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Examination of Pediatric Trauma Patients Admitted to the Emergency Department

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Abstract

Aim: The aim of this study was to analyze the demographic and laboratory data of pediatric trauma patients admitted to the emergency department.

Materials and Methods: Our study was conducted by retrospectively analyzing the files of 573 patients from the computer registry system of pediatric trauma cases aged between 0 and 16. In addition, information such as age and gender of the patients, monthly admissions, mechanism of trauma, the place where the trauma occurred, the consultations requested, the services where the patients were followed, the body parts exposed to the trauma, radiological and laboratory findings, and the treatments given were specified.

Results: The most common mechanisms among trauma etiologies were falling and impact on pediatric traumas. Head and neck injuries occurred first when body parts exposed to trauma were examined. It was determined that head and neck injuries increased as age decreased. It was found that the frequency of abdominal trauma increased as age decreased, and those with abdominal injury had lower hemoglobin and hematocrit values and higher alanine aminotransferase and aspartate aminotransferase values compared with those without abdominal injuries.

Conclusion: It has been determined that in terms of the incidence of pediatric traumas, there were different etiological causes and trauma areas, their frequency varied seasonally, and a good evaluation of the blood tests was critical in the assessment and follow-up of patients and to avoid missing some injuries.

Keywords: Emergency, etiology, laboratory, paediatrics, trauma

Introduction

Trauma is one of the main causes of death in developed countries worldwide. Trauma, which is the leading cause of death in children, accounts for approximately 50% of all childhood deaths (1). It has been reported that 30% of early deaths of children with trauma can be prevented with an early evaluation and treatment (2).

There are significant anatomical, physiological, and psychological differences between adult and pediatric patient populations. The frequency and types of accidents vary with the age of the children (3). The main causes of trauma in children are traffic accidents, falls, and bicycle accidents. One-third of important injuries in children occur in the home environment (1). In infants and young children, injuries most frequently occur at home (4). Additionally, traumas can cause psychological problems as well as acute physical effects, and even months after the accident, hopelessness, depression, and post-traumatic stress can be seen in the child and the family (3). Child abuse can also underlie trauma. However, child abuse is considered only if the trauma is severe. Reports of abuse are very low, and children exposed to abuse experience varying degrees of physical, developmental, mental, and social retardation (5). These situations further increase the importance of evaluating childhood traumas.

Our aim in this study was to examine the pediatric trauma patients admitted to the emergency department and to determine the

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data such as age, gender, place of accident, trauma mechanism, examinations, and treatments, and to analyze whether there is any relation between these data.

Materials and Methods

Approval for this study was obtained from the İnönü University Health Sciences Scientific Research and Publication Ethics Committee with decision number: 2016/10-11, date: 02.08.2016. Our study was conducted by retrospectively analyzing the files of pediatric trauma cases in the 0-16 age group who applied to İnönü University Faculty of Medicine, Department of Emergency Medicine between January 01, 2013, and December 31, 2013, from the computer registry system. Six hundred nine pediatric trauma cases were included in the study; however, 36 patients were excluded because of archiving and recording system deficiencies. A total of 573 patients were reviewed. The exclusion criteria of the study were being 17 years of age or older and being younger than 17 years but admitted to the emergency department for a reason other than injury, and patients with injuries due to burns, suffocation, and animal bites.

Data Collection

A form was created with the title of evaluation of pediatric trauma patients, and the information of the patients who were screened using the hospital information management system was recorded in these forms. In addition to the information such as age and gender of the patients, monthly admissions, mechanism of trauma, the place where the trauma occurred, the consultations requested, the services where the patients were followed, the body parts exposed to the trauma, radiological and laboratory findings [hemoglobin (Hgb), hematocrit (Hct), mean corpuscular volume (MCV), platelets (PLT), white blood cells (WBC), red blood cell distribution width (RDW), creatine (Cr), blood urea nitrogen (BUN), aspartate aminotransferase (AST), alanine aminotransferase (ALT), glucose, activated partial thromboplastin time (aPTT), international normalized ratio (INR), haematuria, and leukocytes in urine] and the treatments given were specified. Then, the statistical relationships between them were examined. Patients were divided into four groups according to age groups: under one year, 1-5 years, 5-10 years, and over 10 years. Falls above 2 m height were grouped as falls from height, whereas falls from a distance below 2 m and impacts were grouped together. Crush and being stuck between two objects were grouped as crush injuries. Injuries that could not be included in other groups, such as object falls, were grouped as others. Treatments were divided into two groups: minor and major surgeries. Minor surgeries were grouped as operations performed under local anesthesia in emergency service conditions. Major surgeries were grouped as surgical interventions performed under operating room conditions.

