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ORIGINAL ARTICLE

Retrospective analysis of traffic accidents related injuries in a tourism region

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Abstract

Background: The number of applications to the emergency service after a traffic accident is quite high. In this study it is aimed to provide up to date data to the literature by making a detailed analysis of the patients who applied to the emergency department after an accident.

Methods: This study was carried out by retrospectively scanning the patients who applied to the emergency department between 01.01.2022 and 31.12.2022 after a traffic accident in a secondary level hospital through the hospital electronic data. The patient's admission date and time, age, gender, accident mechanisms, being a vehicle driver and ethanol positivity above the legal limit in the driver, as well as laboratory and imaging methods performed in the emergency department were examined. The injuries and outcomes seen in the patients were analyzed.

Results: 1596 patients were evaluated within the scope of the study. The mean age of the patients was 32.93±19.26 years old and 66.7% were male. Among the accident mechanisms, 71.1% were found to be in vehicle traffic accidents. Head and neck tomography and extremity imaging were performed most frequently in the patients. Soft tissue trauma and extremity fractures were the most common cases. The discharge rate was 89.2%. It was concluded that hospitalized cases were most frequently made in neurosurgery, orthopedics and thoracic surgery clinics.

Conclusions: The fact that vehicle drivers are drunk increases the risk of traffic accidents. The most common cause of fatal traffic accidents is cerebral hemorrhage. Increasing the safety measures that can be taken to prevent traffic accidents will reduce morbidity and mortality.

Keywords: Emergency Department, Traffic Accidents, Traumatology, Multiple Injuries.

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INTRODUCTION

A traffic accident is defined as an event in which vehicles or people present on the highway are exposed to, resulting in damage and in which injuries and deaths occur (1). Traffic accidents have an important place in social life due to their negative effects on societies. Injuries, disabilities and deaths that occur after an accident are undesired negative consequences (2). About half of the deaths that occur after a traffic accident happen at the scene and shortly after the event. In these cases, the victim of the accident dies rapidly as a result of a sudden and major injury to the heart, great vessels, brain, brain stem and spinal cord (3). It is obvious that deaths and disabilities in this patient group would be prevented viaa rapid and effective intervention in the emergency departments. Reaching the accident site as quickly as possible and having well equipped health institutions for trauma patients in the centers that are closest to the regions where traffic accidents are common will be effective in immediate intervention to patients (2). In this study, it is aimed to evaluate both the demographics and the management process of the patients who applied to a secondary level emergency department with a traffic accident.

MATERIALS AND METHODS

The study has been approved by Hacıbektaş Veli University Non-Interventional Clinical Research Ethics Committee, numbered 2023/02 on 27.02.2023. It has been carried out by retrospectively scanning the hospital electronic data of the patients who applied to the emergency department in a secondary care hospital, with a traffic accident between 01.01.2022 and 31.12.2022

All patients who were diagnosed with a traffic accident in the "V01-V99" ICD diagnostic code range in the hospital electronic data and all pediatric and adult patient groups have been evaluated for the study. The admission date and time, age and gender of the patients, accident mechanisms, whether the patient is the driver of the vehicle or not, and whether the ethanol positivity of the driver is above the legal limit (>0.5 promile) or not have been examined. Moreover, laboratory and imaging methods performed in the emergency department have also been examined. When the ethanol levels in blood have been examined in patients who were the driver of the vehicle and if it has been found as positive (>0.5 promile), which means it is above the legal limit, these patients have been accepted as drunk drivers.

Injuries and outcomes seen in patients have also been analyzed. Within the scope of the study, no distinction is made between patients arriving by ambulance or outpatients. Cases that ended in death at the scene are excluded from the study. Patients who were transferred to another health institution are not followed up and their mortality rate is not included in the evaluations of the study.

RESULTS

For this study, a total of 1596 patients have been analyzed. 66.7% of the patients are male. The mean age is 32.93±19.26 years, and when it is evaluated according to the age groups, it is seen that the most frequent admissions are between the ages of 18 and 65 (70.2%) and the minimum age of 65 years (7.6%). Among the examined patients for this study, the youngest case is a four-month-old baby and the oldest patient is 99 years old. The number of unlicensed vehicle driver patients under the age of 18 who had a traffic accident is 75, which is 10% of the total number of the drivers. The number of patients over the age of 65 who had an accident as a driver is 46, which constitutes 37.7% of the patient group over the age of 65. The number of patients who applied to the emergency department as drivers is 757 (47.4%) and the number of drunk drivers is 103. When drivers are analyzed according to their genders and their alcohol intake status, it is seen that the number of male drunk drivers is 92 (89.3%). When the admission times of the patients are evaluated, it is observed that the most frequent admissions are during the summer months (32.4%) and most of the cases are seen in July. The distribution of patients by months is given in Figure 1. The analysis has been made according to the admission days of the week and it can be concluded that traffic accidents occured mostly on Friday (17.5%) and at least on Sunday (12.8%). The time of admission to the emergency department after a traffic accident have been examined in 3 periods as between 08:00 a.m. and 04:00 p.m. (600 patients, 37.6%), between 04:00 p.m. and 11:59 p.m. (814 patients, 51%), and between 12:00 a.m. and 08:00 a.m. (182 patients, 11.4%).

