

Study of Burn Cases during Autopsy in Relation to Manner of Death

Mohan Kumar Hansda*, Niranjan Sahoo*, Bibhuti Bhusana Panda**, Srimannarayan Mishra***

Abstract

Background: Burn has tremendous importance in medico legal point of view as it is one of common cause of unnatural death and a major health problem in India. Setting of fire to self (*self-immolation*) in public is done to attract the attention of government and media regarding political affairs, personal problem. Sometimes people resort criminal act like murder, rape and for concealing the fact they want to burn the body of crime. Most often circumstance of burn is mysterious, obscurity and even untruthful statement. **Materials used:** Only those cases of burn which are ante-mortem and are confirmed to be so, after autopsy. **Observation:** The highest incidence occurred in the age group of 21-30 years (44%). About 70% of thermal burn incidence occurred in the kitchen. Most of the burn injuries are accidental in nature (70.67%). In suicidal and alleged homicidal majority of them are female. Major cases of accident burn are due to burst of kerosene stove (92%). Abdomen was frequently involved followed by extremities. Scalp hair, eye brow and eye lashes are involved in nearly 100% cases of suicidal and alleged homicidal burn but in accidental cases scalp hair is involved in (83.01%) and eye brows, eye lashes in 79.99% cases. Blackening of skin (20%), Heat rupture (0.67%) and pugilistic attitude was found in (3.33%) of cases. Soot in trachea is found in 20% of cases, Glottis edema in 2%, generalized congestion in 94.66% and generalized pallor in 5.34% cases. **Conclusion:** Awareness should be made to avoid such deaths. The extreme method of suicide can be avoided by proper counseling.

Keywords: Ante-Mortem Burn; Awareness; Education; Manner of Death.

Introduction

Burn has tremendous importance in medico legal point of view as it is one of common cause of unnatural death and a major health problem in India. Setting of fire to self (*self-immolation*) in public is done to attract the attention of government and media regarding political affairs, personal problem. Female mostly suffer accidental burn because of nature of work of women in society. Large portion of burn injuries are related to the nature of domestic

appliances used in our country. Socio-cultural factors like use of crackers in festivals, use of diyas for offering puja, custom of wearing saree and dupatta, huge social, cultural and religious gathering are also contributing factor.

Homicidal burning of married women in our country is major concern for the police, government and forensic experts. Sometimes people resort criminal act like murder, rape and for concealing the fact they want to burn the body of crime. Only by conducting post-mortem meticulously we can arrive at proper diagnosis whether it is postmortem or antemortem burn. Most often circumstance of burn is mysterious, obscurity and even untruthful statement. Investigations of such cases are difficult because of false statement and counter allegation from complainant and accused person.

There is no clear cut demarcation between accidental, suicidal, and homicidal burn. To prove or disprove detail study of burn injury is necessary which will throw light on manner of death. Sometimes we are facing legal problem while

Authors Affiliation: *Assistant Professor, ***Junior Resident, Department of Forensic Medicine and Toxicology, IMS & SUM Hospital, Bhubaneswar, Odisha, India. **Assistant Professor, Department of Forensic Medicine and Toxicology, Hi-Tech Medical College, Bhubaneswar, Odisha, India.

Reprints Requests: Niranjan Sahoo, Assistant Professor, Department of Forensic Medicine and Toxicology, IMS & SUM Hospital, Bhubaneswar - 751003, Odisha, India.

E-mail: nira.cuttack@gmail.com

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attending in court of law which demands clear cut knowledge between homicide from suicidal and accidental burn. Hence our study may solve some of the purpose.

Material & Methods

The study was undertaken in the Department of FMT, S.C.B. MCH Cuttack, Odisha during the period from December 2009 to November 2011. The case of autopsy with the death of thermal burn either due to flame and scald was taken into account in this study.

Inclusion Criteria

Only those cases of burn are included in the study those who were ante-mortem and were confirmed to be so, after autopsy.

Exclusion Criteria

Alleged Post mortem burn cases, lightening, decomposed, electrocution were excluded.

