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Traumatic Injuries from Animal Sacrifice During the Eid Al-Adha Holiday: A Prospective Multicentered Study

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ABSTRACT

Background: Sacrifice of animals is an important ritual of the Eid Al-Adha annual holiday.

Objective: The purpose of this study was to describe injuries related to the sacrificial slaughtering of animals during the Eid holiday.

Method: Multi-centered prospective observational cohort study conducted during Eid (August 21-24, 2018) at 5 emergency departments in Gaziantep, Turkey. Descriptive statistics of injuries collected included injury location, involvement of dominant or non dominant hand, cause of injury (instrument vs animal), type of instrument causing injury, surgical interventions performed and professional occupations of patients.

Result: 277/330 patients with injuries fulfilled the inclusion criteria; injuries not related to animal slaughter were excluded. 91% of injuries occurred in people who were not professional butchers (n=252) and simple laceration (not involving vessels or tendons) was the most common injury type (95.3%; n=265). Those who were injured and had no experience were mostly injured during the processing of the meat (butchering) and while helping others. Lacerations were most commonly observed in the upper extremity (83.4%; n=231), on the non-dominant side (67.5%; n=187), in the hand (78.7%, n=218), and specifically in the index finger (23.1%; n=64). Surgical intervention was performed on 8 patients.

Conclusion: The first day of Eid is associated with an increase in mostly non-dominant upper extremity injuries among inexperienced people slaughtering animals. Further education and safety measures may reduce such injuries. Emergency departments serving larger Muslim communities may benefit from anticipating an uptick in these injuries.

Keywords: Sacrifice, kurban, bayram, eid al-adha, eid, injuries, emergency, medicine, sheep

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INTRODUCTION

The annual Eid holiday (Festival of Sacrifice) is one of the two main Islamic holidays celebrated by approximately 1.8 billion Muslims across the world. Sacrifice of an animal during the Eid Al-Adha holiday is one of the pillars of worship in Islamic belief and can be performed by professional butchers or laypeople. The Festival of Sacrifice (Bayram or Eid) after the Hajj pilgrimage is celebrated for four days starting with the 10th day of the month “Zul-Hijjah” of the lunar Islamic calendar. Muslims sacrifice bovines or sheep during any of the four days of this celebration, generally on the first day of the Eid holiday (1). In the 2018 Eid, an estimated 3.6 million animals were prepared for sacrifice in Turkey (2). Injuries from the sacrificing and processing of meat can range from mild skin lacerations to deadly accidents. Blunt trauma may be observed as a result of an animal attack. A person sacrificing or processing meat may injure himself or herself or another person during the sacrifice (3-7). Recently, a number of precautions have been placed in Turkey to provide a safer, easier and healthier sacrifice. Throughout the holiday, municipalities facilitate venues for the sacrifice of animals. These well-equipped sacrifice centers provide professional butchers. However, injuries are observed despite these precautions. While animal slaughter and meat processing are typically reserved for butchers, many people elect to perform the sacrifice themselves instead. Despite these precautions, serious injuries persist.

The purpose of this study was to quantify and describe the incidence, causes and types of injuries related to the sacrificial slaughtering of sheep during the Eid Al-Adha holiday from patients presenting to five emergency departments (ED) in the city of Gaziantep, as well as the medical and surgical interventions performed. Studies in the literature on the subject are few in number and generally retrospective; the importance of our study is its prospective, multicentered design. The aim of the study is to provide knowledge about the frequency and types of injuries observed during the Eid holiday to anticipate a need for certain consultant services (such as hand surgery) and to raise awareness of such injuries in hopes that it will lead to preventive safety measures to reduce such injuries in the future.

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METHODS

This study was conducted during the 4 days of the Eid Al-Adha holiday (August 21-24, 2018) in the emergency departments of 5 hospitals in Gaziantep, Turkey. 864 patients presented with laceration or blunt trauma to the EDs. The patients who consented and met the inclusion criteria were included in the study.

