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Postmortem Burns to Conceal Homicidal Deaths: an Eight-Year Study

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ABSTRACT

Burned corpses are of medicolegal importance as circumstances may suggest means that are used for committing or concealing homicidal death or death occurring due to accidental causes. Postmortem burns, which may include homicidal burns (torch murder) or burns used to conceal the crime, are committed with the motive of identity destruction, transposing the cause and manner of death and destruction of evidence. The present study aimed to analyse the cases of postmortem burns in the context of the cause of death, manner of death and circumstances pertaining to death. This is a retrospective study performed in the Government Medical College & Hospital, Aurangabad (MH), India, between 1 January 2009 – 31 December 2016. Cases involving burn injuries were examined in detail by autopsy reports, toxicological analyses, crime scene investigation and police records submitted at the Institute's office. A careful examination of vitality signs of burns, soot deposition in the lower respiratory tract and the presence of other fatal injuries was performed for each case. Cases exposed to fire before death were all excluded. Similarly, bodies being charred to such an extent to prevent distinguishing the vitality of burns were also excluded. Postmortem burns were recorded in 13 cases (0.46%) of deceased bodies to cover homicides. Females were reported to be more commonly involved and more in a household environment. Head injury was the most common cause of death, followed by death due to asphyxia due to any means. The findings of the present study reinforce the fact that burning cannot always effectively destroy the evidence, hindering the perpetrator from covering up the crime. Apart from the evidence at autopsy, a transdisciplinary approach must be initiated with detailed crime scene investigation, toxicology, ascertaining the cause of death with analyses of fatal injuries and contributory data for identification of the deceased.

Keywords: postmortem burns, homicides, blunt trauma, concealment of crime.

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INTRODUCTION

Fire-related deaths are the second leading cause of unnatural deaths in the adult population (1) and the third leading cause of death among children (2). Such unnatural deaths may be suicidal, homicidal or accidental in nature. Although suicidal or accidental burns are common in the Indian sub-continent, they usually do not succumb immediately and do not face challenges seen in postmortem burn cases. Circumstances leading to burns, identity of the victim/accused and preservation of evidence are established in such deaths and do not pose a challenge in investigations. In homicidal burn cases, it is reported that 7.8% (3) to 31.7% (4) deaths were directly related to traumatic reasons (not fire). Homicidal fire-related burns may be either deliberate burning alive or postmortem burns after criminal killing. Postmortem burns are committed with the motive of identity destruction, transposing the cause and manner of death and destruction of evidence. A multidisciplinary approach is required to deal with such a case and includes findings of the forensic pathologist, analytical reports provided by the toxicologist, crime scene analysis and data derived from the interrogation by the police. Such a composite and comprehensive approach may furnish exposition towards deriving conclusions in cases with postmortem burns.

The present study aimed to analyse the cases of postmortem burns in the context of the cause of death, manner of death and circumstances pertaining to death. ❑

METHODOLOGY

We retrospectively analysed records of autopsies performed in the Government Medical College & Hospital, Aurangabad (MH), India, between 1 January 2009 and 31 December 2016. Cases involving burn injuries were examined in detail by autopsy reports, toxicological analyses, crime scene investigation and police records submitted at the Institute's office. A careful examination of vitality signs of burns, soot deposition in the lower respiratory tract and presence of other fatal injuries was performed for each case. Cases exposed to fire before death were all excluded. Similarly, bodies being charred to such an extent to prevent distinguishing the vitality of burns were also excluded. ❑

RESULTS

A total of 19,310 autopsies were performed in the Government Medical College & Hospital, Aurangabad (MH), India, between 1 January 2009 and 31 December 2016, out of which 2,810 (14.55%) were fire-related deaths. Postmortem burns were recorded in 13 cases (0.46%) and were meant to cover homicides. Corpses were identified by visual identification in the majority of cases; however, identity was established by DNA fingerprinting or odontological techniques in some of the explored cases. Five cases were males and eight females. The age of victims varied from infant to 51 years, with a mean age of 30.92 years. Crime scene was visited in all cases. Nine cases were recovered from abandoned areas (jungle areas, farmland, abandoned buildings at the periphery of the city area or near a water body), while four cases were recovered from residential areas.

The total body surface area (TBSA) involved varied between 30% to 90% in 12 cases and 8% in one case. The body was burned to skeletal remains in a single case. Soot particles in the airways or gastrointestinal tract were not found in any of the examined cases. The most common cause of death was head injury, followed by strangulation by any means. Cases were screened for alcohol analysis and commonly encountered poisons (organophosphorus compounds, organochlorine compounds, aluminium phosphide and rodenticides). Toxicological analysis did not reveal concomitant poisoning in any of the examined cases.

