

Medicolegal aspect of Thermal burns - A prospective study

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Abstract

Fire was perhaps man's first double-edged sword, for throughout history, it has served as well destroyed mankind. Burns have tremendous medicolegal importance as they may be considered to be the one of the commonest cause of unnatural death in India. Often, the circumstances of burns are enveloped in mystery, obscurity and unreliable statements. The reason behind this action may be personal, domestic, occupational or social tragedy, and more recently dowry death. This was a prospective study carried out at Sri Aurobindo Medical College and Post Graduate Institute, Indore during March 2014 to June 2015 involving all cases admitted in burn ward and post mortem examination done in Department of Forensic Medicine and Toxicology. A total number of 120 cases of burn injuries were taken; of which 88 patients died and a detailed post mortem examination was conducted. Out of total 88 autopsies, 21 (23.86%) cases were magistrate inquest and rest 67 (76.13%) were police inquest. Manner of burn was accidental in nature in majority i.e. in 113 (94.17%) cases, followed by suicidal in 7 (5.83%) cases. Out of total 7 suicidal cases, dying declaration was recorded in 5 cases. Of all autopsied cases carbon soot particles were found in only 5 cases (5.69%). Present study is an effort in highlighting the medicolegal importance of thermal burns. The government should come forward with strict laws and monitoring should be done for strict implementation of the Anti-dowry Act would go a long way in bringing down the incidence of these 'accidents'.

Keywords: Burn, Autopsy, Inquest, Carbon soot particles, Dying Declaration, Accidental, Homicidal Burn

Introduction

Among all discoveries made by men, only a few, such as cultivation of soil, speech and writing, have borne such eventful developments as has finding out how to make fire. It took man a long time to understand, appreciate, and reproduce these occurrences, it took him no time at all to realize that fire can hurt and hurt badly. Globally, there are about 300,000 deaths due to burns every year. Of these, 95% take place in developing countries with Southeast Asia recording nearly 57% of deaths due to burns.⁽¹⁾

In India, every year 1000000 people are moderately or severely injured due to burn injury.⁽²⁾ 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. Deaths from burns are usually accidental but may be of suicidal or homicidal origin. Suicidal burning is relatively uncommon. Homicidal burning is unusual but is seen in cases where paraffin or some other inflammable material is thrown over victim and his clothing then set alight.⁽³⁾ It is not unusual for murderer to try to dispose of 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 victim was or was not alive at the time of fire.⁽⁴⁾

Burns from dry heat are more common than scalds, burns due to dry heat may be caused by high temperature

applied to the body surface by conduction or radiation. Convection is merely a variant of conduction in this respect, as hot gas impinges on the surface, the molecules transfer their high energy in a similar fashion to the direct contact of a hot solid.⁽⁴⁾

Materials and Method

This was a prospective study carried out at SAMC & PGI, Indore during March 2014 to June 2015 involving all cases admitted in burn ward and post mortem examination done in Department of Forensic Medicine and Toxicology. A total 120 cases of burn were taken for study, which included 88 patients who died and a detailed post mortem examination was done. Specially prepared pro-forma was filled by information obtained from the case sheet of patient admitted in burn unit, history taken from the patient and attendants, police inquest and postmortem examination. The information was compiled, tabulated and analyzed.

Observations

A total of 186 burn injury patients were admitted during the study period from March 2014 to June 2015, out of which 66 patients left against medical advice (LAMA/ DOR) during the study period and so were not included in the study. Total 120 cases were considered for the study, out of which 88 patients died and autopsy was performed in the mortuary of Department of Forensic Medicine at SAMC & PGI, Indore and remaining 32 patients were discharged from the hospital after recovery. In the present study, out of total 120 cases, kerosene smell was present in 33 (27.50%) cases,

while in rest of the cases i.e. 87 (72.50%) it was absent (Chart 1). Kerosene was used in 6 out of 7 suicidal deaths (as per dying declaration and police investigation). Among total 120 burn cases, dying declaration was recorded in 74 (61.66%) cases, while in 14 (11.67%)

cases dying declaration could not be recorded as they were unconscious at the time of admission. In the remaining 32 (26.66%) cases statement was recorded and they were discharged from the hospital after recovery. (Chart 2)