Statistical Analysis

Quantitative data are summarized as median, minimum, and maximum, and qualitative data as number and percentage. The IBM Statistical Package for the Social Sciences statistics 25.0 program was used for statistical analysis. In analyzing the data for normality in quantitative data, the Kolmogorov-Smirnov test was used. Unpaired t-test and one-way analysis of variance were used in independent groups for normally distributed data, and Mann-Whitney U and Kruskal-Wallis tests were employed for data that did not show normal distribution. Multiple comparisons of the groups were performed using the Tukey test after a one-way analysis of variance and the Conover test following the Kruskal-Wallis test. The chi-square test was used in qualitative data to determine the difference between the groups. A p value of <0.05 was considered statistically significant.

Results

Of the 573 patients included in the study, 384 (67%) were boys and 189 (33%) were girls. The mean age of the patients was 6.44 ± 4.56 years. The mean ages of male and female pediatric patients were 6.90 ± 4.65 years and 5.52 ± 4.24 years, respectively. The distribution of patients by gender and age group is shown in Table 1. The most frequent admission was in patients aged between 1 and 5 years (41.5%), and the majority were male patients. When we looked at the age groups according to

Table 1. Distribution of patients by gender and age groups

Variable	Category	Statistics	Age group				Total
			0-1	1-5	5-10	>10	
Gender	Male	Number (n)	24	144	109	107	384
		Percentage (%)	4.2	25.1	19.0	18.7	67.0%
	Girl	Number (n)	14	94	51	30	189
		Percentage (%)	2.4	16.4	8.9	5.2	33.0%
Total		Number (n)	38	238	160	137	573
		Total (%)	6.6%	41.5	27.9	23.9	100.0

gender, a significant difference was found between the groups (p=0.006).

The number of admissions of children with trauma increased in July (12.2%), August (10.3%), September (10.1%), and October (10.65%). It was determined that the highest number of applications was in July, with 12.22%, but this was not statistically significant (p=0.380). Figure 1 shows the distribution of patients with trauma admissions by months.

In our study, it was determined that 333 (58.11%) patients were admitted to our clinic due to falls and hit from a distance below the height limit of 2 m, 22 (3.83%) fell from height, 25 (4.36%) were exposed to assault-abuse, 12 (2.09%) were in-vehicle collisions, 11 (1.91%) pedestrian injuries, 31 (5.41%) bicycle accident, 23 (4.01%) sports injury, 48 (8.37%) sharp-penetrating tool injuries, 45 (7.85%) crush injuries, and 23 (4.01%) with other injuries. Among the trauma mechanisms, falls and impacts were found to be the most common type of trauma, with a rate of 58.11%. When we looked at the trauma mechanisms by gender, no significant difference was found between the groups (p=0.084).

As the information on the site of trauma could not be accessed for 103 of the patients, it was determined that in 281 (59.8%) of the remaining 470 patients, trauma occurred at home, and home was the most common trauma place. The number and percentage of trauma areas are given in Table 2.

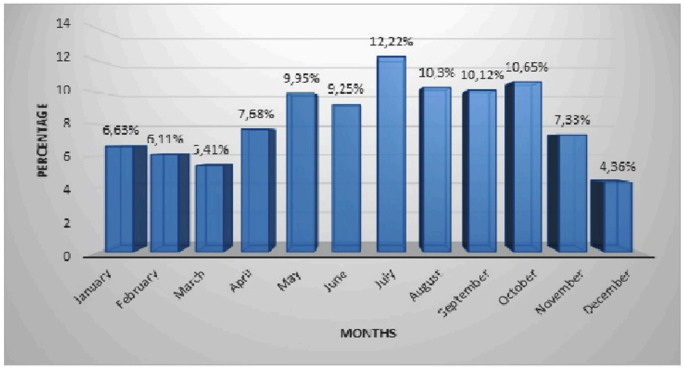

Figure 1. Diagram of the distribution of trauma patients admissions by months

Table 2. Number and percentage of trauma area		
Trauma place	**Number (n)**	**Percentage (%)**
Home	281	59.8
School	22	4.7
Playground	26	5.5
Hospital	4	0.9
Street/Road/Garden	124	26.4
Pool/Gymnasium/AstroTurf	13	2.8
Total	470	100.0

