A Prospective Study of Burn Deaths with Special Reference to Manner of Death and Duration of Survival

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Abstract

Around 0.2 million people are admitted in hospital due to burns, of which about 5000 people die every year.[4] Extent of Total Body Surface Area involved is an important parameter, that affects the prognosis in case of burn injury. The majority of fire related deaths are accidental, usually due to carelessness. Suicidal burns are mostly seen in domestic situations and in females. Homicidal burns are rare; mostly accomplished to take revenge or to conceal crime. So, this study was carried out with the aim to estimate the total body surface area affected & duration of survival / hospital stay and to find out the manner of death in burn cases.

It was found that 79.00% cases had burn injuries covering 60– 100% of the total body surface area (TBSA). Maximum percentage of burns was seen in females (30.00% cases) with TBSA of 80-90%. 95% cases were hospitalized with 75.00% having the hospitalization period of 1 – 10 days and maximum number of cases (33%) survived for a period of 3 to 5 days. In most of the cases (64.00%), the manner of death was accidental followed by suicidal (34.00%), with only 2% cases of homicidal burns.

Keywords: *burn deaths, manner of death, total body surface area, duration of survivl.*

Introduction

Burns are a serious health problem having physical, emotional and psychological impact on sufferers. More than 20 lakhs people sustain burn injuries, nationwide every year. Nearly, 0.5 million people were treated as outdoor patients. Around 0.2 million people are admitted in hospital, of which about 5000 people die every year.[4]

Extent of Total Body Surface Area involved is most important parameter that affects the prognosis in case of burn injury. There is marked fluid loss resulting in shock, in case more than 20 per cent of the body is affected and usually more than 50 per cent is fatal. Generally speaking, involvement of about one-third (33%) of total body surface area has grave prognosis and about 50% involvement of total body surface area is expected to be fatal in present Indian circumstances. However, with recent advances in modalities of treatment, prognosis is expected to improve the prognosis of injury.

Deaths from burns are usually accidental but may be of suicidal or homicidal origin.The majority of fire related deaths are accidental and there is typically abundant collateral evidence, from police and fire brigade investigations, to exclude suicide or homicide. These deaths are usually the result of carelessness, in allowing clothing to brush against fires, in manipulating matches or other lighted objects such as cigarettes, maintaining faulty electrical and heating appliances, as well as being unable to effectively combat or escape a fire.

Alcoholics and other individuals under the influence of drink or drugs are at risk. Occasionally a natural

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disease such as epilepsy or a myocardial infarction may cause the victim to collapse onto a heater, starting a fire; the same natural disease may explain failure to escape the fire.[13]

Suicide by burns is mostly seen in domestic situations like bedroom, bathroom or kitchen. Self immolation as protest against some social injustice is also common. It is common in females especially amongst newlyweds because of marital disputes and inflammable material being very much in reach. Generally fuel is poured on head and it reaches other part of body tricking downwards. Hence, the body catches fire all at a time. Smell of fuel will be present particularly in scalp hairs and clothing worn at the time of incidence. Soles may be spared, but the percentage of area involved is generally more than 60%.

Homicidal burns are relatively rare and seen in cases where paraffin or some other inflammable material is thrown over victim and his/her clothing then set alight[14]. It is not unusual for murderer to try to dispose off the body of the victim by fire to conceal crime. At times, some people may cause burn injuries on a dead body and then produce it before the police to support a false charge of murder against his adversary. In both the cases, care should be taken to distinguish between ante mortem and postmortem burns to show that the victim was or was not alive at the time of fire.[8]

Hence, this autopsy based cross sectional study was planned with the aim to estimate the total body surface area affected & duration of survival / hospital stay and to find out the manner of death in burn cases.