Chart 1: Kerosene smell

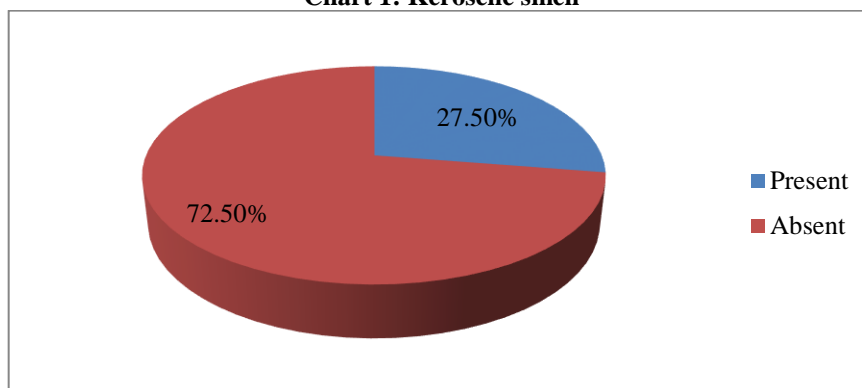
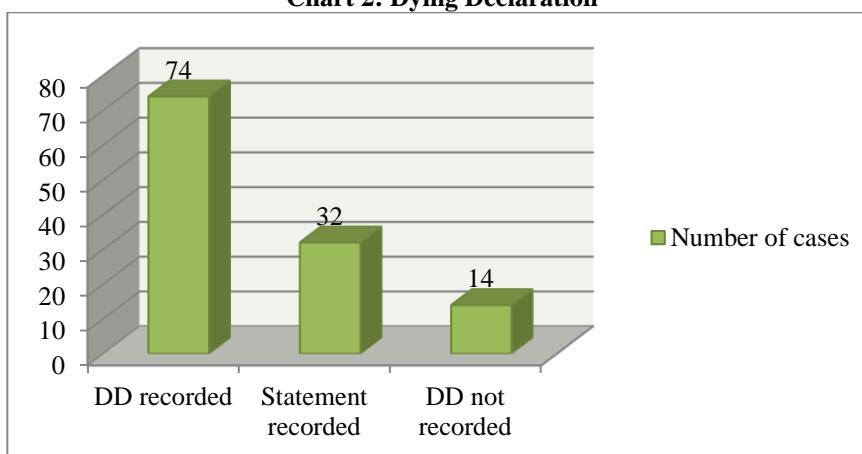


Chart 2: Dying Declaration



As per history, dying declaration, police investigations and postmortem findings it was observed that in majority of the burn victims, the manner of burn was accidental i.e. in 113 (94.17%) cases, followed by suicidal in 7 (5.83%) cases. Out of total 7 suicidal cases, dying declaration was recorded in 5 cases. In 1 suicidal death there was history of pre-existing psychiatric illness and in 1 case there was history of alcohol consumption at the time of incidence (Chart 3). Out of total 88 deaths in which autopsy were conducted, 21 (23.86%) cases were magistrate inquest (dowry death) and rest 67 (76.13%) were police inquest (Chart 4). Carbon soot particles were found in only 5 cases (5.69%). (Chart 5)

