



Suicide by burns in women in the Distrito Federal, midwest of Brazil, from 2010 to 2015

Suicídio por queimaduras em mulheres no Distrito Federal, Brasil, no período de 2010 a 2015

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■ ABSTRACT

Introduction: Suicide is a serious public health problem. For every death, there are an estimated 10 suicide attempts. Among the means of suicide, burns are prominent due to the lesion severity, the high mortality rate, and the severe functional, aesthetic, and psychological damage. Women comprise the majority of patients with a history of attempting suicide and death by burns and represent a vulnerable group that deserves attention. **Methods:** This retrospective descriptive time-series study was performed in the Burn Treatment Unit at the Institute of Legal Medicine in Brasília, Distrito Federal (DF) between 2010 and 2015. **Results:** A total of 42 women with a history of suicide by burns, attempted or consummated, were identified; 15 deaths were directly related to the thermal injury. Suicide by burns was the most predominant among patients aged 30 to 44 years was observed, followed by those aged 15 to 29 years. In 64.3% of cases, the event occurred in the Brasília, Distrito Federal (DF). Alcohol was the most common etiological agent (71.4%). The average burned body surface area was 34.38%, and the patients who died presented larger burned areas (59.53%) than that in those who survived (20.4%). **Conclusion:** The data obtained from the Brasília, Distrito Federal (DF) corroborate information from the literature. Despite progress involving the management and treatment of burn patients, prevention remains the best strategy. **Keywords:** Suicide; Women; Burns; Burn units; Public health.

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■ RESUMO

Introdução: O suicídio é um sério problema de saúde pública. Estima-se que para cada óbito existam 10 tentativas. Dentre os meios utilizados, as queimaduras têm destaque devido à gravidade das lesões, a alta taxa de letalidade e os grandes prejuízos funcionais, estéticos e psicológicos. As mulheres, por constituírem a maioria dos pacientes com história de tentativa de suicídio e morte por queimaduras, representam um grupo vulnerável que merece recorte para aprofundamento do estudo. **Métodos:** Estudo retrospectivo, de caráter descritivo de série temporal. Foi desenvolvido na Unidade Tratamento de Queimados e no Instituto de Medicina Legal em Brasília (DF), entre os anos de 2010 e 2015. **Resultados:** Foram identificadas 42 mulheres com história de suicídio por queimaduras, tentado ou consumado. Houve 15 óbitos relacionados diretamente à lesão térmica. Houve um predomínio da faixa etária entre 30 e 44 anos, seguida por 15 a 29 anos. Em 64,3% dos casos o evento aconteceu no DF. Em relação aos agentes etiológicos, o mais comum foi o álcool (71,4%). A média de superfície corporal queimada foi de 34,38%, sendo que as pacientes que faleceram apresentaram áreas queimadas maiores (59,53%) do que as que sobreviveram (20,4%). **Conclusão:** Os dados obtidos no DF corroboram informações da literatura. Apesar do progresso envolvendo manejo e tratamento dos pacientes queimados, a prevenção continua sendo a melhor atitude. **Descritores:** Suicídio; Mulheres; Queimaduras; Unidades de queimados; Saúde pública.

INTRODUCTION

Suicide is a complex phenomenon and a serious public health problem. Recent studies have reported that suicide occurs every 40 seconds worldwide¹, corresponding to more than 800,000 deaths per year. It is the second largest cause of death among people aged 15 and 29 years, second only to traffic accidents². The picture is even more alarming when suicide attempts are analyzed. For every suicide there are an estimated 10 attempts; moreover, for each documented attempt, there are four unrecorded events³.

Suicidal behavior is complex and multifactorial. The related risk factors are not restricted to a recent stressor event, such as conjugal separation or loss of employment. Suicide results from the interaction between social, cultural, and psychological components⁴.

In most cases, there is a diagnosable mental disorder, often depression and anxiety. Over 60% of people who committed suicide were not in treatment when they died⁵, indicating the importance of recognizing all dimensions of mental disorders in preventing suicide.

An important warning sign for the occurrence of suicide is a previous attempt. The increase in the risk of

suicide after a previous attempt is directly proportional to the number of attempts and inversely proportional to the time passed^{3,5}.

