

# Establishing Identity and Cause of Death in Mutilated and Un Identifiable Corpses: A Challenging Task for Medico Legal Expert

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## Abstract

The basic aim of medico legal autopsy is to establish the identity and cause of death. This is extremely important and has legal values in unnatural deaths. The corpse becomes unidentifiable due to many reasons including intentional mutilation. The mutilation may be possible because of decomposition, changes, or the incidences which occurred at the time of death such as: fire, air crash, natural calamities (earthquakes), building collapse, railway accidents or manmade incidences like bomb blasts or mass firing etc. The intentional mutilation of a dead body by the criminals in order to hide the crime is not uncommon. The task becomes more difficult when bodies are totally skeletonized. However, scientific and meticulous medico legal examination with scientific correlation helps to arrive at definite conclusion about establishing identity and cause of death. This in turn will assist the investigating agencies in bringing justice to the departed and closure to the families of the deceased. In our scientific study, a total of 51 such cases were studied in which establishing identity and cause of death was a challengeable task. However, thorough forensic examination helped to establish identity in most of cases along with the cause of death. The study is presented herewith.

**Keywords:** Burns; Charred bodies; Mutilated bodies; Decomposed bodies; Exhumed bodies; Skeleton remains; Cause of death; Identity establishment

## Introduction

Identity is the determination of the individuality of a person. Article 6of the Universal Declaration of Human Rights states, that everyone has the right to recognition everywhere as a person before the law [1]. The question of identification of a living person is mostly the concern of the police and is raised in criminal courts in connection with absconding soldiers and criminals, as well as persons accused of assaults, rape, sodomy, murder, a mix-up of new born babies in hospitals, or young lost children, and occasionally, adults who have lost their memory. Post mortem identification is frequently raised in civil courts owing to impersonation practiced by people to secure unlawful possession of property, insurance claims or to obtain the prolongation of a lapsed payment [2]. Identification of a living person is based entirely on known fingerprints, birthmarks or several personal impressions with regard to characteristic gestures, movements or shape and other features of the teeth, eyes and hair, or voice [2]. Traditional post mortem identification is based on fingerprint, dental or skeletal evidence. However, deaths as a result of fires, explosions, airplane crashes, and other traumatic events, as well as old remains are difficult to identify via traditional methods [3]. Victim remains at fatal fire scenes are typically difficult to detect, recover and handle. The burned material at the scene, including biological tissue, is often modified to a similar dark black colour. Bones in particular, become discoloured, brittle, and highly fragmented [4]. Perpetrators often use fire in order to destroy the body, destroy features used in victim identification (e.g., facial features or fingerprints), and/or destroy evidence related to the circumstances surrounding the death [4]. The consumption of soft tissues by fire can significantly hamper analysis by experts like forensic pathologists, therefore, analysis of burned human remains is a common task ascribed to forensic anthropologists [4]. When minimal thermal changes are present on remains, normal procedures for identification can be followed [5]. The added post mortem fracturing,

fragmentation and bone loss resulting from these recovery techniques hinder the already difficult task of autopsy and laboratory analysis of burned human remains [4].

When examining burned, mutilated, decomposed or skeletonised remains, identification by visual means, fingerprints or other identifying techniques is many times not possible. In such cases following questions are asked by the investigating agencies,

What is the sex of the human remains? 2) What is the age of remains? 3) What is the cause of death? 4) Possibility to establish specific identity of the individual. To answer this complete autopsy examination including a dental examination and DNA analysis should be done.

## Goals and Objectives

1. Main purpose of study is to establish general identity of person with relation to age and sex.
2. To establish specific identity of the deceased.
3. To know the cause of death.
4. To help crime investigating agencies and correlation with incidence.
5. To recover evidential material samples from the corpse.

