

Injuries related to animal sacrifice during the Feast of Sacrifice in Turkey

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BACKGROUND: The Feast of Sacrifice is a significant annual religious festival in Muslim countries. In these festivals, thousands of animals are usually sacrificed by inexperienced individuals. Thus, many injuries occur during sacrificing of animals.

OBJECTIVES: Describe injuries related to animal sacrifice or meat processing.

DESIGN: Cross-sectional descriptive study.

SETTING: Three hospitals in different cities of Turkey.

SUBJECTS AND METHODS: Severity and type of injuries that occur during animal sacrifice or meat processing after the sacrifice and hospital costs.

MAIN OUTCOME MEASURES: Identification and classification of sacrifice related injuries.

SAMPLE SIZE: 301 injured individuals.

RESULTS: The mean age of the patients was 42.5 (14.8) years and 83.1% of the subjects were male. Most (90.0%) injuries were penetrating injuries and 10.0% were blunt traumas. Upper and lower extremity injuries were identified in 77.4% and 17.9% of cases, respectively. Almost half of the injuries were on the left hand (49.8%). Almost all (96.6%) cases were treated and discharged from emergency services. Median hospital cost per patient was 103.14 Turkish Liras (35.95-852.66 Turkish Liras) (19.53 USD [6.80-161.48 USD]).

CONCLUSIONS: Even though injuries related to animal sacrifice are usually caused by minor sharp objects, they can be severe and life threatening on rare occasions. To minimize the injuries that may occur during this period, public education and more convenient sacrifice centers may be helpful.

LIMITATIONS: Small sample, single country, and short duration of the study.

CONFLICT OF INTEREST: None.

The Feast of Holy Sacrifice is a significant annual religious festival in Muslim countries for social assistance and for convergence with Allah. Muslims share the meat of sacrificed animals with poor people to show their devotion to Allah. The Feast of Holy Sacrifice lasts 4 days and sacrifice can be done until the sunset of the third day but the first day is usually preferred.^{1,2} Thousands of sacrifices are done in a short time span because most animal sacrifices are on the first day of the Feast of Holy Sacrifice. To sacrifice so many animals in such a short time by experienced people requires many butchers. Therefore, animal sacrifice is usually done by inexperienced people.³ This situation causes injuries to thousands of people in a time span of 8-10 hours. These injuries cause overcrowding and increased workload in the emergency services of hospitals, and increases hospital costs as well.

The aim of this study was to identify demographic characteristics, previous experiences with animal sacrifice, the type of sacrificed animal, hospital costs, required treatment, and the type, size and severity of injuries of individuals related to sacrifice or meat processing.

SUBJECTS AND METHODS

This prospective cross-sectional descriptive study included voluntary cases who had an injury related to animal sacrifice or meat cutting in three different cities of Turkey during the Feast of Holy Sacrifice in 2018 (21-23 August 2018). The study included cases only related to the sacrifice. Excluded were other trauma cases such as traffic accidents, home accidents, falls from high- and low- heights presenting to emergency service. Age, gender, educational background, time of admission to the hospital, type, size and mechanism of injury, treatment of the injuries and hospital costs of these trauma cases were analyzed. This study was designed 3 months before the Holy Sacrifice Festival. The study was approved by the Ethics Committee of Ahi Evran University Faculty of Medicine. Study approvals of Samsun Gazi State Hospital and Ankara Etimesgut State Hospital were also obtained.

A questionnaire was prepared to gather information regarding demographic characteristics, previous experiences about animal sacrifice, type of sacrificed animal, hospital costs, required treatment, type, size and severity of injuries of individuals who applied to the emergency service during the festival. The authors, who worked as emergency medicine specialists in hospitals in these three different cities of Turkey, worked during the festival to complete the questionnaires, examine patients and keep records. The study included cases

from three different cities of Turkey, namely Kirsehir, Samsun and Ankara. Education levels of the patients were stratified as primary school, high school and university. Also, occupations of the patients were stratified as housewife, worker, self-employment, civil servant, retired, butcher and student.

