ORIGINAL ARTICLE

Factors affecting mortality among victims of electrical burns

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ABSTRACT

BACKGROUND: The aim of this study was to determine the factors affecting mortality rate among patients with an electrical burn.

METHODS: A total of 115 patients admitted to the emergency department and hospitalized in the Burn Treatment Center or Intensive Care Unit (ICU) due to the electrical burn, were included in the study.

RESULTS: A total of 115 patients (4 female and 111 male) with a mean age of 32.88±12.87 years were included in the study. The mean hospitalization period was 25.03±20.50 days, and the mean total body surface area burned (% TBSA) was 22.83±15.54%. Among those patients, 9 (8.5%) expired, and the remaining 106 were discharged after treatment. In a logistic regression analysis, TBSA >20% (p=0.02, OR: 11.7, CI: 1.38–99.16); ICU requirement (p=0.005, OR: 1.28, CI: 1.08–1.58); erythrocyte transfusion requirement (p=0.02, OR: 12.48, CI: 1.44–107.83); fresh frozen plasma (FFP) requirement (p=0.03, OR: 10.23, CI: 1.18–88.17); albumin requirement (p=0.02, OR: 12.60, CI: 1.44–109.85); admission serum albumin level <3.5 mg/dl (p=0.04, OR: 7.25, CI: 0.82–63.64); and admission hemoglobin level <12 mg/dl (p=0.01, OR: 8.29, CI: 1.57–43.61) were determined as risk factors for mortality in patients with electrical burns.

CONCLUSION: In clinical practice, defining a mortality risk analyzer using these factors may be helpful in the management of patients with electrical burns. Additional, more comprehensive studies are required to define the risk factors for mortality and long-term morbidities in patients with electrical burns.

Keywords: Albumin; burn extent; calcium; electrical burns; hemoglobin; mortality.

INTRODUCTION

Electrical burns are one of the causes of important health burdens throughout the world with incidences varying between 4–18% of all burns.[1–3] In the pathogenesis, with the passage of electric through the human body, the biochemical compositions of the body are altered together with many electro-traumas. Necrosis on the skin and deeper tissues may cause the dysfunction of the affected limbs and life-threatening organ complications including renal failure or sepsis.[4]

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Ulus Travma Acil Cerrahi Derg
2017;23(3):223–229
doi: 10.5505/tjtes.2016.29166

Electrical burns are most commonly reported among young men causing long-term hospitalization and high cost rates.[5] They are still important causes of work-power loss with high rates of morbidity and mortality especially in developing countries.[6] As high as 21.7% of the mortality rate has also been reported in electrical burn patients.[7] Recently Ghavami et al. investigated 682 electrical burn patients and reported the mortality rate as 2.5%, while those requiring amputation was 23.7%.[8]

The aim of this study was to determine the factors affecting mortality rates among the victims of an electrical burn. In this way, we aimed to draw attention to these points for the prompt and improved management of patients.

MATERIALS AND METHODS

This retrospective study was conducted in the Derince Training and Research Hospital, between January 2012 and December 2015. The study was approved by the local ethics committee. A total of 115 patients, admitted to the emergency department and hospitalized in the General Surgery Department or Intensive Care Unit (ICU) due to the electrical burns, was included in the study.

The total body surface area was calculated by the rule of nines, and the maximally affected burn area was also recorded. Burns are graded as: Grade 1: the superficial thickness of the skin is involved; Grade 2: the full thickness of skin is destroyed; Grade 3: the skin, subcutaneous tissues, fat, and muscles are destroyed; Grade 4: the skin, subcutaneous tissues, and bones are destroyed.

After an initial assessment, intravenous fluid resuscitation was started with the monitoring of the urine output. Erythrocyte or fresh frozen plasma (FFP) was transfused when necessary. Surgical interventions including debridement, escharatomies, fasciotomies, or a flap coverage were also managed where required. Demographic data, the hospitalization period, the surgical interventions, and the laboratory data including a complete blood count, renal, and liver function tests, C-reactive protein, blood coagulation parameters, and serum electrolyte levels were recorded. The corrected calcium level was calculated based on the formula

Corrected calcium = serum calcium + 0.8 * (4 - serum albumin).

