



Trauma and Intentional Injury Characteristics of Pediatric Forensic Cases Applying to Emergency Room

Acil Servise Başvuran Çocuk Adli Olgularda Travmaların ve İstemli Yaralanmaların Özellikleri

Pediatric Forensic Cases

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Presented as a poster in I. Ulusal Şiddeti Anlamak Kongresi 12-14 November 2015, İstanbul.

Özet

Amaç: Bu çalışmada, pediatrik adli olgularda meydana gelen yaralanmaların önlenmesine yönelik olarak; travma profilini ve istemli yaralanmaların özelliklerini ortaya çıkarmak amaçlandı. **Gereç ve Yöntem:** Acil servise 01.01.2014-31.12.2014 tarihlerinde başvuran, 18 yaş ve altı çocuk adli olguların dijital ortamdaki kayıtları retrospektif olarak yaş, cinsiyet, yaralanma tipi, travmanın etiolojisi ve etkileri açısından incelendi. **Bulgular:** İncelenen 148 olgunun 62'si (%41,9) kadın, 86'sı (%58,1) erkek cinsiyette ve yaş ortalaması 11,2±0,4 idi. Yaralanma nedenleri ilk sırada, trafik kazaları (n=69, %46,6), ikinci sırada istemli yaralanmalar (32 olgu, %21,6) idi. İstemli yaralanmalardan 20 olgu (%13,5) darp, 7 olgu (%4,7) kesici-delici alet yaralanması, 3 olgu (%2) intihar girişimi, 1 olgu (%0,7) ateşli silah yaralanması ve 1 olgu (%0,7) cinsel istismar idi. Toplam; 11 (%7,4) olguda yaşamsal tehlike mevcuttu. **Tartışma:** Olguların çoğu trafik kazasına bağlı önlenebilir nitelikte yaralanmalardır. İstemli yaralanmalar, okul çağı ve adolesan döneminde daha sıktır. Bu özellikler, yaralanma kontrol programlarının geliştirilmesi ve çocuk güvenliğinin sağlanması açısından çok önemlidir.

Anahtar Kelimeler

Acil Servis; Adli Pediatrik Olgular; İstemsiz Yaralanmalar; Çocuk Güvenliği

Abstract

Aim: In this study, we aim to reveal the characteristics of intentional injuries and the trauma profiles in order to prevent injuries in pediatric forensic cases. **Material and Method:** Forensic cases of patients aged 18 or younger who were admitted into emergency service were analyzed retrospectively in terms of age, gender, type of injury, and etiology of trauma between January 1, 2014 and December 31, 2014. **Results:** Of the 148 cases, 62(41.9%) were female and 86(58.1%) male; the mean age was 11.2±0.4. The most common cause of injury was traffic accident (46.6%). The second most common type of injury was intentional injuries (21.6%). The distribution of intentional injury is: beating in 20 cases (13.5%), stab wounds in 7 cases (4.7%), gunshot wounds in 1 case (0.7%), sexual abuse in 1 case (0.7%), and attempted suicide in 3 cases (2%). Eleven (7.4%) cases had life-threatening injuries. **Discussion:** Most injuries are preventable because they are due to traffic accidents. Intentional injuries were more frequent during school age and adolescence. Understanding these findings is very important in developing child safety programs to reduce injuries.

Keywords

Emergency Service; Pediatric Forensic Cases; Intentional Injury; Child Security

DOI: 10.4328/JCAM.4302

Received: 15.01.2016 Accepted: 03.03.2016 Printed: 01.09.2016

J Clin Anal Med 2016;7(5): 668-71

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Introduction

Intentional and unintentional injuries are the leading cause of disability, morbidity, and mortality in children all over the world [1]. As a result of developments in the area of pediatric health and improvements in data collection methods, it appears that in low and middle income countries the leading cause of child mortality and disability is injury. Research and experience suggest that the majority of these injuries are preventable in all countries [2-4]. In the 0-18 year age group, the leading cause of non-mortal traumatic injuries is unintentional injury [5-7]. This study aims to determine the trauma profile and intentional injury characteristics of forensic cases aged 18 years and below applying to a third-stage emergency service.