Material and Methods

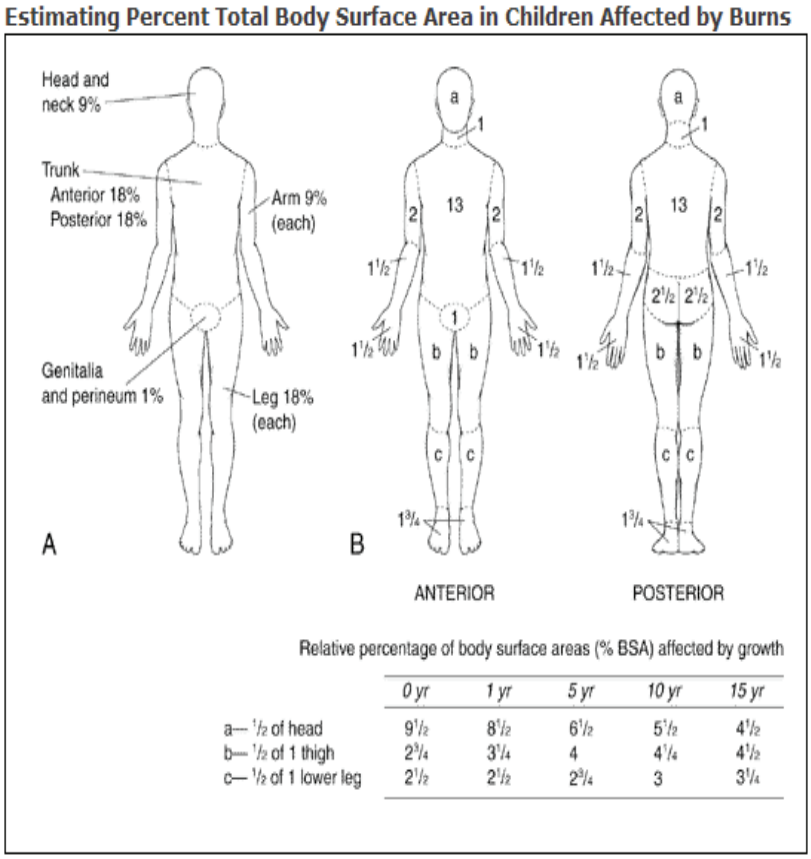
This prospective study was conducted in the Department of Forensic Medicine and Toxicology, at Gandhi Medical College & Hamidia Hospital, Bhopal for a period of 1.6 years. Cases of burns either admitted or directly brought dead to the institute, cases with proper hospital records and cases of spot death due to burns were included. Out of all those, 100 cases were selected by simple random sampling, for the study.

Detailed information regarding the demographic profile of the cases, date, time and place of incidence, duration of hospital stay, cause and manner of death was gathered using a questionnaire; from the case dairies of police that included the inquest papers and dying declaration of deceased, hospital records, autopsy reports and history given by relatives and police accompanying the body.

To estimate the extent of body surface area affected by burns, **Rule of Nines[15]** given by Alexander Wallace (Fig. 1A)[15] was applied; the body being divided into different areas, each representing nine per cent. Head including face and neck 9%, Chest, front & Back each 9%, Abdomen, front & Back each 9%, Upper limbs, Right & Left each 9%, Lower limbs, right & Left each 18%, External genitalia 01%, Total = 100%. For children (less than 15 years of age) and Infants, **Lund and Browder chart[9]** was used (Fig. 1B) [9].

Results And Discussion

On analyzing the collected data, following observations were made:

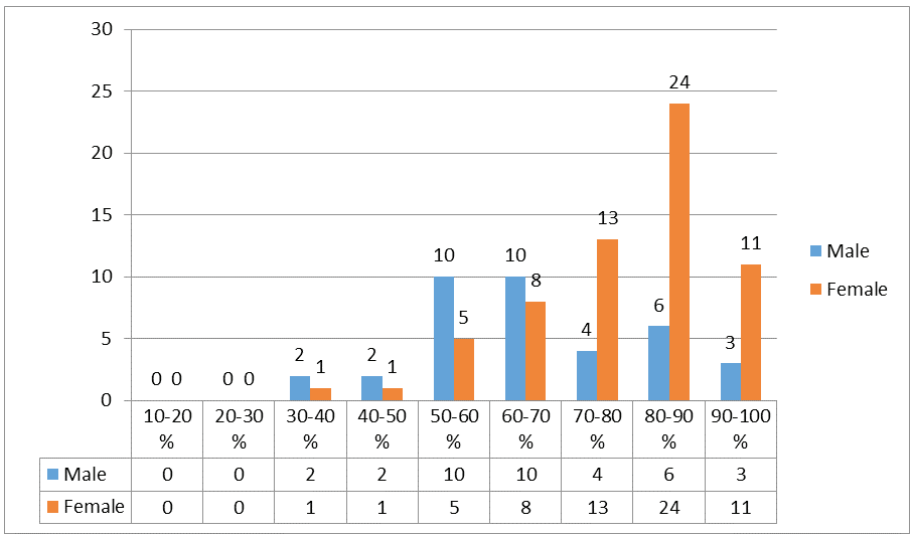


(A) Rule of "nines"

(B) Lund-Browder diagram for estimating extent of burns

Figure- 1 depicts Estimation of total body surface area in Adults and Children (A- Rule of Nine and B- Lund and Browder) [9.15]

I. Distribution of cases according to Total Body Surface Area (TBSA) affected by Burns



	10-20 %	20-30 %	30-40 %	40-50 %	50-60 %	60-70 %	70-80 %	80-90 %	90-100 %
Male	0	0	2	2	10	10	4	6	3
Female	0	0	1	1	5	8	13	24	11

Graph-1: Distribution of cases according to Total Body Surface Area affected by Burns

In the present study, majority i.e. 79 (79.00%) cases, had burn injuries covering 60– 100% of the total body surface area (TBSA). Maximum percentage of burns was seen in females i.e. 30 (30.00%) cases with 80-90% TBSA; as compared to males where 20 (20.00%) cases with 50-70 % TBSA were seen. TBSA of 35% (minimum in this study) was seen in males and 100% TBSA seen in females.