Patients with incomplete records were not included in the study.

The Statistical Analysis

Statistical analyses of the results were performed using the SPSS software (version 21, IBM SPSS Statistics). The results were presented as a mean±SD for continuous variables and as a number and proportions (%) for categorical variables. The student's t-test or the chi square test was used for the analyses. The risk level was assessed by a logistic regression analysis. A p value of less than 0.05 was considered statistically significant.

RESULTS

A total of 115 patients (4 female and 111 male) with a mean age of 32.88±12.87 (16–82) years were included in the study. The accident took place at the home in 19 cases and at work in 81 cases, as well as a traffic accident in 1 case. In the remaining 14 cases, the accident happened in other places. The patients were admitted to the hospital by ambulance (n=98), by their own cars (n=14) or by air ambulance (n=3).

Among those patients, 65 were directly hospitalized in the intensive care unit. A tracheotomy was required in one patient. An inhalation injury accompanying an electric burn was present in one patient. The mean hospitalization period was 25.03±20.50 (1–163) days, and the mean burn extent was 22.83±15.54% (1.0–66.0%). Among those patients, 9 (8.5%) expired, and the remaining 106 were discharged after treatment. The general characteristics of the expired and discharged patients are summarized in Table 1.

The mean age of the expired group was older (42.89±19.00 vs 32.42±12.28 years, p=0.03); the mean total body surface area burned (% TBSA) was larger (40.75±18.79 vs 20.46±14.62, p=0.001); the ICU requirement was more common (100% vs 65.1%, p=0.05), and the mean of the required erythrocyte suspensions (4.14±5.52 vs 1.19±2.53, p=0.01), the fresh frozen plasma (6.00±10.03 vs 2.47±5.38, p=0.04) and the albumin (1.62±1.84 vs 0.52 vs 0.76, p=0.003) were also significantly higher in the expired group.

The laboratory data of the study participants at admission are summarized in Table 2. The mean of serum creatinine (1.14±0.59 vs 0.81±0.21, p=0.03), phosphorus (4.85±3.10 vs 3.22±1.11, p=0.005) and aspartate amino transferase (AST) (466.71±549.61 vs 213.55±254.55, p=0.03) levels were significantly higher; while serum calcium (6.90±1.37 vs 8.32±1.05 p=0.01), albumin (2.68±0.85 vs 3.46±0.73, p=0.01), corrected calcium (8.74±0.88 vs, p=0.04) and hemoglobin (9.89±4.90 vs 13.05±2.43, p=0.002) levels were significantly lower in the expired group.

A logistic regression analysis was performed for these parameters, with their laboratory limits defined as normal, to determine the risk factors in mortality (Table 3). In the logistic regression analysis, TBSA >20% (p=0.02, OR: 11.7, CI: 1.38–99.16); ICU requirement (p=0.005, OR: 1.28, CI: 1.08–1.58); erythrocyte transfusion requirement (p=0.02, OR: 12.48, CI: 1.44–107.83); FFP requirement (p=0.03, OR: 10.23, CI: 1.18–88.17); albumin requirement (p=0.02, OR: 12.60, CI: 1.44–109.85); admission serum albumin level <3.5 mg/dl (p=0.04, OR: 7.25, CI: 0.82–63.64); admission hemoglobin level <12 mg/dl (p=0.01, OR: 8.29, CI: 1.57–43.61) were determined as risk factors for mortality in patients with electrical burns.

DISCUSSION

Electrical burns are devastating conditions. In this study we have evaluated the risk factors for mortality in victims of electrical burns and TBSA >20%; ICU requirement, erythrocyte FFP or albumin transfusion requirements, admission albumin level <3.5 mg/dl and admission hemoglobin level <12 mg/dl were determined as the risk factors for mortality. In patients with electrical burns, since morbidity, and mortality rates are high, defining risk factors is important for the prompt and precise management and especially to reveal preventive measures in high-risk patients. To the best of our knowledge, this is one of the studies evaluating the largest demographic and laboratory features in the prediction of mortality in patients with electrical burns.