Material and Method

Pediatric forensic cases aged 18 years and below admitted to Çanakkale Onsekiz Mart University Application and Research Hospital Emergency Service from January 1, 2014 to December 31, 2014 were retrospectively screened using police records and digital patient records. Cases included in the study were investigated in terms of age, sex, cause of trauma, type of injury and the effects of injury on the body. Data were analyzed using the SPSS 15.0 program. Quantitative variables were indicated as mean ± SD (standard deviation) and categorical variables were summarized as numbers and percentages. Categorical data were analyzed by Pearson chi-square or Fisher's exact test. Values of $p < 0.05$ were considered as statistically significant.

Results

During the time period of the study, 148 pediatric cases applied to the emergency service due to trauma and had a forensic report prepared. Of these cases, 62 were female (41.9%) and 86 were male (58.1%). The distribution of cases according to sex and age is shown in Table 1. The mean age of cases was

Table 1. Distribution of sex of cases according to age group

Age group (years)	Gender				Total	
	Male		Female		n	%
	n	%	n	%	n	%
0-2	7	31,8	15	68,2	22	14,9
3-6	5	31,2	11	68,8	16	10,8
7-14	32	61,5	20	39,5	52	35,1
15-18	42	72,4	16	27,6	58	39,2
Total	86	58,1	62	41,9	148	100,0
p	0,001					

n: patient number

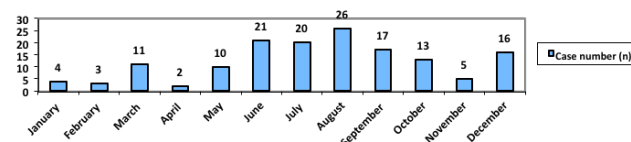
11.2±0.4 years. The injury rate of males (58.1%) was greater than for females (41.9%). The intentional injury rate of investigated male cases was observed to be higher than for female cases ($p=0.001$). When all injuries in both sexes are evaluated together, the unintentional injury cases were observed to be significantly high ($p=0.03$) (Table 2). It appears that more forensic cases were encountered in the summer months compared to other months (Figure 1).

Fifty-one (34.4%) of the investigated cases were observed to have been exposed to trauma in one body area, while 16 cases

Table 2. Distribution of intentional and unintentional injury according to age group

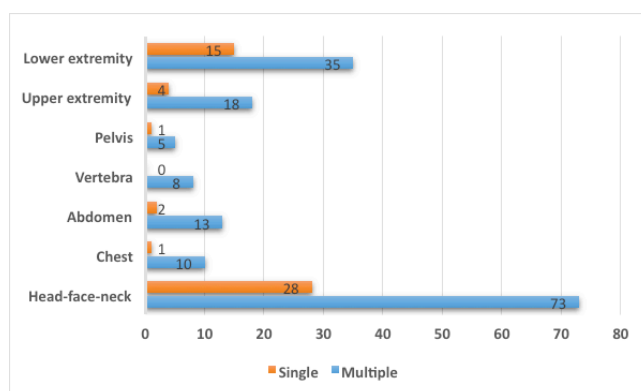
Age group (Years)	Type of injury				Total	
	Intentional		Unintentional		n	%
	n	%	n	%	n	%
0-2	1	4,5	21	95,5	22	14,9
3-6	2	12,5	14	87,5	16	10,8
7-14	11	21,2	41	78,8	52	35,1
15-18	18	31,0	40	69,0	58	39,2
Total	32	21,6	116	78,4	148	100,0
P	0,03					

Figure 1. Distribution of cases according to event date



(10.8%) had trauma in two regions and 22 cases (14.8%) had trauma in three or more regions. The most frequently injured regions were head-neck and lower extremities (Figure 2). In 29

Figure 2. Distribution of areas exposed to trauma



cases (19.5%), there was no region affected by trauma. In 10 cases (6.7%) there was no available data. The number of cases with systemic effects due to external factors was 20 (13.5%). This systemic effect was observed in poisoning and suicide-attempt cases.