Sacrificed animals were stratified into two groups as ovine including goat and sheep and bovine including cattle and cow. Also, patients were stratified according to their experience in butchery as professional butcher, first-try in butchery and butchers-only-in festivals. Sites where trauma occurred were classified into five groups as home, backyard/park, street, or temporary empty areas for the sacrifice and slaughter. Injuries were also stratified into three groups according to type of the injury as self-injuries, injury by another individual or injury by animal. Six groups were formed for trauma locations on the body including head, thorax, back, abdomen, lower extremities and upper extremities. Upper extremity traumas were split into two groups as right and left arm then further split into four groups as hand, distal arm, proximal arm and shoulder. Lower extremities were also split into two groups as right and left legs and then further split into four groups as foot, distal leg, proximal leg and hip. Injuries were grouped as blunt or penetrating were further grouped according to the size of the injury as <5 cm, 5-10 cm and >10 cm. Consultation requirements according to patient needs were stratified into six groups as no consultation required, plastic and reconstructive surgery, orthopedics and traumatology, cardiovascular surgery, neurosurgery and multiple consultations. Results of the patient care were stratified into three groups as discharge with full recovery, hospitalization or referral to another hospital. Organ injuries were identified with imaging methods (ultrasonography, computer tomography, direct X-ray). Our study was conducted in accordance with ethical principles of the Helsinki Declaration.

Patients were evaluated by their demographic, clinical and laboratory data from their medical records starting with their application to emergency service due to trauma related to animal sacrifice.

Data acquired from this study was analyzed with IBM SPSS (Armonk, NY: IBM Corp) version 20. Shapiro Wilk's test was used for analyzing normal distribution of quantitative data. Descriptive statistics were shown as mean and standard deviation or median (minimum-maximum) format for continuous variables, while nominal variables were shown as number of cases and percentage (%). Age was normally distributed and the t test was used for comparison between groups. Chi-square analysis was used to examine the relationships

of nominal variables between groups. Fisher's Exact Test was used in 2xR tables and cases where the expected values in the cells were not sufficient in 2x2 tables. When analyzing the results, .05 was used as the level of statistical significance.

RESULTS

The mean age of patients was 42.5 (14.8) and 250 (83.05%) were male (**Table 1**). Male/female ratio was 4.9:1. The city of Kirsehir had the highest number of cases with 151 cases (50.2%), while the number of cases from Samsun and Ankara were 82 (27.2%) and 68 (22.6%), respectively. Most (n=298, 98.3%) were admitted to hospital by their own means, while 5 cases (1.7%) used ambulance services. The number of cases admitted on each day of the Feast of Holy Sacrifice is shown in **Figure 1**.

Three-fourths of the patients (n=230, 76.4%) stated that they only sacrifice during the festival and learned it from their elders; 64 patients (21.2%) stated that they did it for the first time and 7 patients (2.3%) stated that they were professional and experienced butchers. Other demographic and clinical characteristics of individuals and the sacrifice are shown in **Table 1**. Most injuries occurred at home (45.5%) or in a garden or park (42.2%). Only one occurred at a slaughterhouse. Most individuals injured themselves (81.7%). Most injuries were of the upper extremity (77.4%) and most were penetrating (90.1%) (**Table 2**). All of the animal-related blunt traumas (n=20, 6.6%) occurred in men during the sacrifice of a bovine. Of the blunt traumas, 8 were head traumas, 3 were thorax traumas, 1 was an abdomen trauma and 1 was a vertebra fracture, while 17 cases were blunt extremity traumas. Of the 14 (4.6%) fractures, there were 3 rib fractures, 1 vertebral fracture, 1 distal radius fracture, 2 metacarpal fractures, 4 tibia-fibula fractures, and 3 metatarsal fractures. Perforating traumas of the right hand and left hand were observed in 68 (22.6%) and 150 (49.8%) of the cases, respectively. Most of the injuries of the left hand occurred at the second finger, followed by the thumb and the third finger. Among the patients with right hand laceration, 73.5% stated that they cut themselves, 23.5% stated they were cut by another person, and 2.9% were cut by an animal. Among the patients with left hand laceration, 91.3% stated that they cut themselves, 5.3% stated they were cut by another person, and 3.3% were cut by an animal. **Figure 2** shows the number and percentage of injuries of upper and lower extremity, including the hand, the distal and proximal arm and shoulder on each side and the foot, distal and proximal leg, and hip on each side. There was one multisystemic injury

