

## Spectrum of unnatural deaths: autopsies conducted at A. J. Institute of medical sciences & research centre, Mangalore

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### Abstract

**Introduction:** The incidence of unnatural deaths is found to be persistently increasing. Pattern of unnatural deaths is a reflection of the prevailing social set up and mental health status of the population.

**Aim:** This retrospective and prospective study was undertaken to analyze the various aspects related to unnatural deaths autopsied at A. J. Institute of Medical Sciences & Research Centre, Mangalore which is tertiary health care teaching hospital catering the healthcare needs of rural population of coastal Karnataka and Northern districts of Kerala.

**Materials and Methods:** Materials for the present retrospective and prospective study consists of unnatural deaths autopsied at Department of Forensic Medicine & Toxicology, A. J. Institute of Medical Sciences & Research Centre, Mangalore, Karnataka, during the period from January 2005 to September 2013. All the relevant data were studied from police inquest reports, postmortem reports, chemical analysis report, histopathology report, hospital record findings, and information obtained from relatives and friends. Due permission was taken from Institutional Ethics Committee of A.J. institute of Medical Sciences & Research Centre, Mangalore for the conduct of the study.

**Results:** Among 797 unnatural deaths, 643 were males and 154 were females. Five hundred and fourteen cases of unnatural deaths were in the age group of 20 to 49 years with a peak incidence of 30% in the age group of 20 to 29 years. Sixty three percent of unnatural deaths were secondary to Road traffic accident followed by those resulted from poisoning (9%). Males outnumbered females in all types of unnatural deaths except in case of burns. Majority of unnatural deaths were due to accidents (83%) followed by Suicide (12%), homicide (3%) etc.

Twenty percent of suicide victims had underlying Psychiatric illness. Violence was the preferred means of mechanical injuries (77%) followed by burning (19%) and drowning (1%).

**Conclusion:** Males are the predominant victims of unnatural deaths probably due to social interaction and outdoor activities. Younger age group is the common victim of unnatural deaths. The most significant cause of death was trauma in road traffic accidents. A significant number of deaths resulting from RTAs need proper reforms in terms of traffic regulation.

**Keywords:** Accidental, Autopsy, Cause of death, Manner of death, Unnatural deaths.

### Introduction

Death is inevitable-whether we like it or not. Although it is inescapable, cannot be gainsaid yet not accepted with ease. Death become more troublesome when it is unnatural, i.e. against the order of nature or prematurely caused by injury, violence or poison. The incidence of unnatural deaths is found to be persistently increasing. Pattern of unnatural deaths is a reflection of the prevailing social set up and mental health status of the population. In an attempt to understand the magnitude and pattern of unnatural deaths, the study of unnatural deaths by the autopsies conducted at A.J. Institute of Medical Sciences & Research Centre, Mangalore during the period from January 2005 to September 2013 was carried out. Retrospective and prospective study consisting of medico-legal autopsies conducted at Department of Forensic Medicine & Toxicology, A. J. Institute of Medical Sciences & Research Centre, Mangalore during the period from January 2005 to September 2013 with an aim to describe epidemiological characteristics and to analyze the magnitude and pattern of unnatural deaths in this part of the country so that possible

preventive measures can be suggested and taken up accordingly.

### Materials and Methods

Materials for the present study consists of unnatural deaths autopsied at Department of Forensic Medicine & Toxicology, A. J. Institute of Medical Sciences & Research Centre, Mangalore, Karnataka, during the period from January 2005 to September 2013. All the relevant data were studied from police inquest reports, postmortem reports, chemical analysis report, histopathology report, hospital record findings, and information obtained from relatives and friends. Due permission was taken from Institutional Ethics Committee of A.J. institute of Medical Sciences & Research Centre, Mangalore for the conduct of the study.

The information pertaining to age, sex, incident as per police inquest, organ affected leading to death, circumstances leading to death, timing of occurrence, in case of road traffic accidents- type of vehicle collided with the victim in case of pedestrian, type of occupant, etc.; in case of poisoning- type of poison, place of occurrence, timing of consumption, reasons in case of suicide; in case of violence- type of offending weapon; in case of hanging-

place of occurrence, timing of hanging, reasons in case of suicide; in case of burns- place of occurrence, timing, reasons in case of suicide, duration of survival, body surface area burnt; etc. recorded in a pre structured proforma and analyzed.

