Erişkin Acil Tip Kliniğinde Pediatrik Travmayı Etkileyen Faktörlerin Değerlendirilmesi: Ön Çalışma

Evaluation of the Affecting Factors for Pediatric Trauma Patients in the Adult Emergency Medicine Department: Preliminary Study

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Özet **Amaç:** Bu çalışmanın amacı, Acil Tıp Kliniğinde, pediatrik travmayı etkileyen faktörlerin değerlendirmektir. **Gereç ve Yöntemler:** Üç ay süresince 18 yaş ve altı travma şikayeti ile Acil Tıp Kliniğine başvuran çocuklar kesitsel olarak değerlendirildi. **Bulgular:** Tüm hastaların yaş ortalamaları 7,44±4,54 ve kız çocukların yaş ortalaması erkeklerden istatistiksel olarak daha düşüktü. Travma mekanizmaları karşılaştırıldığında düşmenin diğer tüm mekanizmalarından daha sık (%60,7) gerçekleştiği bulundu. Araç dışı trafik kazaları motorlu taşıt yaralanmalarının %87,5'ini oluşturdu. Ekstremite fraktürü tanısı alan hastaların ortalama vücut ağırlıkları diğer hastaların ortalama vücut ağırlıklarından istatistiksel olarak anlamlı yüksek bulundu. Kafa travması şikayeti ile başvuran hastaların ortalama yaşı diğer hastalardan anlamlı olarak düşüktü. Televizyon düşmesi sebebiyle yaralanan hastaların GKS, RTS, PTS skorları diğer travma mekanizmaları ile karşılaştırıldığında istatistiksel olarak anlamlı düşük bulundu. Ebeveynlerin eğitim durumları ile hastaneye yatış oranı karşılaştırıldığında anlamlı fark mevcuttu. (5,80±3,31'e karşı 6,91±3,29 yıl). Hastaların %73'ünün ortalama aylık gelirleri 1000$'dan düşüktü. **Sonuç:** Yaş, cinsiyet, vücut ağırlığı, travma mekanizmaları, ebeveynlerin düşük eğitim ve sosyoekonomik düzeyleri pediatrik travmayı etkileyen faktörler olarak görülmektedir. Düşme en sık meydana gelen travma mekanizması iken, TV düşmesi ölümcül yaralanma sebebiydi. Ayrıca araç dışı trafik kazaları tüm motorlu taşıt yaralanmaları içinde en sık görülendi.

Anahtar Kelimeler:Çocuk, travma, risk faktörleri, acil tıp, travma skoru

Abstract **Aim:** To evaluate the factors that affect pediatric trauma in the emergency department. **Materials And Methods:** Injured children aged 18 and younger presented to a community hospital-based ED during 3 months were analyzed as cross-sectional. **Results:** Mean age of overall sample was 7.44±4.54 and female victims were significantly younger than males. When compared the mechanisms of pediatric trauma, ground-level fall was found more often (60.7%) than other mechanisms. Pedestrian trauma was found 87.5% of Motor Vehicle Injury (MVI). Mean body weight of patients diagnosed with extremity fractures was significantly higher than the others. Mean age of patients suffered from head trauma was significantly lower than the others. Children hurt by falling TV, had significantly lower Glasgow Coma Scale (GCS), Revised Trauma Score (RTS) and Pediatric Trauma Score (PTS) scores when compared to those with other mechanisms of injury. There was significant relation between the parents' mean education times and the rates of admission into the hospital (5.80±3.31 versus 6.91±3.29 years). Mean monthly household income of 73% of patients was found to be less than 1000$. **Conclusion:** Age, sex, body weight, trauma mechanisms, low educational and socio-economic level of parents were seemed to be affecting factors of pediatric trauma. While ground-level fall was found the most common of trauma mechanism, TV falling was found as mortal injury in pediatric trauma. Also, pedestrian trauma was most common causes of MVI.

