

Epidemiology of Burns in Pakistan a Systematic Review

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ABSTRACT

Burns are graded as the fourth most common trauma type globally followed by other traumas including accidents, interpersonal violence and falls. South Asian regions account for 187- 243 incidences of burns per hundred thousand annually. Whereas Pakistan lacks national data and cannot measure the burn burden annually. Due to the dearth of clinical and epidemiological studies on burns in Pakistan, we performed this study. This systemic review study aimed at summarizing available Pakistan's epidemiological data, based on national studies in the past 32 years. The data of our systemic review were collected from five search engines, i.e. PubMed, Google Scholar, PakMediNet, Scopus, and DOAJ. The studies which were reviewed for the article were from 1990 to 2022. The articles of nonhuman participants, duplication and lacking in primary focus were excluded. The PRISMA guidelines were used. A total of 10 articles were included out of which 4 are from Islamabad ICT, Sindh and 2 from Punjab. The overall gender ratio shows male dominance of 56.07 %. Flame burns were recorded at a higher percentage of 58.32%. The mean TBSA recorded in this research was 29.6%. The mean mortality rate of all the studies shows a percentage of 26.1%. More research studies are needed to be done in the areas lacking information about the victims of burn injuries so that policymakers know the actual figure of the injuries with whom they must deal.

Keywords: Burns Injuries, Prevalence, Pakistan, Epidemiology

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All authors contributed equally to the conception, literature search, manuscript drafting, editing and review

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Introduction

Burns are graded as the fourth most common type of trauma globally followed by other traumas including accidents, interpersonal violence and falls.¹ In 2017, globally the burn mortality rate was estimated to be 1.6 per 100,00 population.² South Asian region accounts for half of these deaths with annual incidence of burns estimated to be as high as 187–243 per 100,000.³ However, in

Pakistan, due to the limited availability of data pertaining to burns, the yearly number of victims is not available readily. Different burn units throughout the country collected data from their respective hospitals that are not consolidated by a centralized agency. Developing countries have a higher incidence and prevalence of burn injury cases and a higher proportion of mortality and morbidity rates than developed ones, making it a

serious public health problem. The main demographic factors associated with burn injuries are age groups and gender.⁴ Most burn cases occur at homes in developing countries.⁵ And most of them included falling on heat sources, spill injuries and children putting on hot liquids upon themselves from a higher surface.⁶ There has been a downfall in burn injury cases over the last several years in the developed world. The incidence of burn injuries overall in the US has decreased from 215 (95% UI, 183-246) to 140 (95% UI, 117-161) per 100,000⁷. However, the relative mortality of burn injury has been fixed over the 26-year study period.⁸ This shows that the developed world is coping with the burns burden strategically and positively outcome-oriented. Pakistan is lacking in burn management as well as there are also very few research studies in this field⁸. As the country is lacking in facilities, the number of referrals has increased from other small cities in recent years.⁹ Pakistan is unfortunately in a complete impasse as it faces a large number of burn-related accidents, and these accidents can be prevented and cured if proper attention is paid to the cause⁸. According to Annual Report of Burn Centers in Pakistan the mortality rate was 8.4% (23). There is limited information on the prevalence and incidence of burn injuries, making it difficult for policymakers to know the burden of burn injuries. Due to dearth of clinical and epidemiological studies on burns in Pakistan, we performed this study. This systemic review study aimed at summarizing available Pakistan's epidemiological data, based on national studies in the past 32 years. We aimed at determining the total mortality rates on a national level along with incidence and prevalence rates of burns.

Methodology

A systemic review was performed for peer-reviewed studies and the data were collected

from PubMed, Google Scholar, PakMediNet, Scopus, and DOAJ focusing on epidemiology and demographic patterns in the Pakistani population. Articles from 1990 to 2022 were included. Search key terms included burns, burn injuries, burn prevalence, burn epidemiology, TBSA and Pakistan to PRISMA guidelines,¹ the references of 2,763 articles were reviewed for further relevant studies by hand combing technique and 32 more articles were added. The duplicates of 1,535 articles were excluded from a total of 2,795 articles. Furthermore, the remaining 1,260 articles were screened using the exclusion criteria: non-human subjects, studies focusing on antimicrobial drug therapy, and availability of full-text articles.