After detail observation of the victim the findings were expressed in tabular form with respective to age, sex, marital status etc. The findings were analyzed and different inference is drawn with this observation.

Result & Discussion

Causative Agent According to the Manner of Death

Kerosene (22%) was the major agent found in burn followed by L.P.G gas (4%) and petrol (0.67%).

Singh D. [1] observed that Kerosene (76%) was most common factor in burn death. 11% of death occurred due to Stove bursting and 27% of death occurs due to leakage of oil from stove. Kumar V. [2] studied 152 cases and observed that smell of kerosene was found in 41 (26.9%) of burnt married female. Among homicide 20(42.55%) cases were found to have odor of Kerosene in clothes and tuft of hair. In 21(62.62%) of suicidal cases kerosene oil is found on clothes and hairs.

Virendra K., Tripathi C.B. [3] reported on their study that 57.44% of homicidal burnt wives have smell of kerosene either on their scalp or on clothing's. Ambade V.N., Godbole H.V.[4] reported in their study that kerosene was main causative factors for burning. Shaha K.K., Mohanty S. [5] in their study revealed that Kerosene was main factor for homicide burn.

Hosseini R.S. [6] in their study found that out of 167 cases, 130 (77.8%) burnt cases were caused by oil and gasoline 28 (16.8%) by gas explosion. 9 (5.4%) by clothing's catching fire. Chawla R. et al. [7] studied 50 cases and found that in 4% of cases smell of kerosene is present.

Kerosene is the inflammable substance most frequently found in my study because it is easily available in every household kitchen.

Marital Status According to Manner of Death

Most number of victims died were accidental (70.67%) in nature, follows suicidal (17.33%) and alleged homicidal (12%). Maximum married female (62.26%) victims died accidentally, followed by unmarried female (19.81%), unmarried male (11.32%) and married male (6.60%). Most of suicidal burn victims were married female (69.23%) followed by unmarried female (23.07%), male (7.68%). All the victims of alleged homicidal are married female.

Subrahmanyam M. [8] studied 175 cases and reported that 79.4% of burns were accidental in nature. Singh D. et al (1998) reported that (80%) of cases were accidental in nature followed by (16.2%) cases were suicidal and (4.1%) were homicidal burn.

Kumar V. et al [2] analysed 152 cases and found that 70(46.05%) died accidentally, 47(30.95%) died due to homicidal burn, 32(21.05%) died due to suicidal burn and rest 3% unknown. Kulshrestha P. et al[9] studied 117 cases and reported that 69(58.97%) of married female were accidental death followed by 35(29.91%) which are suicidal and 6(5.12%) are homicidal death.

Batra A.K.[10] in a study observed that (50.7%) of cases are accidental, (47.8%) are suicidal and 15% of cases are homicidal in nature. 60% of female adopted suicide by burn. Subrahmanyam M., Joshi A.V.[11] in their study reported (82.6%) of cases as accidental in nature, (15%) of cases as suicidal and (2.4%) as homicidal.

Virendra K, Tripathi C.B. [3] reported in their study that out of 152 burnt wives 31% were homicidal burn. Ambade V.N, Godbole H.V. [4] is their report found that (75%) of death are due to accidental burn followed by suicidal and homicidal burn.

Kumar V. et al [12] in their study revealed that majority of burn incident were accidental (75.8%) followed by suicidal (11.5%) and homicidal (3.1%). Srivastava K., Arora P.[13] observed in their study that (44.06%) of death is due to burning in married female about 11.89% were suicidal 9.09 are homicidal

and 23.08% are accidental deaths.

Mangal H.M. et al [14] in their study observed that (61%) of cases are accidental death followed by (35%) of cases are suicidal and (4%) are homicidal death. Menchoubi Ph., Nabachandra H.[15] in their study observed that (35.38%) of death are accidental in nature, (29.23%) of death are homicidal and (24.6%) of cases are suicidal in nature.