Crime scene investigation, fatal cause of death (other than burns) and postmortem burns were strongly indicative of homicide in all cases. The study findings and characteristics of cases are summarised in Table 1. ❑

DISCUSSION

The discovery of a burned corpse raises suspicion of unnatural death, with accidental manner being the most common (3). Unusual incidence of postmortem burns after a suicide is also reported (5). Regarding homicidal fire-related deaths, it is essential to distinguish between

TABLE 1. Case details of fire-related deaths with postmortem burns

Case no.	Sex	Age	Scene of incidence	Autopsy findings	Toxicology/Histopathology	Identification	Cause of death
1	F	28	Home	Post-mortem burns, TBSA 90%, no soot particles	No significant findings	Visual	Head injury by blunt force
2	M	34	Home	Post-mortem electric burns TBSA 8%	No antemortem signs of electrocution at the entry wound	Visual	Manual strangulation
3	F	28	Home	Post-mortem burns, TBSA 50%, no soot particles	No significant findings	Visual	Ligature strangulation
4	M	51	Farm field	Post-mortem burns, TBSA 30%, no soot particles	No significant findings	Visual	Head injury by blunt force
5	F	One month	Open sewer line	Post-mortem burns, TBSA 100%, no soot particles	No significant findings	Unidentified	Head injury by blunt force
6	M	41	Isolated garage	Post-mortem burns, TBSA 100%, no soot particles.	No significant findings	Visual	Gagging
7	M	48	Farm field	Post-mortem burns, TBSA 100%, no soot particles	No significant findings	Visual odontological	Stab injury to the neck
8	F	28	Forest	Post-mortem burns, TBSA 100%, no soot particles	No significant findings	Visual DNA	Head injury by blunt force
9	M	25	Lake	Post-mortem burns, TBSA 100%, no soot particles	No significant findings	Visual	Cutthroat injury
10	F	31	Forest	Post-mortem burns, TBSA 100%, no soot particles.	No significant findings	Visual	Cutthroat injury
11	F	30	Open sewer line	Post-mortem burns, TBSA 80%, no soot particles	No significant findings	Visual	Ligature strangulation
12	F	32	Home	Post-mortem burns, TBSA 60%, no soot particles	No significant findings	Visual	Ligature strangulation
13	F	25	Forest	Burned skeletal remains, TBSA 100%	No significant findings	DNA, anatomical examination	Head injury by blunt force

F=female; M=male; TBSA=total body surface area

burning alive and postmortem burning subsequent to criminal killing (6). The present study found fire-related deaths in 14.55% of cases and postmortem burns in 0.46% of cases. The literature reports a proportion of homicidal fire-related deaths ranging from 9% (7) to 10% (8) of fire fatalities, while the proportion of postmortem burns ranges from 1.4% (9) to 4% (10) among burn cases. Proper diagnosis of postmortem burns arrived after a detailed autopsy and evaluation of traumatic and non-traumatic causes. Lower rates of postmortem burns may be due to a relatively higher number of fire-related deaths, which were mostly suicidal or accidental deaths, and those that happened to survive for some duration. The present study discusses details of deaths due to postmortem burns in the varied causes of death in homicides.

Fire-related deaths have variable sociodemographic patterns in India (1, 11). However, the pattern of homicidal deaths with postmortem burns is comparable with global trends. In our series, the female-to-male ratio of postmortem burning cases was 8/5, which was comparable with observations by Fanton *et al* (6), while male predominance was observed in other studies (8, 12). In completely charred bodies, sex determination may be difficult; however, the prostate and uterus are well-protected visceral organs for sex identification. In one case, skeletal remains were discovered and sex identification was established by anatomical examination and genetic analysis. On the other hand, victims' age range was 25 to 51 years (except for a single case of an infant), with a mean age of 30.92 years, which was comparable with other studies (6, 12-14); however, an isolated case of the elderly has also been reported (14).

In the present study, positive identification was established by visual methods in 11 cases (84.61%). Other methods, including odontological, anthropological, fingerprint matching and DNA matching, can be employed for identification purposes. Fanton L *et al* (6) conducted a study on 12 cases of postmortem burns and used odontological methods for identification in nine cases (75%). In a study by Tumer AR *et al* (12), identification by DNA matching was done in 10 (76.92%) out of 13 cases. Odontological and DNA methods were used along with visual method for confirming identity in cases number 7 and 8, respectively. In case number 13, skeletal

remains were recovered, so the anatomical and DNA method was employed for positive identification. However, in case number 5, identification was not possible despite DNA sampling and other methods of identification.

Burning is not a common method for concealing homicide. More frequent methods include dumping at isolated sites, burial and dismemberment (15). Foremost intent in postmortem burning of corpses is to cover up homicidal action. Further motives for such concealment by burns are to hamper the analysis of trace evidence, identification of the deceased, determination of the postmortem interval and types of fatal injuries sustained (16). In the present study of postmortem burns, nine cases (69.2%) were found in countryside and abandoned areas like isolated garages or open sewer lines. This is in line with the findings of Tumer *et al* (12), Hakan K (17) and Melez *et al* (7), whereas Fanton *et al* (6) reported that six out of nine victims of homicide-involved postmortem burning were discovered at family homes, but considering homicidal burns, they concluded that discovery of a burned corpse in unfamiliar outdoor sites exclusively involved homicides. Three out of the four victims who were discovered at home were females. The probable reason for those burning incidents is an attempt to stage accidental deaths while cooking. Female predominance for cases occurring at home was also observed in a study of homicidal burns from Northern Tunisia (4). Examination of such scene of incidence requires careful manual screening of charred debris, documentation of the position and orientation of the body, condition of the corpse before moving it and description of injuries (18).