Key words: Children, trauma, risk factors, emergency medicine, trauma score

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Introduction

Trauma is the most common cause of mortality in adult population in the world. [1] Childhood injury is a major public health problem that requires urgent attention. Injury and violence is a major killer of children throughout the world, responsible for about 950 000 deaths in children and young people under the age of 18 years each year. [2]

Age and sex have the greatest impact on the type of injuries. Injuries by falling are the most common cause of major trauma for infants and toddlers, motor vehicle and bicycle injuries are for teenagers and adolescent. Most childhood injuries occurs at home environment. [4]

A previous study in North Carolina showed that demographic factors had an important predictive power on the trauma death rate in children. [5] It is well known that the rates of trauma and resultant mortality for children are closely related to socioeconomic factors. Several studies have reported increased rates of injury and mortality due to injury among children who are from racial and/or ethnic minority groups, who lack medical insurance, who reside in low-income communities, and whose mothers have fewer years of education. [6, 7, 8]

The objective of this study is to evaluate the affecting factors (i.e. socioeconomic and educational level, trauma mechanisms, age, sex, body weight, trauma scores) in pediatric trauma patients presented to the Emergency Department (ED).

Materials and Methods

Injured children aged 18 and younger (according to WHO report 2008[2]) presented to an inner-city community hospital-based ED between 20 April 2011 and 20 July 2011 were analyzed prospectively.

The victims' data were abstracted by face-to-face contact and analyzed for their trauma mechanisms, causes of injuries, socio-demographic characteristics, diagnosis and outcome. Data of body weight was learnt from parents in ED. Patients over 18 years of age; those whose parents declined to give informed consent and who had incomplete data were excluded from the analysis.

All obtained data were statistically analyzed using SPSS v.16 for Windows. Chi-square test was used to compare groups for categorical variables. Independent samples t-test, paired samples t-test and Mann-Whitney U test were used to compare mean variables. Statistical significance value is set to 0.05.

Results

Two hundred and eleven pediatric trauma victims (n=74, 35.1% were female) were eligible and were recruited in the study. Mean age of overall sample was 7.44±4.54 and female victims were significantly younger than males (5.96±4.30 vs. 8.23±4.47, respectively, $p<0.001$, Independent samples t-test)

The distribution of admission complaints of the patients in the study were summarized in Figure 1. Injured children were brought to ED mostly due to ground-level falls (n=128, 60.7%). Motor Vehicle Injury (MVI) was the second common cause of trauma (n=32), furthermore 87.5% of MVI were pedestrian trauma (Figure 2).