When the patients in our study were separated and evaluated by the areas exposed to trauma, it was found that head and neck injury was with 367 (64%), and extremity injuries were in the second place with 240 patients (41.9%). The number and percentage of areas exposed to trauma are given in Table 3.

In 422 (73.64%) patients, only one body region was affected because of trauma, and 166 (39.33%) completed their treatment without hospitalization or follow-up. There were 151 (26.35%) patients with multiple trauma, and 13 (8.6%) of these patients were treated without hospitalization or follow-up. Hospitalization and follow-up rates of patients with multiple traumas were higher than those of patients with only one affected area, which was also significant (p<0.001).

It was specified that 5 (0.87%) of the 573 patients included in the study were deceased. It was determined that these patients had fallen from a height (3 patients) and had pedestrian injuries (2 patients).

Of 573 cases admitted to the emergency department, 208 (36.30%) were treated by emergency physicians without asking for consultation. The most frequent consultations were requested from the orthopedics, traumatology, and neurosurgery departments.

Whole blood count in 163 (28.4%) patients, blood biochemistry in 152 (26.5%) patients, complete urinalysis in 39 (6.8%) patients, coagulation parameters in 16 (2.8%) patients, and blood group analyses in 59 (10.3%) patients were performed.

Direct radiography was requested most frequently as a radiological imaging method. Direct radiography was requested from 358 (62.47%) patients, and pathology secondary to trauma was found in 56 (15.6%) patients. After direct X-ray, computed tomography (CT) was the most preferred imaging method as the radiological imaging method in 190 (33.15%) patients, and pathology secondary to trauma was detected in 54 (28.4%) patients. Ultrasonography (USG) was requested from 104 (18.15%)

Table 3. Number and percentage of traumatized areas	
Injured body part	**n* (%)**
Head-neck	367 (64)
Thorax	127 (22.2)
Abdomen	150 (26.2)
Pelvis	76 (13.3)
Extremity	240 (41.9)
Vertebral column	72 (12.6)
Genital area	11 (1.9)
*Numbers are determined according to the presence of more than one body area injury in a patient	

patients, and pathology secondary to trauma was detected in 6 (5.76%) patients.

Treatments given to the patients were grouped as those who did not receive treatment, those who received medical treatment, those who underwent minor surgery, those who underwent major surgery, and those who underwent resuscitation. Treatments according to the trauma mechanism were determined. The total number of patients with crush injuries was 45, and major surgery was performed on 26 (57.7%) patients in an operating room environment, and minor surgery was performed on 9 (20%) patients in the emergency department. The number and percentage of treatments performed according to the trauma mechanism are given in Table 4.

Of the total patients, 214 (37.3%) patients admitted with fall impact were followed up in the emergency department. Of the patients with fall-impact injuries, only 1 case was admitted to the neurosurgery ward. Of the 45 cases with crush injuries, 33 were admitted to the emergency department, followed up, and treated. Of the 22 patients who fell from a height, 4 received outpatient treatment, 16 were hospitalized in the inpatient department of the emergency service, and one was hospitalized in the neurosurgery ward. Inpatient follow-up was recommended for a patient, but the patient's relatives did not accept hospitalization. According to the trauma mechanism, the number and percentage of hospitalizations and follow-ups are listed in Table 5.

The relationship between the injured area and laboratory parameters (Hgb, Hct, MCV, PLT, WBC, RDW, Cr, BUN, AST, ALT, glucose, aPTT, INR, haematuria and leukocyte in urine) and age were examined.

It was established that head and neck injuries increased as age decreased ($p<0.001$). Hgb and Hct values of patients with head and neck injuries were significantly lower than those without head and neck injuries ($p=0.016$, $p=0.043$, respectively). RDW, BUN, MCV, and AST values of patients with head and neck injuries were observed to be significantly higher than those without head and neck injuries ($p=0.025$, $p=0.016$, $p=0.014$, $p=0.046$, respectively). Table 6 shows the relationship between head and neck injury and laboratory parameters.

