

Epidemiology and Outcomes of Burn Injuries at a Tertiary Care Center in Pakistan: A Retrospective Cohort Study

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Abstract:

Background: Burn injuries are a significant public health issue in Pakistan, but detailed epidemiological data are limited. This study evaluates predictors of mortality and clinical outcomes among burn patients admitted to a major tertiary burn center in Lahore.

Methods: A retrospective cohort study was conducted using records of 272 adult burn patients admitted to Jinnah Burn & Reconstructive Surgery Center (JB&RSC), Lahore, between August 2021 and July 2022. Data on demographics, burn characteristics, comorbidities, treatment details, and outcomes were collected. Multivariate logistic regression was used to identify independent predictors of in-hospital mortality. Odds ratios (OR) and 95% confidence intervals (CI) are reported.

Results: Median age was 28 years (IQR: 19-41), and 66.2% were male. Flame burns (83.5%) were the most common type, and 5.5% of cases were non-accidental. Mean %TBSA was $31.4\% \pm 23.4\%$. Overall mortality was 34.6%. Independent predictors of mortality included %TBSA >30% (OR 12.4; 95% CI: 6.5-23.9), flame burns (OR 5.9; 95% CI: 1.9-18.2), non-accidental injuries (OR 9.2; 95% CI: 2.6-32.8), and age >30 years (OR= 1.8; 95% CI: 1.1-3.1).

Conclusion: Burn severity, age, and cause are key predictors of mortality. These findings highlight the need for targeted preventive strategies and investments in burn care capacity.

Keywords: Burn injury, %TBSA, mortality, flame burns, Pakistan, retrospective cohort, epidemiology

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Introduction:

Burn injuries cause extensive morbidity and mortality globally, with the highest burden in low- and middle-income countries (LMICs)[1]. Pakistan reports one of the highest annual burn injury incidences in the world, estimated at 1388 per 100,000 population. Despite this, epidemiological studies at the hospital level remain scarce [2]. Burns in Pakistan are predominantly

flame-related and commonly affect young males due to occupational exposure and hazardous domestic practices.[3] The country also lacks comprehensive burn registries and infrastructure, which hampers effective prevention and treatment[4]. This study aims to describe the demographic and clinical characteristics of burn patients admitted to a major tertiary care center in Lahore and to identify independent predictors of in-hospital mortality[5, 6].

Material and Methods:

This retrospective cohort study was conducted at the

Jinnah Burn & Reconstructive Surgery Center (JB&RSC), a public sector tertiary burn hospital located in Lahore, Punjab, which provides services to patients from across Punjab and neighboring provinces. The study spanned from August 1, 2021, to July 31, 2022. Based on an assumed mortality rate of 30%, with a 95% confidence level and a 5% margin of error, the minimum required sample size was calculated to be 267 patients. The final sample included 272 patients, thereby fulfilling the statistical power requirement..

Result

Table-1: Epidemiological factors among the burn patients

Variables (n=272)		Frequency	Percentage
Gender	Male	180	66.2%
	Female	92	33.8%
Age (Years)	0-10	13	4.8%
	11-30	168	61.8%
	31-50	63	33.2%
	51-70	21	7.7%
	>70	7	2.6%
Types of Burn	Flame Burn	227	83.5%
	Scald Burn	12	4.4%
	HVECI	31	11.4%
	Flash Burn	1	0.4%
	Chemical Burn	1	0.4%
Circumstances	Accidental	257	94.5%
	Suicidal	12	4.4%
	Homicidal	3	1.1%

Area	Lahore	80	29.4%
	Outside Lahore	192	70.6%
%TBSA	<30%	173	63.6%
	30-60%	56	20.6%
	>60%	43	15.8%
Outcome	Died	94	34.6%
	Discharged	178	65.4%

Inclusion and Exclusion Criteria:

Included: All adult patients (≥18 years) admitted with acute burn injuries during the study period. [11, 12]

Excluded: Patients admitted for elective post-burn procedures, follow-up, or outside the study period. [13]