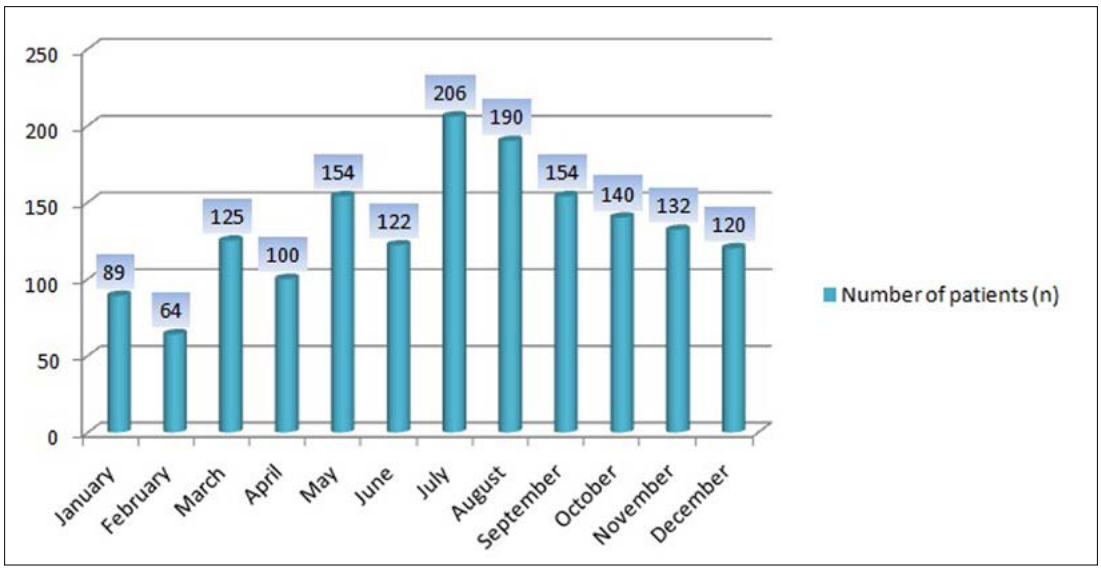

Figure 1.The analysis of the number of the patients admitted to the emergency department after a traffic accident according to the months within the year.

When the alcohol intake rates of the drivers are compared to their admission hours, some significant results are obtained (p<0.001, Chi square:164.163). According to the results, the number of drivers who are drunk and are involved in the accident during the evening and night hours of the day is higher (Table 1). The mechanisms of the accidents are classified in four categories as in vehicle traffic accident (IVTA), nonvehicle traffic accident (NVTA), motorcycle accident and other accidents (tractor accident, ATV accident, bicycle accident etc.). The most common accident type is IVTA (71.1%). The number of patients according to the accident categories is given in Table 2. When the types of accidents are compared according to age groups, it is seen that there have been important differences. The rate of IVTA is higher in all age groups (p<0.001, Chi square: 186.544). In particular, 77.9% of the patients between the ages of 18 and 65 are recorded as having under gone IVTA. When the imaging and laboratory methods performed in the emergency department are examined, it is seen that the rate of direct plain radiograph and computed tomography (CT) in patients is 92.7%, the rate of laboratory evaluation is 62.7% and the rate of the evaluation of radiographs and laboratory together is 60%. Ultrasound has been performed in 32 (2%) patients. The radiographs taken in the patients are classified as tomography and plain radiograph separately and are given in Table 3. Accordingly, it is understood that patients mostly had a head and neck tomography. According to the results, it is observed that 226 patients (14.1%) had whole body tomography (except extremities). A significant correlation is found between the whole-body CT scans and accident types and it can be seen that more shots were taken in cases with IVTA (p<0.001, Chi square: 68.523). According to the classification made according to the types of injuries in the body as a result of the accident, soft tissue trauma (37.1%) is most commonly occurred.