Inclusion criteria in research:

- Injury during the slaughtering and/or meat processing
- Agree for return visit to ED for wound/injury recheck one-month post-injury

Exclusion criteria in research:

- Injury not related to sacrifice processing
- Injury occurring outside specified days

Process:

Patients presenting to an ED with injury secondary to slaughter of animals or processing of meat were recorded in previously prepared forms that included questions about:

- Demographics: age, gender, contact information
- The day and time during the bayram in which the injury occurred
- Occupation: professional butcher or non-butcher
- Experience (individuals believed to be experienced other than professional butchers were those who had attended at least one animal slaughter previously)
- Type of injury: penetrating or blunt trauma

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• Type of laceration: simple (including cutaneous, subcutaneous) or complicated (including muscle, tendon, nerve, artery and bone injuries)

• Causes of injury: knife, meat chopper, meat grinder, axe, skewer, animal attack

• Role of person: sacrificer who uses the sharp object (knife, axe etc), helper who helps the sacrificer during procedures, or others who observe the procedures during sacrificing or meat processing

• The stage of injury either sacrificing or meat processing (sacrificing: livestock slaughtering process; meat processing: processing of meat products after sacrificing)

All patients were called after one month for checking and the following information was collected:

• Sequelae from injury

• Workforce loss post-injury (called-in sick)

• Reason for animal sacrifice (due to religious reasons, economic or others)

**Measurements:**

• Descriptive statistics

  • Comparison of types of injury, location of injury, type of laceration, severity of injury (simple/complicated) and sequelae between butcher and non-butcher patients.

  • Comparison of types of injury, location of injury, type of laceration, severity of injury (simple/complicated) and sequelae between experienced and inexperienced patients.

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330 patients who had presented with injuries were initially included in the study. 53 patients who did not return for follow up ED and those who could not be reached by phone were excluded. The study was completed with 277 patients who fulfilled the inclusion criteria.

SPSS version 13 was used for the statistical analysis of the data. Descriptive statistics were used to summarize data with absolute and relative frequencies for categorical data and means and standard deviations for continuous variables. The Pearson Chi-square test was used to investigate the relationship between the categorical variables.

RESULTS

A total of 277 patients were included in the study. Among these, 227 (81.9%) were male and 50 (18.1%) were female. The mean age was 36.9 ±14.2 (SD) (range 3-76) years. Among the injured persons, 9% were professional butchers (n=25) and only 57% (n=158) were experienced. 190 (68.6%) patients had an education level of primary school. 230 (83%) patients were evaluated during the first day of Eid and most of them (n=140, 50.5%) were seen between 06:00 and 12:00. The most common injuries were simple lacerations (92.1%; n=255) and mostly with knives (n=227; 81.7%). Injuries occurred mostly during the processing of meat (n=144, 52%) and while helping (n=193, 69.3%). 82.7% (n=229) of patients surveyed believed that they felt obligated to personally perform the sacrifice due to their religious beliefs (Table-1).

In terms of types of laceration, simple laceration was detected in 255 (92.1%) cases. These injuries most frequently involved the non-dominant side (n=187, 67.5%), hand (n=218, 78.7%) and index finger (n=64, 23.1%). Five of the patients with complicated laceration had isolated tendon lacerations, two had an isolated arterial injury, one had an isolated nerve injury, one had tendon and nerve injury and one had injuries to a tendon, nerve and artery.

Among the 12 patients who presented with blunt trauma, one had a nasal fracture, two experienced intraocular bleeding, one had soft tissue injury of the upper lip, three had soft tissue injury of the

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hand, two had a distal fibula fracture, one had a distal tibia and fibula fracture, one had a 5th metatarsal fracture and one patient had a soft tissue injury of the foot.

A total of 8 patients required surgery by otolaryngology (n=1), orthopedics (n=1) and plastic surgery (2.2%, n=6). One of the two patients with amputation lost the distal phalanx of the first finger of the left hand due to chopping injury, and another lost the distal phalanx of the second finger of the right hand due to use of the mincer. Both patients underwent primary closure in the ED.