All unnatural deaths autopsied at Department of Forensic Medicine and Toxicology, A.J. Institute of Medical Sciences & Research Centre, Mangalore, Karnataka were included in this study except sudden death cases which later revealed to be death due to natural causes and autopsies on decomposed bodies wherein definite opinion could not be ascertained.

Base line data will be represented using various forms of diagrams and graphs. Statistical analysis was carried out using IBM SPSS Statistics (IBM Inc., version 17 for Windows) software package.

**Results**

During the study period from January 2005 to September 2013, 865 medico-legal autopsies were conducted at A. J. Institute of Medical Sciences & Research Centre, Mangalore, Karnataka. Out of which 797 were of unnatural deaths and 68 were those belonging to natural death and of undetermined causes.

Among 797 unnatural deaths, 643 were males and 154 were females. Out of total 797 cases of unnatural deaths,

most of the deaths (78.17%) belong to those from Hindu religion followed by Muslims (11.54%) and Christians (9.28%).

Five hundred and fourteen cases of unnatural deaths were in the age group of 20 to 49 years with a peak incidence of 30% in the age group of 20 to 29 years as shown in Table 1. The youngest victim was 3 months old and the oldest was 85 years old.

**Table 1:** Age wise distribution of unnatural deaths

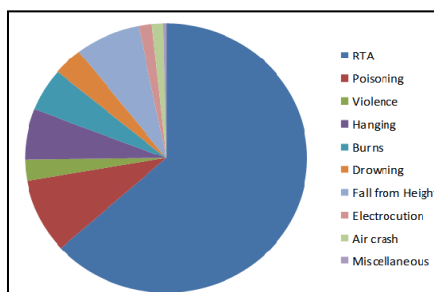
Age distribution	Males	Females	No. (%)
00 – 09	13	16	029 (03.64)
10 – 19	33	21	054 (06.78)
20 – 29	198	39	237 (29.74)
30 – 39	134	17	151 (18.95)
40 – 49	106	20	126 (15.81)
50 – 59	81	16	097 (12.17)
>60	78	25	103 (12.92)
<b>Total</b>	<b>643</b>	<b>154</b>	<b>797</b>

Two hundred and fifty one cases were reported between the months of March and May with a peak incidence of 85 cases in the month of March as shown in Table 2.

**Table 2:** Distribution of unnatural deaths in relation to year and month

Month	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total No. (%)
Jan	2	7	6	4	7	10	5	11	11	63 (07.90)
Feb	3	5	5	4	4	9	7	13	11	61 (07.65)
Mar	4	7	10	3	7	8	9	20	17	85 (10.66)
Apr	10	8	13	9	4	9	10	6	14	83 (10.41)
May	6	8	3	9	8	19	8	11	11	83 (10.41)
June	6	4	3	8	4	5	12	8	9	59 (07.40)
July	3	4	7	2	12	7	9	7	11	62 (07.78)
Aug	6	5	5	4	6	10	8	6	11	61 (07.65)
Sep	2	7	0	6	7	9	11	12	10	64 (08.03)
Oct	8	6	2	6	6	6	15	17	-	66 (08.28)
Nov	8	1	5	11	2	7	10	13	-	57 (07.15)
Dec	5	8	7	4	8	6	5	10	-	53 (06.64)
<b>Total</b>	<b>63</b>	<b>70</b>	<b>66</b>	<b>70</b>	<b>75</b>	<b>105</b>	<b>109</b>	<b>134</b>	<b>105</b>	<b>797</b>

Sixty three percent of unnatural deaths were secondary to Road traffic accident followed by those resulted from poisoning (9%) and those resulted from fall from height (7%) as shown in Figure 1. Among the three miscellaneous type of unnatural death, two resulted from crush injury and one as a result of anaesthesia. Males outnumbered females in all types of unnatural deaths except in case of burns.



**Fig. 1:** Chart depicting distribution of different types of unnatural deaths

According to the information furnished in the police inquest form, majority of unnatural death amongst 797 cases autopsied were due to accidents (83%) followed by Suicide (12%), homicide (3%) etc. The detailed manner/Nature of individual unnatural deaths was elaborated in Table 3.