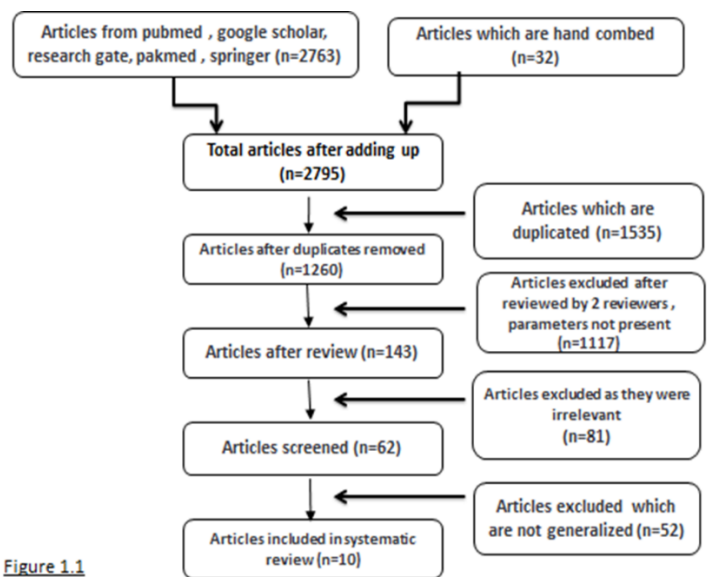


Figure 1.1

Figure 1: Flow diagram of article selection process for systematic review

After this review, 1,117 articles were excluded leaving behind a total of 143. These 143 articles were screened with the exclusion criteria: not having a primary focus and without statistical analysis of the epidemiology. Hence, 81 articles were excluded under these criteria which makes the included articles 62. Out of these 62 articles, 52 were excluded as they were not based on generalized data and included specific

populations like Pediatrics and duplicates. All cleaning and data extraction were done by using Word Processing System. Data were reviewed periodically making a total of 10 articles. The main focus was on gender, TBSA, mortality and mechanism of burns. This data was extracted using a standardized form. All this data were extracted from each research article into a Statistical Package for Social Sciences (SPSS) spreadsheet and trends were identified from tables in tabulate form. The data were then converted into descriptions.

Results

The selected studies were from the year 1990 to 2022. They are from territorial regions of Pakistan, i.e. Punjab, Sindh and Islamabad Capital Territory (ICT). There are a total of 10 articles from which we collected the data which sums up the sample size to be 36391. There were 4 studies from ICT, 4 from Sindh and the remaining 2 from Punjab, (table I). The studies from KP and Balochistan did not fulfil the criteria and the parameters of our study so they were excluded.

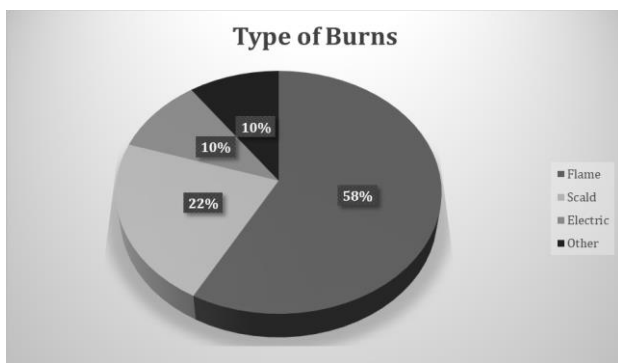


Figure 2: Types of Burns

Types of burn

Types of burns include scalds, flame burns, electric burns and others. The values are given in percentages, those values that are in numbers and not in percentages are converted into percentages by relevant calculations for convenience purposes. The separate percentages

of types of burns are then converted into one single percentage that shows mean values, flame burns are on the top with a percentage of 58.32%, followed by scalds at 21.99% and then electric burns at 10.13%. Data are presented in table I and figure 2.

Table I: Studies included

Sr No.	Author	Year Published	Province	Sample Size
1	Iqbal et al	2005	ICT	429
2	Khan et al	2006	Punjab	111
3	Ahmad et al	2007	ICT	142
4	Khaliq et al	2013	Sindh	489
5	Iqbal et al	2013	ICT	13295
6	Hashmi et al	2013	Sindh	1597
7	Ibran et al	2013	Sindh	1979
8	Ali et al	2016	Sindh	4016
9	Rehman et al	2018	Punjab	264
10	Iqbal et al	2021	ICT	14069

Gender:

The actual figure of male and female patients of every study were separated and percentages of male and female victims were noted separately. The studies where percentages were not mentioned, they were calculated from the number of mortalities. The overall percentage of male patients were 56.07% and of females were 43.93%, (table III) (Figure.3). This overall percentage shows males dominating in burn injuries over females.

TBSA

The overall percentage of TBSA was 29.6%. All studies shows that the increase in TBSA increases with the mortality rate. There is a very vast

Burn Types	Scald (%)	Flame (%)	Electric (%)	Others (%)
Iqbal et al	21	43.5	22	13.50
Khan et al	48.5	41.4	5.4	4.70
Ahmad et al	16.75	47.9	10.6	24.75
Khaliq et al	4	78.7	16.3	1
Iqbal et al	42.48	39	9.96	8.56
Hashmi et al	27.8	64.05	5.96	2.19
Ibran et al	5.4	81.3	9.3	4
Ali et al	5.1	83.9	7.9	3.10
Rehman et al	7.5	75.6	9	7.90
Iqbal et al	41.1	27.9	4.9	26.10

Sr No	Author	Gender	
		Male (%)	Female (%)
1	Iqbal et al	55.01	44.98
2	Khan et al	55	45
3	Ahmad et al	54.2	45.80
4	Khaliq et al	56.6	43.4
5	Iqbal et al	56.43	43.56
6	Hashmi et al	58.3	41.67
7	Ibran et al	53.1	46.9
8	Ali et al	56.6	44.4
9	Rehman et al	63.6	36.4
10	Iqbal et al	51.9	48.1

deviation in the TBSA values showing range of values. These values were converted into one single value for each study. At the end all mean was calculated (table IV).

