A Retrospective, Facility Based, Analytical Study of Burn Injury, and Correlation of Various Factors with Outcome in a Tertiary Care Hospital of Kashmir

Shiwani Thakur¹, Irshad Ahmad², Yaser Hussain Wani³, Naseer Awan⁴, Zuneera Banoo⁵, Neha Sharma⁶, Safoora Wani⁷, Adan Iqbal⁸

^{1, 2, 3, 4, 5, 6, 7, 8} Department of General Surgery, Government Medical College, Srinagar, Jammu and Kashmir, India.

ABSTRACT

BACKGROUND

The skin is the largest organ of our body with a complex function. Burn injuries result in damage to the skin by electrical, chemical, thermal or radiation energies or a combination of them, by far the most common being the thermal injuries. However, most burn injuries are preventable and hence need preventive strategies. Outcome is dependent on various factors. The focus of this study is to provide an overview of various factors and clinical presentation of burn injury and their correlation of these various factors with outcome of burn injury.

METHODS

A retrospective facility-based document review analytical study was conducted on 215 patients admitted in the emergency (burn ward) department of Government Medical College and Hospital, Srinagar, Kashmir from September 2019 to September 2020.

RESULTS

In our study, out of total 215 hospitalized burn patients, 101 (47 %) were female and 114 (53 %) were males. In 103 (47.9 %) patients, burn injury was caused by scald burn, kangri burn was present in 3 (1.4 %) patients; 207 (96.3 %) patients had accidental burns and 8 (3.7 %) patients had suicidal burn injuries; 181 (84.2 %) had received good pre-hospital intervention; 165 (76.7 %) patients were discharged without complications. Various parameters – degree of burn, cause of burn, nature of burn, nutritional status and antibiotic coverage show statistical significance with P-value < 0.05.

CONCLUSIONS

Kashmir is a valley surrounded by mountains, has cold weather for about threequarters of year. People here are more prone to burn injuries especially thermal injuries. Outcome of burn injuries is better for lesser degree of burns and mortality increases with severe degree of burns. Patients without complications, patients with good nutritional status at presentation and patients with proper antibiotic coverage had good outcome.

KEYWORDS

Burn Injury, Kangri, Outcome of Burn

Corresponding Author: Dr. Yaser Hussain Wani, Wani Villa, Kaunsar Colony, Old Airport Road, Rawalpora, Srinagar – 190005, Jammu and Kashmir, India. E-mail: dr.yaser.hussain.wani@gmail.com

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BACKGROUND

Burn injuries are one of the commonest forms of trauma which accounts for a large proportion of emergency cases worldwide. Although, with recent advancement in treatment guidelines, there is significant decline in mortality rate, still burn injuries continue to be a big challenge, due to burn related mortality and morbidity.¹ Burn injury causes lifelong physical and psychological scarring,² influencing mental and physical health, quality of life, ability to return to work and mortality later on.^{3,4,5} According to world health organization (WHO) estimation, worldwide there are about 11 million burn injuries of all types that occur annually, out of which 180,000 are fatal² but wide variability lies in the incidence of burn injury.⁶

The majority of epidemiological data available are from high-income countries which are related to access to health care resources, difference in environment and resources available at different health care system,^{7,8,9} whereas, fewer resources, such as geographical constrains, access to health care and cost, limit data collection in lower income countries.¹⁰ Also, cultural factors like open air cooking areas, loose clothing(saris), domestic violence, dowry deaths contribute to different regional variations in lower income countries.^{11,12,13} There is a bimodal age distribution, one group of young children (1-15.9 years) and other group of working age (20-59 years), in USA, but regardless of country, burns in children are equally distributed between boys and girls.¹⁴ In most of the countries, this trend changes with increase in age, with men being injured two times as that of women, with exception in India and Ghana, where women are injured three times and die of burn injuries than that of men.15,16

According to reports by American Burn Association (ABA) National Burn Repository 2019, flame burns (41 %) still contribute to majority of burns, with second being scald burns (31 %), followed by electrical burns (3.6 %) and chemical burns (3.5 %).¹⁴ In children, < 5 years of age, scald injuries contribute to majority of causes followed by flame burn.¹⁷ Thermal injuries are categorized based on cause and depth of injury. Different causative agents like flame, scald, and contact with hot and cold objects cause coagulative necrosis of tissues through transfer of energy. Other causes are due to conduction of electricity and contact with chemicals which causes direct damage to cellular membranes in addition to transfer of energy. Skin acts as a major barrier which restricts the transfer of heat to underlying tissues but injury to deep tissues still occurs due to local tissue response to burn injury.¹