Palimer V. et al [16] in their study reported that (92.8%) 39 cases are accidental death. Shirkhoda M. et al [17] and others in their study found that out of 303 cases. 165 deaths are accidental, 138 cases are suicidal in nature.

In the present study it shows that in all manner of death married women were mostly affected because of lack of safety measures, torture, dowry demand, mental instability, domestic disharmony, mal-adjustment and heavy and loose clothing's.

Age Wise Distribution According to the Manner of Death

It is observed that majority of accidental victims belong to 11-40 years (84.06%), out of which most of them were 21-30 years group (42.45%), least victim belongs to <10 yrs, 71-80 yrs, >80 yrs age group (1.87%) each.

Most of the suicidal victim belongs to 11-40 years age group, out of which (50%) belongs to 21-30 years group, least number of victims belong to 41-50 years (7.70%). Alleged homicidal victim belongs to age group of 11-30 years (88.88%), least victim belong to 31-40 years age group (11.12%).

Majority of victims belong to 21-30 years group because around half of the day is spent in kitchen, most of them were married, lack of awareness, maintaining low standard of safety measure. This age group is generally more active and exposed to hazardous atmosphere. Suicidal burn is more in this age group because of marital disharmony, mal-adjustment in initial year of marriage. Alleged homicidal burn was mainly due to torture and demand of extra dowry.

Place of Incidence According to Manner of Death

Highest number of accidental (69.82%), suicidal (61.54%) and alleged accidental (83.33%) burn injury occurred in kitchen followed by (16.04%) accidental, (34.62%) suicidal occurred in living room. (7.54%) of accidental burn occurred in open space. Least number of burn injury occurred in living room cum kitchen. No cases of suicidal, alleged homicide were recorded

in open space.

Most of the accidental death occurred in kitchen because of wearing loose clothing, using defective kerosene stove, cooking in conventional Chula, and lack of awareness and safety measures. Suicidal and alleged homicidal death occurs because it is a secluded place, no one can know what had actually happened and lot of things can be concealed and falsely alleged.

Body Surface Involved According to Manner of Death

In accidental burn wide range of involvement of body surface area is found i.e. 41- 100%. But in suicidal and alleged homicidal it involves >90% of total body surface area. Among suicide and alleged homicide victim if meticulous observation is done we find that in suicide case involvement of body surface is > 90% where as in alleged homicide cases the body surface area involved is >80%.

Present observation have similar finding with Kumar V. et al [2], and Shaha K.K. et al [5].

In accidental cases there shows wide range of involvement of body surface because victim tries to save therefore less area is involved. But in cases of suicide victim's intention is to die so maximum area is involved. In alleged homicide cases victim is unable to escape.

Involvement of Body Hair According to the Manner of Death

Scalp hairs (87.33%) were more involved in burn injury than eye brow/ eye lashes (84%) and pubic hair (66.67%). Scalp hair is involved mostly in suicidal burn injury (100%) than in alleged homicidal (94.4%) and accidental case (83.01%). Eye brow and eye lashes are mostly involved in suicidal (100%) burn injury then in alleged homicidal (88.88%) and accidental (79.24%). Pubic hair is mostly involved in alleged homicide (83.33%) than in suicide (80.77%) and accidental (60.34%).

Kumar V. et al [2] studied 152 cases and observed that generalized congestion of viscera is found in large majority of cases 112 (73.68%), out of which 40 (57.14%) were homicidal, 41 (58.57%) were suicidal, 28(87.5%) were accidental. Generalised pallor was found in 39(23.64%) cases out of which most of them were accidental in nature. The present study is similar with Kumar V. et al [2].

All hairs are involved because intention is clear to die; fire is spread in fraction of minute as a result of

inflammable substance and engulfs the whole body.

External Findings According to Manner of Death

Blackening of skin is found in (33.34%) of burn injury, pugilistic attitude is found in (3.33%) and heat rupture is found in (0.67%) of victims. Blackening of skin is widely present in alleged homicidal (50%) burn injury then in suicidal (42.30) and accidental (9.43%). Pugilistic attitude is found in suicidal (7.69%) victims and alleged homicidal (5.55%) burn injury victim and least in accidental (1.88%) victims. Heat rupture was found only on accidental victim (0.94%).

