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Audit of burn deaths among older adults in North India – An autopsy-based study

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Abstract *Objective:* Burn injury among older adults above 60 years of age will result in notable morbidity and mortality despite the many advances in treatment. The motive of this study was to record and assess the causes and magnitude of the fatal burns in older adults.
Methods: This study was carried out on older adults who were autopsied at Forensic Medicine & Toxicology Department of King George's Medical University, India. From a total of 26,880 medico legal deaths reported over a period of 6 years 2008–2013, 2695 (10.02%) deaths were due to burns. Among which 77 were older adults who forms the material of this study. The results were presented in Mean ± SD and percentages and analyzed with SPSS 16.0.
Results: In all burn deaths among older adults, 41.6% of the victims were male and 58.4% were female with male: female ratio 1:1.4. Most common manner of deaths among elderly was accident (42.9%) followed by homicide (35.1%) and suicide (22%). Women in all three groups were more to the risk of burn deaths. Causative agents for the accidental deaths were fire in all cases while in suicidal and homicidal deaths the causative agents were sprinkling /pouring of kerosene. 54.7% of the suicidal victim's had burns >70% TBSA (total body surface area).
Conclusion: Results of this study shows that incidence of burn mortality was significantly higher among females. Most common manner of deaths among elderly is accident. Women in all three groups are more to the risk of burn deaths. Majority of burn victims were between the ages of 60–69 years. The percentage of TBSA was found to be significantly higher among suicidal subjects. Results of this study provide the necessary information to implement programs for health education relating to prevention of burns.

1. Introduction

Burns have always been considered as one of the most important health problems, causing not only morbidity and mortality but also crucial economic and psychological impacts and long-term somatic sequel as well.[1] Approximately 300,000

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people die from fire related burns. The vast majority occur in low- and middle-income countries.[2]

Burns occur in all age groups and may vary in seriousness. Older adults above 60 years of age are at high risk for thermal injury and experience significant burn-related morbidity and mortality.[3] A 10-year analysis (1995–2005) of the National Burn Repository of the American Burn Association revealed that individuals over the age of 65 comprise 9.9% of all burn unit admissions, and have a mean age of 76.4 ± 6.6 years.[4] Burns and other fire-related injuries are currently the second-leading cause of death from home accidents among older adults and the fourth most common type of trauma worldwide, following traffic accidents, falls, and interpersonal violence.[5]

With the steady growth of the older adult population, questions regarding burn prevention and treatment among older individuals have become important.[6] Numerous studies have been outlined from different parts of India[7–9] on various aspect of burn but there is lack of information especially on fatal elderly victims from the Lucknow region. No study has described the characteristics of older adults who die in fires.

Hence, this study was designed with a purpose to know the magnitude and the socio-cultural factors of the problem of burns in older adults, so that a sound prevention program could be suggested, planned and implemented for reducing the incidence of fatal burns.

2. Methodology

A retrospective study was carried out on older adults who were autopsied according at Forensic Medicine & Toxicology Department of King George's Medical University, Lucknow, India. Lucknow, the capital of Uttar Pradesh, has resident population of 4,588,455 according to 2011 census. Although the total area covered by the Lucknow district is only about 2,528 square kilometers (976 sq mi), the population density was much above that of the 1815 inhabitants per square kilometer (4700/sq mi).[7]

An in-depth examination of the epidemiological features and medicolegal aspects of these 77 burn deaths was performed in an effort to more clearly understand the dynamics surrounding these deaths. Data were collected from the autopsy reports, case sheets from the hospital, the general prosecutor's investigations report and the inquest reports from police by the enumerators. All enumerators were college students and were trained by the investigator. The data collected were thoroughly cleaned and entered into MS-Excel spread sheets and analysis was carried out using the Statistical Package for Social Science (SPSS) Version 16.0(Chicago, Inc., USA) and Microsoft Excel. The results are presented in mean ± SD and percentages. A *P*-value less than 0.05 were considered statistically significant. In our study, in all the cases, the victims' families were interviewed and the case-notes were examined to find out the information by the investigator. Thus, it is unlikely that suicidal attempts and homicidal deaths were under represented in the study.

3. Results

From a total of 26,880 medico legal deaths reported at the mortuary of King George's Medical University, over a period of 6 years 2008–2013, 2695 (10.02%) deaths were due to burns. Out of which 77 were older adults which forms the material of this study. 17 (22.1%) suffered as a result of suicidal death. They formed group A. The other groups (group B & C) comprised of cases with accidental and homicidal intent (n = 33 (42.9%) & 27 (35%) respectively).

3.1. Demographics

The age and sex distribution are given in Tables 1 and 2. The population incidence of burn mortality was significantly higher among females (58.4%) compared with males (41.6%), with male: female ratio 1:1.4. Most common manner of deaths among elderly is accident (42.9%) followed by homicide (35%) and suicide (22.1%).

Suicide cases are more common in females (70.6%). Women in all three groups are more at the risk of burn deaths. The high risk for females is associated with open fire cooking, or inherently unsafe cook stoves, which can ignite loose clothing. Open flames used for heating and lighting also pose risks, and self-directed or interpersonal violence are also factors. The age of victims ranges from 60 to ⩾75 years. 71.4% of the burn victims were between the ages of 60–69 years. 22 (28.6%) of cases were observed in the extreme age groups outside ⩾70 years.

In this study, 66.7% cases of homicidal death belonged to the urban community as compared to 42.4% of accidental deaths and 52.9% of suicidal deaths while there are more accidental deaths 57.6% in rural areas as compared to suicidal and homicidal deaths.

The group C is highly educated as compared to group B & A.

As shown in Fig. 1 and 16.1% cases of non-intentional death belonged to the low socio-economic status as compared to 9.1% of suicidal deaths and 5.70% of homicidal deaths while there are more homicidal deaths 31% in upper and upper middle status as compared to suicidal and accidental deaths.

Table 1 Manner of burn related deaths in elderly.

Gender	Suicide		Accident		Homicide	
	No.	%	No.	%	No.	%
Male	5	29.4	15	45.5	12	44.4
Female	12	70.6	18	54.5	15	55.6
Total	17		33		27	

P = 0.51 (Chi-square test).

Table 2 Distribution of burn deaths according to age.

Age in years	Suicide		Accident		Homicide	
	No.	%	No.	%	No.	%
60–69	11	64.7	26	78.8	18	66.6
70 above	6	35.3	7	21.2	9	33.3

P = 0.39 (Chi-square test).