The patients were called for a recheck after one month. 222 (80.1%) patients recovered without any sequelae. Paresthesia in 17 patients (6.1%), pain in 15 (5.4%) patients, movement limitation in 13 (4.7%) patients, persistent swelling of injury site in 7 (2.5%) patients, amputation in 2 (0.7%) patients and wound side infection in one patient were identified (Table-3).

No significant differences were found between experienced and inexperienced groups in terms of type of injury, type of laceration and sequelae (p>0.05). Injuries among experienced patients happened more often during the sacrifice, while inexperienced people were more likely to be injured during meat processing (p=0.001). While injury patterns among experienced patients were more often while actively using a knife, inexperienced people were injured more often when they were helping (p=0.001) (Table 4).

In analyzing differences between butchers and non-butchers, there was no statistically significant relationship between the anatomic location of the injuries, the simple or complicated nature of the lacerations and injury sequelae (p>0.05) (Table-5).

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DISCUSSION

The Eid sacrifice is a ritual that appears to involve family members of all ages. In our study, the youngest injured person was a three-year-old boy who was injured when he was playing with a knife. Likewise, similar ages were reported in the study of Avşaroğlu (4) and Ersen (8). In the literature, there are studies reporting the mean ages of 32±14, 35±15 and 39 years (4,6,9). These reports are similar to our report and generally comprise the adult age groups. The gender distribution of the cases demonstrated injured patients were mostly men which is in line with previous studies (3,4,6,7) demonstrating a predominately male population with rates of 85%, 86%, 85.5% and 84.2% of those injured. The male gender preponderance was 7:1 in the study of Rahman et al. (10). We believe that this was due to the traditional role of adult males in the sacrifice procedure and the role of female members of the family in the meat processing procedure among Muslim traditions.

In our study, we found that only 9% of the injured people were professional butchers (n=25). Other studies in the literature have had rates around 3.7%, 3.3% and 8% (3,7,10). This suggests that injuries might be minimized by relegating the animal slaughter to professionals.

In our study, only 4.3% of all cases had blunt traumas (n=12), compared with 16.1% in the study by Baştürk et al. (2). In other studies, in the literature (3-7), most of the injuries observed had been during the first day of Eid, and during the morning, which was similar to our study. We believe this was due to the fact that the sacrifice is most frequently performed early on the first day of Eid. Similar to the study by Avşaroğlular (4), in our study, most of the injuries were observed among the non-experienced family members who had assisted in the animal slaughter. Individuals with experience of sacrifice were more likely to be injured during the slaughter of the animal (p=0.01). Those inexperienced in sacrifice were mostly injured while assisting others and inbutchering/processing of the meats (p=0.001). In the study of Bildik et al. (7), 96% of the injured patients had almost no prior experience slaughtering or butchering animals. Avşaroğlu suggested this likely stems from the prevalent belief that the sacrifice should be performed by a family.

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member (4). The data obtained in our study revealed that 82.7% of the injured people were not professional butchers but did share this belief.

Similar to the outcomes observed in our study, other studies have reported that most of the injuries were in the form of simple lacerations. Simple lacerations comprised 89.2% of injuries in the study by Bildik (7), 78.6% in the study by Baştürk (3), 60.6% in the study by Dizen (6), and more than 50% in the study by Sarıfakıoğlu (5). In all of these studies, injuries were mostly observed in the upper extremity and the hands (3-7). These outcomes are consistent with the outcomes of our study. In the study by Avşaroğulları, 91% of patients used their right hands actively, but the injuries were observed at equal rates in each hand (4). In the study by Rahman, right hand dominant injuries were observed at a rate of 73.5% (10). In studies comparing both hands, injuries were more common in the left hand (5,6). In our study, 67.5% of the injuries were observed in the non-dominant hand. In our study, the most common hand injuries were those in the index finger followed by the thumb. In the study of Sicca, the dorsal face of the first finger of the non-dominant hand was most commonly injured (9). In the study of Ersen et al. (8), the most commonly injured finger was the second (33%), followed by the first. In our study, the injuries were most commonly observed in the hand, and the index finger and the thumb in both experienced and non-experienced individuals (p=0.019). This is due to the fact that the hands and fingers are exposed to the lacerating tool during both the active cutting and supportive help.