Kumar V. et al [2] studied 152 cases and observed that in 102 (67.10%) of cases there is singeing of hair, it is more found in suicidal cases 93.75%, sooty blackening is found in 86(56.57%) cases, pugilistic attitude is found in 24(15.78%) cases, heat rupture is found in 23(15.15%) cases and heat fracture is found in 2(1.31%) cases

Present series of findings is nearly corresponding with Kumar V. et al [2] and other findings are due to prolong exposure to heat. Blackening of skin is due to inflammable substance used in burning.

Internal Findings According to Manner of Death

Soot in trachea was found in (20%) of burn injury, glottis edema is observed in (2%) of victim. Generalised congestion, generalised pallor, cherry-red color blood, pleural effusion, ascitic fluid, pleural effusion & ascitic fluid is found in (94.66%), (5.34%), (16.67%), (18.67%), (2%), (15.33%) respectively.

Soot particle are more found in alleged homicidal (44.44%) than suicidal (30.76%) and accidental (13.20%). Generalised congestion was commonly observed in suicidal (100%) and alleged homicidal (100%) victims than in accidental (91.50%) burn injury. Cherry-red color of blood was maximally present in alleged homicidal victims (44.44%) followed by suicidal (30.76%) and accidental (8.50%) victims. Effusion of fluid was mostly found in accidental burn injury. Present observation shows nearly similar finding with Kumar V. et al [2].

Generalised congestion is due to bacterial toxins, absorption of toxic substance like CO₂, CO etc. Generalised pallor is due to prolong illness, superimposed by infection, anemia, and severe pain. Carbon soot particles are more found in homicidal and suicidal burn. It is not detectable in large number of cases because of hospitalisation, it gets washed away or the victim did not get sufficient time to inhale carbon particles.

Table 1: Causative agent according to the manner of death

Agents found	Accidental		Suicidal		Alleged Homicidal		Total
	Male	Female	Male	Female	Male	Female	
Kerosene	1 (0.94)	9 (8.94)	0	12 (46.15)	0	11 (61.11)	33 (22%)
Petrol	1 (0.94)	0	0	0	0	0	1 (0.67%)
LPG	2 (1.89)	4 (3.77)	0	0	0	0	6 (4%)
Total	4	13	0	12	0	11	40

Table 2: Marital status according to manner of death

Manner of Death	Male		Female		Total
	Married	Unmarried	Married	Unmarried	
Accidental	7 (6.60%)	12 (11.32%)	66 (62.26%)	21 (19.81%)	106 (70.67%)
Suicidal	1 (3.84%)	1 (3.84%)	18 (69.23%)	6 (23.07%)	26 (17.33%)
Alleged Homicidal	0	0	18 (100%)	0	18 (12%)
Total	8 (5.33%)	13 (8.66%)	102 (68%)	27 (18%)	150 (100%)

Table 3: Age wise distribution according to the manner of death

Age in Yrs	Accidental	Suicidal	Alleged Homicide	Total
<10	2(1.89)	0	0	2(1.33)
11-20	23(21.70)	5(19.23)	8(44.44)	36(24)
21-30	45(42.45)	13(50)	8(44.44)	66(44)
31-40	21(19.81)	06(23.07)	02(11.12)	29(19.33)
41-50	05(4.72)	02(7.70)	0	07(4.67)
51-60	03(2.83)	0	0	03(2)
61-70	03(2.83)	0	0	03(2)
71-80	2(1.87)	0	0	02(1.33)
> 80	2(1.87)	0	0	02(1.33)
Total	106(70.67)	26(17.33)	18(12)	150