**Table 3:** Distribution of Nature/Manner of death amongst individual unnatural death

	Accident	Suicide	Homicide	Sudden Unexplained death	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
RTA	505 (63.36)	00 (00.00)	00 (00.00)	00 (00.00)	<b>505 (63.36)</b>
Drowning	22 (02.76)	04 (00.50)	01 (00.13)	00 (00.00)	<b>27 (03.39)</b>
Poisoning	23 (02.89)	36 (04.52)	00 (00.00)	12 (01.51)	<b>71 (08.91)</b>
Hanging	00 (00.00)	49 (06.15)	00 (00.00)	00 (00.00)	<b>49 (06.15)</b>
Violence	00 (00.00)	00 (00.00)	20 (02.51)	00 (00.00)	<b>20 (02.51)</b>
Burns	36 (04.52)	00 (00.00)	05 (00.63)	00 (00.00)	<b>41 (05.14)</b>
Electrocution	12 (01.51)	00 (00.00)	00 (00.00)	00 (00.00)	<b>12 (01.51)</b>
Air crash	10 (01.25)	00 (00.00)	00 (00.00)	00 (00.00)	<b>10 (01.25)</b>
Fall from height	50 (06.27)	09 (01.13)	00 (00.00)	00 (00.00)	<b>59 (07.40)</b>
Miscellaneous	03 (00.38)	00 (00.00)	00 (00.00)	00 (00.00)	<b>03 (00.38)</b>
<b>Total</b>	<b>661 (82.94)</b>	<b>98 (12.30)</b>	<b>26 (03.26)</b>	<b>12 (01.51)</b>	<b>797</b>

Amongst unnatural deaths studied in 41% of cases victim succumbed because of fatal brain injury followed by haemorrhage (15%), Septcemia (14%) and Asphyxia (11%). Maximum number of RTA victims were occupants (Rider/Pillion) of two wheeler (44% related to motor cycle and 1% related to bi-cycle) followed by pedestrians comprising of 23% of victims. In case of pedestrians maximum number got injured due to the collision of heavy motor vehicle (40.35%) followed by two wheelers (30%) as illustrated in Table 10.

In fifty eight percent of poisoning cases victims consumed poison indoor whereas in forty two percent of cases poison was consumed outside their dwelling. Forty seven percent of the poisoning victims consumed poison during the day and twenty seven percent of the poisoning victims consumed poison during night.

In majority of cases victims hanged themselves inside their dwelling (82%).

Most of the burn victims (59%) succumbed within 10days of sustaining burns as depicted in Table 15.

Fifty nine percent of victims sustained burns during day and twenty nine percent of victims sustained burns during night. Most of the victims (90%) succumbing to burns sustained burn injuries involving more than forty percent of total body surface area burnt.

Twenty percent of suicide victims had underlying Psychiatric illness as illustrated in Table 4.

**Table 4:** Reasons for committing Suicide

Reasons for suicide	No. (%)
Psychiatric illness	53 (54.08)
Physical ailments	10 (10.20)
Financial & business loss	10 (10.20)
Death of near & dear ones	06 (06.12)

Marital & Love failure	12(12.24)
Exam failure	03(03.06)
Miscellaneous	04(04.08)
<b>Total</b>	<b>98</b>

Miscellaneous includes unemployment, scolding by sister and mistaking it to medicine.

Violence was the preferred means of mechanical injuries (77%) followed by burning (19%) and drowning (1%) as depicted in Table No. 5. In sixty percent of violence related homicide preferred choice of weapon is sharp weapon (60%).

**Table 5:** Means in case of Mechanical Injuries

Means of Homicide	No. (%)
Violence	20 (76.92)
Burns	05 (19.23)
Drowning	01 (03.85)
<b>Total</b>	<b>26</b>

### Discussion

Unnatural death is one of the indicators of the level of social and mental health. Crime has never been free from any human society since their emergence on this earth. This study was undertaken to analyze the various aspects related to unnatural deaths autopsied at A. J. Institute of Medical Sciences & Research Centre, Mangalore which is tertiary health care teaching hospital catering the healthcare needs of rural population of coastal Karnataka and Northern districts of Kerala.

Our study reflects gradual rise in medico-legal autopsies and unnatural deaths. A study reported from Pekanbaru, Indonesia showed a decreasing trend in unnatural deaths whereas the number of medicolegal autopsies increased over the years.<sup>1</sup> Eighty one percent of unnatural death victims are of male gender, an observation

which is similar to the studies done across the globe.<sup>1-6</sup> The said finding has the following basis of logical explanation. Firstly, males go out for work, much more than their counterpart, exposing themselves or making themselves vulnerable various risks attributed with unnatural deaths. Secondly, men are mostly indulged with both socio-political rows (rivalry, revenging, killing, leadership crisis) and crimes acts (robbery, looting, drug abusing etc) than women. The lower instances of unnatural deaths in females are mainly attributed to custom, social values and preference of females to stay indoors.