Variables Collected:

Demographics: Age, sex, residence, Clinical: Burn type, %TBSA, comorbidities, time to admission, inhalation injury, injury [14]

Cause

Treatment: ICU admission, ventilation, surgery

Outcomes:

In-hospital death or discharge, hospital stay duration [15]

Table 2: Relation between Epidemiological factors and outcome among the burn patients

Variables		Outcome				P value	Remarks
		Died		Discharged			
		n	%	n	%		
<i>Gender</i>	Male	6	35	1	64	0.629	Not Significant
		4	.6	1	.4		
			%	6	%		

	Female	30	32.6%	62	67.4%		t
Age	Up to 30 years	55	30.4%	126	69.6%	0.041	Significant
	Above 30 years	39	42.9%	524	57.1%		
Area	Lahore	26	32.5%	54	67.5%	0.645	Not Significant
	Outside Lahore	68	35.4%	124	64.6%		
Type of Burn	Flame Burn	90	39.6%	137	60.4%	<0.0001	Significant
	Other	4	8.9%	41	91.1%		
Circumstances	Accidental	82	31.9%	175	68.1%	<0.0001	Significant
	Non-Accidental	12	80%	3	20%		
Length of Stay	Up to 3 weeks	92	37.4%	154	62.6%	0.002	Significant
	More than 3 weeks	2	7.7%	24	92.3%		
%TBSA	<30%	13	13.8%	160	89.9%	<0.0001	Significant
	>30%	81	86.2%	18	10.1%		

Definitions:

- Flame burn: Injury from open flame or explosion;

Non-accidental: Suicidal or homicidal burns

%TBSA:

Total body surface area burned, calculated via rule of nines or Lund-Browder chart[16].

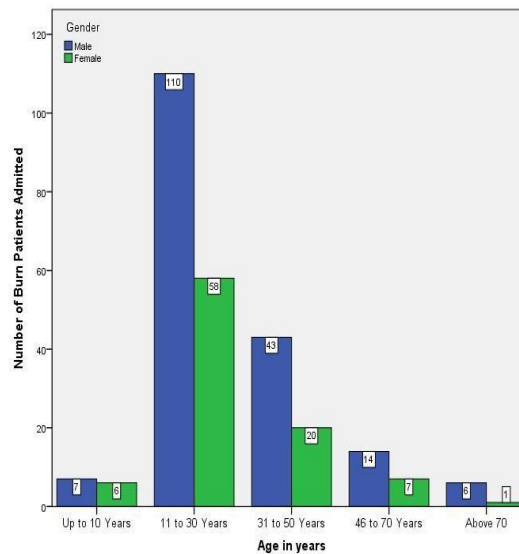


Figure .1 Age & Gender wise distribution of burn patients admitted in Burn Ward of JB&RSC

Results

Patient Characteristics:

Median age: 28 years (IQR 19–41)

Sex: 180 males (66.2%), 92 females (33.8%)

Burn types: Flame (83.5%), HVECI (11.4%), scald (4.4%), flash/chemical (<1%)

Cause: Accidental (94.5%), Non-accidental (5.5%)

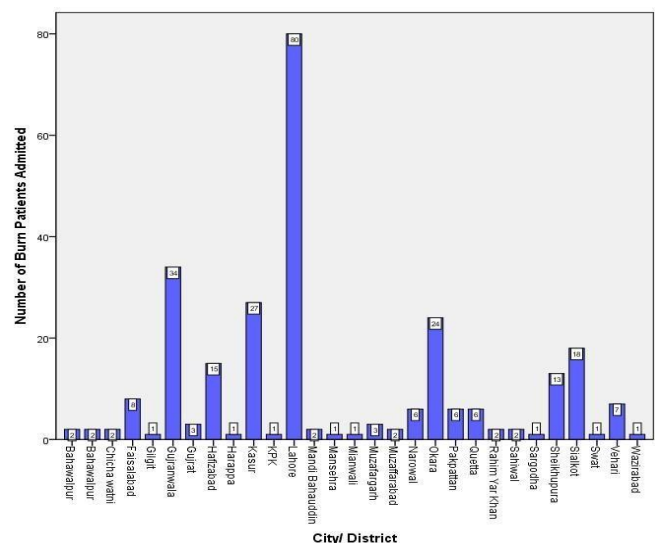


Figure. 2 City/ District wise distribution of burn patients admitted in Burn Ward of JB&RSC