Table 1. Analysis of the number of patients with ethanol positivity above the legal limit in the laboratory test of drivers who had an accident at the time of the traffic accident.

Time Zone	Alcohol Test		Total
	Negative	Positive*	
08:00 a.m.-04:00 p.m.	589	11	600
04:00 p.m.-11:59 p.m.	773	41	814
11:59 p.m.-08:00 a.m.	131	51	182
Total	1493	103	1596

* Patients with positive blood ethanol values above the legal limit (>0.5 promile)

Table 2. Analysis of the number of patients injured in traffic accidents according to the way the accident occurred.

Accident Categories	Number of Patients (n)	Ratio (%)
In vehicle traffic accident*	1134	71.1
Non vehicle traffic accident**	239	15
Motorcycle accident	205	12.8
Other accidents***	18	1.1
Total	1596	100

* Patients who were in the vehicle at the time of the accident

** Patients who were out of the vehicle at the time of the accident, pedestrians etc.

***Tractor accident, bicycle accident, all train vehicle accident etc.

Table 3. Analysis of the number of radiological imaging performed to diagnose patients in the emergency department

Examination type	Number of patients	Ratio (%)*
Brain and/or cervical CT**	1021	64
Thorax CT	636	39.8
Abdomen CT	424	26.6
Pelvis CT	257	16.1
Thoracolumbar CT	287	18
Extremity CT	112	7
Brain, cervical, thorax CT	584	36.6
Brain, cervical, thorax, abdomen CT	405	25.4
Brain, cervical, thorax, abdomen, pelvis, Thoracolumbar CT	226	14.2
Posteroanterior lung graphy	441	27.6
Pelvis graphy	337	21.1
Spinal graphy	58	3.6
Upper extremity graphy	561	35.2
Lower extremity graphy	623	39

* It is the rate given according to the total number of patients.

**Computerized Tomography

Moreover, there has been statistically significant relation between the rate of soft tissue injuries (STI) and accident types. (p<0.001, Chi square: 166.573). It has been observed that STI is seen in 76% of the motorcycle accidents. Injuries such as simple skin incision, edema, hematoma and abrasion are evaluated as STI. Extremity fractures are seen as the second most common injury in patients and the lower extremity fracture rate is the highest among all injuries. Table 4 includes the list of the body parts that are injured as a result of the accident and the number of patients. Given in Table 5, it is seen that in the cases, 1423 (89.2%) patients were discharged from the emergency department, 97 (6.1%) patients were admitted to the service, 53 (3.3%) patients were admitted to the intensive care unit, 13 (0.8%) patients were referred to the upper center and 11 (0.7%) patients died in the emergency department or intensive care unit. The most frequently admitted clinical departments have been orthopedics, neurosurgery and thoracic surgery, respectively. Traumatic aortic dissection has been found in 3 of the cases that ended in death, while multi organ injury, especially cerebral hemorrhage, has been observed in other cases. Eleven of 103 patients who were found to be alcoholic have been treated in the intensive care unit. On the other hand, it is observed that there has been no statistically significant relation in the comparison made in terms of resulting in death among drunk drivers (p=0.521, Chi square: 0.128). Also, a comparison is made between accident mechanisms and resulting in death. However, it is concluded that there is no significant difference (p=0.694, Chi square: 1.451). There is no significant value in the comparison made in terms of death at the time of the accident (p=0.272, Chi square: 2.602).

Table 4. Analysis of the types of injuries detected according to the results of examination and imaging methods in patients evaluated in the emergency department after the accident.

Type of Injury	Number of Patıents	Ratio (%)*
Fracture of skull or facial bones	56	3.5
Bleeding, edema, contusion in the skull base	39	2.4
Cervical vertebral fracture	11	0.7
Thoracic vertebral fracture	11	0.7
Lumbar vertebral fracture	33	2.1
Pneumothorax / hemothorax	21	1.3
Lung contusion	43	2.7
Costal fractures	60	3.8
Intra abdominal organ injury	15	0.9
Pelvic fracture	24	1.5
Fracture of upper extremity bones	95	6
Fracture of lower extremity bones	99	6.2
Soft tissue ınjury**	601	37.7

* It is the rate given according to the total number of patients.

