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Original Article

The Frequency of Death Associated with Burn Injury in General Population of Peshawar City

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ABSTRACT

Background: Burn injuries represent a significant public health issue worldwide, with a notably higher incidence and mortality rate in low and middle-income countries. These injuries are characterized by their devastating physical, psychological, and economic impacts on victims and their families. In Peshawar city, the lack of comprehensive data on burn-related deaths has hindered effective prevention and management strategies.

Objective: This study aims to provide a demographic profile of burn-related deaths in Peshawar city, focusing on the factors influencing these fatalities and the manner of death, to inform better clinical practices and preventive measures.

Methods: A retrospective study was conducted in the burn and trauma unit of Hayatabad Medical Complex, Peshawar, from May 1, 2021, to May 1, 2022. Data on 80 cases of death due to burns were collected and analyzed, categorizing by age, sex, cause of injury, nature and extent of burns, total body surface area (TBSA) affected, toxicological findings, location of the incident, duration of survival post-injury, and mechanism of death. The study adhered to the Declaration of Helsinki principles, with ethical approval obtained from the institutional review board.

Results: The study found that out of 80 burn-related deaths, 70% (56 cases) were females and 30% (24 cases) were males. The highest number of fatalities was observed in individuals under 12 years, comprising 28.75% of the cases. Accidental burns were the leading cause of death, with more than 60% of incidents falling into this category. The average TBSA affected in fatal cases was significant, emphasizing the severity of injuries leading to mortality.

Conclusion: Burn-related fatalities in Peshawar city predominantly affect females and young children, with accidental burns being the most common cause. This underscores the necessity for targeted preventive strategies, public awareness campaigns, and improvements in burn care facilities to address the high incidence and mortality rates of burn injuries in the region.

Keywords: Burn injuries, Mortality, Epidemiology, Peshawar, Retrospective study, Public health, Burn prevention, Burn care.

INTRODUCTION

Burn injuries, often overshadowed by other forms of trauma, pose a significant threat to individuals globally, impacting lives irrespective of location or time. These injuries can result from various sources, including friction from cold, heat, radiation, chemicals, or electricity, with heat from hot substances or fire identified as the primary cause (1). The immediate aftermath of a burn injury reveals the extent of damage and depth of the burn, especially with hot liquids or vapors, due to the rapid dispersion of energy. Chemical burns, particularly from alkaline substances, induce liquifactive necrosis, transforming affected tissues into a liquid mass, whereas acid burns lead to coagulation necrosis, fundamentally altering tissue structure. Unique among burn injuries, electrical burns can inflict profound internal damage that belies the visible skin injury, a consequence of the electric field strength and the body's resistance (2). Cold injuries, including frostbite, result from direct cellular damage, water crystallization, ischemia, and re-perfusion, leading to necrosis at both the skin and deeper tissue levels (3).

Globally, burns are a leading cause of death, with an estimated 5 million fatalities annually attributed to burn injuries (1). The severity of a burn injury, often determined by the size of the burn area rather than the depth, plays a critical role in mortality, with increased

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risks among the elderly, those with extensive burn areas, and cases involving airway injury and inhalation of hot gases (3). Despite advancements in medical care, burns remain a major cause of morbidity and mortality, particularly in middle and low-income countries (4), imposing substantial physical, economic, and psychological burdens on patients, families, and societies (2).

Burns are classified into first, second, and third degrees, reflecting the severity of the injury. Research from the Kurdistan region of Iraq and Middle Eastern countries such as Iran and Egypt has highlighted that burns, especially self-inflicted ones by married women with lower education levels and young females, respectively, are often acts of desperation (8, 9). However, the majority of burn incidents in these regions are accidental, with domestic accidents like water scalds being prevalent among children and the elderly (10, 11). A concerning trend is the high incidence of scald fatalities in children under 5 years, pointing to a need for heightened awareness and preventative measures (12). This is particularly relevant in communities where women are primarily engaged in domestic activities involving open fires and stoves, increasing their risk of burn injuries (13, 14).

The management of burn injuries encompasses identifying the cause, categorizing the severity, depth, and size of the burn, and determining the appropriate course of treatment. Superficial burns affect only the epidermis, while deeper burns may require surgical intervention and can result in significant scarring. The categorization of burns as minor or major is based on the total body surface area (TBSA) affected, with different thresholds for the elderly, adults, and children. Severe burns can trigger a prolonged hypermetabolic response, leading to increased risk of organ failure, infections, and delayed healing, with effects lasting years beyond the initial injury (15).