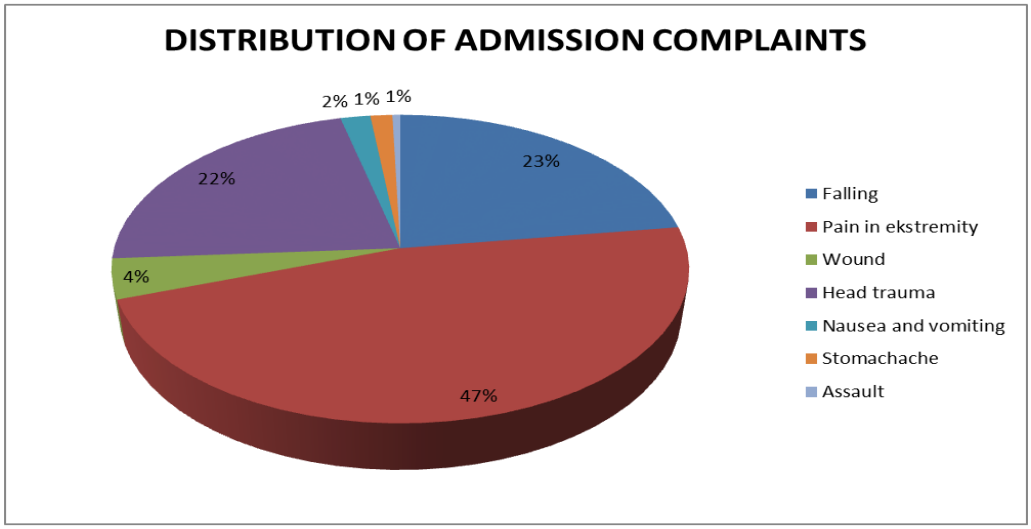

Figure 1. Distribution of admission complaints of the patients in this study

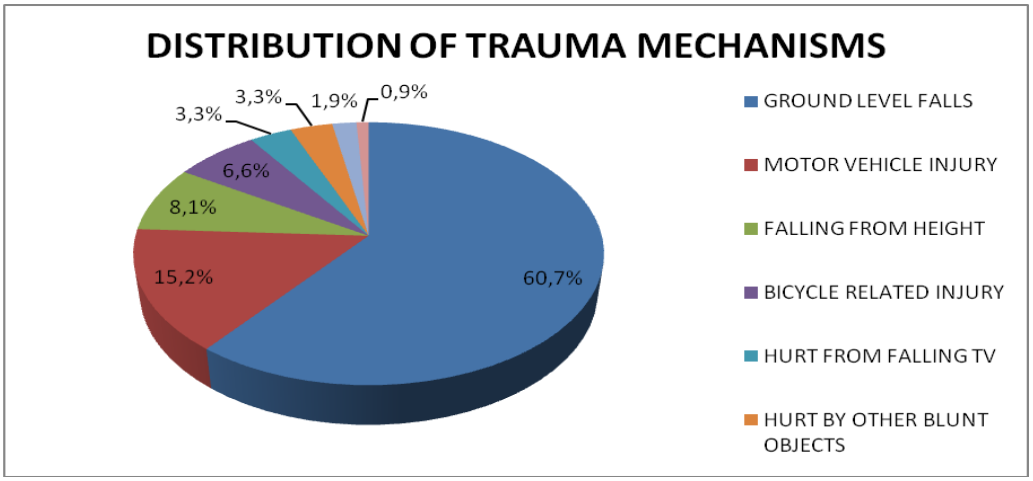

Figure 2. The distribution of trauma mechanisms of the patients in this study

In this study, the most common trauma localizations were extremities (n=110, 52.1%), and cranial (n=91, 43.1%).

Mean age of the patients with head injuries was significantly lower than that of the patients without any head injury (5.38±3.81 and 9.0±4.46, respectively, p<0.001).

Mean ages of the groups suffering from ground level falls, falling from height and hurt by falling TV were lower than the groups suffering from MVI, bicycle-related injury, stab wounds, blunt injury and assault. Children injured by TV falling on the child, had lower Glasgow Coma Scale (GCS), Revised Trauma Score (RTS) and Pediatric Trauma Score (PTS) scores when compared to those with other mechanisms of injury (p=0.001), (Table 1).

Mothers of injured children had a mean education time as long as 5.80±3.31 years vs. fathers' 6.91±3.29 years. Also 3.79% of fathers (n=8) and 12.8% of mothers (n=27) were illiterate. There was significant relation between the mothers' mean education time and the rates of admission into the hospital (p=0.009). (mean maternal education time of hospitalized patients: 4,84; others': 6.19) Also there was similar significant relation between the fathers' mean education time and the rates of admission into hospital (p=0.016) (mean paternal education time of hospitalized patients: 6.08; others': 7.25) Mean monthly household income of the children was found to be less than 1000$ in 73% (n=154). Forty-two (27.3%) of them were admitted into the hospital. Twenty seven percent (n=57) of the patients' household income was found to be more than 1000$ and 33.3% of them (n=19) were admitted into the hospital. There was no significant relation between the families' monthly income and the rates of admission into the hospital (p=0.38).

While female patients were mostly exposed to trauma at home, male patients were outdoors. Thirty seven percent of patients (n=80) had trauma at home and the mean age for those was 4.22±3.56. Ten point four percent of patients (n=19) had trauma at school and the mean age for those was 9.42±2.63.

Overall mean body weight was 28.4±18.15 kg (22.95±14.59 kg for females, 31.35±19.22 kg for males). The children with extremity fractures (n=65) had a significantly higher mean body weight compared to those without (n=146) (32.22±18.10 kg and 26.70±17.96 kg, respectively, p=0.04). The distribution of discharge diagnoses of the patients in the study were summarized in Figure 3. In this study, 28.9% (n=61) of the patients were admitted to hospital after evaluation in the ED.

While 99.52% of patients were alive, clinical course was fatal in a two-years old girl diagnosed with intracranial hematoma and thoracic contusion injured by TV falling, died at the third day of stay in hospital.

Table 1. Relationship between mean ages and trauma scores of the victims with regard to the mechanisms of injuries