Mortality

The mean mortality rate of all 10 studies was 26.1%. The mortality rate of all the studies shows that it depends on the number of patients included in the study and the total body surface area that was burned. The mortality rate of few studies was mentioned in the article and the mortality rate of the remaining few were calculated (table IV).

Sr No	Author	Mortality (%)	TBSA (%)
1	Iqbal et al	29	52.40
2	Khan et al	29.7	15.50
3	Ahmad et al	17	33
4	Khaliq et al	26.38	24.69
5	Iqbal et al	1.48	10.64
6	Hashmi et al	41.30	32.5
7	Ibran et al	36.12	34
8	Ali et al	36.9	35.49
9	Rehman et al	34.8	31.6
10	Iqbal et al	8.4	26.7

Discussion

Burn injury victims always remain a considerable cause of emotional, physical and psychological disability.¹⁰ This systemic review sums up the

Gender, TBSA, Mortality and Mechanism of Burns among burn victims from 10 different studies which included 36,391 patients from various regions of Pakistan, over the time span of 32 years (1990-2022).

According to our study, most of the patients were from ICT. The main reason for the huge sample size of 27935 was because the main burn centre of the country with maximum facilities is in the capital of Pakistan. From the peripheries with a lack of facilities, people head toward the capital city for better and more effective treatment. We didn't have any data from Balochistan, AJK or Gilgit-Baltistan which hinders the generalizability of the collected data.

There were different patterns of burn injuries in which flame burns remained at the number one spot with a percentage of 58.3%. The major reason for flame burns is due to the large use of gas cylinders not only at home but also in vehicles as it is a cheap source of fuel unfortunately it results in cylinder blasts and gas leaks which can be deadly.¹³ Two of our findings are similar to the study of Shankar et al., which took place in the two hospitals of Belgaum City of India, where flame burns were the most common cause of burn injuries with a huge of percentage of 82.3%.¹⁴ Whereas in contrast to our study, there is an article by Rezaee et al., states that showed scalds were the most common type of burn injury with the leading percentage of 49.4%.¹⁵ Adding on to this article there is another contrary study done by Yuce et al., clearly mentioned that scald burns were the most frequent type of burn injury with a percentage of 44.2%.¹⁶ There was male dominance in burn injuries in our systemic review accounting for 56.7% of males. According to the study by Zheng et al., it showed that 67.1 % of burn victims were males and 32.9% were females.¹⁷ In our all selected 10 articles, males are dominant in burn injuries. Males are the majority as they do manual work as their occupation, e.g. dealing with automobiles, cylinder works and

much more.¹⁸ According to the study by Vietnam National Burn Hospital, 72.8% of burn victims were males.¹⁹ Another study by Rezaee et al states male dominance of 59.4%.¹⁵ Similarly, the study by Yuce et al, the male dominates with a percentage of 68.6%.¹⁶ Mortality rates in these studies are fluctuating with the passage of time so there's no specific trend from 1990 till 2022. The overall mortality rate was 26.1%, which is like the study of Khaliq et al., which shows a mortality rate of 26.38%.²¹ The high overall mortality rate is due to a lack of resources, a management system and the unavailability of burn centres all over the country. Another study by Forbinake et al., a Cameroonian experience, states that the mortality rate was 23.4%.²² The TBSA of burn injury varies from study to study but the mean was 29.6 %, which is similar to the TBSA percentage of the study of Iqbal et al, which is 26.7%.²² A study done by Bailey et al in Bangladesh states a high TBSA of 46.4 %.²³ Another study of Gurbuz et al., done in Adana city training and research hospital of Turkey showed a mean TBSA of 16.0%(SD=18.2%)²⁴. Various studies showed a positive relationship between TBSA and mortality, the more the TBSA is, the more the mortality rate (P value=0.01).

Conclusion

It is concluded from our systematic review that there is a strong need for a national burn survey, as there is a lack of data from the remote areas of the country as we are only being able to analyze data from three major provincial areas. Burn policies need to be set by the policymakers to control, manage and record burn cases. The record of cases is a major factor to investigate as we must know the burden of the problem so that we can work on it. More studies are to be done to identify the burns burden. Basic epidemiological data can act as a basis to design preventive measures in the country.

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