Hgb and Hct values of patients with thoracic injuries were lower than those of those without thoracic injuries ($p=0.012$, $p=0.035$, respectively).

When the relationship between abdominal injuries and parameters was reviewed, abdominal trauma increased as age decreased ($p=0.041$). Hgb and Hct values of patients with abdominal injuries were lower than those of those without abdominal injuries ($p=0.006$, $p=0.014$, respectively). AST and ALT values of patients with abdominal trauma were higher than those without abdominal trauma ($p=0.016$, $p=0.026$, respectively).

When the relationship between pelvic injury and parameters was examined, Hgb and Hct values were lower in patients with pelvic

Table 4. Number and percentage of treatments performed according to trauma mechanism

		Trauma mechanism										
Variable	Value	Fall-impact	Fall from height	Assault-abuse	In-vehicle collisions	Pedestrian Injuries	Bicycle accident	Sports injury	Sharp-penetrating tool injuries	Crush	Others	Total
Untreated patient	(n)	111	2	11	7	2	6	14	3	2	6	164
	(%)	19.4	0.3	1.9	1.2	0.3	1.0	2.4	0.5	0.3	1	28.6
Medical treatment	(n)	154	15	12	5	6	19	6	19	8	13	257
	(%)	26.9	2.6	2.1	0.9	1.0	3.3	1.0	3.3	1.4	2.3	44.9
Minor surgery	(n)	68	2	2	0	1	6	2	25	9	1	116
	(%)	11.9	0.3	0.3	0.0	0.2	1.0	0.3	4.4	1.6	0.2	20.2
Major surgery	(n)	0	0	0	0	0	0	1	1	26	3	31
	(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	4.5	0.5	5.4
Resuscitation	(n)	0	3	0	0	2	0	0	0	0	0	5
	(%)	0.0	0.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.9
Total	(n)	333	22	25	12	11	31	23	48	45	23	573
	(%)	58.1	3.8	4.4	2.1	1.9	5.4	4.0	8.4	7.9	4.0	100.0

injury than in those without pelvic injury (p=0.001, p=0.002, respectively). AST and ALT values were higher in patients with pelvic injury (p<0.001, p=0.017, respectively).

No statistically significant relationship was established between genital injuries and other parameters.

Considering the relationship between vertebral injuries and parameters, Hgb and Hct values were lower in patients with vertebral injuries (p=0.001, p=0.003, respectively). AST and RDW values of patients with vertebral injury were higher than those without vertebral injury (p=0.000, p=0.046, respectively).

Table 5. The number and percentage of hospitalization and follow-up by trauma mechanism

		Trauma mechanism										
Variable	**Value**	**Fall-impact**	**Fall from height**	**Assault-abuse**	**In-vehicle collisions**	**Pedestrian injuries**	**Bicycle accident**	**Sports injury**	**Sharp-penetrating tool injuries**	**Crush**	**Others**	**Total**
Outpatient discharge	Number (n)	93	4	12	1	3	4	11	30	12	9	179
	Percentage (%)	16.2	0.7	2.1	0.2	0.5	0.7	1.9	5.2	2.1	1.6	31.2%
Follow-up was recommended in the emergency department, but not accepted	Number (n)	25	1	0	4	0	3	0	0	0	1	34
	Percentage (%)	4.4	0.2	0.0	0.7	0.0	0.5	0.0	0.0	0.0	0.2	5.9
Follow-up in the emergency department	Number (n)	214	16	12	7	8	22	11	16	33	13	352
	Percentage (%)	37.3	2.8	2.1	1.2	1.4	3.8	1.9	2.8	5.8	2.3	61.4%
Hospitalization in a ward other than emergency	Number (n)	1	1	1	0	0	2	1	2	0	0	8
	Percentage (%)	0.2	0.2	0.2	0.0	0.0	0.3	0.2	0.3	0.0	0.0	1.4
Total	Number (n)	333	22	25	12	11	31	23	48	45	23	573
	Percentage (%)	58.1%	3.8	4.4	2.1	1.9	5.4	4.0	8.4	7.9	4.0	100