**Simple skin incision, edema, hematoma, abrasion etc.

Table 5. The results of the patients who were diagnosed and treated in the emergency department after the accident

Results	Number of patients	Ratio(%)
Discharge from the emergency department	1423	89.2
Admission to service	97	6.1
Intensive care hospitalization	53	3.3
Referral to higher health institution	13	0.8
Death	11	0.7

DISCUSSION

Nowadays, people have been using highways more and the number of vehicles has been increasing day by day. While it affects the increase in accident rates, it is also clear that alcohol use, sleepless driving, being non compliance with traffic rules, inadequate traffic training and inspections also cause accidents (4-6). In this study, it has been observed that traffic accident smostly happen during summer months. In accidents that occur in the evening and at night, the number of drunk drivers is higher than in other times of the day. It is also determined that the rate of IVTA (in vehicle traffic accident) is higher than the other types of accidents. In addition, it is seen that soft tissue injuries, mainly; extremity fractures; chest, head and neck injuries are the most common types of injuries as a result of the accidents

In this study 66.7% of the traffic accident cases admitted to the emergency department are male. In studies conducted in our country and in different parts of the world, similarly, it is observed that the cases who had traffic accidents are predominantly male (1-3,5,7,8). It is thought that these results occur due to the fact that men spend more time in traffic and the drivers of vehicles in many countries are predominantly male.

When the age group is examined in the study, it is seen that the most frequent traffic accidents are in the age group between 18 and 65. The mean age is 32.93±19.26 years. In similar studies conducted in our country, the results are obtained with an average age of between 30 and 35 (1,3,5,9) and between 20 and 30 (2,4). The average age is found to be 28 by Sawe et al. (7), 29±13,549 by Honelg et al. (8), and between 25 and 35 by Lenjani et al. (10).

Although the average values vary according to the demographic structures of the regions where the studies are conducted, it seen that similar results are obtained. One of the striking values in this study is that the drivers who drive without a license against the rules are found to be 4.7%. In addition, the drivers over the age of 65 have been involved in an accident with a rate of 37.7% in their age group. Considering these values, it can be concluded that the rules should not be violated, up to date inspections should be carried out at regular intervals, especially in the driver group over the age of 65, and the ability of the person to drive with chronic diseases should also be evaluated.

It is determined that 13.6% of the drivers, who have been included in the study, were alcoholic. Most of the patients who had an accident especially between 11:59 p.m. and 08:00 a.m. are alcoholics. When several other studies have been exmined it is seen that in a study conducted in Edirne, the rate of the drunk drivers has been determined as 18.9% (4). In another study conducted in Antalya it has been 22.1% (11) and in a study conducted in Trabzon it has been 40.2% (12). Although it can be assumed that the rates vary according to the regions and the patient group in the center of the cities where the study is conducted, it is obvious that alcohol use causes serious traffic accidents. Similar to the study conducted in Trabzon, in this study, one of the most important causes of night time accidents is also alcohol use (12).

When the seasonal analysis of the accidents is made, it is seen that the accidents increase in the summer months. In similar studies in the literature, it has been reported that the accident rate increases in summer (2-4,9,11). However Armagan et al. (5) have reported that the increase is seen in October. Besides, Ozdemir et al.(13) have observed that traffic accidents occur more frequently in the winter months. However, it cannot be ignored that there are seasonal differences in weather conditions according to the study centers. Active presence of people in traffic and adverse weather conditions will also affect the results. Although it is seen that the analysis of the days of the accidents is not very frequent in the studies, it has been stated that the most frequent accident rate is on Saturday (4,14). In this study, it has come to the fore on Friday. When the admission hours after the accident have been examined, it is determined that the most frequent admission time is between 04:00 p.m. and 11:59 p.m., with a rate of 51%. In several other studies conducted in our country, admission hours are generally between 04:00 p.m. and 11:59 p.m., too (2,4,11). However, in a study conducted on NVTA in the pediatric age group, it is observed that the most frequent admission is between 08:00 a.m. and 04:00 p.m. (15). Due to the different age groups, it is thought that daytime hours come to the fore in this study. In a study conducted in Korea on pedestrian accidents experienced by elderly patients, it has been observed that there are more frequent accidents between 11:59 p.m. and 08:00 a.m. with a rate of 44.5% (16). Considering the demographic difference of the study groups and the time difference between countries, different results are expected to emerge.

There have been some factors such as types of accidents, seasonal factors, cultural differences and the use of different vehicle types that are affecting the results between regions. In similar studies conducted in our country various results have been reported. In our study, it is observed that the highest rate of IVTA is 71.1%. In the study of Aydeniz et al.(2), 56.6%of the cases are seen as IVTA. However, in other studies that belong to Ozdemir et al.(13) and Atik et al., (17) the rates of NVTA are found to be higher. In a study conducted in Tanzania, more than two thirds of the cases are found to be motorcycle accidents (7). In another study conducted in Ethiopia, 85.5% of the injuries are found to be IVTA and 14.6% of them are pedestrian injuries (8).