Apart from scarring of skin which causes disfigurement, deeper burns may result in functional disability, may lead to isolation due to social stigma and other psychological and physical impairment limits one's productivity due to post traumatic stress disorder.¹⁸ Immediate pre-hospital care provided to victims who sustain burn injury, can greatly affect the extent and depth of wound and can effectively decrease the morbidity and mortality to a great extent.¹⁹

In cases of burn injuries, first 24 hours represents one of the greatest challenges in burn care and predicts the outcome of patients.²⁰ Patients of burn injury have unique resuscitation requirements, metabolic stress, pattern of complications and determinants of outcome. Organ dysfunction, typically driven due to infections and lack of fluid resuscitation reflect the perturbation in burn injury. Therefore, proper antibiotic coverage to control infection and sepsis should be done for better outcome.²¹ Accurate assessment of depth of burn wounds on admission is very important in making decisions about dressings and surgery later on. Optimal treatment of burn wounds also shortens the healing time, return to normal functions and reduces the need for secondary reconstruction.²² Kashmir is a valley surrounded by mountains resulting in cold weather for more than half of year. People here use different sources of heating resulting in significantly high unintentional burn injuries. Therefore, the purpose of study is to assess the various risk factors and correlate with outcome.

We wanted to study the clinical presentation and aetiology of burn injuries and evaluate the various factors affetcting the outcome of burn injuries.

METHODS

A retrospective facility-based document review analytical study design was conducted in Government Medical College and Hospital, Srinagar, Kashmir. Government Medical College and Hospital, Srinagar, is major referral center in Kashmir. Therefore, patients presenting to this hospital are from almost all regions of Srinagar. The study population of this study was 215 patients admitting in emergency department of hospital due to burn injury from September 2019 to September 2020. All the admitted patients with incomplete medical records and patients who left against medical advice (LAMA) were excluded from the study.

Data Collection

Based on patient's registration number, patient's chart was traced. The data collection process was carried out.

Data Management and Statistical Analysis

Data was analyzed using SPSS 23. Categorical variables were presented as frequencies and percentages. Descriptive statistics was computed for independent variables and outcome variables. Tables, texts, and graphs were used to present the results. P value < 0.05 was considered statistically significant. Chi square and fischers exact test were used where ever applicable.

RESULTS

Gender Distribution

In our study, out of total 215 hospitalized burn patients, 101 (47 %) were female and 114 (53 %) were males concluding males sustained more injuries. Gender has no correlation with outcome of burn injury.

Degree of Burn

In our study, out of 215 patients, 85 (39.5 %) patients had Ist degree burn, of which all had good outcome; 84 (39.1 %) patients had 2nd degree burn, of which 79 (36.7 %) had good outcome; 38 (17.7 %) patients had IIIrd degree burn, of which 22 (10.2 %) had good outcome and 8 (3.7 %) patients had IVth degree burn injuries with all of them having mortality.

			Total		
			Death	Live	Total
	1	Count	0	85	85
	1	% of Total	0.0 %	39.5 %	39.5 %
	2	Count	5	79	84
Degree	Z	% of Total	2.3 %	36.7 %	39.1 %
	3	Count	16	22	38
		% of Total	7.4 %	10.2 %	17.7 %
	4	Count	8	0	8
		% of Total	3.7 %	0.0 %	3.7 %
Total		Count	29	186	215
		% of Total	13.5 %	86.5 %	100.0 %
Table 1. Degree of Burn Injury is a					
Predictor of Outcome of Burn Injury					
Fischer exact test- < 0.001					

Cause of Burn Injury

In our study, out of total 215 hospitalized burn patients, 207 (96.3%) patients had accidental burns, of which 185 (86 %) had good outcome and 8 (3.7 %) patients had suicidal burn injuries, of which 7 (3.3 %) had mortality.