The long-term impact of burn injuries extends beyond physical recovery, influencing morbidity and mortality for years post-injury. This has led to a shift in the focus of burn care towards long-term outcomes, including scarring, mental health, and quality of life. The trauma care community has set ambitious goals of achieving "no death, no scar, and no pain" for burn victims (16). With the World Health Organization estimating 11 million burn injuries annually worldwide, and 180,000 resulting in fatalities (17, 18), the need for effective burn injury prevention, acute management, and long-term rehabilitation cannot be overstated. This study, therefore, not only sheds light on the epidemiology and clinical treatment of burn injuries but also emphasizes the significant inflammatory and metabolic consequences of severe burns, underscoring the critical need for comprehensive care and management strategies to mitigate the lasting consequences and mortality associated with these devastating injuries.

MATERIAL AND METHODS

This retrospective study was conducted in the burn and trauma unit of Hayatabad Medical Complex, Peshawar, Khyber Pakhtunkhwa, over a 12-month period from May 1, 2021, to May 1, 2022. The aim of the study was to construct a demographic profile of burn-related deaths within this timeframe, focusing on the influential factors and the nature of these fatalities. The methodology involved the collection of data on cases of death resulting from burns, meticulously gathered from the hospital's records, including the reception of cases, and supplemented by information provided by the patients' attendants, next of kin, or other individuals involved in the incidents. A total of 80 cases were analyzed, with the data categorized by various parameters such as age, sex, cause of injury, nature and extent of burns including the total body surface area (TBSA) affected, toxicological findings, location of the incident, and duration of survival post-injury, as well as the mechanism and manner of death.

Data collection was systematically approached by reviewing medical records and conducting interviews where necessary, ensuring a comprehensive understanding of each case. The assessment encompassed a detailed analysis of the burn injuries' characteristics, circumstances leading to the injuries, and the outcomes. Each case was evaluated to determine the cause of the burn, categorizing them into accidental, self-inflicted, or assault-related incidents. The extent of burns was quantified based on TBSA, utilizing established medical criteria to assess burn severity.

The study adhered to the ethical principles outlined in the Declaration of Helsinki, ensuring respect for the privacy and confidentiality of the patients and their families. Prior to data collection, ethical approval was obtained from the institutional review board of Hayatabad Medical Complex. Informed consent was waived due to the retrospective nature of the study and the use of anonymized patient data, which was deemed to not compromise the ethical standards or the integrity of the research.

Data analysis was conducted using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Statistical methods were applied to evaluate the collected data, aiming to identify patterns, correlations, and potential causes of burn-related deaths. Descriptive statistics were used to summarize the demographic information, injury characteristics, and outcomes. Inferential statistics were employed to examine the relationships between variables and to assess the factors influencing mortality rates among the burn victims.

This comprehensive approach to data collection and analysis aimed to provide a detailed understanding of burn-related deaths in the studied population, with the goal of informing future preventive measures, improving patient care, and guiding policy development in the field of burn and trauma.

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RESULTS

The distribution of burn-related deaths according to age groups and gender revealed a significant disparity between males and females across various age brackets. The data, as outlined in Table 1, indicates that the highest number of fatalities occurred in individuals under 12 years of age, with a total of 23 cases. Among these, females constituted a significant majority, accounting for 86.95% (20 cases), while males represented 13.04% (3 cases). In the age group of 12-25 years, a similar trend was observed with females comprising 83.33% (10 cases) of the deaths and males 1.66% (2 cases). The 26-30 years age group showed a slightly reduced disparity, with 71.42% (15 cases) being females and 28.57% (6 cases) males. A notable balance was observed in the age groups of 31-45 and 46-60 years, where the distribution was evenly split at 50% for both genders. However, in the age group exceeding 60 years, the pattern shifted with males accounting for a higher percentage of deaths at 66.66% (4 cases) compared to females at 33.33% (2 cases). Overall, the total distribution comprised 30% (24 cases) males and 70% (56 cases) females out of 80 cases.

Regarding the manner of death, the study illustrated a varied distribution of cases. However, detailed specifics about the manner of death were not directly provided, emphasizing the need for further examination of individual cases to understand the underlying causes and contributing factors. The study also explored the types of burns suffered by the victims. While specific details on the types of burns were not delineated in the provided text, understanding the distribution of burn types is crucial in tailoring prevention and treatment strategies.