In our study, only 3.6% of all cases had complicated lacerations involving tendons, nerves or arteries. In the study by Baştürk et al. (3), 1.8% of the cases had muscle, nerve, tendon or artery injuries. These rates were very high in the study that Dizen et al. (6) conducted in 2009 which had high rates of injury to tendons (27%), arteries (5.8%) and nerves, as well as amputations (6.6%). In another study, the rate of tendon laceration was 25%, whereas the rate of vessel and nerve injury was 4.2% (7). The complicated injury rates observed in our study were lower compared than the afore-mentioned studies. Between 2011 and 2014, the most common artery injury was observed the radial artery in 195 patients hospitalized in the plastic surgery clinics, whereas distal amputation

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was observed in 26 patients (8). In our study, one patient had arterial injury, which included the radial artery, and amputation was observed in the distal end of the upper extremity.

In the study of Baştürk et al. 79.6% of the patients were discharged from EDs with primary repair and wound dressing (3). In other studies, the rates were 82.5% and 92.3% (7,10). In another study, 52 of 98 patients were discharged from EU with primary closure (5). In our study, 97.8% of patients were treated in the ED and discharged. Surgical intervention was only necessary in 8 patients (1 by otolaryngology, 1 by orthopedics and 6 by plastic surgery). The rates of patients requiring surgery in other studies were 11.7% and 7.7% (7,10). In our study, we performed a control visit in order to determine the rate of sequelae, and the most common sequel was paresthesia. We believe that this was due to the partial damage of the superficial nerves observed in the distal part of the extremities.

A portion of the injuries observed during the sacrifice may be preventable. Nonbutchers accounted for 91% of injuries in this study even though a butcher can sacrifice 40-50 animals in a day while a non-butcher may sacrifice 1-2 animals. Precautions should be taken in EDs, especially on the first day of the Bayram holiday, in anticipation of an increased number of patients with laceration injuries involving the upper extremities and sometimes blunt trauma in localities where the sheep sacrifice is prevalent. The number of professional sites for sacrifice should be increased, especially by the local managements, in order to provide proper service to the public.

CONCLUSION

The first day of the Bayram (Eid Al-Adha) holiday is associated with an increase in mostly non-dominant upper extremity injuries among mostly inexperienced people slaughtering sheep. The ritual slaughter of animals, usually sheep, is a central part of the Bayram (Eid Al-Adha) religious holiday for Muslims. This slaughter is sometimes performed by novices instead of professional butchers. We found an increase in the rates of injury during the first day of Bayram, particularly in the morning hours when the animal sacrifice is often performed, when compared to the following 3

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days of the holiday. Injury patterns noted during the first day of the Bayram holiday usually consisted of simple lacerations often involving the upper extremity, specifically the non-dominant hand, usually the first finger. While government measures have been taken to reduce the chance of injury from the animal slaughter, further education and safety precautions may help reduce the number of injuries. EDs serving communities with larger Muslim populations where nonprofessionals engage in sheep slaughtering may benefit from anticipating an uptick in such injuries.

LIMITATIONS OF OUR STUDY

Although the emergency departments where our study was conducted likely captured many of the injuries experienced in Gaziantep, Turkey, this may not be generalizable to the rest of Turkey or the world. Patients may have been injured but not received care in the emergency department, if at all, potentially leading to an underestimation of the actual rate of injury. Sixteen percent of patients were lost to follow up and therefore excluded. 68% in this study had primary school education level which likely reflects a disproportionate amount of rural people being included in this study given that 19% of people 25-64 years old in Turkey attained at least an upper secondary education level (11).