Epidemiological data obtained in our study was concomitant with the literature. In a study of Iqbal et al.,[9] among 13,295

Table 1. The general characteristics of the study participants

	Discharged (n=106)		Expired (n=9)		p
	n	%	n	%	
Age (Mean±SD)	32.42±12.28		42.89±19.00		0.03
Gender (Male/Female)	102/4		9/0		1.0
Total body surface area burned					0.009
Lower than 10%	32	30.2	0	0	
10–19%	31	29.3	0	0	
20–29%	26	24.5	4	44.4	
≥30%	17	16.0	5	55.6	
Burn degree					0.72
2nd degree	70	66.0	5	55.6	
3rd degree	36	33.9	4	44.4	
Burn area (maximally affected)					0.15
Hairy skin	4	3.7	0	0	
Extremity	69	65.1	5	55.6	
Body	19	17.9	3	33.3	
Head and neck	8	7.5	1	11.1	
Genital-gluteal region	6	5.7	0	0	
Operation requirement	74	69.8	8	88.9	0.58
Debridement number					0.53
Lower than 5	56	52.8	6	66.6	
6–10	20	18.9	1	11.1	
11–20	16	15.1	1	11.1	
>20	14	13.2	1	11.1	
Hospitalization time (days)					0.19
1-10	18	16.9	4	44.4	
11-20	25	23.6	3	33.3	
21-30	27	25.5	0	0	
31-40	21	19.8	0	0	
41-50	10	9.4	1	11.1	
≥51	5	4.7	1	11.1	
Intensive care unit requirement	69	65.1	9	100	0.005
Multi-trauma presence	9	8.5	2	22.2	0.38
Intensive care unit hospitalization time					0.55
1–10 days	19	17.9	3	33.3	
11–20 days	25	23.6	3	33.3	
21–30 days	16	15.1	1	11.1	
≥31 days	9	8.5	2	22.2	
Erythrocyte transfusion requirement					0.009
No	84	79.2	0	0	
1 unit	13	12.3	3	33.3	
2 units	4	3.8	2	22.2	
3 units	1	0.9	2	22.2	
≥4 units	4	3.8	2	22.2	
Fresh frozen plasma requirement					0.04
No	81	76.4	0	0	
1 unit	18	16.9	4	44.4	
2 units	3	2.8	1	11.1	
3 units	1	0.9	1	11.1	
≥4 units	12	11.3	3	33.3	
Albumin requirement					0.006
No	87	82.1	1	11.1	
1 unit	10	9.4	6	66.6	
2 units	9	8.5	2	22.2	
Dialysis requirement	5	4.7	1	11.1	0.12

Table 2. Laboratory data of the study participants at their admission to the hospital