When cases are investigated according to etiology, the most common was traffic accidents (TA) with 69 cases (46.6%). Intentional injury cases, including interpersonal violence and suicide attempts, were second most common totaling 32 cases (21.6%). The distribution of the injuries in the violence-linked and intentional injury category were 20 cases of beating (13.5%), 7 cases of sharp object injuries (SOI) (4.7%), 1 case of firearm injury (FI) (0.7%), 1 case of sexual abuse (0.7%), and 3 suicide-attempt cases (2%). The sexual abuse case concurrently was involved in substance abuse. There were a total of 22 cases (14.8%) with falls from the same level or from a height and 17 cases of poisoning (11.4%). The distribution of cases according to etiology and gender is shown in Table 3. When the admissions to the emergency service were examined, 10 cases (6.7%) admitted themselves, 33 cases (22.2%) came in an ambulance,

Table 3. Distribution of percentage etiology of trauma by gender

Etiology	Sex			
	Female		Male	
	n	%	n	%
Traffic accident	34	49,3	35	50,7
Fall*	10	45,5	12	54,5
Poisoning	6	35,3	11	64,7
Hitting**	1	20,0	4	80,0
Burn	1	33,3	2	66,7
Beating	6	30,0	14	70,0
Stabbing***	2	28,6	5	71,4
Firearm****	0	0,0	1	100,0
Suicide	2	66,7	1	33,3
Sexual abuse	1	100,0	0	0,0

*Includes cases of falls from the same level and from a height, ** Includes impact cases, hitting an object or hit with an object, ***Injury with sharp object, ****Firearm injury

and 11 cases (7.4%) were transferred from external centers. The results of forensic traumatology reports were 33 cases (26.4%) with no external traumatic change, 40 (27%) cases in which the situation was resolved with basic medical intervention (BMI), 11 cases (7.4%) that were life-threatening, and 21 cases (14.3%) with bone fractures (Table 4).

In ten (47.6%) cases there were multiple bone fractures. In the head and neck region the most common fracture was nasal bone fracture 5 olgu (23.8%). In one case (4.7%) there were multiple fractures in face bones. In three cases (14.2%) there was frontal bone fracture and in one case (4.7%) there was occipital bone fracture. In all cases the most common bone fractures were lower extremity fractures, of which there were four femur (19.0%), three tibia (14.2%), three fibula (14.2%), and three metatarsal (14.2%). In upper extremities, there were three ulnar (14.2%) and one phalanx fracture (4.7%).

Discussion

Trauma in the childhood period is a significant public health problem as many cases with injuries (either fatal or non-fatal) require hospital care. A significant portion of these patients experience life-long health problems and disabilities. Though trauma in the pediatric period is a significant cause of morbidity and mortality, the majority of traumas are preventable [1, 8]. In pediatric trauma epidemiology studies in our country, usually traffic accidents (TA) appear in first place [9-11]. This fact is of separate importance in terms of preventability of injury in the pediatric period and in ensuring child safety against injury.

Table 4. The distribution of forensic traumatologic assessment of injury according to age group

Age group	Life-threatening		BMI*				Fractures					
	Yes		No		Yes		No		Yes		No	
	n	%	n	%	n	%	n	%	n	%	n	%
0-2	2	9,1	20	90,9	9	40,9	4	18,2	3	13,6	19	86,4
3-6	2	0,0	16	100,0	9	56,2	2	12,5	2	12,5	14	87,5
7-14	5	9,6	47	90,4	27	51,9	16	30,8	9	17,6	42	82,4
15-18	4	6,9	54	93,1	24	41,4	18	31,0	7	12,1	51	87,9
Total	11	7,4	137	92,6	69*	46,6	40**	27,0	21	14,3	126	85,7

* basic medical intervention, **A total of 39 cases (26.4%) were found not to have any traumatic change

Additionally, in our study of pediatric forensic cases, the rate of intentional injury linked to violence was very high; it was the most frequent forensic report after TA.

Within the one-year period of the study, the majority of forensic cases under 18 years of age admitted to our emergency service were male (58.1%). Across all cases the majority of forensic reports were in the 15-18 year age interval, whereas the age interval for female cases was 7-14 years. Seasonal distribution of cases showed that the majority (45.5%) admitted in the summer, with 38.8% in the month of August. A recent national study stated that pediatric forensic cases were higher for males, with the most frequent age range being 7-10 years [9].

In a regional study by Erhan et al. [12] the male/female rates were similar; they attributed this to the similarly active lifestyles of male and female children. However, in our study, the male forensic case numbers were significantly higher (p=0.001). In the literature, generally, higher rates for male cases are reported [9, 12, 13]. One reason for TA coming to the fore in our study may be the increased motorcycle and bicycle use in our region, especially during the summer months.

When all trauma cases in our study are evaluated together, TA was the leading cause of emergency application with a rate of 46.6%. There are many studies stating that TA is the most frequent cause of pediatric forensic cases. A study by Çınar et al. reported a rate of 52% while Cooper et al. reported a rate of 59%. These are similar to the results of our study [10, 14]. However, there are some studies that do not align with our results, stating that TA is more rarely observed [12, 15]. It is thought that regional differences are an important factor in these variable epidemiological results.