Table 6. Relationship between head and neck injury and laboratory parameters

Variable	**No head-neck injuries**			**Head and neck injury present**			
	Median	**Minimum**	**Maximum**	**Median**	**Minimum**	**Maximum**	**p value**
Age (month)	81.5	7	202	58	1	199	**<0.001**
Hgb	13.1	11.3	15.7	12.6	2.9	16.3	**0.016**
Hct	38.30	32.10	45.60	37.50	8.60	47.30	**0.043**
MCV	83.10	70.50	91.40	81.00	39.10	98.20	**0.014**
PLT	304	181	509	297	14	556	0.735
WBC	10.40	5.00	17.40	10.40	2.70	33.70	0.592
RDW	13.55	11.80	17.70	14.10	12.50	27.50	0.025
Cr	0.57	0.43	0.74	0.54	0.40	6.3	0.278
BUN	12	7	20	11	4	27	**0.016**
AST	28.50	17	242	32	13	657	**0.046**
ALT	17.50	11	153	18	8	115	0.701
Glucose	100	75	220	102	70	378	0.995
aPTT	30.8	27.5	31.7	32.45	26.8	44.7	0.248
INR	1.05	1.0	1.1	1.05	1.0	2.0	0.789
Haematuria	1	0	19	1	0	5	0.939
Leukocyte in urine	1	0	8	1	0	6	0.183

Hgb: Hemoglobin, Hct: Hematocrit, MCV: Mean corpuscular volume, PLT: Platelets, WBC: White blood cells, RDW: Red blood cell distribution width, Cr: Creatine, BUN: Blood urea nitrogen, AST: Aspartate aminotransferase, ALT: Alanine aminotransferase, aPTT: Activated partial thromboplastin time, INR: International normalized ratio

When the relationship between extremity injuries and parameters was examined, it was found that extremity injury increased as the age increased (p=0.009). AST, ALT, and RDW values were higher in patients with extremity injuries (p=0.025, p=0.048, p=0.024, respectively).

Discussion

Our study determined that the number of admissions was higher in pediatric patients who were admitted to the emergency department with trauma between the ages of 1-5 and in boys. Child traumas were higher in July, August, September, and October than in other months. Falls and impacts were found to be the most common mechanism among the trauma etiologies of our patients. The most frequent traumas occurred at home. The mortality rate was determined to be 0.87%. When the areas exposed to trauma were examined, it was seen that head and neck injuries took the first place. The number of admissions of pediatric patients with isolated region injuries was higher than those with multiple traumas; however, hospitalization and follow-up rates of patients with multiple traumas were higher. The most frequently studied examination was complete blood count, and direct radiography was the preferred radiological imaging method. Consultation was most frequently requested from the orthopedics and traumatology department, and the second most frequent consultation was requested from the neurosurgery department. It was observed that most of the hospitalized patients were followed up in the emergency department. It was found that head-neck injuries increased significantly as age decreased. Hgb and Hct values of patients with head and neck injuries were significantly lower than those of patients without head and neck injuries, and MCV, RDW, BUN, and AST values were significantly higher. The Hgb and Hct values of patients with thoracic injuries were found to be significantly lower than those of those without thoracic injuries. The abdominal trauma of the patients increased as the age decreased, and the Hgb and Hct values of the patients with abdominal injuries were significantly lower than those without abdominal injuries, and the AST and ALT values were significantly higher. The Hgb and Hct values of patients with pelvic injury were significantly lower than those without, and the AST and ALT values were significantly higher. In patients with vertebral injury, Hgb and Hct values were significantly lower than those in patients without vertebral injury, and AST and RDW were significantly higher. Extremity injury significantly increased with age, and AST, ALT, and RDW were significantly higher in patients with extremity injury than in those without extremity injury.