Traffic accidents are considered as high energy trauma, and laboratory and imaging methods are widely evaluated in the diagnosis and the treatment process of patients. In this study, the rate of direct radiography and computed tomography (CT) is 92.7%, the rate of laboratory evaluation is 62.7% and the rate of evaluation of radiographs and laboratory together is 60.5%. Also, the rate of ultrasound is 2%. In the study performed by Ozdemir et al.(13) the rates belonging to the diagnosis and the treatment process are as following; 53.6% blood examination, 72.5% direct radiography, 52.3% CT, and 11.4% ultrasound. In the study performed by Varlık et al. (1) the imaging rates are 65% for head and neck CT, 24% for thorax CT, 45% for spinal CT, 15% for abdominal CT, 19% for extremity CT and 8% for ultrasound. When the rates of plain radiographs performed in patients in similar studies are evaluated, similar to our study, plain radiographs of the head, neck, thorax and extremities come to the fore most frequently. Although more specific injuries are seen in different parts of the body according to the types of the accidents and the severity of the accident, head, neck and extremity injuries are more common in the studies available in the literature (1-5,13,16,18). Uzun et al.(19) have reported that the most common lower extremity injury is seen in motorcycle accidents. As in this study, the rate of STI is found to be more frequent in motorcycle accidents than in other accident types (4,19). It can be thought that motorcycle accidents are caused by the body's direct contact with the external environment and there is a problem of the in adequate use of protective equipment. In this study, the results are similar to the literature.

When the literature is reviewed, it seen that there have been several studies examining the way in which the

treatment of the patients in the emergency department is terminated and similar results have been reported. Although the discharge from the emergency department is the highest in the vast majority of the cases, hospitalization, referral to another center, and death rates have resulted in close numbers (1-5,15,16). In the literature, it is seen that mortality rates are higher in some studies than others.

In the study conducted by Lee et al.(16) in Korea, the death rate is 5% and, in the study, conducted by Kocak et al.(18) on motorcycle accidents, it is reported that the death rateis 14%. It can be thought that this difference between studies is due to the limited number of patients included. In these studies, the orthopedics and neurosurgery clinics are the most frequently hospitalized clinics due to injuries after a traffic accident (1,3,5,13). In this study patients are admitted to orthopedics, neurosurgery and thoracic surgery clinics most frequently. In a study conducted in the Thrace region, 57.8% lung and 48.5% brain damage are observed in traffic accidents (4).

In a study it has been found that the most common causes of death among forensic cases seen in emergency departments are IVTA and NVTA, respectively (20). Deaths in accidents occur most frequently at the scene and as a matter of fact, transportation to the nearest health institution is also important for the survival rate. In a study conducted in the United States of America, it is reported that the death rate of motorcycle accidents occurring in the country side is higher than the ones in the city center (21). Among the causes of death by traffic accidents, brain hemorrhages due to head trauma are the most common. (4,8,20). In this study, it is seen that most of the patients who have been admitted to the intensive care unit and died are significantly associated with intracranial hemorrhage (p<0.001, Chi-square: 674.552). The alcohol consumption of the drivers can also affect the severity of the accident and affect both the intensive care hospitalization process and death. While Goksu et al.(11) have stated that there has been no relationship between alcohol positivity and hospitalization rates in their study, Kesen et al.(12) have found a significant relationship between low Glasgow Coma Score (GCS) and alcohol positivity. In our study, while alcohol positivity has affected the intensive care hospitalization rates, no significant correlation is observed in the cases that resulted in death.

It is known that traffic accidents are mostly due to negligence. Besides, alcohol use increases the accident rates. Most of the deaths in traffic accidents occur at the scene and in the emergency departments within the first hour. We think that the data obtained from this study will be useful in evaluating the measures that can be taken to prevent the occurrence of traffic accidents. In addition, we anticipate that there will be more effective diagnosis and treatment admissions with current data in the evaluation of patients admitted to emergency departments after a traffic accident. We think that it would be beneficial to establish trauma centers in regions where traffic accidents are intense.

Declarations

The authors have no conflicts of interest to declare. The authors declared that this study has received no financial support.

This study was approved by the Hacıbektaş Veli University Non-Interventional Clinical Research Ethics Committee (Date: 27.02.2023, Number: 2023/02)

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