This observation was somewhat similar to the study of Harish D et al (2013)[7] where 22% (85) victims had 61- 70% TBSA, followed by 71- 80% TBSA in 17% (64) cases i.e. majority of the victims (about 40%) had burn injuries covering 61– 80% of the total body surface area. Memchoubi and H. Nabachandra (2007)[12] observed that in 73.84% cases, >80% body surface area was involved. Mazumder A and Patowary A (2013)[11] observed in most of the victims the burn injury covers 90-100% of the total body surface area followed closely by 50-60% of the total body surface area involvement.

Chawla R et al (2011)[4] found that in males, maximum 10% cases suffered burns to the extent of 0-50%, followed by 8% to the extent of 81-90% TBSA. In females, maximum 26% cases fell in the category of 91-100% of TBSA. Gowri S et al (2012)[6] reported that 39% of males with total burn surface area <19% whereas in 40% females, total burn surface area was >61%.

Chaudhary BL et al (2013)[3] in their study reported that 96 (46.37%) cases had total body surface area of burn between 90 to 100% followed by 80-90% in 29 (14.00%) cases. Buchade D et al (2011)[2] observed that 51 to 75% burns found in133 (56.12%) cases. Mangal HM et al (2007)[10] notedthat 232 cases (77.33 %) had >50 % of body surface area, while in 48 cases (16 %) 40-50 % body surface area was burnt and in only 20 cases (6.67%) the involved body surface area was <40%.

II. Distribution of cases in accordance with Duration of Hospitalization (Survival)

Table-1 Distribution of cases in accordance with Duration of Hospitalization(Survival)

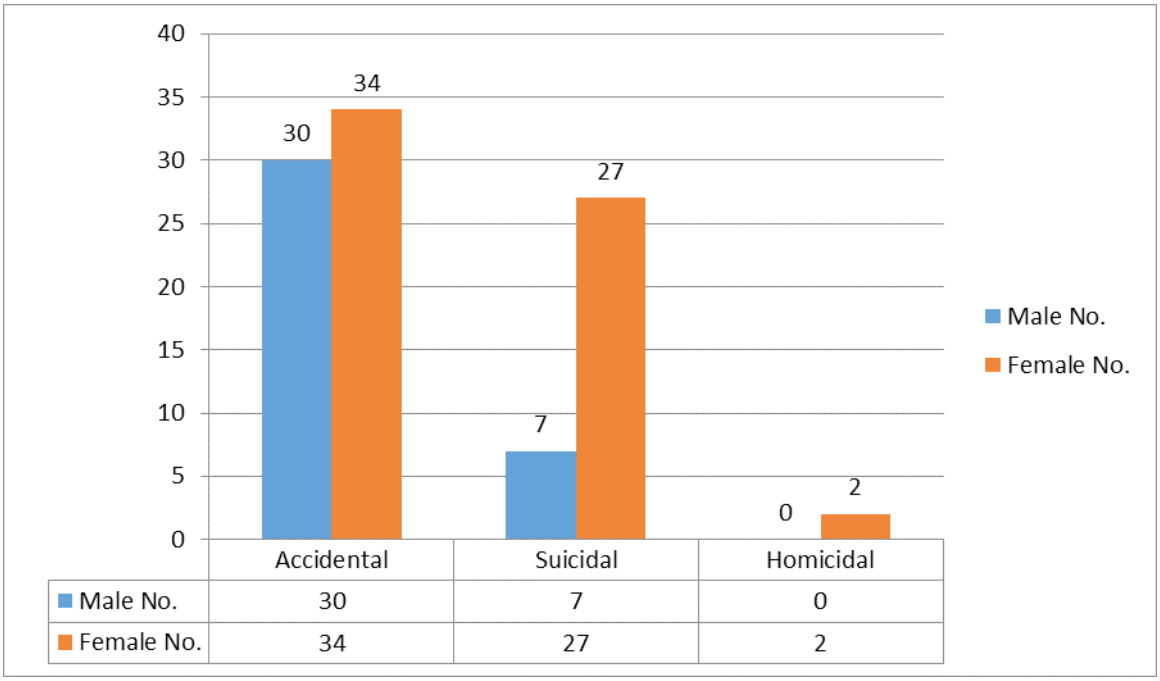
Duration	Number of Cases	Percentage of cases
Bought Dead	2	2 %
<24 hours	11	11 %
1-3 days	27	27 %
3-5 days	33	33 %
5-7 days	6	6 %
7-10 days	9	9 %
10-15 days	4	4 %
15-30 days	6	6 %
>30 days	2	2 %
Total	100	100%

95 cases were hospitalized (95%), two cases were of spot death and 3 cases were declared brought dead at casualty. Majority i.e. 75 (75.00%) cases had the hospitalization period of 1 – 10 days. 11 (11.00%) cases succumbed to death in less than 24 hours. Maximum duration of hospitalization after sustaining burns was 45 days.