In a study conducted, it was found that among pediatric patients admitted to the hospital due to trauma, the rate of male and female admissions was 65/35, and the mean age was 6.6±4.4 years (3). In another study, the male/female ratio was reported as 2.35/1, the mean age of the patients as 6.14, and the most common age group as 6-12 years (6). In another study, 61.1% of the pediatric trauma admissions were male and 37.2% were female (7). In another study analyzing child traumas, the ratio of males was 73%, whereas the ratio of females was 27%, and the most common age group was between 2 and 7 years old (8). In another study, it was reported that the ratio of males and females was 1.7, the mean age of males was 8.11±5.19, the mean age of females was 6.89±5.04, and the most common age of trauma was 7-14 (9). In our study, 384 (67%) of 573 patients were male and 189 (33%) were female, and the mean age of the patients was 6.44±4.56 years. The mean age of male and female pediatric patients was 6.90±4.65 years and 5.52±4.24 years, respectively. The most common admissions were between the age range of 1-5; most were male patients.

Paediatric trauma cases are mostly admitted to hospitals in spring and summer (9). Similarly, in our study, the number of admissions in July (12.2%), August (10.3%), September (10.1%), and October (10.65%) was higher than that in the other months. The highest number of admissions was found to be in July with a ratio of 12.22%, and when the distribution of age groups by month was analyzed, the number of admissions in July was higher for each age group compared with other months. Naturally, trauma-related admissions increase in the summer months. However, contrary to the literature, our study's number of applications is also high in September and October.

Falls were determined to be the leading cause of injury among patients who were admitted to emergency departments because of injury (10). Falls are one of the most common injury mechanisms in children (11-13). Because motor skills develop over time, fine motor movements, walking, and balance functions are not fully developed in children (14,15). Caution should be taken during falls, which are an essential cause of child injury and death. A seemingly minor fall can result in irreversible injuries (13). We also determined in our study that falls and impacts were the most common traumas, with a rate of 58.11%.

It was determined that among the places where pediatric injuries occurred, the home was with a rate of 60.8%, and the street was in the second place with a rate of 16.8% (6). In another study, it was found that pediatric accidents occurred most commonly at home with a rate of 52.3% and in the street with a rate of 19.3% (3). Our study also observed that child traumas occurred most commonly at home with a rate of 59.8%.

In a study that examined pediatric forensic cases under 16 years of age admitted to the emergency department, it was found that

the mortality rate was 0.4% (16). In another study examining pediatric trauma cases, the mortality rate was 0.11% (9). Another study determined the overall mortality rate in pediatric trauma as 0.5% (17). Our study found that the mortality rate was 0.87%, and there was no significant difference between the mortality rates by gender.

In a study on accident-related injuries in children, it was stated that among the affected different body parts, extremities were 52.7%, head/face was 32.7%, spine was 7%, and multiple system injuries were 14.6% (3). In another study, extremity injury was found to be with a rate of 55.5%, and head-neck injury was in the second place with a rate of 47.5% (6). When the patients' body parts exposed to trauma were examined in our study, we found that head-neck injuries were with a rate of 64%, and extremity injuries were in the second place with a rate of 41.9%.

In our study, it was observed that only one body part was affected by the trauma, with a rate of 73.64%, and 39.33% of these patients' treatments were completed without hospitalization and follow-up. The rate of patients with multiple traumas was 26.35%. Hospitalization and follow-up rates of patients with multiple traumas were significantly higher than those of patients with only one affected body part.

In our study, among the blood tests requested from the patients were whole blood count with a rate of 28.4%, biochemistry at 26.5%, coagulation parameters at 2.8%, and blood group tests at 10.3%. Additionally, a complete urinalysis was performed at a rate of 6.8%. In a study that examined pediatric traumas, direct radiography was performed at a rate of 57.3%, CT at a rate of 37.8%, and USG at a rate of 2.1% (18). In another study, the most commonly requested examination from patients was direct X-ray with a rate of 53.7%, followed by brain CT with a rate of 21.3%, and abdominal USG with a rate of 2.6% (6). In a study conducted with 697 patients (89.6%), only direct radiography was requested, whereas 27 (3.6%) required both direct radiography and CT (19). Direct radiographs were performed at a rate of 62.47%, CT at a rate of 33.15%, and USG at a rate of 18.15% as radiological imaging methods in the patients included in our study.

In a study, consultation was mainly requested from the orthopedics department at a rate of 39%, followed by the neurosurgery department at a rate of 28.8% for pediatric trauma cases (6). In our study, consultation was mostly requested from the orthopedics department with a rate of 22.16% and then from the neurosurgery department with a rate of 21.11%, and 36.3% of our patients' consultations were not requested from any department.