An interesting aspect of the study involved analyzing the living arrangements of the general population, which, though not directly related to burn injuries, offers insight into potential environmental and socioeconomic factors that might influence burn risk. The data revealed that 22% of people reside in detached houses, followed by 18% in semi-detached houses, 15% in terraced houses, and a minority of 4% in flats. This distribution could indirectly affect the likelihood of burn incidents through various risk exposures associated with different types of housing.

Table 1 Distribution of burn related deaths according to age groups and gender

Age group year	Males (%)	Females (%)	Total number
< 12	3 (13.04%)	20 (86.95%)	23
12-25	2 (1.66%)	10 (83.33%)	12
26-30	6 (28.57%)	15 (71.42%)	21
31-45	5 (50%)	5 (50%)	10
46-60	4 (50%)	4 (50%)	8
> 60	4 (66.66%)	2 (33.33%)	6
Total	24 (30%)	56 (70%)	80

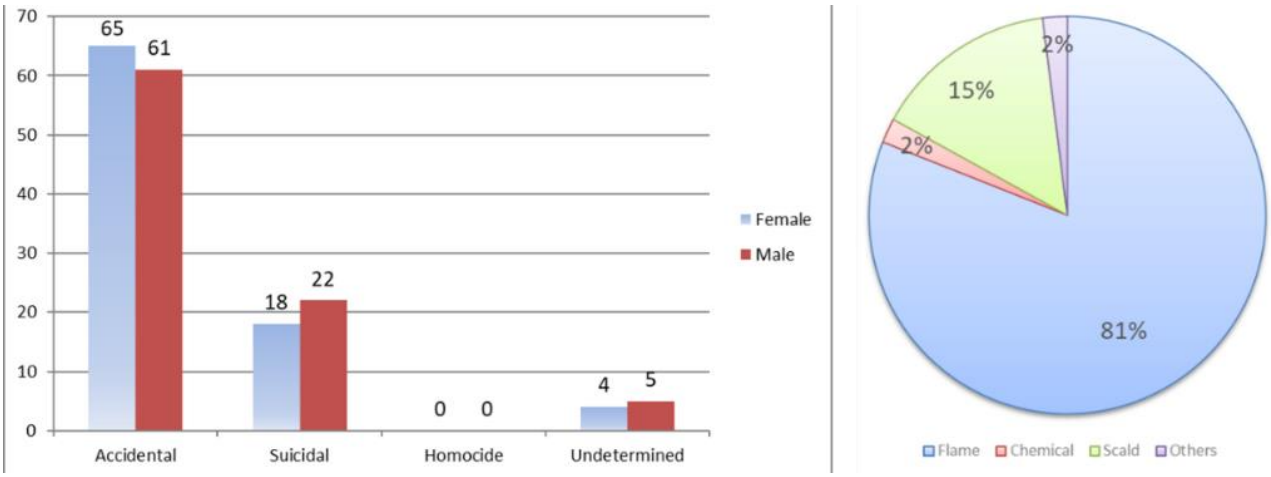

Figure 1 Distribution of cases according to manner of death.

Distribution of cases according to types of burn

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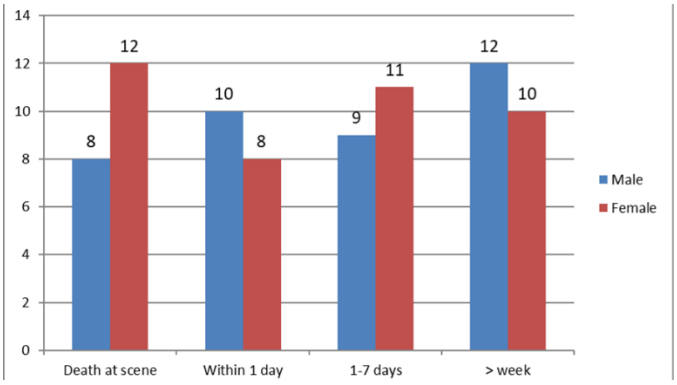

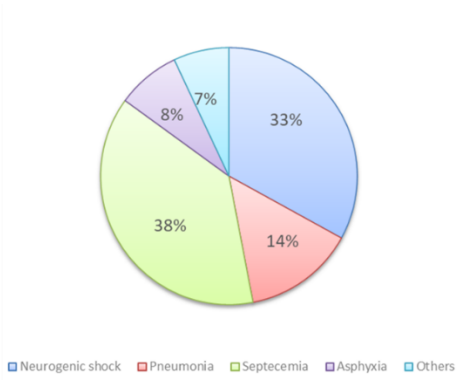

Figure 2 Distribution according to duration of survival of victims after burn injury

Distribution of cases according to mechanism of death

Additionally, the study presented a comparison of unintentional injury deaths in 2019, highlighting falls as the leading cause with 41,000 deaths, followed closely by motor vehicle crashes at 39,000 deaths, drownings at 9,600 deaths, and poisonings at 6,000 deaths. This contextual information underlines the importance of comprehensive injury prevention efforts beyond burn injuries alone.

