

# Evaluation of Demographic and Clinical Characteristics of Patients who Attempted Suicide by Self-Inflicted Burn Using Catalyzer

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**Our aim was to assess demographic and clinical characteristics of patients treated at our units who attempted suicide by self-incineration, and to compare the results of burns with or without catalyzer use. Twenty patients who attempted suicide by self-incineration were examined in terms of clinical and demographic characteristics. Average age of the study population was 35 years (range 13–85 years). Average percentage of total body surface area burn was 53% (9%–100%). Six (30%) patients used gasoline and 5 (25%) used paint thinner in order to catalyze burning. Of these 11 patients who used a catalyzer, 5 (45.4%) had inhalation injury and 7 (63.6%) died. Among 9 patients who did not use any catalyzer, 1 (11.1%) had inhalation injury and 4 (44.4%) died. In general, inhalation injury was diagnosed in 6 patients (30%) while 11 (55%) patients died. A high morbidity and mortality rate was found in patients who used a catalyzer.**

**Key words:** Self-incineration – Self-inflicted burn – Suicide – Burn – Gasoline – Thinner – Catalyzer

Self-inflicted burn is an interesting and dramatic way of a suicidal attempt. This kind of suicide is rarely seen in western civilizations; however, it is more frequent in eastern and more closed societies.<sup>1,2</sup> Different rates have been reported for self-incineration suicide as the cause of burn patients.

Rates as high as 71% have been reported in some parts of Iran, while the rate goes down to 0.06% in Rome.<sup>1,3</sup> Turkey, a country lying on both Asia and Europe, has a different socio-cultural structure. Ninety-six percent of Turkey's population is Muslim and generally living in a closed society. In a PubMed

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Table 1 Demographic and social distribution of patients

Demographic and Social Variables	n (%)
Gender	
Woman	6 (30)
Man	14 (70)
Marital status	
Single	12 (60)
Married	7 (35)
Widowed	1 (5)
Occupational status	
Housewife	5 (25)
Unemployed	4 (20)
Artisan	4 (20)
Student	2 (5)
Farmer	1 (2.5)
Other	4 (20)
Level of education	
Elementary school	12 (60)
High school	5 (25)
Uneducated	3 (15)
Place of burn event	
Residence	15 (75)
Business	3 (15)
Outdoor area	2 (10)

search using the key words “suicide,” “burn,” and “Turkey,” we found a total of 12 articles published in Turkey so far. Five of these 12 articles were related to our subject. Three of these studies were done in a civil hospital and 2 in a military hospital. In these studies, among patients treated in burn units, the rate of self-burning suicides was reported between 0.6% and 4.6%.<sup>4–7</sup>

Injuries as a result of such burns tend to be deeper and more extensive than those occurring in accidents, and thus they are associated with higher morbidity and mortality rates.<sup>4</sup> Lately, there has been an increasing rate of suicidal attempts by self-inflicted burns.<sup>5</sup> The main reason for this increase is that the actual purpose of the victims is not to harm themselves, but to draw the attention of society. Catalyzers (i.e., gasoline, thinner, coal oil) hasten the event and cause more serious traumas in suicidal attempts.

With this study, we aimed to assess demographic and clinical characteristics of patients who attempted suicide by self-burning suicide and were treated at our burn units in 3 different provinces of Turkey, and to define their mortality and morbidity rates. No study as yet has compared catalyzers used for suicide attempts. Therefore, we compared the use of

catalyzers for suicidal purposes in patients with self-burning.