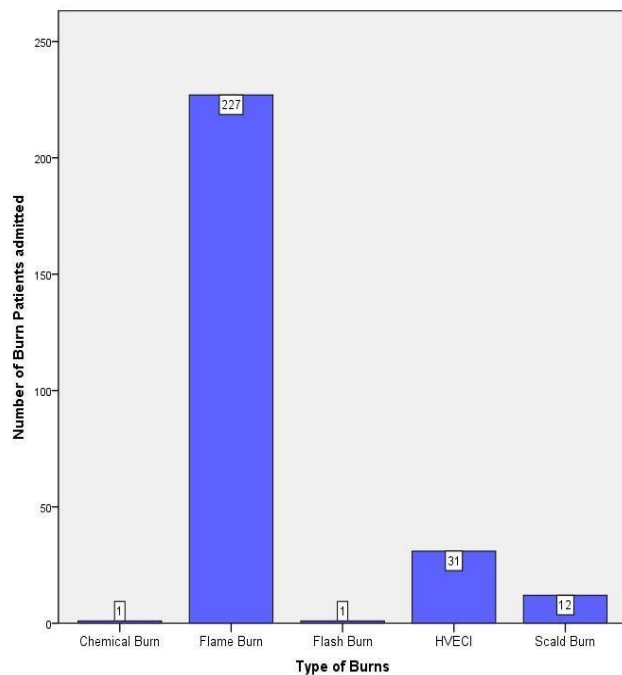


Figure. 3 Type of Burns in patients admitted in Burn Ward of JB&RSC

%TBSA: Mean 31.4% $\pm$ 23.4%

Inhalation injury/comorbidities: Not consistently recorded

Mean hospital stay: 9.08 days (range: 1–53 days)[22, 23]

Outcomes:

Discharged: 178 (65.4%)

Died: 94 (34.6%)

Mortality Associations (Bivariate):

%TBSA >30%: 81/99 died ($p < 0.001$)

Flame burns: 90/227 died ($p < 0.001$)

Age >30 years: 39/91 died ($p = 0.041$)

Non-accidental burns: 12/15 died ($p < 0.001$)[24, 25]

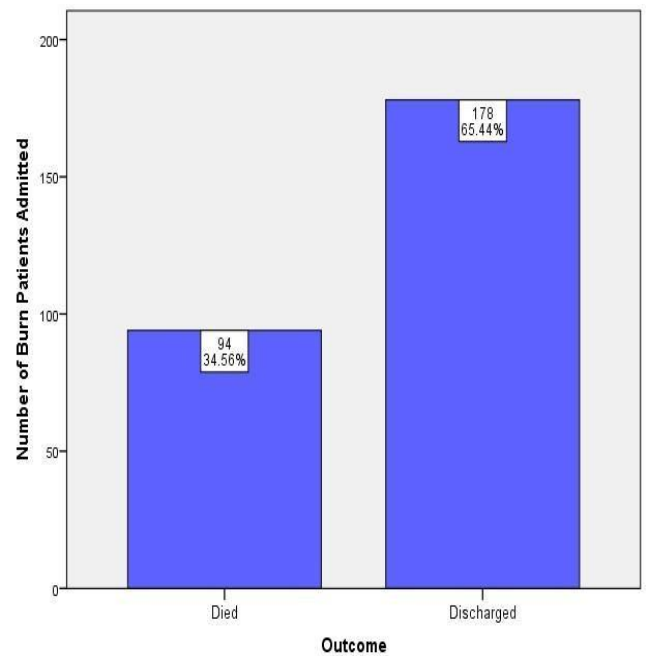


Figure. 4 Outcome of admitted patients in Burn Ward of JB&RSC

Multivariate Logistic Regression:

%TBSA >30% (OR 12.4; 95% CI 6.5–23.9; $p < 0.001$)

Flame burn (OR 5.9; 95% CI 1.9–18.2; $p = 0.002$)

Non-accidental injury (OR 9.2; 95% CI 2.6–32.8; $p < 0.001$)

Age >30 years (OR 1.8; 95% CI 1.1–3.1; $p = 0.027$)[26]

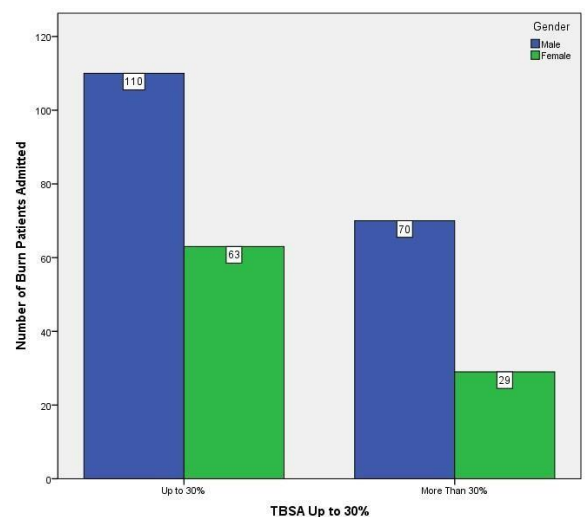


Figure. 5: Percentage of Total Body Surface Area involved in burns in patients admitted in the Burn

Ward of JB&RSC

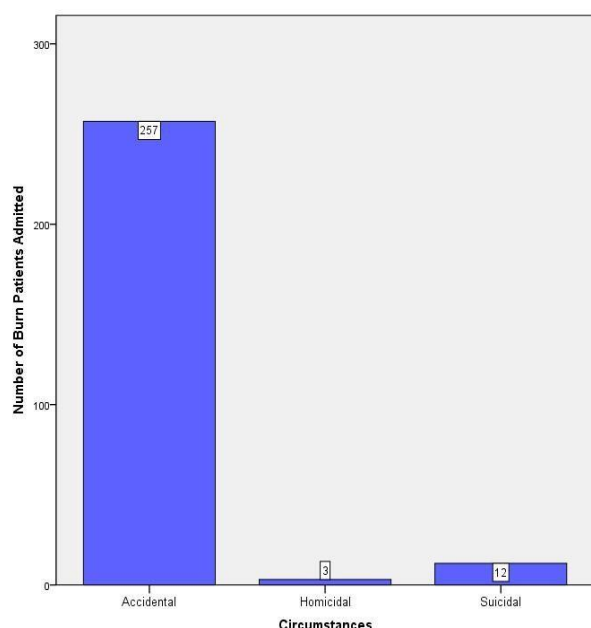


Figure-6: Circumstances leading to burns in patients admitted in the Burn Ward of JB&RSC

Discussion:

This study reinforces that flame burns and high TBSA involvement are strong predictors of mortality. Our 34.6% mortality rate is consistent with Pakistani studies but significantly higher than that in high-income countries (e.g., Singapore: 4.3%, Netherlands: 4.1%).

Pakistan's burn burden is exacerbated by poor gas safety, overcrowding, and limited acute care capacity. Non-accidental burns, while infrequent, had the highest fatality - underlining the importance of mental health screening and domestic violence interventions. Younger patients had better survival. However, older patients and those with extensive burns need early ICU referral. Time from injury to admission was not well-documented but may influence survival - a topic for future research.

Conclusion

Burn injuries, especially flame burns with high %TBSA, carry significant mortality risk in Pakistan. Age and injury intent also influence outcomes. Strengthening emergency response, early referral, and critical care access is critical.

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