Chart 3: Manner of Death

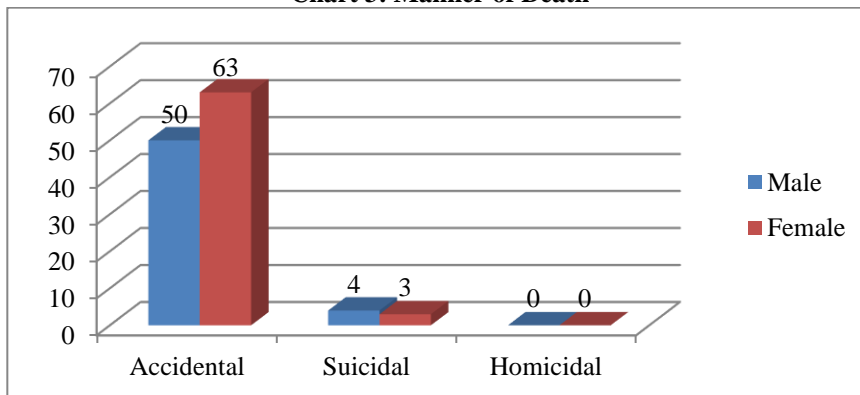


Chart 4: Type of Inquest

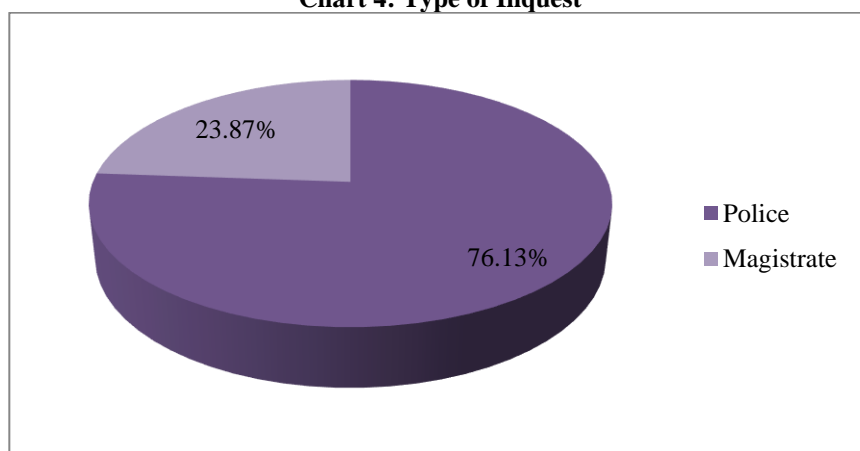
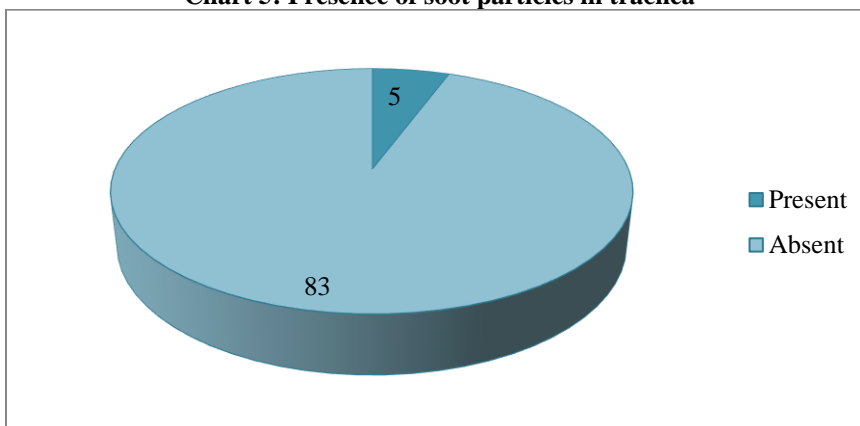


Chart 5: Presence of soot particles in trachea



Discussion

In the present study kerosene smell was evident in 33 (27.5%) cases out of total 120 cases. Among suicidal cases, kerosene was used in 6 out of total 7 suicidal cases. This may be due to reason of extensive use of kerosene in household purposes for cooking and in lighting lamps in the evening and night in the rural areas as there is less availability of cooking gas and electricity in rural areas. Whereas on the contrary Chaudhary BL et

al⁽⁵⁾ in their study observed smell of kerosene in only 4% cases.

In the present study dying declaration was taken in 74 (61.66%) cases and in 13 (10.83%) cases dying declaration could not be taken as they were unconscious at the time of admission and one case was brought dead 1 (0.83%). In the remaining cases statement was recorded and they were discharged from the hospital after recovery. Chawla R et al⁽⁶⁾ found in their study that 58% cases were conscious and 38% were unconscious before death. 66% cases had given dying declaration and

30% cases had not given dying declaration. 8% cases after giving dying declaration became unconscious terminally. Ames WA⁷ observed that often consciousness was lost only as a pre-terminal event. Literature on shock clearly mentions that sensorium remains clear in all forms of shock till the terminal stage. So dying declaration or statement by dying person regarding the events can be recorded in almost every case.⁽⁷⁾

As per history, police investigations, dying declaration and postmortem findings it was observed in the present study that in most of the burn victims the manner of burn injury was accidental in 113 cases (94.17%), followed by suicidal in 7 cases (5.83%). According to Leth P et al,⁽¹⁶⁾ a very small proportion of burns are deliberately self-inflicted. Approximately 2% or 3% of burn unit admissions are the result of self-immolation. Out of 7 suicidal cases in 5 cases dying declaration was recorded. In 1 suicidal death there was history of pre existing psychiatric illness and in 1 case there was history of alcohol consumption at the time of incidence. Out of 7 suicidal cases, in 6 (5.00%) cases there was alleged history of pouring of kerosene and then setting of fire, whereas in 1 (0.83%) case there was alleged history of pouring of petrol and then setting of fire. Homicidal burn was not seen in any of the case. Homicidal burn is not so common as it is difficult to kill active conscious person by burning. There may be evidence of making the subject unconscious or semiconscious by poisoning or injury or gagging or tying hands. In most of such cases, he or she remains in lying down position before burning and hence there are no burn injuries on the part touching the ground. Inflammable material will be detected more on other parts of the body than vertex.⁽¹⁵⁾ In this study most of injuries are accidental in nature, which is similar to the findings of Chaudhary BL et al⁽⁵⁾ who found accidental burns in 72.94% cases, followed by suicidal in 17.39% and homicidal in 9.66% cases. Buchade D et al,⁽⁸⁾ 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⁽⁹⁾ conducted 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 seen by Das KC⁽¹⁰⁾ and Bangal RS.⁽¹¹⁾ It is very difficult to say that a burn injury is accidental or suicidal or homicidal in nature, until and unless an eye witness is there. 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 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 of dowry disputes (as per dying declaration). The pattern of burn injuries on body were also correlated with the history regarding manner of burn and in most of the cases it was matching. In case of any doubt, further information with relatives was obtained. In the present study out of total 120 burn cases, 88 cases died and autopsy was conducted. Out of total 88 autopsies, 21 (23.86%) cases were magistrate inquest under section 176 CrPC, as they were females who died within 7 years of marriage and rest 67 (76.13%) were police inquest.