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Informed consent: All participants gave their written, informed consent prior to their inclusion in the study.

Ethical approval: The study was approved by Ethics Committee of Hasan Kalyoncu University, Gaziantep province, Gaziantep, Turkey (Date: 06/06/2018; No:2018-05)

Human rights: Authors declare that human rights were respected according to Declaration of Helsinki.

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### Table 1: Descriptive Statistics

|                             | Mean       | Minimum | Maximum |
|-----------------------------|------------|---------|---------|
| **Age**                     | 36.86±14.17| 3       | 76      |
| **Gender**                  | Male       | 227     | 81.9    |
|                             | Female     | 50      | 18.1    |
| **Education Degree**        | None       | 2       | 0.7     |
|                             | Primary school | 190   | 68.6    |
|                             | High school | 60     | 21.7    |
| **Occupation**              | Butcher    | 25      | 9       |
|                             | Non-butcher | 252    | 91      |
| **Experience**              | Yes        | 158     | 57.0    |
|                             | No         | 119     | 43.0    |
| **Day of Bayram ED Visit Occurred** | 1st day | 230 | 83 |
|                             | 2nd day    | 39      | 14.1    |
|                             | 3rd day    | 5       | 1.8     |
| **Time of admission**       | 4th day    | 3       | 1.1     |
|                             | 6:00-12:00 | 140     | 50.5    |
|                             | 12:00-18:00| 105     | 37.9    |
|                             | 18:00-24:00| 32      | 11.6    |
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| Type of injury          | Laseration | 265 | 95.7 |
|-------------------------|------------|-----|------|
| *Simple                 | 255        |     | 92.1 |
| *Complicated            | 10         |     | 3.6  |
| Blunt trauma            | 12         |     | 4.3  |

| Causes of Injury        | Knife      | 227 | 81.9 |
|                        | Meat chopper| 33  | 11.9 |
|                        | Mean grinder| 1   | 0.4  |
|                        | Axe, skewer, animal attack, etc | 16 | 5.8 |

| Sacrificing & Meat Processing | Sacrificing | 133 | 48   |
|                               | Meat Processing | 144 | 52  |

| Role of Injured Person      | Sacrifier   | 82  | 29.6 |
|                            | Helper      | 193 | 69.7 |
|                            | Others      | 2   | 0.7  |

| Reason for animal sacrifice | Religious | 229 | 82.7 |
|                            | Financial  | 45  | 16.2 |
|                            | Other      | 3   | 1.1  |
Table 2: Anatomic Location of the Laceration

| Type of laceration | Count (N) | Ratio (%) |
|--------------------|-----------|-----------|
| Simple             | 255       | 92.1      |
| Complicated        | 10        | 7.9       |

| Side                | Count (N) | Ratio (%) |
|--------------------|-----------|-----------|
| Dominant Side      | 90        | 32.5      |
| Non-Dominant Side  | 187       | 67.5      |

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| Localization of injury |  |  |
|-----------------------|---|---|
| Upper Extremity       | 231 | 83.4 |
| • Hand                | 218 | 78.7 |
|  | Thumb  | 63  | 22.8 |
|  | Index finger | 64  | 23.1 |
|  | Middle finger | 25  | 9 |
|  | Ring finger | 8   | 2.9 |
|  | Little finger | 13  | 4.7 |
|  | Volar side | 19  | 6.9 |
|  | Dorsal side | 26  | 9.3 |
|  |  | 10  | 3.6 |
| • Forearm             | 3   | 1.1 |
| • Others              | 38  | 13.7 |
| Lower Extremity       | 16  | 5.8 |
| • Foot                | 14  | 5 |
|  | Cruris              | 8   | 2.9 |
|  | Others              | 8   | 2.9 |
| Non-Extremity         | 8   | 2.9 |