(thoracic, abdominal and head injuries).

For the treatment of the injuries, 252 cases were sutured, 8 cases were treated with tissue adhesive, 14 cases were treated with splints, 18 cases were left for secondary wound healing, 8 cases received tendon or nerve repair and 1 case received urgent operation (**Table 1**). One case was admitted to a neurosurgery ward due to minimal epidural hematoma because of a head trauma, one case was identified with arterial bleeding and received ligation treatment and another case had 15% compression fracture in first lumbar vertebrae and conservative treatment with a lumbosacral corset was recommended.

No consultation was required for 271 of patients (90%), while plastic surgery, orthopedics, neurosurgery, cardiovascular surgery or multiple consultations were required in 16 (5.3%), 6 (1.9%), 4 (1.3%), 2 (0.6%) and 2 (0.6%) of cases, respectively (**Table 1**). Most cases (n=291, 96.6%) were discharged after treatment in

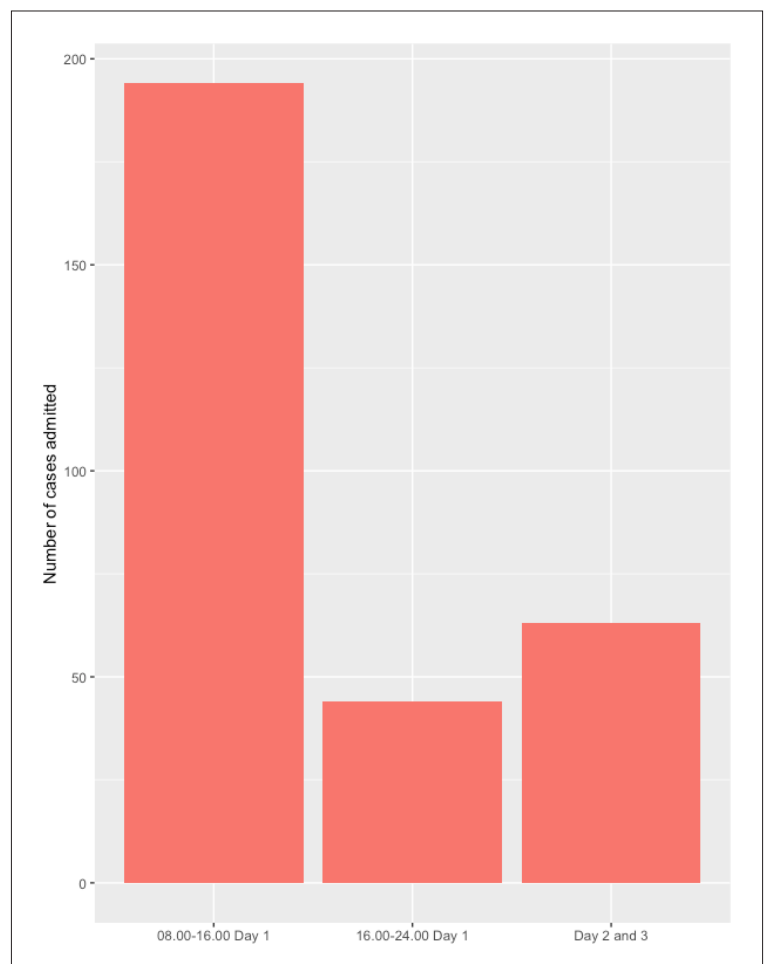


Figure 1. Number of cases admitted on each day of the Feast of Holy Sacrifice.