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## Material and Methods

This study is conducted in The Department of Forensic Medicine and Toxicology, which is located in a tertiary care hospital and Government Medical College. This is a tertiary referral center for medico legal cases. Here numerous bodies were sent for medico legal post mortem investigation. We had included total 51 cases in which identity was not established beyond doubt and cause of death was uncertain. These cases include unknown and unclaimed bodies such as, exhumed bodies, burned and charred bodies, skeletonized human remains, mutilated bodies, and decomposed bodies.

Determining the identity is required in criminal cases in order to file charges against the alleged perpetrator, in processing of life insurance claims and in handing over the remains to relatives. In absence of established identity, the death certificate is not issued with the name of the individual. This in turn may create inadequacy to fulfil legal formalities for administrative purpose in civil and criminal cases.

After receiving the body to mortuary, the information provided by investigating authorities was reviewed. The autopsy examination includes the following, examination of clothes and foreign material, ornaments, locket, I cards, mobiles etc. Photographs were taken during the autopsy in all cases. Radiological examination was done in indicated cases. External examination of body, which includes specific evaluation of identifying features fingerprints and tattoos, abnormalities, scar etc. if preserved. Examination of genitals and orifices was done. Examination of injuries and of the changes due to decomposition was done. In skeletonized bodies the detailed examination of the bones was done. Detailed internal examination was done and samples for chemical analysis were preserved. In female corpse, vaginal and rectal swabs were preserved to rule out the possibility of sexual assault based on the presence of semen. Samples were collected for DNA analysis and grouping like hair bulbs, bone, vertebra, tooth etc. The results were correlated and interpreted here.

## Review of Literature

The protocols used during the Disaster Victims Identification include steps like body tagging and bagging, fingerprinting, forensic pathology, and forensic dentistry. Forensic dentistry team was divided into two parts, dental examination and dental radiology [6]. DNA is useful in identifying human remains and in criminal investigations for several reasons. The first reason being that DNA is unique to an individual and remains constant through life and secondly it follows The Laws of Mendelian inheritance [7].

The young and the elderly are the common victims of accidental fires. In building fires the presence of soot inhalation is very common (90% or more of cases). The presence of soot in the airways below the level of the vocal cords, noticed at the time of the autopsy, is proof that the victim was alive at the time of the fire.8"Smoke inhalation" is a general term embracing the inhalation of particulate matter and gases produced in the fire by combustion or pyrolysis (decomposition by heat without sufficient oxygen to cause ignition) [8].

Teeth are resilient to environmental assaults, such as incineration, immersion, trauma, mutilation, and decomposition. As a result of that, teeth represent an excellent source of DNA material [9]. Forensic odontology is the branch of forensics concerned with identifying human individuals based on their dental features. Traditionally, forensic odontologist relied on the morphology of dental restorations (fillings, crowns... etc.) to identify victims. However, some modern materials used in restorations and fillings have poor radiographic

characteristics. Currently, this search and identification process is carried out manually, which makes it very time consuming and sometimes unreliable. A more advanced system may help correct this problem. The Automated Dental Identification System (ADIS) can be used by law enforcement agencies to locate missing persons using databases of dental x-rays [10].

It has been a challenge to extract DNA from bones which were previously soaked in water, burned, or buried for a long time. This is due to the reduced quality and quantity of DNA in the bone samples. The dramatic degradation of the DNA and the presence of PCR inhibitors in the collagen significantly complicate the process of DNA identification in skeletonized and charred bones. A successful alternative to these methods is to use DNA technology for identification purposes. Typically, this entails the use of short tandem repeat (STR) markers, which are characterized by a high level of polymorphism and are abundant in the human genome. Methods are in place to carry out multiplex genotyping of STR markers using sensitive and highly reliable fluorescent technologies, which are widely used in the field of forensics [11].

In 1991, Sajantila et al. reported successful DNA typing on all 26 samples extracted from 10 fire victims exhibiting extreme charring.11 Accounting for 95 percent of the cases, 19 were said to be male. The age group 21-50 years accounted for the maximum number of cases; i.e. 58%, Identification was established from clothes in 4 cases (21%) and from tattoo design in one case (5.2%) [12].