Other factors, usually considered in association with those mentioned above, are related to individual conditions (interpersonal conflicts, chronic pain, feeling of hopelessness, family history of suicide, drug use, alcoholism, and genetic and biological factors), social (difficulty in accessing health services, stigmatization of mental disorders and patients seeking help for self-harm ideation, and ease in achieving the means or instruments to commit suicide) and environmental (war, disasters or conflicts, discrimination, trauma, and abuse)⁴.

According to the Mortality Information System (Sistema de Informações sobre Mortalidade) of the Ministry of Health, 152,135 deaths by external causes occurred in 2015 in Brazil, of which 11,178 (7.34%) were reported as "intentional self-harm"⁶. This number may be even higher, as 9,810 deaths were classified as "events (facts) whose intention is undetermined"⁶. Within the categories listed as methods of self-harm by the Ministry of Health, 156 deaths were classified as "intentional self-harm caused by smoke, fire and flame" in Brazil in 2015⁷. The methods used to cause self-harm are varied, with different morbidity and mortality. In

this context, burns, although not the first choice as a method of self-harm, play an important role due to the injury severity, the high mortality rate, and the major psychological, functional and aesthetic damage in those who survive the attempt⁸. In particular, women, representing the majority of patients with a history of suicide attempts and death from self-inflicted burns⁹⁻¹¹, constitute a vulnerable population group that deserves deeper study.

Suicide is a preventable death⁴. Thus the importance of this study, given that a review of the literature did not find epidemiological studies on this subject in the female population in the *Distrito Federal*, midwest of Brazil

OBJECTIVE

The objective of this study was to characterize the women hospitalized for attempted suicide by physical means (burns) in the reference center for burn treatment or who died as a result of self-inflicted burns in the Federal District between July 2010 and June 2015.

METHODS

This retrospective, descriptive time-series study was performed in two locations: the Burn Treatment Unit (Unidade de Tratamento de Queimados, UTQ) of the Asa Norte Regional Hospital (Hospital Regional da Asa Norte, HRAN), a referral center for burn victims at the Federal District Department of Health (Secretaria de Estado de Saúde do Distrito Federal, SESDF), and the Institute of Legal Medicine (Instituto de Medicina Legal, IML) of the Civil Police of the Federal District, where all *postmortem* examinations of cases of deaths from external causes occurring in this federation unit are performed.

The sample was of convenience, consisting of all cases reported as suicide by burns, attempted or accomplished, which occurred from July 1, 2010, to June 30, 2015, based on the date of hospitalization in the UTQ or the completion of the *postmortem* examination (in the case of victims admitted to the HRAN). The choice of the study period was based on the availability of data upon the introduction of electronic medical records in the SESDF.

Data obtained from documents that did not objectively describe a suicidal intent, nor the action of the physical environment (burns) as the primary cause of hospitalization or death were excluded from the study.

Data collection occurred between January and June 2017 and was performed based on the availability of documents from each institution.

In the HRAN, data were collected from reports of patient discharge and, in case of doubt or the absence of certain information, an active search was performed in the electronic medical records of the Department of Health of the Federal District for complementation.

At the IML, the collection was performed from the computerized database of the Civil Police.

A listing of the *postmortem* reports of women killed by physical means (burns) in the study period was provided by the Information Technology, Planning and Statistical sector of the Institute, which allowed the examination of the medical documents and police reports related to the event.

Data, including victim age, place where the burn occurred, date of burn, date of hospitalization, date of *postmortem* examination, date of discharge or death, days between burn and hospitalization, days of hospitalization, burned body surface area (BSA), depth (degree) of burn, body segments affected, agent, presence of associated lesions, clinical history, clinical course during hospitalization, and outcome (discharge or death) were collected and stored in Microsoft Excel, version 2013.

The data were statistically analyzed using Microsoft Excel, version 2013.

This study was approved by the Research Ethics Committee of the foundation of Teaching and Research in Health Sciences (Opinion n° 1.504.214 - Fundação de Ensino e Pesquisa em Ciências da Saúde/SES/DF). At no time were the physical documents removed from the workplaces, nor were they digitally printed or recorded on other media, and only the data present in the sample were analyzed.

RESULTS

Between July 2010 and June 2015, we identified 42 women with a history of suicide by burn, attempted or consummated, in the Federal District (Figure 1). Of these, 40 women were admitted to the HRAN and one to a private hospital (Tables 1–3).