Table 1. Demographic and clinical characteristics of study population (n=301).

Characteristics	Gender		P value	Injury location		P value
	Male	Female		Lower extremity	Upper extremity	
Age (years)	41.5 (13.8)	47.1 (13.0)	.013	45.7 (13.3)	41.6 (13.5)	.100
Gender						
Male	250 (100.0)	-	-	47 (87.0)	190 (81.5)	.427
Female	-	51 (100.0)		7 (13.0)	43 (18.5)	
Educational status						
Primary school	113 (45.2)	37 (72.5)	.003	31 (57.4)	113 (48.5)	.262
High school	90 (36.0)	10 (19.6)		13 (24.1)	83 (35.6)	
University	47 (20.8)	4 (7.8)		10 (18.5)	37 (15.9)	
Occupations						
Butcher	7 (2.8)	0	<.001	2 (3.7)	5 (2.1)	.731
Civil servant (Engineer, Doctor, Teacher, Secretary, etc)	60 (24.0)	4 (7.8)		12 (22.2)	47 (20.2)	
Housewife	0	43 (84.3)		6 (11.1)	36 (15.5)	
Retired	45 (18.0)	0		9 (16.7)	35 (15.0)	
Self-employed	62 (24.8)	2 (3.9)		14 (25.9)	47 (20.2)	
Student	30 (12.0)	2 (3.9)		3 (5.6)	27 (11.6)	
Worker	46 (18.4)	0		8 (14.8)	36 (15.5)	
Butchery experience						
Do this work only while Islamic feast of sacrifices	193 (77.2)	37 (72.5)	.303	43 (79.6)	176 (75.5)	.486
First attempt	50 (20.0)	14 (27.5)		9 (16.7)	52 (22.3)	
Working as a butcher	7 (2.8)	0		2 (3.7)	5 (2.1)	
Locations of injury occurred						
Garden/Park	113 (45.2)	14 (27.5)	.003	27 (50.0)	93 (39.9)	.580
Home	102 (40.8)	35 (68.6)		22 (40.7)	112 (48.1)	
Slaughterhouse	1 (.4)	0		0	1 (.4)	
Street	6 (2.4)	1 (2.0)		0	6 (2.6)	
Temporary arena for sacrifice	28 (11.2)	1 (2.0)		5 (9.3)	21 (9.0)	
Hospital admission type						
Ambulance	5 (2.0)	0	.676	1 (1.9)	1 (.4)	.822
By self	245 (98.0)	51 (100.0)		53 (98.1)	232 (99.6)	
Animal species						
Cow/cattle	203 (81.2)	33 (64.7)	.014	46 (85.2)	178 (76.4)	.202
Sheep/goat	47 (18.8)	18 (35.3)		8 (14.8)	55 (23.6)	

Table 1 (cont.). Demographic and clinical characteristics of study population (n=301).