Cavard et al. reports that, out of 134 cases almost 28% have been identified with molecular biology (DNA), 23% with odontological examination, 7.5% with fingerprinting 7.5% with clothes/personal items and 4.5% with identity documents [13].

## Observation and Results

After the autopsy examinations were performed and the forensic expert's analysis was finalized, the following observations and results were recorded:

### Condition of body

In recent studies, a total of 51 unknown corpses were studied to determine identity and cause of death. Out of the 51 cases, 39 cases (76.47%) were burned and charred remains. These cases mainly sustained burns in accidental fire incidents. Majority of the fire related deaths were accidental in nature and burns were ante mortem as confirmed during the autopsy examination. However two of the cases, showed multiple injuries associated with post mortem burns.

Seven bodies (13.7%) were skeletonized and six skeletons were exhumed by police and brought for medico legal postmortem examination. The autopsy examination of four of the skeletons revealed fractured skull bones indicating that the mode of death was a homicide. Two skeletons showed fractures of limb bones indicating mode of death as homicide by multiple injuries. In one skeleton no bone injuries were noted, hence the "unknown" cause of death.

Four bodies (7.8%) were found in mutilated state. In one case only two lower limbs (below the knees) were sent for medico legal post mortem examination. Another case only had the left arm sent for examination. The third case presented a decapitated head of female in a partly skeletonized state. The last case, a transected trunk region of female was brought for medico legal autopsy examination. Sharp incised cuts were taken at knee level and over abdominal region to transect the

trunk, in the intent to hide identity of the victim. One corpse (1.9%) was in state of decomposition in the form of mummification (Table 1).

### Sex (Gender)

During the external examination in seven cases (13.72%) the sex (gender) was determined from identifiable external genitalia. After analysis reports, out of the 51 cases 34 were (66.7%) identified to be males and 15 were females (29.4%). In two cases (3.92%), exact identification and sex at the time of external examination was not possible beyond doubt however, in one case the left arm was forwarded for autopsy examination and another was a case examined below the knee. Opinion about sex determination is pending maceration procedures and skeleton examination (Tables 2 and 3).

### Age group

After analyzing the reports, age group distribution of all the 51 cases was done. Age wise distribution is as follows:1 day to 10 yrs- 2 cases (3.9%), 11 to 20 yrs-3 cases (5.88%), 21 to 30 yrs- 16 cases (31.38%), 31 to 40- 11 cases (21.5%), 41 to 50- 8 cases (15.68%), 51 to 60- 5 cases (9.8%), >61 yrs- 2 cases (3.9%) and in 4 cases (7.8%) age could not be established due to mutilation. Among the four cases, two cases presenting with amputated limbs were sent for examination (Figure 1). In the remaining two cases the age determination was not possible due to skeletonization and decomposition changes, hence the unknown results listed (Table 2).

### Method of identification

In majority of the cases studied (34 cases i.e. 66.7%) identity of the individual was determined by DNA matching with parental alleles.

Condition Of Body	Cases	Percentage (%)
Burned And Charred	39	76.47
Exhumed &Skeletal Remains	7	13.73
Mutilated	4	7.84
Decomposed	1	1.96
Total	51	100

Table 1: Condition of Corpses.

Age Group	Cases	Percentage (%)
1 day to 10 yrs	2	3.92
11 to 20	3	5.88
21 to 30	16	31.38
31 to 40	11	21.56
41 to 50	8	15.68
51 to 60	5	9.8
>61	2	3.9
Unknown	4	7.84
Total	51	100

Table 2: Distribution by Age.

Gender	Cases	Percentage (%)
Male	34	66.7
Female	15	29.4
Not identified	2	3.9
Total	51	100

Table 3: Distribution by Gender.