Harish D et al (2013)[7] made similar observation that majority of patients i.e. 102 (24%) surviving for more than a week before succumbing to the death and 31 (8%) cases died within the 1st 24 hours of sustaining burn injuries. Chaudhary BL et al (2013)[3] observed in their study that 150 (72.46%) cases of burns died in hospital after admission during course of treatment while 57 (27.53%) cases died on the spot and declared brought dead in hospital. In 42 cases (20.28%) period of survival after sustaining burn injury was between 7 to 15 days followed by 39 (18.84%) cases where survival period was 3 to 7 days. The maximum period of survival was 59 days in a single case.

On the contrary, Memchoubi and H. Nabachandra (2007)[12] in their study observed that 49.23% victims died within an hour of sustaining burns whereas 21.53% cases survived for more than 1 week. Chawla R et al (2011)[4] reported that 40% cases died within few minutes to 24 hours of sustaining burns, 24% cases died within a week and 20% cases died within 2 weeks. 12% cases died within 3 weeks and beyond.

III. Distribution of cases on the basis of Manner of Infliction of burns



	Accidental	Suicidal	Homicidal
Male No.	30	7	0
Female No.	34	27	2

Graph-2: Distribution of cases on the basis of Manner of Infliction of burns

On the basis of history, police investigations and postmortem findings, it was observed that in most of the cases i.e. 64 cases (64.00%), the manner of death was accidental, followed by suicidal in 34 cases (34.00%). Out of 34 suicidal cases, 33 (97.00%) cases had alleged history of pouring of kerosene and then setting fire. Homicidal burns were seen in 2 cases, who were newly married females.

This finding of the present study is similar to Chaudhary BL et al (2013)[3] who observed accidental burns in 72.94% cases, followed by suicidal in 17.39% and homicidal in 9.66% cases. Buchade D et al (2011)[2], also found that most common manner of the burn was accidental in 147 (62.02%) cases, followed by suicidal in 62 (26.16%) and homicidal in 28 (11.82%) cases. Mangal HM et al (2007)[10] conducted their study on 300 cases and observed that in most of the burn victims, the manner of death was accidental in 183 cases (61%), followed by suicidal in 105 cases (35%) and homicidal in only 12 (4%) cases. Similar observations were made by Das KC (1998)[5] and Bangal RS (1995)[1].

It is very difficult to state that a burn injury is accidental or suicidal or homicidal in nature, until and unless an eye witness is there. At times, the only way to prove homicidal nature is the Dying Declaration, which is very difficult to obtain either due to unconsciousness of victim, negligence or lack of knowledge on the part of the police. The higher number of accidental deaths especially in females may be due to their involvement in domestic cooking work responsible for accidental cases; and suicidal incidents might be because of marital mal-adjustment resulting in suicidal or bride burning cases owing to dowry disputes.

Conclusion

From the present study, it is evident that maximum number of cases (79.00%), had burn injuries covering 60– 100% of the total body surface area (TBSA), with TBSA of 80-90% seen predominantly in females. 75.00% cases had the hospitalization period of 1 – 10 days. 11.00% cases succumbed to death in less than 24 hours. Maximum duration of hospitalization after sustaining burns was 45 days. The manner of death was accidental in majority (64.00%), followed by suicidal (34.00%) and least numbers were homicidal (2%).

Similarly, Harish D et al (2013)[7], Memchoubi and H. Nabachandra (2007)[12], Mazumder A and Patowary A (2013)[11] in their study also reported TBSA of more than 60% in maximum cases. Chawla R et al (2011)[4] and Gowri S et al (2012)[6] also observed maximum % TBSA in females. Chaudhary BL et al (2013)[17] also noted survival/ hospitalization period of 7-15 days in majority of the cases, quite similar to the present study. Buchade D et al (2011)[2], Mangal HM et al (2007)[10], Das KC (1996)[5] and Bangal RS (1995)[1] in their respective studies, also found accidental burns to be the most common manner of death,

With advanced burn care, survival rate in patients less than 60% TBSA of burns and without any significant comorbidities, have improved up to a great extent. But still there's a long way to go to achieve the targets. Educating masses regarding safety precautions to be taken while handling fire; and counseling by experts to control the in- built aggression in individuals and to inculcate awareness; is the need of the hour.

Conflict of Interest : None

Source of Funding: self with assistance from the institute.

Ethical Clearance: The study protocol was approved by the Institutional Ethics Committee of Gandhi Medical College, Bhopal.

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