Characteristics	Gender		P value	Injury location		P value
	Male	Female		Lower extremity	Upper extremity	
Occurrence of injury						
By animal	29 (11.6)	0	.012	11 (20.4)	10 (4.3)	<.001
By another person	22 (8.8)	4 (7.8)		1 (1.9)	25 (10.7)	
By him/herself	199 (79.6)	47 (92.2)		42 (77.8)	198 (85.0)	
Fracture situations						
Fractured	14 (5.6)	0	.172	6 (11.1)	4 (1.7)	.003
No fracture	236 (94.4)	51 (100.0)		48 (88.9)	229 (98.3)	
Treatment needed						
Secondary healing	17 (6.8)	1 (2.0)	.006	3 (5.6)	10 (4.3)	.002
Splint	14 (5.6)	0		8 (14.8)	6 (2.6)	
Suture	206 (82.4)	46 (90.2)		43 (79.6)	203 (87.1)	
Tendon or nerve repairing	8 (3.2)	0		0	8 (3.4)	
Tissue adhesive	4 (1.6)	4 (7.8)		0	6 (2.6)	
Urgent surgery treatment	1 (0.4)	0		0	0	
Consultations needed						
Brain surgery	4 (1.6)	0	.535	0	0	.105
Cardiovascular surgery	2 (0.8)	0		1 (1.9)	0	
Multiple consultation	2 (0.8)	0		1 (1.9)	0	
Not necessary	222 (88.8)	49 (96.1)		48 (88.9)	216 (92.7)	
Orthopedics and traumatology	5 (2.0)	1 (2.0)		2 (3.7)	4 (1.7)	
Plastic and reconstructive surgery	15 (6.0)	1 (2.0)		2 (3.7)	13 (5.6)	
Outcome						
Discharged	240 (96.0)	51 (100.0)	.649	53 (98.1)	227 (97.4)	.249
Hospitalized	4 (1.6)	0		1 (1.9)	1 (0.4)	
Send to another hospital	6 (2.4)	0		0	5 (2.1)	

Data are number (%) or mean (standard deviation) unless noted otherwise.

emergency service, 4 (1.3%) were hospitalized. Of the hospitalized cases, one patient had a tendon incision, two patients had rib fracture and one had epidural hematoma. Six (1.9%) of the patients were referred to other hospitals due to overcrowding. One case that was referred was operated on for splenectomy due to a blunt abdominal trauma.

Median hospital cost to patients was 103.14 Turkish Liras. The lowest treatment cost was 35.95 Turkish liras

and the highest treatment cost was 852.66 Turkish Liras. Median, lowest and highest treatment costs equaled 19.53, 6.80 and 161.48 USD, respectively, according to the rate of exchange during the time frame of the study.

The mean age of women was higher than men ($P=.013$) (Table 1). The proportion of high school and university graduates was higher in males than females ($P=.003$). Occupation distributions differed significantly between men and women ($P<.001$). The rate of home

