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# Death from Burns: A Twenty Years Autopsy Study in Faisalabad, Pakistan

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## ABSTRACT

**Objective:** To determine the epidemiology of deaths due to Burns in the city of Faisalabad, Pakistan for the last twenty years. **Study Design:** Observational, descriptive, retrospective analysis. **Setting:** Post-Mortem Unit, Allied Hospital, Faisalabad. **Period:** 01st January 1997 to 31st December 2016. **Methodology:** 106 cases of deaths due to burns were labeled on the basis of police inquest, autopsy findings and interviews with relatives and friends of victim. The study is based on autopsy reports analysis in detail along with related data in the department. Cases were grouped on the basis of age, sex, manner of death, type of burns and seasonality. Findings were tabulated and analyzed. **Results:** The study revealed that prevalence of death due to fatal burn is only 1.8%, with female preponderance. The peak incidence was in 20-29 years in females and 30-39 years in males. Manner of death was homicide in majority of cases. Dry burns were most common. A seasonal surge in spring was noted. **Conclusion:** In Faisalabad, number of deaths due to burns is very low as compared to other cities of Pakistan. The outcomes of the current study give important knowledge to implement plans for health education involving prevention of burns in high risk groups.

**Keywords:** Burns, Homicide, Death

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## INTRODUCTION

History of burn injuries is as old as human history, when Stone Age man learned about lighting of fire. Modern civilization provided thousands of facilities, those harbor many types of lethality. Accidental fires in sky high buildings, industries and markets result in deaths of hundreds of people all over the world daily and disfiguring and disabling thousands every year.[1-2]

Causing around 265,000 deaths each year, burns are a worldwide public health problem. Most of these deaths take place in low and middle-income countries, particularly the areas lacking required resources to reduce the rate and extent of the problem.[3] Injuries due to burns are predominant cause of medico legal deaths in Pakistan. In Pakistan the age specific mortality rate by fire & heat is 5.8 per 100,000 population according to the report of Global Burden of Disease 2010.[4] Female gender, old age, flame burn, inhalational injury, and total body surface area (TBSA) of more than 40% are some of the reported risk factors.[4,5]

Injury due to dry heat is called a burn, and injury caused by moist heat from hot water, steam and other hot liquids is called Scalding. Living tissues are vulnerable to temperature more than 50°C. Damage to the tissues depends upon the intensity of the temperature and the time for which body remains exposed to source of burn. Damage can occur even at 44°C if contact remains over several hours. [6]

Severity of burn also depends on thickness of skin. Skin of palms and soles, being the thickest, is least affected by heat while skin over flexor surfaces of arms and forearms, being thinnest, is most at risk to be damaged by heat.[6,7]

Most of the deaths that occur due to fire, are caused by inhalation of toxic smoke. Degree of the injury due to fume inhalation is determined by type of fumes, their density and exposure time.[7] Presence of soot particles in respiratory tract below vocal cords on autopsy is the surest sign of death due to burns.[6,7]

Burns have always been considered as one of the most destructive injuries, causing not only deaths but also major economic and psychological impacts and lifelong physical sequelae. Burn injuries are an increasingly recognized public health problem, substantially affecting nearly every population and every geographical zone in the world.[8]

Current study was carried out to analyze the mortality rate associated with injuries caused by

burns to formulate preventive strategies in future. The particular burn cases were analyzed according to age group, sex, type of burns and manner of death, among autopsies conducted in Faisalabad. Measures can be then taken for prevention by observing the factors significantly linked to it.

## METHODOLOGY

**Study Design:** It is an observational, descriptive, retrospective analysis

**Setting:** Post-Mortem Unit, Allied Hospital Faisalabad.

**Study Period:** 01st January 1997 to 31st December 2016

**Inclusion criteria:** All autopsy cases of deaths from thermal, electrical & chemical burns are included in this study.

**Exclusion criteria:** Deaths resulting from causes other than burns are excluded from this study.

**Methodology:** This is a retrospective study of 106 cases of death due to burns. Data is collected from Post-Mortem Unit, Allied Hospital Faisalabad. In our study period, from 01st January 1997 to 31st December 2016, a total of 5797 autopsies were conducted. Out of those, 106 dead bodies were brought with the alleged history of burn injuries. These cases of death due to burns were labeled on the basis of police inquest, autopsy findings and interview with relatives and friends of victim. Our study is based on autopsy reports analysis in detail along with related data recorded in the department. These cases were grouped on the basis of age, sex, manner of death and type of burns.