The hospitalization rate of pediatric trauma patients was determined to be 4.3% (9). In our study, the rate of patients who were admitted to a ward other than the emergency department was 1.4%. In our study, the low rate of inpatient follow-up can be explained by having an inpatient department in our emergency department and following up on trauma patients in this department.

In our study, head-neck injuries were determined to increase significantly as age decreased, depending on age. The head-to-body ratio of the pediatric age group was larger than that of adults. A bigger head causes the center of gravity to be higher than that of adults; therefore, head trauma is one of the most common childhood injuries.

It has been reported that RDW predicts mortality in trauma patients independently (20). It has also been shown that there is a relationship between high RDW and mortality in traumatic brain injuries (21). In another study conducted with trauma patients, RDW values were higher, and MCV and Hgb values were lower in patients with chest, extremity, and head trauma than in controls (22). In a study conducted on children younger than 2 years with severe head trauma, Hgb and Hct values were significantly lower in deceased cases than in survivors (23). It has been reported that patients with severe head trauma can have high BUN values at admission (24). However, studies have demonstrated that no routine blood test measured at admission can significantly predict outcomes in patients with severe traumatic brain injury (25). Our study found that patients with head and neck injuries had significantly lower Hgb and Hct values and significantly higher MCV, RDW, BUN, and AST values than those without head and neck injuries. Additionally, our study determined that extremity injuries increased significantly with age, and AST, ALT, and RDW were significantly higher in patients with extremity injuries. In our study, Hgb and Hct values were significantly lower in patients with thoracic injuries than in those without thoracic injuries.

Because they have less subcutaneous fat, larger heads, and larger abdominal solid organs than adults, severe and multiple injuries are common in pediatric high-energy trauma patients (26). In pediatric abdominal trauma patients, acute anemia and high AST and ALT values are important in terms of showing the severity of the trauma and being a warning in terms of tomography (27). A study stated that in pediatric pelvis fractures, the mean decrease in Hgb levels was 1.5 g/dL (28), although severe bleeding is rarer in pediatric patients than in adults. Hgb and Hct values of patients with abdominal injury were significantly lower, and AST and ALT values were significantly higher than those of patients without abdominal injury. Our study found that abdominal trauma of the patients increased as age decreased. Hgb and Hct values of patients with abdominal injury were significantly lower, and AST

and ALT values were significantly higher than those of patients without abdominal injury. Hgb and Hct values were significantly lower, and AST and ALT values were significantly higher in patients with pelvic injury.

A study found that high RDW was associated with an increased probability of vertebral fracture in the elderly (29). It was determined that Hgb and Hct values were significantly lower and AST and RDW were significantly higher in patients with vertebral injuries in our study.

Having adequate knowledge about trauma patients' demographic and trauma-related characteristics will ensure that the treatments are faster and more effective. As accidents are preventable, in addition to health workers, non-health workers should also be informed about the results of such studies and provided with adequate training. We believe that multicenter studies conducted with more patients will provide us with more precise information on this subject, and additionally, it will be appropriate for countries to establish government policies on the subject to reduce accidents.

Study Limitations

The limitations of our study can be noted as being single-center, number of cases, a 1-year cross-sectional period, and being retrospective.

Conclusion

Because of our study, it has been determined that in terms of the incidence of pediatric traumas, there were different etiological causes and trauma areas, and their frequency varied seasonally. The injured body area mainly was the head-neck region. Head-neck and abdominal injuries increased as age decreased, extremity injuries increased as age increased, and in pediatric traumas, a good evaluation of the blood tests was critical in the assessment and follow-up of patients and to avoid missing some injuries.

Ethics

Ethics Committee Approval: Approval for this study was obtained from the İnönü University Health Sciences Scientific Research and Publication Ethics Committee with decision number: 2016/10-11, date: 02.08.2016.

Informed Consent: Retrospective study.

Authorship Contributions

Concept: E.Y., M.G.T., C.Ç., Design: E.Y., M.G.T., C.Ç., Data Collection or Processing: E.Y., M.G.T., C.Ç., Analysis or Interpretation: C.Ç., Literature Search: E.Y., M.G.T., Writing: E.Y., M.G.T.

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