The duration of survival post-burn injury and the mechanisms of death were also examined. A pie chart depicted a gender distribution among victims, while a bar graph outlined the survival duration, indicating that the immediate fatality rate at the scene was notable. Another graph provided insights into the causes of death, including neurogenic shock and asphyxia, highlighting the critical nature of immediate and effective medical intervention following burn injuries.

Overall, the results underscore the gender and age disparities in burn-related fatalities, the significance of immediate and long-term medical care, and the potential influence of living conditions on burn injury risks. This detailed analysis lays the groundwork for targeted interventions and reinforces the need for ongoing research into the multifaceted aspects of burn injuries and their outcomes.

DISCUSSION

The global burden of burn injuries is profound, with their financial and psychological repercussions being especially severe (5). Notably, 95% of burn deaths occur in low and middle-income countries, highlighting a significant disparity in the incidence and outcomes of burn injuries across different socioeconomic backgrounds (6, 7). The lethality of burns is often correlated with the total body surface area affected, with injuries covering 30-50% of the body surface generally deemed incompatible with survival due to the extensive systemic impact (2). Historical epidemiological data from the 1990s in Basra revealed a mortality rate of 23.1% among hospitalized burn patients, underscoring the critical nature of burns as a health issue (8). Further research in Hira mirrored these findings, showing a higher incidence of burns in males but also indicating a substantial overall inpatient mortality rate of 17.5% (9). The phenomenon of self-harm, contributing to approximately 4% of hospitalizations worldwide, underscores the complexity of factors behind burn injuries, including societal and psychological dimensions (10).

The prevalence of burns in developing nations, particularly among women of childbearing age, signifies a major public health challenge. This study's findings, corroborated by extensive history taking and autopsy, predominantly classify these incidents as accidental, diverging from the notion of burns primarily resulting from self-harm. Nonetheless, young women aged between 15 and 40 years are more likely to succumb to burns from self-harm compared to their male counterparts (11), a trend that aligns with observations from other Middle Eastern countries like Iran and Egypt (12, 13). This suggests a nuanced picture, where cultural and societal norms may influence the risk and nature of burn injuries. In contrast, studies from Iran and India highlight the accidental nature of most burns, challenging the perception of burns as predominantly intentional (14).

The demographic profile of burn victims in this study, particularly the vulnerability of children under 5 years to scalding accidents, points to a pressing need for enhanced preventive measures and awareness. Such incidents underscore potential neglect and a lack of safety precautions within domestic settings (15, 16). The role of women in domestic environments, especially in Middle Eastern societies where they are primarily engaged in cooking and related activities, exacerbates their risk of burn injuries. The design of cooking appliances and the flammability of traditional women's clothing are identified as contributing factors to this heightened risk (17).

This research underscores the critical gap in knowledge regarding burn-related fatalities, particularly in regions like Peshawar city. The predominance of female victims and the nature of burn incidents, largely accidental yet significantly influenced by domestic and social factors, call for a multifaceted approach to prevention and intervention. The data underscores the necessity of addressing

household safety and reducing risk factors associated with burns, alongside considering the underlying social and cultural dynamics that contribute to these incidents.

In reflecting on the strengths and limitations of this study, it is evident that while the retrospective analysis provides valuable insights into the patterns and characteristics of burn-related deaths, the reliance on historical data and secondary information sources may introduce biases or gaps in understanding the full context of each case. Future research should aim for a more prospective approach, incorporating real-time data collection and broader sociocultural investigations to enhance the depth and accuracy of findings (18-20).

Recommendations for addressing the public health challenge of burns should include targeted awareness campaigns, improvements in domestic safety standards, and interventions aimed at mitigating the specific risks faced by vulnerable populations, particularly women and children. Additionally, enhancing the capacity of healthcare systems to manage burn injuries effectively, from acute care through to rehabilitation, is essential for reducing mortality and improving outcomes for burn victims.