		N	Mean Age ± SD	p value	Mean GKS	P value	Mean RTS	p value	Mean PTS	p value
MVI	+	32	9.28 ± 3.99	p= 0.01	14.9 ± 0.1	p=0.58	11.9 ± 0.2	p=0.82	10.7 ± 1.1	p=0.41
	-	179	7.11 ± 4.56							
Stab Wounds	+	4	8.75 ± 6.55	p= 0.56	15	p=0.79	12	p=0.70	10.0 ± 0.8	p=0.09
	-	207	7.41 ± 4.51							
Ground-level falls	+	128	6.71 ± 4.49	p= 0,004	14.9 ± 0.19	p=0.07	11.9 ± 0.1	p=0.17	10.8 ± 0.9	p=0.57
	-	83	8.55 ± 4.41							
Falling from height	+	17	6.76 ± 4.71	p=0.52	14.9 ± 0.2	p=0.81	12	p=0.42	11.0 ± 0.6	p=0.56
	-	194	7.49 ± 4.53							
Hurt by falling TV	+	7	3.57 ± 1.27	p=0.02	12.5 ± 3.9	P<0.001	11.2 ± 1.1	P<0.001	9.8 ± 2.4	p=0.01
	-	204	7.57 ± 4.55							
Bicycle related injury	+	14	10.64 ± 2.87	p=0.006	15	p=0.62	12	p=0.47	10.9 ± 0.6	p=0.79
	-	197	7.21 ± 4.55							
Blunt Injury	+	7	9.86 ± 5.49	p=0.15	15	p=0.73	12	p=0.61	11.5 ± 0.5	p=0.06
	-	204	7.35 ± 4.49							
Assault	+	2	10.0 ± 1.41	p=0.42	15	p=0.85	12	p=0.79	12	p=0.12
	-	209	7.41 ± 4.55							
Total		211								

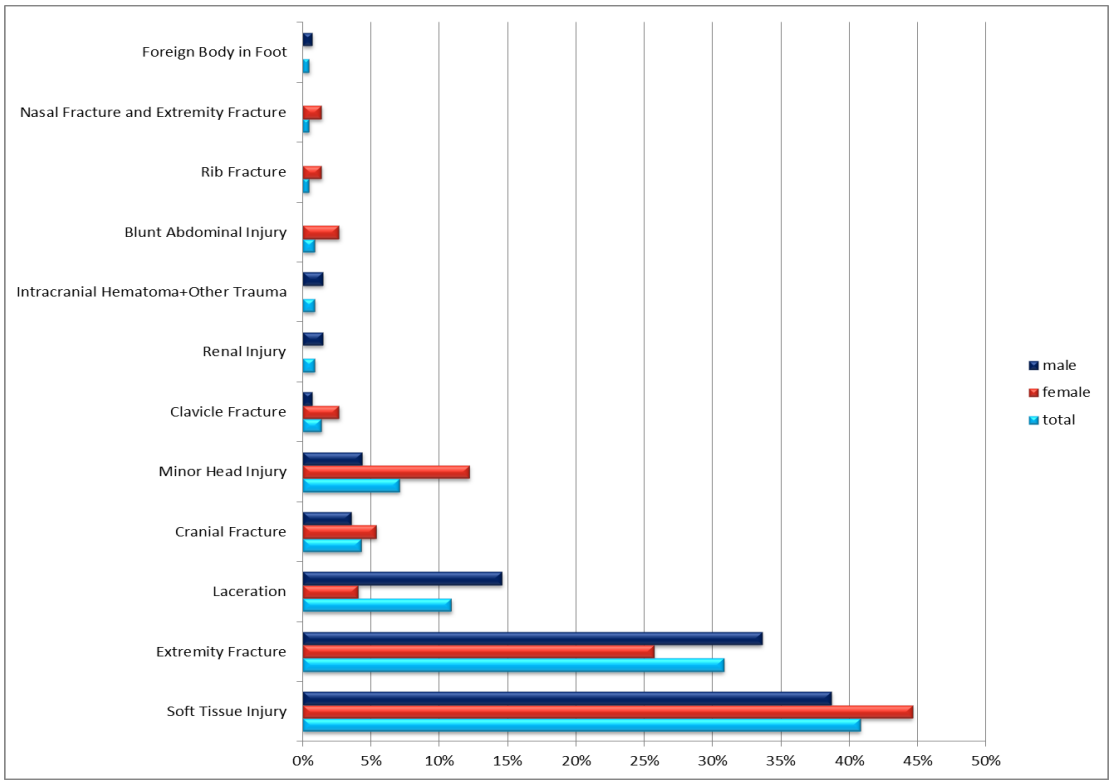

Figure 3. The distribution of discharge diagnoses of the patients in the study

Discussion

Trauma is the most important cause of mortality in the pediatric age group. Nearly 16,000,000 children visit EDs for injuries each year. Of those, 15,000 die and 20,000 are temporarily disabled. As in adults, boys are more frequently injured than girls by a factor of 2:1.[3] In previous reports about pediatric trauma, it is indicated that 67.8% to 68.4% of pediatric patients were male and 32.4% to 31.6% were female[6, 10] Soreide et al. stated that the mean age was 13 years and Mihalicz et al reported the mean age was 11 years.[11, 12]

In this study, distribution of gender was similar with previous reports and furthermore female victims significantly younger than male. Also, in this study the mean age was found to be lower than the previous figures. Eighteen (8.5%) infants are included in the sample, a finding suggestive of a need for parental training on childhood injuries and preventive measures.