			Outcome		Tatal	
			Death	Live	Total	
Cause	Accidental	Count	22	185	207	
	ACCIDENTAL	% of Total	10.2 %	86.0 %	96.3 %	
	Suicidal	Count	7	1	8	
		% of Total	3.3 %	0.5 %	3.7 %	
Total		Count	29	186	215	
		% of Total	13.5 %	86.5 %	100.0 %	
Table 2. Cause of Burn Injury is a						
Predictor of Outcome of Burn Injury						
Fischers exact test < 0.001						

Complications

A variety of complications can develop during the course of management. These can be systemic (fluid loss, systemic sepsis) and local (eschar, wound infection, scarring, contracture, respiratory compromise, gangrene). Out of total 215 hospitalized burn patients, 165 (76.7 %) patients were discharged without complications, of which 164 (76.3 %) patients had good outcome; and 50 (23.3 %) patients had complications, of which 28 (13 %) patients had mortality.

		Outcome			Total
			Death	Live	iotai
	No	Count	1	164	165
Complication		% of Total	0.5%	76.3%	76.7 %
Complication	Yes	Count	28	22	50
		% of Total	13.0 %	10.2 %	23.3 %
Total		Count	29	186	215
		% of Total	13.5 %	86.5 %	100.0 %
Table 3. Patients Presenting with Complications					
is a Predictor of Outcome of Burn Injury					
Chi-Square- < 0.001					

Nutritional Status

In our study, assessment of nutritional requirement was done using Curreri formula. Out of total 215 hospitalized burn patients, 185 (86 %) patients had good nutritional status at presentation, of which 184 (85.6 %) had good outcome; and 30 (14 %) patients had poor nutritional status, of which 28(13 %) patients had mortality.

			Outcome		Total	
			Death	Live	TOLAI	
	Cood	Count	1	184	185	
Nutritional	Good	% of Total	0.5 %	85.6 %	86.0 %	
Status	Poor	Count	28	2	30	
		% of Total	13.0 %	0.9 %	14.0 %	
Tete	Tatal		29	186	215	
Total		% of Total	13.5%	86.5%	100.0 %	
Table 4. Nutritional Status of Patient is a						
Predictor of Outcome of Burn Injury						
Fisher's exact test- < 0.001						

Antibiotic Coverage

In our study, out of total 215 hospitalized burn patients, 202 (94 %) patients had received proper antibiotic cover, of which 186 (86.5 %) had good outcome; and 13 (6 %) patients did not receive proper antibiotic coverage and all of them had mortality. Chi-Square- <0.001.

Proper antibiotic coverage is a predictor of outcome of burn injury.

			Outcome		Tabal
			Death	Live	Total
	Blast	Count	3	0	3
		% of Total	1.4 %	0.0 %	1.4%
	Contact	Count	0	9	9
	Contact	% of Total	0.0 %	4.2 %	4.2%
	Floctric	Count	0	14	14
	LIECUIC	% of Total	0.0 %	6.5 %	6.5%
Naturo	Flame	Count	21	61	82
Nature		% of Total	9.8 %	28.4 %	38.1%
	Kangari	Count	0	3	3
		% of Total	0.0%	1.4 %	1.4%
	Scald	Count	5	98	103
		% of Total	2.3%	45.6 %	47.9%
	Thormal	Count	0	1	1
	mermai	% of Total	0.0%	0.5 %	0.5%
	Total Count			186	215
TULAI		% of Total	13.5 %	86.5 %	100.0 %
Table 5. Nature of Burn is a Predictor of					
Outcome of Burn Injury					
Fischers exact test- <0.001					

Nature of Burn Injury

In our study, out of total 215 hospitalized burn patients, nature of burn is flame burn in 82 (38.1%) patients, of which 61 (28.4%) patients had good outcome; scald burn in 103 (47.9%) patients, of which 98 (45.6%) patients had good outcome; electric burn in 14 (6.5%) patients; contact burn in 9 (4.2%) patients; kangari burn in 3 (1.4%) patients; thermal burn in 1 (0.5%) patient and all of them had good outcome; blast injury was present in 3 (1.4%) patients, all of them had mortality.

DISCUSSION

We enrolled a total of 215 patients in our study and studied different parameters and their correlation with outcome of all patients of burn injury. The studied parameters are

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gender, percentage surface area of burn, degree of burn, causes of burn, complications, nutritional status and antibiotic coverage. All studied parameters show statistical significance with chi-Square value of < 0.001.