Intentional injuries were determined to be the second most common trauma with an incidence of 21.6%. Among these injuries, battery was the most frequently encountered cause (62.5%). Of all forensic cases, battery had a rate of 13.5%, with the majority of cases (70.0%) exposed to this trauma being male patients. When examined generally, the percentages of forensic case reports after battery in our study were compatible with other studies [10, 15]. SOI cases were the second most common cause among intentional injuries (4.7%) and fourth place for all traumatic injuries. The majority of these cases (71.4%) were male children. Demir et al. found that SOI was the third most common (6.8%) form of injury in traumatic injury cases [11]. Additionally, three of our cases were suicide attempts, with two of these female. One patient had a firearm injury and one patient applied as a result of sexual abuse. In the adolescent period an individual is greatly affected by friends and environment. Led by feelings of independence, they may act without thinking. It is reported that this situation can increase the tendency for violent behavior, especially in male children [16, 17]. In the pediatric age group, among injuries linked to violence, intentional injury is a serious health problem related to violence, with striking and preventable effects [8, 9]. After intentional injury, fall cases with a 14.8% rate were the third most common forensic case report. Similarly Buken et al. [12] stated that injury linked to falls was the third most common cause with a rate of 11.96%. However Çetinel et al. [18] reported a rate

of 23.38%, higher than that generally stated in the literature. In our study poisoning cases (11.4%) were fourth in emergency services applications. The majority of these cases (64.7%) were male patients. In international studies the poisoning rate is approximately 12%, while national studies generally show wide variations in poisoning rates, ranging from 5% to 30% [9, 10, 13, 18].

Many studies state that head-neck and upper extremity regions are the most frequently injured body areas. In single area trauma, again head-neck injuries are the most frequently injured region [10, 13, 16]. In our study, compatible with general findings, nearly half of patients (49.3%) had trauma in the head-neck region, followed by 23.6% with lower extremity trauma. Upper extremity was the third most common region and abdominal the fourth. Additionally, the head-neck region was most frequently affected in single-region injury (34.4%).

During our study, 19.5% of patients with forensic case reports were treated after admission to hospital. The majority of hospitalized patients (82.7%) were unintentional trauma cases and the most common cause was TA. Though 7.4% of hospitalized patients had life-threatening injuries, no forensic case died. Nearly 2/3 of patients had mild injuries requiring basic medical intervention and they were discharged after outpatient treatment. Çetinel et al. [18] reported that half of pediatric forensic applications required hospitalization. The death rate of these cases was 9.0%. Sever et al. [13] had a similar hospital stay rate (40.1%) and reported the death rate as 9.0%. In a study only monitoring in-patients, Akay et al. reported the most common forms of trauma were abdominal trauma and head trauma; the mortality rate was given as 6.7% [11]. In the literature, similar to our study, studies with lower hospitalization rates are found. In these studies, the mortality rate is very low (0.4%) or no case ended in death [9, 10]. In our study, when the cases are evaluated in terms of severity of trauma, in the majority of cases the injury was not life threatening. Basic medical intervention was sufficient and bone fractures did not occur. We did not have any case resulting in death. In conclusion, the majority of our cases were assessed as having a mild or moderate degree of injury. This situation is interpreted clinically as the most important factor in explaining our low hospitalization rates and 0.0% mortality.

According to the results of our research, TA, injury due to falls, and poisoning were identified as the most important etiologic factors in unintentional injury of children. Female children are observed to have more injuries in the early childhood period, whereas male children are observed to have more injuries in the school and adolescent periods. This was identified in the type and frequency of regional differences in forensic cases. Regarding both intentional and unintentional injuries, preventive measures can be taken. To ensure child protection, it is important to determine the characteristics and trauma profile of forensic cases in the pediatric period. In conclusion, in taking preventive precautions for injuries and developing injury control programs, the epidemiological data obtained in these types of studies should be considered.

Competing interests

The authors declare that they have no competing interests.

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How to cite this article:

Kalkan EA, Yıldırım A, Akdur O. Trauma and Intentional Injury Characteristics of Pediatric Forensic Cases Applying to Emergency Room. *J Clin Anal Med* 2016;7(5): 668-71.