P<.001) (10). Another study observed a negative correlation between trauma scores and falling distance (15). Muneshige et al. reported that the falling range was associated with the duration of treatment in the hospital. They also emphasized that the ratio of suicides, the number of lower-extremity fractures, the classification score of McCormack, and the time intervals of ICU and hospital stay were found to be significantly higher in cases falling from above 6 meters than lower (16). Falls are seen frequently in two age groups; one is very young people and the other is older adults (14). Similar to our results, most fall cases among the children's age group are preschool children (15). In our study, the mean patient age was 4,4 years. Therefore, our study consisted of literature. Some studies which comprehend fall cases 18 years old and below suggested different average ages. For example, Wang et al. found 10.8 (10).

In some studies, race and ethnicity may indicate the number of cases of sustained trauma. Interestingly, falls among

black children who live in poor districts were found to be higher as well as falls among whites who live in high-income districts of the city (17). In a study, it was suggested that low-income urban families need education on injury prevention against falls and other accidents (18). Faelker et al. suggested that children from low-income families sustained trauma, including falls, 1.67-fold higher than those who do not suffer from poverty (19). In addition, 6% of cases had no insurance (12). Chaudhary and colleagues reported that black children patients were younger than whites in their study, comprehending 1086 FFH patients (14). Gyedu et al. suggested that inconsistency was found between child falls and the education of the caregiver, socioeconomic status, and beliefs in terms of the cause of household child injuries (20).

During the COVID-19 days, while infections, malignities, and dermatologic illnesses decreased, trauma in children increased (21). In a study which was investigated COVID-19 effects on pediatric trauma cases, the number of cases of outdoor traumas, traumas with high energy, the rate of cases that required surgery, and the presentations to the emergency department were found to increase when compared to the results of the same months of a year ago (22). It was stated that the number of trauma cases decreased in the curfew period, but the proportions of the types of trauma were not changed (23). Aydın and colleagues revealed that the number of pediatric fall cases decreased, but its proportion among the injury-related cases could not reach a significant ratio (24). Many studies confirmed that trauma presentations were reduced in half during the lockdown (25)(26). From the view of our findings, it was revealed that when the school precautions existed, the number of fall cases who were admitted to PICU of our hospital decreased nearly 90% (Figure-3). In addition to this result, when the general precautions were performed, the number of fall cases who were admitted to PICU of our hospital decreased to nearly two third (Figure-3). Giudici et al. found that the number of deaths caused by accidental falls on the death scene decreased by half during the COVID-19 outbreak (27). On the other hand, the same investigators reported that suicidal falls increased seven times higher in the same time interval (27). Chiba et al. found similar results compared to last one year (respectively n=36 (3.1%), n=30 (2.5%))(28). Additionally, Ferro et al. revealed that the number of pediatric FFH cases increased in COVID-19 compared to one year before the pandemic (n=591 and 67.24%, n=695 and 69.99)(29). In Germany's lockdown sample, the number of admissions of injury-related trauma cases decreased (30). It was reported in many countries that admissions of trauma-related pediatric cases decreased to almost one-third in the lockdown period (30). It is unclear why this decline occurred.

Mental disorders were found to be linked with higher rates of spinal cord injury (17). Additionally, those cases are more likely to suffer multiple trauma (17). Not only psychiatric diagnosis but also alcohol dependency was associated with accidental falls in adolescents (16). A study revealed that three-quarters of the cases who fell from above six meters suffered from a mental illness (16).

Liver, spleen, or kidney damage was determined in 17.1% (n=19) cases. On the other hand, some researchers suggested that abdominal injury accounted for only 3% of patients (12). Our study on FFH showed that falling from the storey of a building, pneumocephalus, and pneumothorax have higher odds with height falls. Kocak et al. suggested that loss of consciousness and falling from higher than lower distances were significantly associated (15). In contrast to our results, the rates of injury are usually higher in rural than in urban areas (2). Nevertheless, Kocak et al. found that nearly two third of child falls occur in city centers, similar to our results (15).

Among the patients who suffered from craniofacial fractures, occipital fractures were observed in 20 patients, frontal fractures in 19 patients, and temporal fractures in 16 patients (Figure-1). Some researchers have suggested that skull fractures are the most common fracture line in parietal bone (10).

Falls from height are the reason for either severe injuries or loss of money. Although average hospital charges for injuries from falls from heights were almost $9000 in the USA (11). Our study revealed that it was costed 4057₺ (around US$221) per child in Turkey. This finding is contrary to our results. Presumably, the different health care costs, economic status, and health systems are reasons for this discrepancy.

Results from a study on the height of falls suggested that extremity injuries were the most common body part for falls in children (10). However, our findings revealed that head trauma is the most common result of falls in children. Similar to our results, some researchers revealed that the most common injury was head trauma in FFH cases (12) (15).

More than half of the fall cases were admitted between 22:00 and 03:00 o'clock (n=58, 52.2%, Figure-2). Some researchers had found similar results to ours (12). Wang and colleagues reported that one-third of presentations occurred between 16:00 and 20:00 o'clock (10). Many researchers suggested that most of the falls occurred in warm months of the year (10)(12). Similarly, our results showed that falls from heights occurred in the same season of the year.

Our study's in-hospital mortality rate was 3.6% (n=4). Different mortality rates were reported in the literature. For instance, Pressley et al. reported twelve deaths (11%) (17). Kocak revealed six deaths (4.5%) (15). The ultimate cause of all four deaths was head trauma. It reflects the results of the previous studies (12).

Kocak and colleagues reported that the most frequent falling place cases were balconies (38%) (15). Our results show that the average hospital stay in the ward was 7,1 (1-42) days; in PICU was 5 (1-27) days. Vish et al. reported that the median length of stay was two days (12).

Strengths and Limitations of the Study

Neither Pediatric Trauma Score nor Glasgow Coma Score could not be achieved in the medical records of the cases. Perhaps these scores are recorded in the more comprehensible patient files. Unfortunately, medical doctor orders with handwriting do not exist in the digital patient files. It is the limit of our study.

Conclusions

Accidental falls in children may cause serious injuries and even death. Many factors affect the survey of these types of injuries such as softness of the ground, hit on the sharp shape of the things, age of the victim. It is vital to have safety systems in home windows or balconies against falls. Designing strategies to prevent falls based on the environmental circumstances and social context in which they occur.

Our findings have three implications. First, it was presented that above 4.57 meter falls cause more severe injuries than lower falls. Second, injury patterns, social parameters, epidemiological differences, required prevention equipment, and education of caregivers of fall cases were revealed. Third, the influences of the curfew on the COVID-19 pandemic were discussed.

Declaration

Statement of Ethics

This study was approved by Bursa Yuksek Ihtisas Training and Education Hospital Ethics Committee (No:2011-KAEK-25 2022/06-04).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contribution

Serbülent Kılıç, Arzu Oto: collected the data. Musa Şahin: analyzed the data. Serbülent Kılıç wrote the first draft of the manuscript. Serbülent Kılıç, Arzu Oto and Musa Şahin: designed the manuscript. Serbülent Kılıç, Arzu Oto and Musa Şahin: read and revised the manuscript.

Data Availability Statement

All data is available.

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