Gender Distribution

In our study, out of total 215 hospitalized burn patients, 101 (47%) were female and 114 (53 %) were males concluding males sustained more injuries.

Blom L et al. in their study observed that men sustained more injuries of somewhat different aetiology and were referred to higher levels of care more often for comparable wound severity.²³

Degree of Burn

In our study, out of 215 patients, 85 (39.5 %) patients had Ist degree burn, of which all had good outcome; 84 (39.1 %) patients had IInd degree burn, of which 79 (36.7 %) has good outcome; 38 (17.7 %) patients had IIIrd degree burn, of which 22 (10.2 %) had good outcome; and 8 (3.7 %) patients had IVth degree burn injuries with all of them had mortality. Our study concluded that outcome of burn injuries is better for lesser degree burns and mortality increases with severe degree of burns.

Tian H et al. concluded in their study that, severe burns injury is a serious pathology, leading to teratogenicity and significant mortality, and it also has a long-term social impact & needs ICU admission.²⁴

Cause of Burn Injury

In our study, out of total 215 hospitalized burn patients, 207 (96.3 %) patients had accidental burns, of which 185 (86 %) had good outcome and 8 (3.7 %) patients had suicidal burn injuries, of which 7 (3.3 %) had mortality. Study concluded that patients with suicidal burns had mortality and poor outcome.

S.A. Wagle et al. in their study concluded that, patients who had suicidal intent came from joint family, had more stressful life events and suffered larger & severe burns and had more mortality compared with those who experienced accidental burn injuries.²⁵

Complications

Out of total 215 hospitalized burn patients, 165 (76.7%) patients were discharged without complications, of which 164 (76.3%) patients had good outcome; and 50 (23.3%) patients had complications, of which 28 (13%) patients had mortality. Study concluded that patients without complications had good outcomes.

Rowan MP et al. in their study observed that severe burns cause complications & mortality. Furthermore, burn wounds are complex and can present unique difficulties that require late intervention or life-long rehabilitation.²⁶

Nutritional Status of Patients

In our study, out of total 215 hospitalized burn patients, 185 (86%) patients had good nutritional status at presentation, of which 184 (85.6%) had good outcome; and 30 (14%) patients had poor nutritional status, of which 28 (13%) patients had mortality. Study concluded that patients with good nutritional status at presentation had good outcomes.

Ahmed SM et al. in their study observed that nutrition is essential for wounds to heal and should be monitored closely to provide adequate amounts as inadequate nutrition might lead to altered immunity and impaired healing which was found in the results of the current study.²⁷

Antibiotic Coverage

In our study, out of total 215 hospitalized burn patients, 202(94 %) patients had received proper antibiotic cover, of which 186 (86.5 %) had good outcome; and 13 (6 %) patients did not receive proper antibiotic coverage and all of them had mortality. Study concluded that patients with proper antibiotic coverage had good outcome.

Soleymanzadeh-Moghadam et al. in their study concluded that appropriate prescription of antibiotic, not only facilitates control of resistance to antibiotics but also helps in prevention of infection caused by multi-drug resistant (MDR) microorganisms can also decrease the cost of treatment.²⁸

Nature of Burn Injury

In our study, out of total 215 hospitalized burn patients, nature of burn is flame burn in 82 (38.1 %) patients, of which 61 (28.4 %) patients had good outcome; scald burn in 103 (47.9 %) patients, of which 98 (45.6 %) patients had good outcome; electric burn in 14 (6.5 %) patients; contact burn in 9 (4.2 %) patients; kangri burn in 3 (1.4 %) patients; thermal burn in 1 (0.5 %) patient and all of them had good outcome; blast injury is present in 3 (1.4 %) patients, all of them had mortality.

CONCLUSIONS

Burn injuries remain one of the major forms of trauma. Kashmir is a valley surrounded by mountains, has cold weather for about three-quarters of year, hence people here are more prone to burn injuries, with males sustaining more injuries than females. Outcome of burn injuries is better for lesser degree burns and mortality increases with severity of burns. Patients with suicidal burns had mortality & poor outcome compared to patients with accidental burn injuries. Patients without complications, patients with good nutritional status at presentation and patients with proper antibiotic coverage and application of antibiotic ointments, all of these factors are associated with good outcome in patients with burn injury.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com. Financial or other competing interests: None. Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

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