Table 4: Place of incidence according to manner of death

Place of Incidence	Accidental	Suicidal	Alleged Homicide	Total
Kitchen	74 (69.82%)	16 (61.54%)	15 (83.33%)	105 (70%)
Living Room	17 (16.04%)	09 (34.61%)	01 (5.55%)	27 (18%)
Living Room cum Kitchen	06 (5.66%)	01 (3.85%)	02 (11.12%)	09 (6%)
Open Space	08 (7.54%)	0	0	08 (5.33%)
Industries	01 (0.94%)	0	0	01 (0.67%)
Total	106 (70.67%)	26 (17.33%)	18 (12%)	150 (100%)

Table 5: Body surface involved according to manner of death

Manner of death	< 30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%	Total
Accidental	1	3	12	8	12	13	20	37	106
Suicidal	0	0	1	1	1	0	9	14	26
Alleged Homicidal	0	0	0	1	0	2	4	11	18

Table 6: Involvement of body hair according to the manner of death

Manner of death	Scalp Hair		Eye brow/Eye lashes		Pubic Hair	
	Involved	Spared	Involved	Spared	Involved	Spared
Accidental	88 (83.01%)	18 (16.99%)	84 (79.24%)	22 (20.76%)	64 (60.34%)	42 (39.62)
Suicidal	26 (100%)	0	26 (100%)	0	21 (80.77%)	5 (19.23)
Alleged Homicidal	17 (94.4%)	1 (6.6%)	16 (88.88%)	2 (11.12%)	15 (83.33%)	3 (16.67%)
Total	131 (87.33%)	19 (12.67%)	126 (84%)	24 (16%)	100 (66.67%)	50 (33.33%)

Table 7: External findings according to manner of death

External Findings	Accidental	Suicidal	Alleged Homicide	Total
Blackening of skin	10 (9.43%)	11(42.30%)	9 (50%)	45 (33.34%)
Pugilistic attitude	2 (1.88%)	2 (7.69%)	1 (5.55%)	5 (3.33%)
Heat rupture	1 (0.94%)	0	0	1 (0.67%)
Total	13	13	10	36

Table 8: Internal findings according to manner of death

Internal Findings	Accidental	Suicidal	Alleged Homicide	Total
Soot in trachea	14(13.20%)	8 (30.76%)	8 (44.44%)	30 (20%)
Glottis edema	2 (1.88%)	2 (7.69%)	1 (5.55%)	3 (2%)
Generalised congestion	97 (91.51%)	12 (100%)	18 (100%)	142 (94.66%)
Generalised Pallor	8 (7.54%)	0	0	8 (5.34%)
cherry red Color blood	9 (8.90%)	8 (30.76%)	8 (44.44%)	25 (16.67%)
Pleural Effusion (P.E)	22(20.75%)	4(15.38)	2(11.11%)	28(18.67%)
Ascitic Fluid (AS.)	2(1.87%)	0	1(5.55%)	3(2%)
P.E + AS.	19(17.92%)	3(11.53%)	1(5.55%)	23(15.33%)

Cherry-red color of blood is due to CO poisoning. Effusion of fluid occurs due to increase permeability of fluid as a result of inflammation by thermal burn.

Conclusion

Female are more prone to burn injury in all manner of death. Awareness should be made to avoid such deaths. The suicidal rate in female is more than other two manner of death. This is because of mal-adjustment in family life like torture for dowry. Accidental nature is more common than suicide and homicide due to unawareness and carelessness.

Hence education regarding use of such modern equipment should be imparted before using it. For avoiding accidental fire kitchen and living room should be well ventilated. Next more common nature is suicide and alleged homicide. The extreme method of suicide can be avoided by proper counseling. In modern democratic society self immolation is also a political cause. Police protection help a lot for avoiding such cases.

Alleged homicide is not uncommon now a day due to mal-adjustment of bride with in laws. The evil of dowry was almost in all cases, either pure suicide or alleged homicide in our series. Hence proper education should be imparted to the people and legal

aspects should be widely explained to all people to avoid such unfortunate death. Kerosene being a sole agent found in this series should be kept in proper place and out of reach from children. Crackers should be stored in away from the crowd and should be used under the guidance of elders.

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