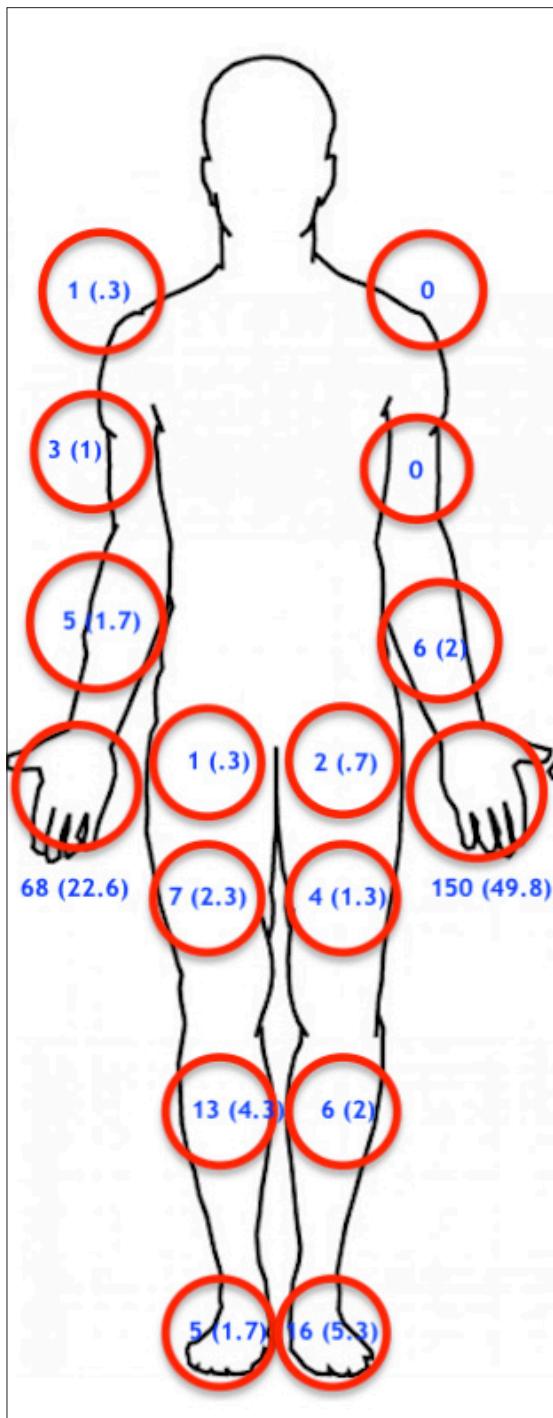


Figure 2. Number and percentage upper and lower extremity injuries. body site.

Table 2. Injury location and type of injury.

	n (%)
Injury location	
Head	8 (2.7)
Thorax	3 (1.0)
Back	1 (0.3)
Abdomen	1 (0.3)
Type of injury	
Blunt trauma	30 (9.9)
Penetrating trauma <5 cm	239 (79.4)
Penetrating trauma 5-10 cm	24 (8.0)
Penetrating trauma >10 cm	8 (2.7)

injuries was higher in women compared to men. The rate of those injured in the garden or park was higher in men compared to women ($P=.003$). The majority of injuries in males and females were caused by cow or cattle slaughter, and the rate of injuries caused by cow or cattle was higher in males than females ($P=.014$). All animal-related injuries were observed in men, and the rate of self-injuries was higher in women compared to men ($P=.012$). The distribution of treatment needs in men and women varied significantly ($P=.006$). The rate of animal-related injuries was higher in the lower extremity of the cases compared to the upper extremity ($P<.001$) (Table 1).

DISCUSSION

Thousands of sacrifices are done in a short time span because most of animal sacrificing is on the first day of Feast of Sacrifice.^{3,4} Thus, hundreds of patients are admitted to emergency services in 8-10 hours for complaints related to animal sacrifice on the first day of the feast. Two previous studies reported that the ratio of people admitted to emergency service in the earlier part of the first day was 64% and 73%.^{5,6} Our study also reports a percentage of 79.1% for emergency service admission on the first day of the feast in accordance with the literature. Most of these admissions are hand traumas but also include other traumas.

Until 5-10 years ago, animal sacrifice used to be performed everywhere, even in the larger cities of Turkey; for example, parks, streets and empty areas in all cities. Even bovines used to be sacrificed in gardens or unused lands by the owners of animals, and consequently, animal-related injuries used to be quite common. However, in recent years, sacrificing of bo-

vines has been done in slaughterhouses, followed by the subsequent meat processing procedure performed in household areas or gardens, which thereby lowered the rate of animal-related injuries. In the study of Deniz et al, animal-related injury percentage was 20.9%.⁴ However, we observed a 9.6% rate. On the other hand, the frequency of lacerations that occurred during subsequent meat-cutting after sacrifice was the same as observed by Deniz et al. For the last 10 years, some grocery store chains in large cities have been doing animal sacrifice and distribution of the meat thereafter on behalf of the people who want to sacrifice. Because animal sacrifice is carried out by professional people in such companies, the incidence of injuries of inexperienced people is gradually decreasing. However, this is not the case for smaller cities and sparsely populated towns where such injuries are still more prevalent.

Most of the injuries related to sacrifice are due to sharp objects and mostly occur in males.^{1,4} According to previous studies, the exposure rate of males for these injuries is between 84% and 86%.^{1,3,6} In accordance with the literature, this percentage was 83.1% in our study. Three studies conducted in Turkey reported an average age of between 32-43 years for sacrifice-related injuries.^{1,3,7} The average age in our study was 42.5 years. The injury rate of professional butchers was 3-6%^{1,4} in the literature and 2.3% in our study. The scarcity of the injuries in butchers in our study might have been related to their occupational experience and their meticulous attention during the sacrifice. Moreover, 2 out of 7 butchers injured in our study were injured due to the carelessness of other individuals.