	Discharged (n=106)	Expired (n=9)	p
	Mean±SD	Mean±SD	
Creatinine (mg/dL)	0.81±0.21	1.14±0.59	0.03
Urea (mg/dL)	29.29±11.89	34.55±23.96	0.28
Glucose (mg/dL)	132.25±56.29	167.85±47.31	0.11
Calcium (mg/dL)	8.32±1.05	6.90±1.37	0.01
Corrected calcium (mg/dL)	8.74±0.88	7.95±1.30	0.04
Chloride (mEq/L)	104.82±6.27	104.85±4.14	0.99
Total protein (mg/dL)	6.01±1.09	4.81±1.55	0.01
Albumin (mg/dL)	3.46±0.73	2.68±0.85	0.01
Phosphorus (mg/dL)	3.22±1.11	4.85±3.10	0.005
Uric acid (mg/dL)	4.49±1.82	3.69±1.70	0.11
Aspartate amino transferase (IU/l)	213.55±254.55	466.71±549.61	0.03
Alanine aminotransferase (IU/l)	103.50±174.10	136.71±119.37	0.62
Total bilirubin (mg/dL)	0.83±0.49	0.90±0.54	0.71
Potassium (mEq/L)	3.83±0.68	4.04±0.87	0.44
Sodium (mEq/L)	136.88±4.98	136.57±5.13	0.87
C-reactive protein	75.88±62.40	72.10±70.73	0.86
Hemoglobin (g/dL)	13.05±2.43	9.89±4.90	0.002
Lymphocyte count	15.18±7.93	9.72±6.54	0.09
Mean platelet volume	8.44±1.90	8.40±0.75	0.92
Neutrophil (%)	74.73±9.75	66.85±32.41	0.12
Red cell distribution width	14.39±1.88	14.76±2.24	0.61
Platelet count	228.43±82.68	259.50±136.63	0.35
White blood cell count count	16.96±6.73	18.15±6.98	0.64
International normalized ratio	1.11±0.32	1.22±0.14	0.34
Activated partial thromboplastin time (sec)	29.95±21.08	29.98±5.24	0.99

SD: Standard deviation.

patients admitted with burns, about 10% were with electrical burns. The patients with electrical burns were mainly (98.6%) males as in our study. The mortality rate was 14% in all of the hospitalized burn patients while in the electrical burn sub-group, the mortality rate was reported to be lower than 1%. Kym et al.[10] retrospectively analyzed the clinical records of 625 patients with a mean age of 33.4±18.2 years admitted with an electrical injury. They determined the male/female ratio as 13.5 and the burn extent as 14.0%±13.8%. Mohammadi et al.[11] reported the mean age as 30.5 years and the mean burn extent as 27.5% with a 95.3% male predominance among electrical burn patients and defined that 59.3% of them occurred at the work site. Similarly Ghavami et al.[7] assessed 682 electrical burn patients (~10.8% of all burn patients); with a mean age of 29.4 years and 97.8% of a male predominance. They also defined that most of the electrical burns took place at work. The young age and high percentage of the male gender may be explained by the work conditions that result in the higher exposure to electrical devices.

The mortality rate has been defined as varying between 0–21.7% in electrical burns in previous studies.[11–13] We have reported an 8.5% mortality rate which may be regarded as not low. We believe that since our hospital is a tertiary center, more complicated cases are being admitted, and in this study, we only have investigated the hospitalized patients which are considered as the main reasons of this not low rate.

The risk factors of mortality in patients with electrical burns have been studied in several previous studies. Agbenorku et al.[14] investigated 13 electrical burn patients (11 male, 2 female; with a mean age of 37.8 years) and reported an older age and TBSA >20% as risk factors for mortality. The overall mortality rate reported was 23.1% in that study. Saracoglu et al.[15] investigated the factors affecting the mortality rate of

Table 3. The logistic regression analysis

	p	Odd's ratio (95% confidence interval)
Age >33 years of age	0.18	2.74
Total body surface area burned >20%	0.02	11.7 (1.38–99.16)
Intensive care unit requirement	0.005	1.28 (1.08–1.58)
Erythrocyte transfusion requirement	0.02	12.48 (1.44–107.83)
Fresh frozen plasma requirement	0.03	10.23 (1.18–88.17)
Albumin requirement	0.02	12.60 (1.44–109.85)
Admission creatinine >1.1	0.10	4.72
Admission albumin <3.5 mg/dL	0.04	7.25 (0.82–63.64)
Admission phosphorus> 4.5 mg/dL	0.20	3.25
Admission calcium <8.5 mg/dL	0.07	7.24
Admission aspartate amino transferase >40	0.60	1.57
Admission hemoglobin <12 mg/dL	0.01	8.29 (1.57–43.61)

patients presenting with electrical burn wounds in a retrospective study and reported the mortality rate as high as 26% in 101 patients. Similar with our study, they also reported that 72% of the burns took place at work. In this study, all of the expired patients were men, and the mean age, creatine kinase, and creatine kinase-MB levels, TBSA, the hospitalization period in the intensive care unit, and the intubation rate were significantly higher in the expired group.