## RESULTS

In our study period, total 5797 medico-legal autopsies were conducted. Out of those, only 106 (1.8%) cases were brought with the alleged cause of death as burns.

No steady trend was noted in the study period; however maximum number of autopsies (17) was conducted in 2013 followed by 2012 where number of burn cases was 11. In 2004, number of autopsies due to burn was 7 followed by 6 cases each in 1998, 2001 and 2015. In rest of the years, number of burn autopsies was 5 or less. (Fig. 1)

Out of total cases, 39% were males and 61% were females. (Fig. 2)

Overall 44 cases (41.5%) were from age group 20-29 years, however women (33) were three times more than men (11) in this age group. 26 cases (24.5%) were from age group 30-39 years. Most vulnerable age group in females was 20-29 years and in males was 30-39 years. 14 victims (13.2%) were in age group 10-19 years. From age group 0-9, number of cases was 8 (7.5%) followed by age group 40-49 years where 7 cases (6.6%) were brought with the alleged cause of death as burns. Number of cases from rest of age groups, were 2 or less. (Fig. 3)

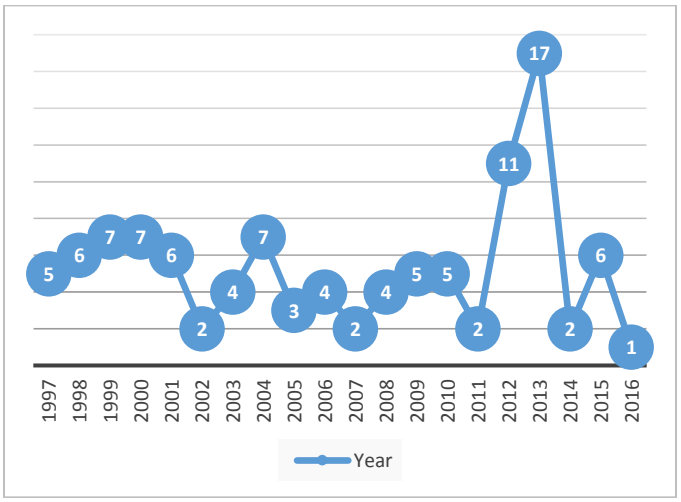


**Figure 1: Year wise Distribution of Burn Cases at Postmortem Unit Allied Hospital Faisalabad during 1997-2016**

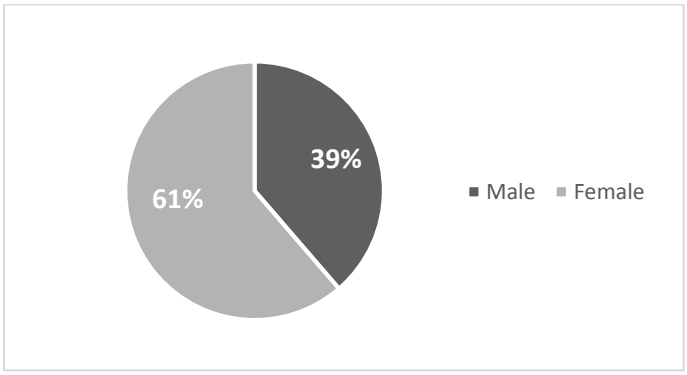


**Figure 2: Gender wise Distribution of Burn Cases at Postmortem Unit Allied Hospital Faisalabad during 1997-2016**

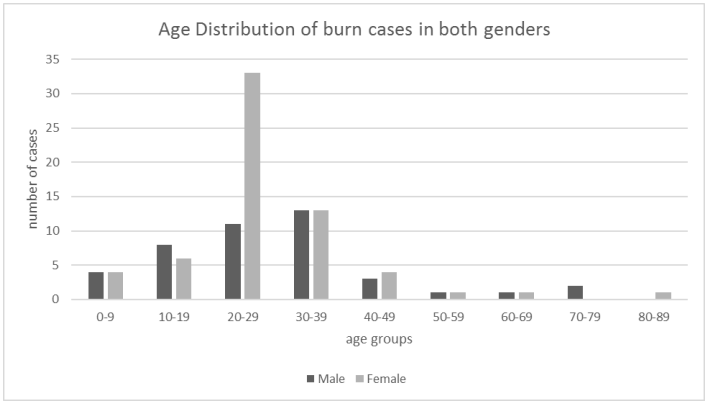


**Figure 3: Age wise Distribution of Burn Cases at Postmortem Unit Allied Hospital Faisalabad during 1997-2016**

Most common manner of death was Homicidal (59%), followed by accidental (28%) and suicidal 13 % cases. (Fig. 4)