## Materials and Method

In our study, data of 4776 patients treated for burn injuries between 1997 and 2013 in 3 distinct burn care centers (Adana, Ankara, and Konya) of a unique institute were analyzed retrospectively. Twenty patients were treated for self-inflicted burn for suicidal purposes. Patient data were obtained from a database of burn patients treated in intensive burn care unit. Data of 20 patients were analyzed in terms of age, sex, marital status, occupation, education, pre-trauma psychological disorders, comorbid diseases, mode, site, degree and percentage of total body surface area (TBSA) burn injury, any additional traumas, and number of the operation for burns, inhalation injury, blood supplementation, means of catalyzer usage for suicidal attempt, infections, and mortality rates. Evidence for suicidal attempt in 11 of 20 patients was catalyzer use. For the remaining 9 victims, suicidal attempt was clarified by testimony given by themselves or their first degree relatives, or deposition given by eye witnesses in judicial records. Data were recorded on a computer media and analyzed with SPSS (version 11.5) software package. This study was approved by Baskent University Institutional Review Board (Project no: KA13/26) and supported by Baskent University Research Fund.

## Results

Mean age of 20 patients was 35 years (13–85 years). Fourteen patients (70%) were male and 6 (30%) were female. Six patients (30%) had a previous history of a psychiatric disorder. Among them, major depression was the most common diagnosis (15%). No other comorbidity, a previous history of suicidal attempt or concurrent trauma was present. Demographic and social characteristics and distribution of the data were presented in Table 1. Fifteen (75%) patients were referred to our clinic from other centers. Of these, 10 (50%) were sent from upstate and 5 (25%) from local units.

It was learned that 6 (30%) of the patients used gasoline and 5 (25%) used paint thinner in order to catalyze burning. Of these 11 patients who used catalyzer substances, 7 (63.6%) died. Demographic characteristics of patients according to catalyzer use are given in Table 2. The influence of catalyzer use

Table 2 Comparison of demographic and clinical characteristics of self-inflicted burn patients according to catalyzer use

Demographic and clinical characteristics	With catalyzer	Without catalyzer
Age (mean) years	34 (13–63)	36 (14–85)
Gender (man/woman)	9/2	5/4
Number of patients	n: 3	n: 3
with psychiatric disorders (n)	1 depression 1 drug addiction	2 depressions 1 depression + chronic alcoholism
Number of surgical operations	1 delirium 14 debridement 3 escharotomies 6 skin grafting 1 fasciotomy 1 amputation 1 tracheotomy Total 26	9 debridement 1 escharotomies 4 skin grafting Total 14

on percentage of TBSA and distribution of burn injury, existence of inhalation injury, and mortality is shown in Table 3. All victims had at least deep second-degree burns involving 53% (9–100%) of TBSA on average (Fig. 1). In all patients, microbial growths were demonstrated in early tissue microbiology cultures. Most prevalent microorganisms growing in culture tests were *Pseudomonas aeruginosa* and coagulase-negative *Staphylococcus*. The mean number of surgical interventions performed for early burn treatment was 2 (between 0 and 7) while the mean number of erythrocyte suspension units transfused was 7.4 (between 0 and 23). A total of 40 surgical operations were performed in 20 individuals. Of these 20 patients, inhalation injury was present in 6 (30%), 5 (83%) of whom died. Overall, a total of 11 (55%) patients died. Average hospital stay was 27 (1–96) days.

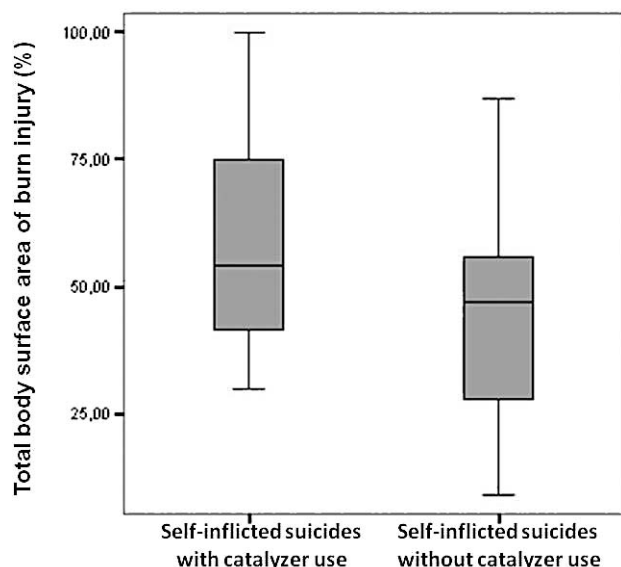
Table 3 Comparison of burn areas, existence of inhalation injury and mortality between patients who committed suicide by self-infliction with or without catalyzer use