The mortality associated risk factors have been studied more extensively in all types of burn patients. Quite recently, Huang et al.[16] developed a mathematical model of predicting mortality based on the admission characteristics including gender, age, the total burn area, the full thickness burn area, the inhalation injury, shock, and the period before admission in 6220 burn cases. Ceniceros et al.[17] investigated the factors associated with mortality in burn patients and reported that age, the burn extent, and the SOFA score at the onset of bacteremia and recurrent bacteremia were significantly associated with the mortality. We did not investigate the bacteremia status of the participants. In our study, although the mean age was statistically significantly different between the expired and discharged patients, we did not determine age as a risk factor for mortality, but the TBSA >20% in the logistic regression analysis.

Nevertheless, the association of laboratory data at admission with mortality has only been studied in a limited number of previous studies. Aguayo-Becerra et al.[18] reported that burn patients with albumin levels <2 g/dL at admission had a mortality risk of >80%, with 84% sensitivity and 83% specificity. Maldonado et al.[19] investigated the role of some biochemical variables including albumin and calcium levels in the prediction of mortality in 143 patients with major burns hospitalized in the ICU but reported that in a multi-variate analysis, only age, the total body surface area burned, the pH value, and the magnesium levels were independently associated with mortality. Hamilton et al. reported that there was not any significant difference regarding 30-day mortality rates between patients with a hemoglobin level of higher or lower than 10 mg/dl among critically ill burn patients.[20] We have defined the admission albumin level <3.5 mg/dl and admission hemoglobin level <12 mg/dl as the risk factors for mortality in electrical burns. There are some mechanisms of the hypo-albuminemia development in burn patients. All types of burns result in hyper-catabolic responses that decrease serum albumin levels, and also with an increase in TBSA%, an extracellular fluid loss induces vascular permeability and a plasma albumin loss from the wound exudations. When developed, hypoalbuminemia is associated with edema, disturbances in wound healing, and an increased susceptibility to sepsis that may play a role in mortality.[21] On the other hand, anemia directly reduces the oxygen delivery and worsens the multi-organ failure, especially an acute kidney injury if present which may be associated with the increased mortality.[22]

The effects of transfusion requirements in defining mortality risk factors in burns also were not studied considerably previously. In concomitant with our results, Caleman et al.[23] defined the albumin transfusion requirement as a risk factor for mortality in burn patients. Lu et al.[24] did not define the erythrocyte or plasma transfusion as a predictor of mortality in patients with a burn injury. Nevertheless, we have determined that erythrocyte, FFP, or albumin transfusion requirements were all associated with the increased risk of mortality in electrical burn patients. Similar to our results, Palmieri et al.[25] also defined an association of increased mortality with a blood product use in severe burns in childhood.

There are some limitations of this study that should be mentioned. High voltage burns have been defined as a risk factor for mortality in previous studies, but we did not classify the burns at a high or low voltage. Secondly, the long-term complications could not be defined since the follow-up records were not examined. Lastly, the bacteremia status of the participants was not investigated which may also have some effects on mortality.

Conclusion

In this study, we have evaluated the risk factors for mortality in victims of electrical burns and reported that TBSA >20%; ICU requirement, erythrocyte, FFP or albumin transfusion requirements, admission albumin level <3.5 mg/dl and admission hemoglobin level <12 mg/dl are the risk factors for mortality. In clinical practice, defining a mortality risk analyzer using these factors may be helpful in the management of these patients. Additional, larger studies are required to define the risk factors for mortality and long-term morbidities in patients with electrical burns.

Conflict of interest: None declared.