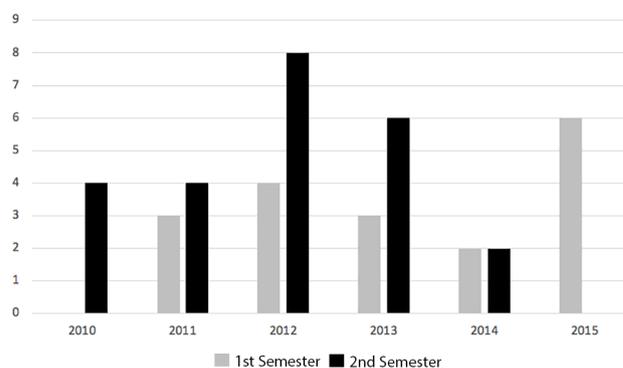


Figure 1: Yearly distribution of suicide cases, attempted or consummated, by burns between July 2010 and June 2015, in Brasília (DF).

Table 1. Epidemiological profiles of women victims of attempted or consummated suicide in Brasilia (FD), July 2010 to June 2015.

Characteristic	N	%
Age range (years)		
15 to 29	12	28.5
30 to 44	20	47.6
45 to 59	8	19
60 or higher	2	4.9
State where the burn occurred		
DF	27	64.3
GO	10	23.8
MG	3	7.1
MT	1	2.4
TO	1	2.4
Etiologic agent		
Alcohol + fire	30	71.4%
Acetone + fire	7	16.6%
Fire	2	4.8%
Gasoline + fire	1	2.4%
Caustic soda	1	2.4%
Hot water	1	2.4%

DF: Distrito Federal; GO: Goiás; MG: Minas Gerais; MT: Mato Grosso; TO: Tocantins.

Table 2. Age, days of hospitalization, and burned body surface area (BSA) of women victims of attempted (hospital discharge) or consummated suicide (death) in Brazil (FD), July 2010 to June 2015.

Characteristic	Discharge		Death		Total	
	Mean	SD	Mean	SD	Mean	SD
Age (years)	33.4	± 10	42.8	± 11.6	36.7	± 11.5
Days of hospitalization	28.3	± 23.2	12.07	± 10.5	22.5	± 21.1
BSA	20.4	± 13	59.53	± 24.7	34.38	± 26

Table 3. Clinical profiles of women victims of attempted (hospital discharge) or consummated suicide (death) in Brasilia (FD), July 2010 to June 2015.

Characteristic	Discharge		Death		Total	
	n	%	n	%	n	%
N° of women:	27	64.3	15	35.7	42	100
Severity:						
Low	10	23.8	0	0	10	23.8
Medium	6	14.3	2	4.7	8	19
High	11	26.2	13	31	24	57.2
Priors:						
PSQ*	16	59	13	86.6	29	69
Prior Attempt	4	14.8	5	33.3	9	21.4
Inhalation injury:	1	3.7	7	46.6	8	19
Complications:						
Surgical wound infection	17	63	4	26.6	21	50
Pneumonia	2	7.4	4	26.6	6	14.3
Sepsis	5	18.5	7	46.6	12	28.5

DISCUSSION

The average age of the women in this study was 36.76 years, ranging between 15 and 70 years, with a predominance of women aged between 30 and 44 years (47.6%), followed by those aged 15 to 29 years (28.5%). These findings were similar to those of other studies^{10,12} and a report from the World Health Organization (WHO), in which suicide was among the three main causes of death of people aged 15 to 44 years, with approximately one million deaths annually, corresponding to 1.4% of all deaths. These figures do not include suicide attempts, which are 10 to 20 times more frequent than suicide⁴.

Assessment of the federation unit where the event occurred revealed that the Federal District (FD) was identified as an address in 27 cases (64.3%), while 15 cases (35.7%) occurred in other states. Of these, 86.6% occurred in Goiás and Minas Gerais and 13.4% in Mato Grosso and Tocantins. The capital of the country is surrounded by several municipalities of the states of Goiás and Minas Gerais, making up the Regional Development of the Federal District and Environs (Região Integrada de Desenvolvimento do Distrito Federal e Entorno). These municipalities have had a high population growth in recent years, without a proportional growth of the hospital structure. Given that the HRAN is the nearest public specialized burn treatment center, a high number of patients was expected in these states.