In present study soot particles were found in trachea in only 5 (5.68%) cases out of 88 cases in which autopsies were performed, the rest of the cases were devoid of the soot particles in the trachea. This observation is different from the findings of Mazumdar A and Patowary A⁽¹²⁾ who found soot particles in trachea in 19% of cases, Das. K.C.⁽¹⁰⁾ who found soot particles in trachea in 18.05% cases, Nath D⁽¹³⁾ who found soot particles in trachea in 34.07% cases and Mishra PK et al⁽¹⁴⁾ found soot particles in trachea in 5.55% of cases. Most of the victims in our study died in the hospital after receiving treatment, which include intravenous fluid and also some oral medication. Many of the cases may have occurred in some open spaces. These two may be the reason for absence of soot particles in the trachea in most of the victims in our study.

Conclusion and Recommendation

In the current study, majority of burn cases were accidental and only few were suicidal in nature. No homicidal burn case was observed. Burn injuries present challenging problems to the forensic physician and pathologist. The principal issue usually is causation, particularly when a distinction is to be made between an accident and a deliberate act.

As this problem of thermal deaths persists in our country, the government along with various working groups and the NGOs, including the doctors need to put in more sincere effort. The government must appoint more doctors in the burn units. Following the safety instructions like putting the lights off while going out, wearing tight and cotton cloths while cooking, not leaving a fire source unattended etc. will definitely help to reduce the incidence of burn injuries, as we feel most of the accidental burn cases are preventable.

The government needs to concentrate in this direction. The NGOs and social groups must arrange a periodic effort in educating the rural people. Steps should be taken not only to minimize burn mortality but also to prevent and reduce their incidence at least in cases where human errors and human greed plays a role.

The present study is concluded with the hope that the given suggestions will help in reducing the number of burn injuries.

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References

1. World Health Organization (WHO). A WHO Plan for Burn Prevention and Care. Geneva: WHO, 2008. Available from: http://whqlibdoc.who.int/publications/2008/9789241596299_eng.pdf.
2. WHO. Burns, 2014. Available at: <http://www.who.int/mediacentre/factsheets/fs365/en/>.
3. Mukherjee JB, Forensic Medicine and Toxicology. 2nd Ed. New Delhi;1994 p. 440-454
4. Knight Bernard, Forensic Pathology. 3rd Ed. Arnold, London;2004 p. 312-325.
5. Chaudhary BL, Yadav P, Kumar M, Rahul B: Mortality Profile of Burn Injuries: A Postmortem Study in Lady Hardinge Medical College, New Delhi. J Indian Acad Forensic Med, 2013,35(2):123-126.
6. Chawla R, Chanana A, Rai H, Aggarwal AD, Singh H, Sharma G: A Two-year Burns Fatality Study. J Indian Acad Forensic Med, 2010,32(4):292-297.
7. Ames WA. Management of the Major Burn. Update in Anaesthesia 1999;10:57-60.
8. Buchade D, Kukde H, Savardekar R: Pattern of Burn Cases Brought to Morgue, Sion Hospital, Mumbai: A Two Year Study. J Indian Acad Forensic Med, 2011,33(4):311-312.
9. Mangal HM, Pathak A, Rathod JS: The Fire is Both "A Blessing & Scourge to the Mankind" JIAFM, 2007,29(4):75-77.
10. Das. K.C. "A study of burn cases in medico-legal autopsy" MD thesis, 1998; Gauhati University, Guwahati, Assam, India.
11. Bangal RS: Thermal Injuries-A study of mortality patterns. JFMT; 1995, XII (1&2), 1-4.
12. Mazumdar A, Patowary A: A Study of Pattern of Burn Injury Cases. J Indian Acad Forensic Med, 2013,35(1):44-46.
13. Nath D. "A statistical study of pattern of ante mortem burn injuries" MD thesis, 2007; Gauhati University, Guwahati, Assam, India.
14. Mishra PK, Tomar J, Sane MR, Saxena D, Yadav A. "Profile of Death in Burn Cases: A Post-mortem Study". JIAFM 2016;38(1):8-10.
15. Deoskar A. S. Medical Jurisprudence, Toxicology and Forensic Science for classroom, investigation and courtroom with case laws. 3rd Ed. New Delhi; 2014; p. 147-156.
16. Leth P, Hart Madsen M. Suicide by self-incineration. Am J Forensic Med Pathol 1997;18:113-118.