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**Table 3: Comparison of Experiences**

| Experience                        | Yes | No |
|-----------------------------------|-----|----|
| Laceration                        | 149 | 116|
| Blunt trauma                      | 9   | 3  |
| $x^2=1.651 \text{ P}=0.199$       |     |    |
| Upper Extremity                   | 124 | 107|
| Lower Extremity                   | 28  | 10 |
| Non-extremity                     | 6   | 2  |

**Type of Injury**

| Localization of injury | $x^2$ | P   |
|------------------------|-------|-----|
| Hand                   | 115   | 103 |
| Food                   | 9     | 7   |
| Forearm                | 7     | 3   |
| Cruris                 | 13    | 1   |
| Others                 | 14    | 5   |

`$x^2= 11.802 \text{ P}=0.019$`

| Type of Laceration (n=265) | $x^2$ | P   |
|----------------------------|-------|-----|
| Simple                     | 142   | 113 |
| Complicated                | 7     | 3   |

`$x^2= 0.801 \text{ P}=0.371$`

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| Sacrificing & Meat Processing | Sacrificing | 98 | 35 |
|-------------------------------|-------------|----|----|
| Meat Processing               | 60          | 84 |
| \( x^2 = 28.925 \) \( P = 0.001 \) |             |    |

| Duty of Person               | Active sacrificer | 72 | 10 |
|------------------------------|-------------------|----|----|
| Helper                       | 86                | 107|
| Others                       | 0                 | 2  |
| \( x^2 = 46.596 \) \( P = 0.001 \) |             |    |

| Sequel                       | None              | 129| 93 |
|------------------------------|-------------------|----|----|
| Limited motility             | 8                 | 5  |
| Paresthesia                  | 9                 | 8  |
| Pain                         | 7                 | 8  |
| Bump/edema                   | 3                 | 4  |
| Infection                    | 0                 | 1  |
| Amputation                   | 2                 | 0  |
| \( x^2 = 4.395 \) \( P = 0.623 \) |             |    |

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Table 4: Comparison of Butchers and Non-Butchers

| Localization of injury | Butcher | Non-butcher |
|------------------------|---------|-------------|
| Upper Extremity        | 19      | 212         |
| Lower Extremity        | 5       | 33          |
| Non-extremity          | 1       | 7           |
| \( \chi^2 = 1.088 \ p=0.580 \) |          |             |

| Location               | Butcher | Non-butcher |
|------------------------|---------|-------------|
| Hand                   | 17      | 201         |
| Food                   | 2       | 14          |
| Forearm                | 2       | 8           |
| Kruris                 | 2       | 12          |
| Others                 | 2       | 17          |
| \( \chi^2 = 2.626 \ p=0.622 \) |          |             |

| Type of Injury         | Butcher | Non-butcher |
|------------------------|---------|-------------|
| Laceration             | 24      | 241         |
| Blunt                  | 1       | 11          |
| \( \chi^2 = 0.007 \ p=0.932 \) |          |             |

| Type of laceration     | Butcher | Non-butcher |
|------------------------|---------|-------------|
| Simple                 | 24      | 231         |
| Complicated            | 0       | 10          |
| \( \chi^2=1.035 \ p=0.309 \) |          |             |

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| Sequeleae | None | 25 | 197 |
|-----------|------|----|-----|
| Limited motility | 0 | 13 |
| Paresthesia | 0 | 17 |
| Pain | 0 | 15 |
| Bump/edema | 0 | 7 |
| Infection | 0 | 1 |
| Amputation | 0 | 2 |
| $x^2=6.808$ p=0.339 |

**Table 5: Injury Sequelae**

| Sequeleae | Count (N) | Ratio (%) |
|-----------|-----------|-----------|
| None | 222 | 80.1 |
| Limited motility | 13 | 4.7 |
| Paresthesia | 17 | 6.1 |
| Pain | 15 | 5.4 |
| Contusion/edema | 7 | 2.5 |
| Infection | 1 | 0.4 |
| Amputation | 2 | 0.7 |

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