In a study of Bildik et al, conducted in 2010, the proportion of primary school graduates among the injured individuals was 67%.¹ Possibly because of the higher rate of literacy or regional differences, in our study it was 49.8%. In the studies of Sarifakioglu et al and Rahman et al, the rate of inexperienced individuals among all injury cases were 86% and 94%, respectively.^{5,6} In our study, it was a significantly higher rate (97%). Males are exposed to animal-related injuries more often, because males are primarily responsible for sacrificing an animal.⁴ In our study, all of the 20 blunt traumas caused by animals occurred in males. Also, male patients mostly were injured in the early hours of the first day of the sacrifice feast, while females were mostly injured between the afternoon of the first and third day of sacrifice feast because the females were mostly injured during subsequent meat cutting instead of the primary sacrifice.^{5,8} A study conducted by Deniz et al found that hiring rates of butchers were as low as 3%.⁴ In our opinion, this situation cannot be judged by

the number of injured butchers admitted to emergency services, as nearly all the butchers work intensely during the Feast of Sacrifice to earn money by butchering tens of animals. Their relatively lower rate of admission to emergency services is probably because they are less prone to injury due to their professional experience.

Penetrating traumas constitute 88% of all injuries in the literature.^{1,3} This percentage was 90.0% in our study. Injuries related to animal sacrifice are mostly in the upper extremities (81.1-88.4% for such traumas).^{1,7} Our study also discovered 77.4% upper extremity and 17.9% lower extremity injuries, slightly lesser than the literature. In the study by Yildiran et al, the proportions by non-dominant and dominant hand were 62.9% and 37%, respectively.⁸ Consistent with that study, we found 68% non-dominant hand injuries and 31.1% dominant hand injuries. In two studies, fingers were the most common location of hand injuries and the index finger was the most commonly injured finger.^{8,9} Similarly, we found that penetrating injuries of the hand were mostly in the index finger followed by the thumb. Lacerations of the left hand were caused by the person himself in 91.3% of cases and 5.3% were done by others. Lacerations of the right hand were caused by the person themselves in 73.5% of cases and 23.5% were done by others.

During the Feast of Sacrifice, approximately 100 trauma cases are admitted to hospitals for injuries related to animal sacrifice. Considering the number across the country, this causes a significant economic impact and loss of labor. Also, many cases require a rehabilitation period after treatment. According to 2018 data, 1514 hospitals are operating in Turkey and half of these are medium-sized hospitals. These injuries cause considerable hospital costs and labor loss across the nation. The treatment cost observed in our study was similar to findings of a study conducted by Bildik et al. In their study hospital cost was a median 104.76 (67.48-322.12) Turkish Liras.¹ Even though we observed no deaths in our study, life-threatening injuries might occur during animal sacrifice.

The main strength of our study is that it was conducted simultaneously during the days of the activity across three different cities, compared to most previous studies in the literature, which were conducted in tertiary centers and were medical record reviews. Secondly, contrary to the tertiary centers in other studies where they mainly treat such injury cases referred from small-scale hospitals, the three hospitals in our study were secondary health-care centers where they accept all admissions for sacrifice-related injuries with-

in their catchment areas and hence reflected all the aspects of such injuries with regard to demographic, social and clinical characteristics.

Most of the injuries that occur during the Feast of Sacrifice are skin lacerations by sharp objects. However, even though skin lacerations are more common, sometimes severe and life-threatening injuries might occur. In order to minimize the rate of animal sacrifice-related injuries, it might be helpful to pro-

vide public education through effective use of media about proper animal-sacrificing and probable complications that are likely to be observed during this procedure. Also, increasing the number of more convenient slaughterhouses where skilled butchers perform the sacrificing procedure might be useful. Moreover, volunteers for animal-sacrificing can be educated and certified to increase professional butchers and to decrease the rate of injuries.

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