	Self-inflicted suicides with catalyzer use (Gasoline –thinner)	Self-inflicted suicides without catalyzer use
Number of patients (n)	11	9
Percentage of TBSA of burn injury (%)	59.2	45.5
Existence of inhalation injury (n)	5	1
Mean percentage of abdominal burns (%)	22.7	12.9
Mean percentage of lower extremity burns (%)	18.4	13.7
Mean percentage of upper extremity burns (%)	12.7	13.4
Mean percentage of head–neck burns (%)	5	4.6
Mean percentage of perineal burns (%)	0.3	0
Mortality (n) (%)	7 (63.6%)	4 (44.4%)

## Discussion

Current social problems such as unemployment, social isolation, and socio-economic difficulties have led to an increase in suicidal attempt cases.<sup>8</sup> Self-inflicted burns have been reported as a way of suicide in many developed or developing countries. The rate of committing suicide substantially differs between societies depending on some cultural, national, and in particular religious differences.<sup>1,2,4,5,9,10</sup> It is generally lower in developed Western cultures and higher in less developed or developing Middle East and Asian countries. The rates reported in domestic studies with limited sample size have varied between 0.6% and 4.6%.<sup>4–7</sup> In our series, it was found to be 0.4%. Ratios of different genders in suicidal self-burning patients vary by country studied. A women predominance is observed in Asian, Middle Eastern, and Muslim countries.<sup>1,2</sup> Previous domestic studies and our study found a lower ratio of females.<sup>4–7</sup> This is possibly because women in our country were granted democratic rights to elect (year 1930) and be elected (year 1933) before most European countries. Mean age of patients was found to be 35 years in the self-burning suicide. This figure is similar to previous studies in our country.<sup>4,7</sup> In the literature, varying rates of marital status have been reported in patients with self-burning suicide.<sup>1,2,5</sup> In our study, 60% of patients were single. In line with the literature, the majority of our patients were either unemployed, or housewives.<sup>1,2,4,11,12</sup> Seventy-five percent of the patients who attempted suicide by self-burning were either uneducated or primary school graduates. This rate was similar to previous rates published in our country.<sup>4</sup>

In literature, most of the patients (56%–91%) who burned themselves on purpose had a previous history of a psychiatric disorder, most of whom



**Fig. 1** Total body surface area of burns in patients with self-burning for suicidal purposes with versus without use of catalyzers.

(8%–49%) also attempted a suicide before. In our study, there was no history of a previous suicide attempt. The most common psychiatric diagnosis was affective disorders in this group of patients in previous studies.<sup>4,5,13,14</sup> In contrast, in our series, the majority of patients were diagnosed with major depression, while 30% of the patients had affective disorders. Although 3 of 9 living patients had no previous history of a psychological disorder, psychiatric assessments performed during recovery period showed the opposite. These data may indicate that Turkish people are not familiar with psychiatric examination as compared to the rest of the world.

There are no studies in literature comparing mortality and morbidity rates with respect to catalyzer usage. Access to catalyzers (i.e., gasoline, coal oil, thinner), which are frequently used as heating, fueling, and other purposes, is easier in third-world countries like ours. Catalyzers are generally used by people of low social and economic class for deflagrating firing materials (i.e., wood). Easier access to catalyzers compared to western countries increases their misuse risk for suicidal purposes. A high rate (55%) of catalyzer-associated burns in our study supports this theory. At first glance, the ratio of burn patients due to self-incineration is low in our series. However, wide and deep burn injuries secondary to burn trauma causes considerable amount of workload and cost.