Evaluation of the administrative regions (AR) of the FD, where more cases were observed, revealed seven cases in Ceilândia (16.6%) and four in Santa Maria (9.5%). Two cases each occurred in Taguatinga, Samambaia, and Brazlândia. The remaining cases were distributed unitarily in the other ARs. Between 2012 and 2013, Ceilândia was the most populous AR in the Federal District and had the highest number of records of violent acts against women¹³. While these data alone do not allow us to conclude that violence against women directly reflected the increase in suicide cases, they allows us to infer a relationship between the two situations.

Frequent exposure to violent situations may result in the normalization of these events. It is common for the highest levels of domestic violence to be associated with higher global indices of violence¹⁴. Precarious socioeconomic conditions, interpersonal and violent relations, drug and alcohol abuse, and cultural aspects related to the position of women within the family may result in unbalanced and unstable domestic environments, where violent events, particularly against women and children, are overlooked and the distinction between intentional and accidental (including self-inflicted) events becomes

difficult, mainly due to insufficient information provided to health services and public safety^{15,16}.

Among etiologic agents, thermal burn was the most frequent. Flammable liquids associated with fire were reported in 38 cases (90.5%), corroborating published findings^{17,18}. Within the category of “flammable liquids,” alcohol was prominent, concordant with observations in other studies^{8,19}. In contrast with accidental burns, scalding (burns by spilling of heated non-flammable liquids) was infrequent²⁰, as were chemical burns, represented in this study by caustic soda.

The average burned BSA in the present study was 34.38%, varying between 2 and 95%. The BSAs for the patients who were discharged and those who died were $20.4 \pm 13\%$ and $59.53 \pm 24.7\%$, respectively. Deep and total partial thickness burns occurred in 59.5% of cases. Evaluation of the severity of the condition at admission or at the time of death based on the burned BSA and lesion depth²¹ showed a predominance of large burns, which were reported in 24 patients (57.6%), corroborating the results of previous studies¹⁹. These numbers reflect the direct proportionality between BSA and clinical severity. The higher the BSA, the larger the loss of the skin barrier and the imbalance of homeostasis, predisposing patients to infectious complications, hydroelectrolytic disorders, and altered tissue perfusion²².

Assessment of the body segment affected showed a predominance of burns to the upper half of the body. Burns occurred on the head, trunk, and upper limbs of 38 (90.4%), 39 (92.8%), and 35 (83.3%) women, respectively. Twenty-six women (61.9%) had burns on their lower limbs. These data confirm the information available in the literature²³⁻²⁵. This may be due to the dynamics of the intentional event, which tends to start the spill of liquid, mainly flammable, on the head, which travels to the upper limbs and trunk by gravity. The average period of hospitalization was 22.5 days, varying between 1 and 92 days. The average lengths of hospitalization for patients who were discharged and those who died were 28.3 ± 23.2 and 12.7 ± 10.5 days, respectively. This difference was also reported in other studies²⁶.

The incidence of attempted self-extinction by fire is among the most dramatic of all forms of suicide, with psychological distress an important motivation for self-immolation. Based on reports of the patient, family members, or psychiatric evaluation during hospitalization, a history of psychiatric diseases was identified in 29 women (69%). A history of prior suicide attempt was also reported by the patient or family member in nine cases (21.4%). The association between suicide attempts and psychiatric diseases is widely discussed in the scientific literature^{8,10-12}; furthermore, a history of previous attempts is also a risk factor for

a new attempt^{3,4,24}.

Infectious complications were the most prevalent in the present study. Twenty-eight women presented infectious complications; of these, 21 were diagnosed with surgical wound infection and 6 with pneumonia. Thirteen patients progressed to sepsis.

Fifteen of the 42 women included in this study died, corresponding to a mortality rate of 35%. This finding is in agreement with other scientific studies^{11,19}. Of those deaths, 14 occurred in the hospital environment and one at the site where the suicide was committed. All deaths were necropsied in the IML (Table 4).

Increased burned BSA, lesion depth, and airway burns are directly associated with increased mortality¹². Inhalation burns decrease airway protection against infections, predisposing the patient to pulmonary complications such as respiratory failure and pneumonia²⁷, worsening their prognosis. In the present study, 13 of the women who died had larger burned BSA (86%) and 7 (46.6%) presented inhalation burns diagnosed during hospitalization or in *postmortem* examination, corroborating the current literature.