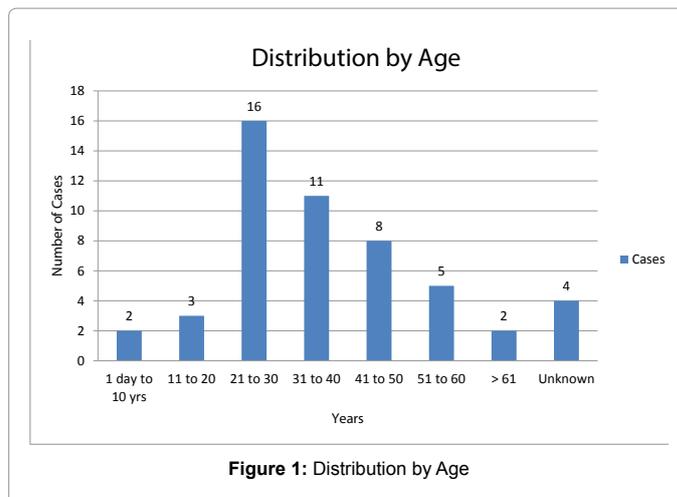


Figure 1: Distribution by Age

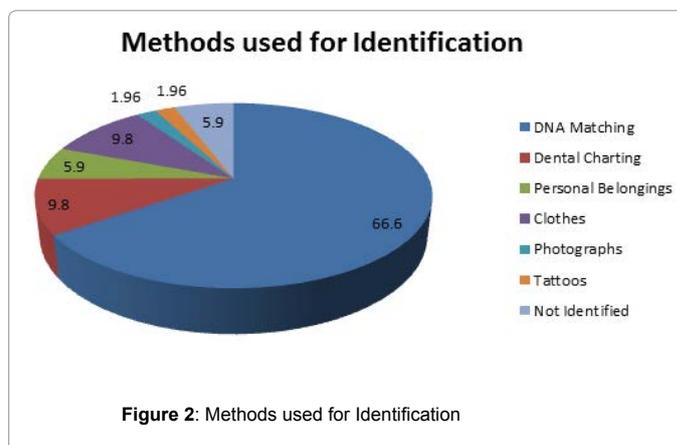


Figure 2: Methods used for Identification

Dental findings like the presence of crown, silver filling, missing tooth, artificial tooth, and trauma or deformity or peculiarity of tooth was found to be helpful to determine identity in five cases (9.8%). Ornaments and personal belongings like gold chain, metallic bangles, identity card and mobile etc. assisted identification in 3 cases (5.8%). Five bodies (9.8%) were identified by relatives from the deceased clothes, such as sari and blouse, shirts and pants, salwar and kamiz etc. (Figure 2).

One of the burned cases (1.9%), the identity was from photographs, which were matched with a missing victim. The relatives later verified the body. In another case (1.9%), identity was verified from the tattoo marks present on the arm (tattoo of 'heart shape' over right forearm and tattoo of sacred 'om' over left forearm). In two mutilated remains (3.92%) investigations still continued to determine identity (Figure 3-5).

### Cause of death

Cause of death of extensive burns was noted in 35 cases (68.62%), of which maximum victims were of mass disaster. Where history of incidence was known and 2 cases (3.92%) were died as result of asphyxia due to smoke inhalation of irrespirable gases in accidental fires. Head injury was noted in total six cases studied. Four of the six remains (7.84%) were skeletonized and in the remaining two cases (3.9%) head injury with post mortem mutilation with burns were noted. Death due to multiple injuries in was present in 6 cases (11.76%), and in two cases (3.9%) an opinion could not be given. That was due to no positive



**Figure 3:** Burned and charred body later found to be of a male.



**Figure 4:** Decomposed body due to mummification changes, found to be of a female.



**Figure 5:** Skeleton found on exhumation, on anatomical examination found to be of female.

analytic reports found in one skeleton and the other was a decomposed body (Tables 4 and 5).