After deflagration begins, the involuntary movements to escape usually enhance the severity of trauma especially when catalyzers like gasoline or thinner are used. When catalyzer liquids are poured down from the head, risk of inhalation injury and mortality increases. When compared to incidental burn cases, victims of self-inflicted burns were shown to have wider and deeper burn wounds, longer duration of hospital stay, as well as higher mortality rates.<sup>15</sup> Complications like multiple organ dysfunction, growth of antibiotic-resistant bacterial strains, and increased need for antibiotics have been reported. The mortality rate for self-inflicted burn patients (55%) was higher than accidental flame burns (24%) and total burns (10%) hospitalized in our series. Similarly, previous data have also shown that burns associated with self-incineration have high mortality rates.<sup>2,4,5</sup>

The limitations of our study include the small sample size of patients with catalyzer usage and lack of follow-up.

Mortality rates are reportedly higher in suicidal burns, especially with catalyzer usage. Social, economic and cultural levels of the society should be increased and more attention should be paid to psychological and social rehabilitation of public in order to prevent such traumas associated with high morbidity and mortality rates, as reported in our study. Additionally, regulation of selling and usage of catalyzers like gasoline, thinner, and coal oil by community laws will reduce high mortality and morbidity rates associated with self-inflicted burning.

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## References

1. Ahmadi A, Mohammadi R, Schwebel DC, Khazaie H, Yeganeh N, Almasi A. Demographic risk factors of self-immolation: a case-control study. *Burns* 2009;35(4):580–586
2. Mohammadi AA, Danesh N, Sabet B, Amini M, Jalaeian H. Self-inflicted burn injuries in southwest Iran. *J Burn Care Res* 2008;29(5):778–783
3. Cave Bondi G, Cipolloni L, Parroni E, Cecchi R. A review of suicides by burning in Rome between 1947–1997 examined by

- the Pathology Department of the Institute of Forensic Medicine, University of Rome 'La Sapienza'. *Burns* 2001; **27**(3):227–231
4. Uygur F, Sever C, Oksüz S, Duman H. Profile of self-inflicted burn patients treated at a tertiary burn center in Istanbul. *J Burn Care Res* 2009; **30**(3):427–431
  5. Zor F, Deveci M, Bozkurt M, Dikkatli S, Duman H, Sengezer M. Psychological evaluation of self-inflicted burn patients: suicide or parasuicide? *Burns* 2005; **31**(2):178–181
  6. Al B, Yildirim C, Coban S, Aldemir M, Güloğlu C. Mortality factors in flame and scalds burns: our experience in 816 patients. *Ulus Travma Acil Cerrahi Derg* 2009; **15**(6):599–606. Turkish.
  7. Hilal A, Cekin N, Arslan M, Gulmen Mk. Deaths due to burns in Adana, Turkey. *Burns* 2008; **34**(7):982–985
  8. Koc I, Albayrak F. Suicide in Turkey. *Nufusbil Derg* 1993; **15**:55–68
  9. Horner BM, Ahmadi H, Mulholland R, Myers SR, Catalan J. Case-controlled study of patients with self-inflicted burns. *Burns* 2005; **31**(4):471–475
  10. Donald M, Dower J, Correa-Velez I, Jones M. Risk and protective factors for medically serious suicide attempts: a comparison of hospital-based with population-based samples of young adults. *Aust N Z J Psychiatry*. 2006; **40**(1):87–96
  11. Ahmadi A. Suicide by self-immolation: comprehensive overview, experiences and suggestions. *J Burn Care Res* 2007; **28**(1): 30–41
  12. Ahmadi A, Ytterstad B. Prevention of self-immolation by community-based intervention. *Burns* 2007; **33**(8):1032–1040. Epub 2007 Jun 1.
  13. Chan RC, Burd A. Suicidal burn in Hong Kong. *Burns* 2012; **38**(6):937–941
  14. Geller JL. Self-incineration. A review of the psychopathology of setting oneself a fire. *Int J Law Psychiatry* 1997; **20**(3):355–372
  15. Ali SN, Soueid A, Rao K, Moiemmen N. Self-inflicted burns, outcome and cost. *Burns* 2006; **32**(4):463–466
  16. Wallace KL, Pegg SP. Self-inflicted burn injuries: an 11-year retrospective study. *J Burn Care Rehabil* 1999; **20**(2):191–194; discussion 189–190