The main causes of death in burned patients are infectious complications, especially sepsis and multiple organ failure²⁸. Sepsis is the main cause of death at more than 24 hours and up to 2 weeks after burns²⁹. The main causes of death due to sepsis or septic shock in burned patients are surgical wound infections and pneumonia²⁹. In the present study, diagnoses of sepsis, pneumonia, and multiple organ failure were reported in the *postmortem* examination in seven, one, and one case, respectively.

This study has some limitations. The choice of study period, for convenience, limited comparisons between years. Because this was a retrospective analysis of data in medical and police documents, inadequate recording of data was possible. The documents contained the information available at the time and may not have been updated based on the findings of hospital examinations or police investigations.

In addition, there may have been no suspicion of self-inflicted violence on the part of the care provider, whether in Health or Public Safety. Regarding the incompleteness of the data, the underreporting of cases as self-harm was a considerable limitation. The absence of an objective report of attempted or consummated suicide in both medical and police documents excluded these women from the study, thus restricting the sample.

CONCLUSION

The data obtained in this study corroborate the literature available on the subject. Most women who attempted suicide by burns were between 15 and 44

Tabela 4. Mulheres vítimas de suicídio no período de julho de 2010 a junho de 2015, em Brasília (DF).

	Age (years)	BSA	Degree	Days of Hospitalization	Evolution	Cause of Death (postmortem)
1	47	72	3	1	AIRB	Multiple organ failure
2	53	83	2nd and 3rd	1	AIRB	Great burned
3	36	35	2nd and 3rd	31	AIRB, SWI, PNM, sepsis	Multiple burns
4	43	60	2nd and 3rd	12	AIRB, SWI, ARF, sepsis	Sepsis
5	30	70	2nd and 3rd	14	Sepsis	Sepsis
6	55	85	2nd and 3rd	12	AIRB, ARF, sepsis	Sepsis
7	45	40	2nd and 3rd	8*+24	PNM, ARF, sepsis	Sepsis
8	19	24	2nd	16	SWI, RF	PNM
9	41	16	2nd and 3rd	12	ARF, RF	Complications of burns
10	36	30	2nd and 3rd	21	SWI, sepsis	Sepsis
11	70	50	2nd and 3rd	23**	AIRB, PNM, ARF, Sepsis	Sepsis
12	48	93	2nd and 3rd	2	RF	Sepsis
13	47	70	2nd and 3rd	0***	AIRB	Pulmonary Edema
14	41	95	2nd and 3rd	1**	Dehydration	Great burned
15	31	70	2nd and 3rd	3	Pulmonary Edema	Hypovolemia

*Prior admission to UQ/HRAN; **Hospitalization in another hospital; ***Died at the site of the event. BSA: burned body surface area; AIRB: airway burn; SWI: surgical wound infection; PNM: pneumonia; ARF: acute renal failure; RF: respiratory failure

years of age. The personal lives and work of these young women are permanently compromised due to the functional, aesthetic, and psychological sequelae of their suicide attempt by burns.

The number of women who use alcohol as a fuel in suicide attempts by thermal agents remains high. Despite awareness campaigns and banning the indiscriminate sale of liquid alcohol, it is still easily obtained^{8,12}.

A history of psychiatric diseases and previous suicide attempts were observed, indicating that the main risk factors for suicide can be prevented if they are suspected, identified, and treated.

Intentional burns are more severe than accidental burns⁸. Women victims of suicide attempts by burns have deeper lesions, a greater association with inhalation injury, increased hospitalization periods, and higher mortality³⁰. The treatment of these women represents a significant financial cost for the health system and an even higher emotional and psychological cost to the victims and their families. Despite progress in the management and treatment of burned patients, prevention remains the best strategy. With measures such as proper attendance of patients, suspicion of cases of self-inflicted violence, and referral for pertinent treatment and follow-up, suicide may be avoided and lives saved.

This study outlined the epidemiological profile of women who attempted suicide with burns to raise awareness of this important and scarcely explored topic. Furthermore, our findings emphasized the implications and impact of these occurrences in the health system and called attention to the recurring challenge of incomplete information in the assessment of secondary data.

COLLABORATIONS

MS

Analysis and/or data interpretation, Conception and design study, Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Realization of operations and/or trials, Visualization, Writing - Original Draft Preparation, Writing - Review & Editing

MLCO

Analysis and/or data interpretation, Conception and design study, Conceptualization, Final manuscript approval, Formal Analysis, Funding Acquisition, Methodology, Project Administration, Resources, Supervision, Validation, Visualization, Writing - Review & Editing

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