### Mode of death

Homicide, as a mode of death, was found in 12 cases (23.52%) out of a total of 51 cases. In 37 cases (72.54%) mode of death was accidental. In two cases (3.92%) mode of death was uncertain. Out of the 12 cases of homicide, 8 victims (66.66%) were females and two were males (16.6%). In two of the cases (16.6%) sex was not determined (Table 6).

### Discussion

In recent study, 51 unknown bodies were determined, but the identity was a difficult task, which were studied in detail. The following points were discussed:

Burned remains cases represented the majority of cases; i.e. 39 cases 76.47% followed by skeletonized remains 7 cases i.e. 13.73%. The

majority of the cases (34 cases) were male victims (i.e. 66.7% followed by 15 females (29.4%)). More cases were reported from the age groups 21 to 30 years (i.e. 16 cases (31.38%), and 31 to 40 years (i.e. 11 cases (21.56%). This finding is consistent with Kumar Ajay et al.

DNA fingerprinting was the predominant method used for identification, proved to be more helpful to determine identity in 34 cases (i.e. 66.7%), followed by dental examination in 5 cases i.e. 9.8%. In five cases (9.8%), the relatives of the deceased had identified the bodies by their clothes. The cause of death was the extensive burns in the 35 cases (68.62%) followed by multiple injuries in 6 cases (11.76%), and head injury in 4 cases (7.84%). Mode of death was accidental in 37 cases; i.e. 72.76%, followed by homicide in 12 cases 23.52%. Out of 12 cases of homicide, eight victims (66.66%) were females and two were males (16.66%).

The general identifying features as to the age and sex was determined in 47 cases (92.15%) out of the 51 cases. The identification was not determined in 4 cases i.e. 7.84%. However, the specific identification such as the name and address was recognized in only 44 cases i.e. 86.27% and not in seven cases (13.72%) out of the 51 cases (Table 4).

### Conclusions

The detailed medico legal examination and evaluation of the total 51 cases, specific identity was determined in 86.27 percent of the cases and cause of death was found in 96.07 percent of the cases with the following conclusions.

- 1) In present study males predominance was noted in the unnatural death category.
- 2) Most vulnerable group was age group between 21 to 40 years.

	Cases	Percentage (%)
DNA Analysis	34	66.7
Dental Charting	5	9.80
Personal Belongings	3	5.9
From Clothes	5	9.8
Photographs	1	1.96
Tattoos	1	1.96
Not Identified	2	3.9
Total	51	100

**Table 4:** Methods used for Identification.

Cause of Death	Cases	Percentage (%)
Extensive Burns	35	68.62
Head Injury	4	7.84
Smoke inhalation	2	3.92
Multiple Injuries	6	11.76
Head injury with Burns	2	3.9
Unknown	2	3.93
Total	51	100

**Table 5:** Cause of Death.

Manner of Death	Cases	Percentage (%)
Accident	37	72.54
Homicide	12	23.52
Suicide	0	0
Unknown	2	3.93
Total	51	100

**Table 6:** Mode of Death.

- 3) The general identification was established in 92.15 percent cases.
- 4) Gender Identification was established in 96.07 percent cases.
- 5) DNA Analysis assisted in establishing identity in 66.7 percent cases.
- 6) The manner of death of homicide was noted in 23.52 percent cases.
- 7) Predominant number of the homicide victims was females i.e. 66.66 percent.

Detail and thorough medico legal autopsy including examination of personal belongings, external examination, and internal examination and supported by necessary analytical investigations are helpful to determine identity and cause of death. History of the incident is equally important to the cause of death in highly decomposed and or skeletonized bodies. Skeletal anatomical examination and DNA analysis are important establishing identity. Other useful methods used in identification are radiological assessment of age, injury, foreign body and dental data. Chemical analysis of the samples may prove to be helpful in some cases. A multi factorial approach is necessary to establish identity and cause of death.

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