REFERENCES

1. Burn Incidence and Treatment in the United States: 2015. Available from: http://www.ameriburn.org/resources_factsheet.php.
2. Aldemir M, Kara IH, Girgin S, Güloglu C. Factors affecting mortality and epidemiological data in patients hospitalised with burns in Diyarbakir, Turkey. S Afr J Surg 2005;43:159–62.
3. Sun CF, Lv XX, Li YJ, Li WZ, Jiang L, Li J, Feng J, et al. Epidemiological studies of electrical injuries in Shaanxi province of China: a retrospective report of 383 cases. Burns 2012;38:568–72. [CrossRef]
4. Buja Z, Arifi H, Hoxha E. Electrical Burn Injuries. An Eight-year Review. Ann Burns Fire Disasters 2010;23:4–7.
5. Patil SB, Khare NA, Jaiswal S, Jain A, Chitranshi A, Math M. Changing patterns in electrical burn injuries in a developing country: should prevention programs focus on the rural population? J Burn Care Res 2010;31:931–4. [CrossRef]
6. Sahin I, Ozturk S, Alhan D, Açikel C, Isik S. Cost analysis of acute burn patients treated in a burn centre: the Gulhane experience. Ann Burns Fire Disasters 2011;24:9–13.
7. Ghavami Y, Mobayen MR, Vaghardoost R. Electrical burn injury: a five-year survey of 682 patients. Trauma Mon 2014;19:18748. [CrossRef]
8. Acosta AS, Azarcon-Lim J, Ramirez AT. Survey of electrical burns in Philippine General Hospital. Ann N Y Acad Sci 1999;888:12–8. [CrossRef]
9. Iqbal T, Saaiq M, Ali Z. Epidemiology and outcome of burns: early experience at the country's first national burns centre. Burns 2013;39:358–62.
10. Kym D, Seo DK, Hur GY, Lee JW. Epidemiology of electrical injury: Differences between low- and high-voltage electrical injuries during a 7-year study period in South Korea. Scand J Surg 2015;104:108–14.
11. Mohammadi AA, Amini M, Mehrabani D, Kiani Z, Seddigh A. A survey on 30 months electrical burns in Shiraz University of Medical Sciences Burn Hospital. Burns 2008;34:111–3. [CrossRef]
12. Rai J, Jeschke MG, Barrow RE, Herndon DN. Electrical injuries: a 30-year review. J Trauma 1999;46:933–6. [CrossRef]
13. Luz DP, Millan LS, Alessi MS, Uguetto WF, Paggiaro A, Gomez DS, et al. Electrical burns: a retrospective analysis across a 5-year period. Burns 2009;35:1015–9. [CrossRef]
14. Agbenorku P, Agbenorku E, Akpaloo J, Obeng G, Agbley D. Electrical burns: The trend and risk factors in the Ghanaian population. Ann Burns Fire Disasters 2014;27:176–83.
15. Saracoglu A, Kuzucuoglu T, Yakupoglu S, Kilavuz O, Tuncay E, Ersoy B, et al. Prognostic factors in electrical burns: a review of 101 patients. Burns 2014;40:702–7. [CrossRef]
16. Huang Y, Zhang L, Lian G, Zhan R, Xu R, Huang Y, et al. A novel mathematical model to predict prognosis of burnt patients based on logistic regression and support vector machine. Burns 2016;42:291–9. [CrossRef]
17. Ceniceros A, Pértega S, Galeiras R, Mourelo M, López E, Broullón J, et al. Predicting mortality in burn patients with bacteraemia. Infection 2016;44:215–22. [CrossRef]
18. Aguayo-Becerra OA, Torres-Garibay C, Macías-Amezcua MD, Fuentes-Orozco C, Chávez-Tostado Mde G, Andalón-Dueñas E, et al. Serum albumin level as a risk factor for mortality in burn patients. Clinics (Sao Paulo) 2013;68:940–5. [CrossRef]
19. Maldonado AA, Sillero A, Küntscher M. Prediction of mortality in patients with major burns: clinical and biochemical factors. Ann Plast Surg 2011;67:226–31. [CrossRef]
20. Hamilton JA, Mora AG, Chung KK, Bebarta VS. Impact of Anemia in Critically Ill Burned Casualties Evacuated From Combat Theater via US Military Critical Care Air Transport Teams. Shock 2015;44 Suppl 1:50–4. [CrossRef]
21. Lehnhardt M, Jafari HJ, Druecke D, Steinstraesser L, Steinau HU, Klatte W, et al. A qualitative and quantitative analysis of protein loss in human burn wounds. Burns 2005;31:159–67. [CrossRef]
22. Han SS, Baek SH, Ahn SY, Chin HJ, Na KY, Chae DW, et al. Anemia Is a Risk Factor for Acute Kidney Injury and Long-Term Mortality in Critically Ill Patients. Tohoku J Exp Med 2015;237:287–95. [CrossRef]
23. Caleman G, Morais JF, Puga ME, Riera R, Atallah AN. Use of albumin as a risk factor for hospital mortality among burn patients in Brazil: non-concurrent cohort study. Sao Paulo Med J 2010;128:289–95. [CrossRef]
24. Lu RP, Lin FC, Ortiz-Pujols SM, Adams SD, Whinna HC, Cairns BA, et al. Blood utilization in patients with burn injury and association with clinical outcomes (CME). Transfusion 2013;53:2212–21.
25. Palmieri TL, Sen S, Falwell K, Greenhalgh DG. Blood product transfusion: does location make a difference? J Burn Care Res 2011;32:61–5.