CONCLUSION

The findings of this study highlight the urgent need for comprehensive burn prevention strategies and improved healthcare responses in Peshawar city, particularly targeting the most vulnerable populations, including women and children. The disparity in burn-related fatalities underscores the importance of addressing both the immediate healthcare needs and the broader socio-cultural factors contributing to these injuries. Enhancing public awareness about burn risks, implementing safety measures in domestic environments, and improving emergency and rehabilitative care can significantly reduce the incidence and impact of burn injuries. This approach requires a coordinated effort among healthcare providers, policymakers, and the community to mitigate the devastating consequences of burns and improve overall patient outcomes.

REFERENCES

1. Chandran A, Hyder AA, Peek-Asa C. The global burden of unintentional injuries and an agenda for progress. Epidemiologic reviews. 2010;32(1):110-20.
2. Abd Mohammed AQ. The prevalence of burn related deaths in Basrah. The Medical Journal of Basrah University. 2018;36(1):22-7.
3. Payne-James J, Jones RM. Simpson's forensic medicine: CRC Press; 2019.
4. Hemeda M, Maher A, Mabrouk A. Epidemiology of burns admitted to Ain Shams University burns unit, Cairo, Egypt. Burns. 2003;29(4):353-8.
5. Sadeghi-Bazargani H, Maghsoudi H, Soudmand-Niri M, Ranjbar F, Mashadi-Abdollahi H. Stress disorder and PTSD after burn injuries: a prospective study of predictors of PTSD at Sina Burn Center, Iran. Neuropsychiatric disease and treatment. 2011;7:425.
6. Peden M, McGee K, Krug E. Injury: a leading cause of the global burden of disease, 2000: World Health Organization; 2002.
7. Forjuoh SN. Burns in low-and middle-income countries: a review of available literature on descriptive epidemiology, risk factors, treatment, and prevention. Burns. 2006;32(5):529-37.
8. F Fathallah Z. Epidemiological profile of burn injuries in Basrah. Basrah Journal of Surgery. 2005;11(1):60-6.
9. Hatif M. Burn trauma in Babylon. Medical Journal of Babylon. 2008;5(3).
10. Horner B, Ahmadi H, Mulholland R, Myers S, Catalan J. Case-controlled study of patients with self-inflicted burns. Burns. 2005;31(4):471-5.
11. Qadir AR. Women suicide attempted by burning in Sulaimania city. Zanco Journal of Medical Sciences (Zanco J Med Sci). 2012;16(1):4-8.
12. Panjeshahin M-R, Lari AR, Talei A-R, Shamsnia J, Alaghehbandan R. Epidemiology and mortality of burns in the South West of Iran. Burns. 2001;27(3):219-26.
13. Afify MM, Mahmoud NF, Abd El Azzim GM, El Desouky NA. Fatal burn injuries: A five year retrospective autopsy study in Cairo city, Egypt. Egyptian Journal of forensic sciences. 2012;2(4):117-22.
14. Batra AK. Burn mortality: recent trends and sociocultural determinants in rural India. Burns. 2003;29(3):270-5.
15. Ansari-Moghaddam A, Baghbanian A, Dogoonchi M, Chooban B, Mostaghim-Roudi M, Torkfar G. Epidemiology of burn injuries in south-eastern Iran: a retrospective study. J Pak Med Assoc. 2013;63(12):1476-81.
16. Maghsoudi H, Samnia N. Etiology and outcome of pediatric burns in Tabriz, Iran. Burns. 2005;31(6):721-5.
17. Chavoshi MH, Abbasi-Shavazi MJ, McDonald P, editors. Women's autonomy and reproductive behavior in Iran. 12th Biennial Conference of the Australian Population Conference, Camberra; 2004: Citeseer.

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18. Masud S, Hyder AA, Khan UR, Khan NU, Petrucka P. Epidemiology and perceptions of non-fatal burns among select youth (15–24 years old) from Peshawar Pakistan; a sequential explanatory mixed methods study. Burns Open. 2024 Apr 1;8(2):60-7.

19. Mashreky SR, Rahman A, Chowdhury SM. Non-fatal burn is a major cause of illness.

20. Nazir N, Ali S. Socioeconomic and demographic risk factors of child sexual abuse in Pakistan: a case study of Khyber Pakhtunkhwa Province. Pakistan journal of humanities and social sciences. 2023 Jun 30;11(2):2783-91.