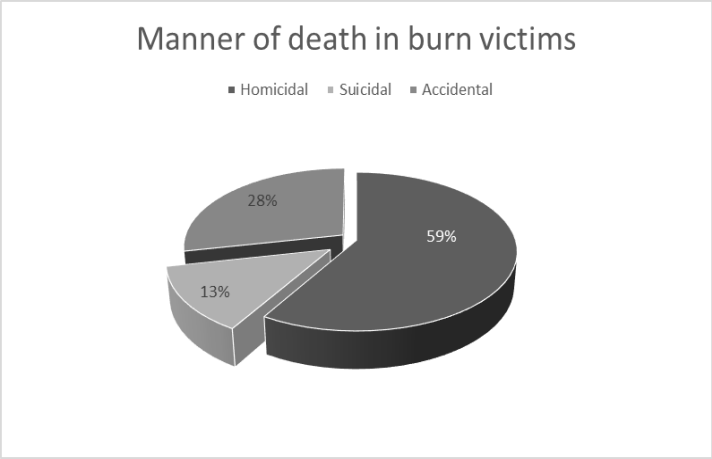


**Figure 4: Manner of Death of Burn Victims at Postmortem Unit Allied Hospital Faisalabad during 1997-2016**

In most of the cases (94) flame/dry burns were found, only 7 cases were of chemical burns. In 5 cases burns were due to hot liquids (scalds). (Fig. 5)

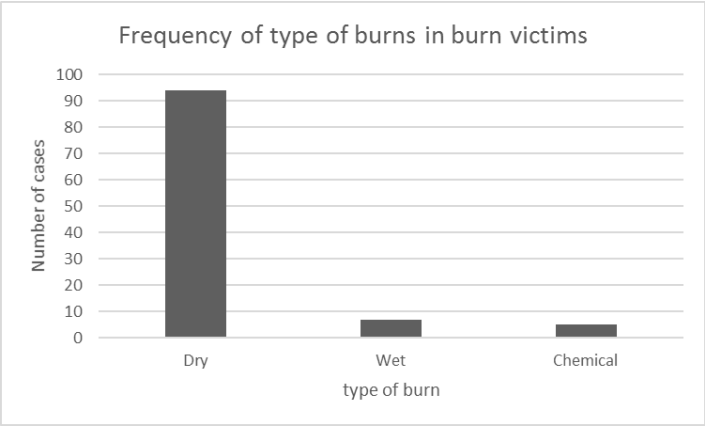


**Figure 5: Frequency of Different Types of Burns at Postmortem Unit Allied Hospital Faisalabad during 1997-2016**

Maximum number of incidents (40) was during Spring season with 17 cases in April, followed by 12 in March and 11 in February. 35 burn cases were found in Summers with 11 in June, 9 in May, 8 in July and 7 in August. 10 cases of burn were found in Autumn season, out of which 7 were in September and only 3 in October. In Winters, total 21 burn cases were seen with 8 cases in December, 7 in January and 6 in the month of November. (Fig. 6)

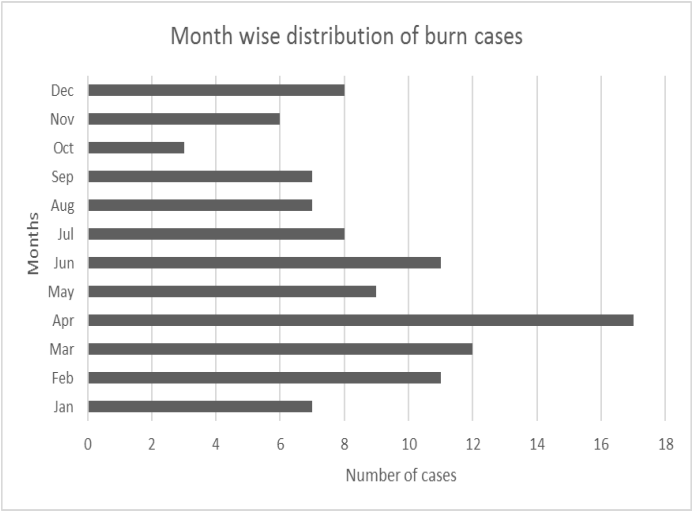


**Figure 6: Month wise Distribution of Burn Cases at Postmortem Unit Allied Hospital Faisalabad during 1997-2016**

## DISCUSSION

Despite being a serious hazard, the causative factors and outcomes of burn injuries remain an area that is not explored much by the research scholars in Pakistan. The purpose of our study is to examine the epidemiology of mortality due to burns in Faisalabad in order to create awareness at mass level.