Hambidge et al. investigated trauma-related admissions and reported 19% sports-related injuries, 16% falling, 15% related to natural events, 8% penetrating injuries, 5% motor vehicle injuries, 4% assaults, 2% burning.[13] In a study from Turkey, Soyer et al. reported patients accounts for 74% falling, 9.6% MVI, 7.5% pedestrian injuries, 6.2% assault, 2.1% stabbing and gunshot wounds.[14] Similarly, the present findings indicate that falling and MVI were the most common causes of trauma. However, in this study, rate of pedestrian trauma was found higher than literature.

Soyer et al. reported that some patients presented with trauma have multiple site injuries. Injuries according to body site were head in 78.1%, abdominal in 61.6%, extremity in 41.8%, thoracic in 8.6% and genitourinary in 1.4% of all case. [14] Suominen et al. reported that 69% of patients who were treated in trauma center suffered from extremity fractures.[15] In this study, it is found that extremity injuries was encountered most commonly, followed by head injuries additionally mean age of the patients with head injuries was significantly lower than that of the patients without any head injury.

Brown et al. reported that the mean age of patients suffering MVI was 11.2±3.5 vs. 9.4±3.3 for bicycle injuries.[16] In this study, the mean age of patients suffering MVI was lower and the mean age of patients suffering from bicycle injuries was similar to literature data.

In this study, while the rate of pedestrian trauma was found higher than and the mean age of pedestrian trauma was found lower than in literatures. As a result, the playground for the children is insufficient to suggest that our province.

Injuries by TV falling championed among domestic injuries referred to the ED for the children of one to three years old. That is caused by learning how to walk and their desire to discover the environment. In a study on pediatric injuries by TV falling, Rutkoski et al. reported that the mean age of children was 3 which is comparable to the corresponding figure (3.57) found in this study in the same group of injured children.[18]

Durkin et al. stated that for all traumatic injuries, the results of the bivariate regression shows high positive correlation with low income and single parents; smaller but still significant positive correlation with non-high school graduates, and unemployed mothers and fathers.[19]

In this study, the mothers' mean years of education is lower than six years (The mean education years was given as 9.22 in male and 7.97 in female according to 2013 Turkish Statistical Institute in our country[17]).

In a study about socioeconomic factors in pediatric trauma, Marcin et al. stated that the mean monthly income of patients' families was 2500$ and %17.6 of them were below the poverty line.[6] They reported that the rate of hospital admission and mortality decrease as mean monthly income increases. In this study, 73% of families had an average monthly income below 1000$. However there was no significant relation disclosed between monthly income and hospitalization.

Hambidge et al. reported that four-fifths of trauma-related primary care visits were due to domestic injuries for the children below 5 years; and one-fourth at school, and another one-fourth at sports areas for adolescents. [13] In this study, 37% of patients were exposed to trauma at home and the mean age for those was 4.3. One-tenth of patients had trauma at school and the mean age for those was 9.4.

Zonfrillo et al. reported that there is a significant correlation between increased weight percentile and lower extremity injuries.[20] Kessler et al. reported that increased body mass index causes increased lower extremity fractures.[21] In this study it is observed that incidence of extremity fractures boosted while body weight increases in children.

Conclusion

Falling is the most common mechanism of trauma for the pediatric patients who were brought to ED due to trauma. Also, pedestrian trauma was most common causes of MVI. TV falling can results in more severe injury when compared to other mechanisms of pediatric trauma. Age, body weight, low socioeconomic and educational level of the parents seem to be affecting factors of pediatric trauma.

Study Limitation

Injured children presented to the adult ED in the scheduled shift work of the principal author comprised the study sample. This study is preliminary study.

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Dr. Derya is the guarantor for this article, and takes responsibility for the integrity of the work as a whole.

Conflict of Interest. Derya Ozasir, Dogac Niyazi Ozucelik, Mustafa Yazicioglu, Uyarıs Coban, Yilmaz Aydin, Halil Doğan Ozgur Karcioglu declare that they have no conflict of interest.

Compliance with Ethics Guidelines. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

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