ORİJİNAL ÇALIŞMA - *ÖZET*

Elektrik yanıklarında mortaliteye etki eden faktörler

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AMAÇ: Bu çalışmanın amacı elektrik yanığı olan hastalarda mortalite oranlarına etki eden faktörleri belirlemektir.
GEREÇ VE YÖNTEM: Elektrik yanığı nedeniyle Derince Eğitim ve Araştırma Hastanesi Acil Servisi'ne kabul edilip yanık tedavi merkezi veya yoğun bakıma (YB) yatırılan 115 hasta çalışmaya dahil edildi.
BULGULAR: Ortalama yaşı 32.88±12.87 yıl olan toplam 115 hastanın (4 kadın, 111 erkek) çalışmaya alındı. Ortalama hastanede yatış süresi 25.03±20.50 gün ve yanan ortalama toplam vücut yüzey alanı (%TVYA) ise %22.83±15.54 idi. Bu hastaların 106'sı tedavi sonrası taburcu edilirken, dokuzu (%8.5) hayatını kaybetti. Lojistik regresyon analizinde, TVYA >%20 (p=0.02, odds ratio (OR): 11.7, confidence interval (CI): 1.38–99.16), YB gerekenler (p=0.005, OR: 1.28, CI: 1.08–1.58); eritrosit transferi gerekenler (p=0.02, OR: 12.48, CI: 1.44–107.83); Taze donmuş plazma (TDP) gereksinimi olanlar (p=0.03, OR 10.23, CI: 1.18–88.17); albümin gereksinimi olanlar (p=0.02, OR: 12.60, CI: 1.44–109.85); kabulde serum albümin seviyesi <3.5 mg/dL (p=0.04, OR: 7.25, CI: 0.82–63.64); kabul hemoglobin seviyesi <12 mg/dL (p=0.01, OR: 8.29, CI: 1.57–43.61) hastalarda mortaliteyi belirleyen risk faktörleri olarak belirledik.
TARTIŞMA: Klinik uygulamada, elektrik yanığı olan hastalarda bu faktörlerin analiz edilmesi mortalite oranını belirlemede yararlı olabilir. Elektrik yanığı olan hastalarda mortalite risk faktörlerini ve uzun dönem morbiditeleri belirlemek için daha geniş çalışmalara gereksinimi vardır.
Anahtar sözcükler: Albümin; elektrik yanığı; hemoglobin; kalsiyum; mortalite; yanık derecesi.

Ulus Travma Acil Cerrahi Derg 2017;23(3):223–229 doi: 10.5505/tjtes.2016.29166