In our study it is observed that prevalence of death due to fatal burns victims is only 1.8% which is less than other studies held in Egypt[8], Pakistan[5, 9-13] and India.[14-19] Though there is no steady trend seen in number of burn cases each year, but it was highest during 2012 and 2013. Probable reason of higher number of deaths due to burns during this period is fire related accidents taking lives of many family members at the same time.

In the current study, around 66% of the victims were below the age of 40 years. Most vulnerable age group in females was 20-29 years and in males was 30-39 years. Almost similar trends were observed in previous studies from Hazara[1], Karachi[5,9-10], Islamabad[12], Cairo (Egypt) [8] and many cities of India.[14-20] Since these are the years of independent existence and higher activity level, there can be marital, economic and domestic problems. Increasing stress due to day to day problems like unemployment, illiteracy and poverty, which together give rise to greater issues like marital disharmony, violence and carelessness at work place might have resulted in accidents.

The incidence of deaths due to burns was noted to be higher among females throughout the study period and a majority of them were in the reproductive age group. Females are more likely to be affected by burn incidences because of their

household activities in association with fire sources. Secondly, Pakistani women mostly wear dressed like shalwar-kamiz with dupattah, that cover almost the entire body. Such clothes escalate the damage done by the burn injuries. These observations are in concordance with other studies from various regions of Pakistan and India. [5, 9-13, 14-19]

Among the causes of death in Pakistan and India, burn is the only one which not only caused more female deaths than males, but the sex ratio was almost three times higher.[1,5,11-16,19-20] Interestingly, in contrast to this, there are countries like Argentina, Thailand, Uruguay, Saudi Arabian and Spain where 70% of burn victims are male.[8]

Manner of death was homicidal in majority of cases in our study. Two thirds of the victims were females. In our male dominating society, many women become a victim of domestic violence followed by thermal injuries that can be fatal. Same trend was noted in other regions of Pakistan and India.[1, 5, 11-20]

In 28% of cases manner of death was accidental. Similar finding is noted in many other studies. However opposite trend was seen in few studies, where more than 2/3 of mortalities were due to fire related accidents. [10, 14-15] Homicidal cases are also misreported as domestic accidents resulting from stove explosion.

In present study, burning for suicide was used less frequently but almost equally by men and women. All suicidal patients sustained flame burns which was consistent with the studies of other researchers in the region.[9] Reasons for misreporting suicide as accident might be legal, socio-cultural and religious stigma in our society. Families often report suicidal cases as domestic accidents. Probably this is the reason it is difficult to assess the true causes from the existing data. Secondly, people often choose less violent but effective means for suicide.[12]

Homicidal and suicidal burns are not quite infrequent particularly among women of younger age groups. Accidental injuries should always be taken with suspicion. A vigilant approach should be adopted by the forensic clinicians to avoid possibilities of inaccurate conclusions.[11]

Almost 90% cases were of dry/flame burn in our study. Scalds and chemical burns were found only in few cases and formed only 10% collectively. Dry burns were found to be the main reason of death in many other studies as well.[9, 11, 13-17] Reason behind high mortality due to dry burns is inhalational injuries in addition to other damages. Hot liquids and chemicals mostly cause superficial damage which does not prove lethal in most of the cases but results in disfigurement.

In current study a seasonal trend could also be observed showing more deaths due to burns occurring in spring followed by summer. Contrary to this trend from developing countries, burn death incidents were highest in winter months in developed countries. [8, 15]

## CONCLUSION

Burn injuries are one of the major sources of morbidity and mortality and have become an important public health consideration.[13] Homicide from burns seem to be common amid females of this region. Further research is needed to analyze the state of affairs and the usefulness of any precautionary measure adopted involving high risk groups' especially young females.

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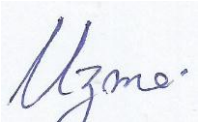
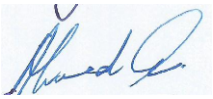
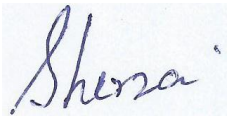
| **Dr. Uzma Masud**<br>Assistant Professor,<br>Independent Medical College<br>Faisalabad | Writing discussion |  |
| **Prof. Dr. Ahmad Saeed**<br>Head of Forensic Medicine<br>Faisalabad Medical University, Faisalabad | Data collection |  |
| **Dr. Shirza Nadeem**<br>Assistant Professor Forensic Medicine<br>University of Medical & Dental College,<br>Faisalabad | Final Layout |  |