Involved TBSA ranged from 8% to 100%, with most cases sustaining 100% burns or completely charred (n=7, 53.84%). Melez *et al* observed that 83.3% of fourth-degree burns were homicidal deaths (7). A single case (case number 2) was observed having a postmortem electric burn with associated thermal burns amounting to 8% of TBSA. In case number 13, burns consumed complete soft tissue and only skeletal remains were recovered, death was due to head injury. Police investigation proved that the victim was burned by her husband after deliberate killing. All described cases had postmortem burns. Bodies were burned after criminal killing with the hope that it would conceal the identity or mask the fatal injury other than burns. However, burning a body is usually not an effective method to remove physical traces (15). Richards observed that, at a temperature of 680° C, the arms showed severe signs of charring after 10 minutes, legs after 14 minutes, face after 15 minutes and skull after 35 minutes (19). Lerer found that attempts to hamper the identification of the deceased individual was a major challenge in such cases, but also mentioned that in 82% of cases attempts at burning were not successful in disguising the nature of the fatal injury (8). Melez *et al* observed that, in the case of postmortem burns (with burns reaching up to carbonisation), perpetrator could not always achieve spoliation by burning as homicide was able to be determined by other factors (7).

The diagnosis of a burned corpse to cover up a homicide requires the presence of fatal injuries inflicted by another person and the absence of the classic signs of vitality of burns. Some of the artefacts caused by thermal effects may resemble injuries, e.g., heat fractures to the skull, the presence of extradural blood leakage (heat haematoma) or skin retractions causing stab wound-appearing defects (20). It is often impossible to distinguish whether injuries were inflicted prior to or after the burning and if those injuries were severe enough to account for the cause of death. There must be unequivocal evidence of antemortem signs of injuries (*e.g.*, blood infiltration at the site or along the track of injury), which is a challenge in completely burned corpses or charred remains as it causes extensive damage to the external surface of the body.

The most common cause of death was head injury by blunt force (n=5, 38.46%), followed by strangulation by any means (n=4, 30.76%). Trauma by blunt force was also the most common observation made by Lerer (8), Maria *et al* (16) and Conway (21). However, firearm injuries were a common cause of death in studies conducted by Fanton *et al* (6) and Tumer *et al* (12). Although strangulation by any means was the most common cause of death reported by Dogan (17), it remains the second most common cause of death in most of the studies on this topic (12, 14), including the present one. Strangulation was also reported as the cause of death in various case reports (22-24).

Determining the vitality of burns is crucial and it has to be established whether the victim has been exposed to fire before or after death. In order of importance, the vital signs of burns are a blood carboxyhemoglobin (COHb) level greater than 10%, the presence of soot in the lower respiratory tract, esophagus and/or stomach and a red flare (7). In 11 (84.61%) out of 13 cases there were no signs of vitality of burns. In case number 2, burns lacked red flare and examination of blood COHb and soot particles was not warranted as the corpse was not burnt to that extent. In case number 13, the body sustained severe burns with recovery of few skeletal remains. Blood COHb and soot particles in the airways were not available for analysis. However, all remaining cases showed an absence of flare, lack of soot particles in airways and signs of vitality like burn blisters. Other signs of vitality for burns include a combination of pseudo-goblet cells, increased secretion of mucous and vesicular detachment of respiratory epithelium (25). Histopathological other reported findings include separation of epidermis from dermis and breaking of epithelium, flattening and elongation of epithelial cells, vacuolisation and capillary dilation (10).

Even though this is a retrospective study, at least one of the authors has witnessed each of the autopsies and concurred with the findings. One of the main limitations of our study was that not all tests, such as COHb and histopathological tests, were performed in every case. The unambiguous nature of postmortem burns might explain why the above-mentioned tests were not performed. Even though fatal trauma was reported in the described cases, the relative contribution of smoke, soot inhalation and thermal injuries to the cause of death remains an important diagnostic challenge. ❑

CONCLUSIONS

Establishing the cause and manner of death in bodies recovered from fires remains a challenge. The present study evaluated the pattern of homicidal deaths having postmortem burns and drew several conclusions as follows. We found a rare occurrence of postmortem burns, as most fire-related homicides were directly caused by burns and non-traumatic in nature. Females were reported to be more commonly involved, mostly in a household environment. Head injury was the most common cause of death, followed by death due to asphyxia due to any means. The findings of the present study reinforce that burning cannot always effectively destroy the evidence, hindering the perpetrator from covering up the crime. Apart from the evidence at autopsy, a transdisciplinary approach must be initiated with detailed crime scene investigation, toxicology, ascertaining the cause of death with analyses of fatal injuries and contributory data for identification of the deceased. ❑

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