There is unambiguous dominance of males in various types of unnatural deaths except in case of unnatural deaths resulting from burns in which females outnumber males by a large margin, similar to those reported from various parts of India, Pakistan and Iran.<sup>7-12</sup> This high occurrence of burn deaths in females may be attributed to the fact that they are the main working hands for the domestic activities in kitchen and thus exposed to cooking on open, unguarded flame such as stove, chullha, cooking gas and other means. Females also presume that the burning is the easiest mode of ending life when there is hostility in their personal or marital life. This is in contrast to the literature reported from Imphal, Egypt, Spain and United States of America.<sup>13-16</sup>

Almost all age-groups were represented with the most being middle aged adult persons (20-29 years). In the studies reported from across India, Bangladesh, Indonesia, and Nigeria reported the similar trend.<sup>1, 13-16</sup> This preponderance of younger age group could be attributed to the stressors one has to undergo at this age. This is the age at which the individual ventures into life defining moments of existence, such as employment, marriage and family responsibilities which makes the individual vulnerable to various hazards of life. Most of the unnatural death victims are from Hindu religion followed by Muslims and Christians, which is in accordance with the studies reported from other parts of India.<sup>17,18</sup> This may be explained by the fact that the religion of most of the population of this locality is Hinduism.

Sixty three percent of unnatural deaths were secondary to road traffic accident, an observation corroborated by studies done across the nation and other countries.<sup>19-23</sup> This trend is a universal issue, because of traffic overloading worldwide. In our context, the high incidence of RTA deaths could be due to pitiable enforcement of traffic rules and regulations, drunk driving, risk taking behavior of youngsters, and the intricate, twisting, winding nature of roads in the rural areas of coastal Karnataka. In city the high occurrence of RTA could be attributed to the better roads thereby increasing the risk of rash and negligent driving. The high proportion of young adults affected could be due to their high levels of activity, as they are the most economically active segment of the population. Most of the studies around the world agree to the finding that majority of fatal crash victims are that of male gender.<sup>24-28</sup> Most of the RTA related deaths were in relation to two wheeler, either rider or pillion. Similar findings were observed in the studies reported from the same geographic location.<sup>29,30</sup>

Forty one percent of unnatural deaths wherein mortality is attributed to injury to brain alone, which is in concurrence with the study reported from northern part of India.<sup>31</sup> This may be attributed to the fact that the bulk of deaths were those arising from RTA and head is most vulnerable part in the body in case of impact.

Accidental deaths constituted 83% of unnatural fatalities. A study conducted at Chandigarh also reported high incidence of accidental unnatural deaths followed by suicidal (13.9%) and homicidal (6%) deaths.<sup>32,33</sup> Homicide is the predominant manner of death as per the study reported from Pekanbaru, Indonesia.<sup>1</sup>

During the study period we undertook autopsy on 10 victims in relation to heartbreaking and disturbing episode of Air India Express Boeing 737-800 flight IX-812 crash at the Mangalore International Airport on 22 May 2010 which lead death of total 158 people on board. Most of the bodies were charred beyond easy recognition, necessitating identification on the basis of DNA typing.<sup>34</sup>

Fifty eighty percent of poisoning victims consumed poison indoors. This high prevalence of indoor poison consumption is in concurrence with studies from others part of India.<sup>35-38</sup> Seventy six percent of the poisoning victims consumed poison during day time. The rationale for preferring day time may be isolation of victims when the family members go out for work or kids to school, literate mass mostly in the day time are engaged in multifarious works resulting in great stress and strain and the stress will be in its peak during the day.<sup>37</sup>

Dominance of poison consumption during day time is in accordance with the trends observed in studies conducted worldwide.<sup>35-39</sup> A study conducted in Nepal highlighted the poison consumption more prevalent during night time.<sup>40</sup> Most of the victims succumbed to poisoning consumed agricultural pesticides. This is explained by the fact that in India, an agricultural country with a lack of strict regulation over the sale of these chemicals, such poisoning agents are easily accessible. The easy availability and cheaper price have made them a popular killer agent especially among the medium and low socioeconomic groups. Studies from other south Asian countries also show the main agents in poisonings to be agricultural chemicals.<sup>41-48</sup> The gamut of poisoning deaths in developed countries contrasts remarkably with that of developing countries. Almost all of poisoning deaths in the United States are ascribed to drugs, mostly resulting from abuse of prescription and illegal drugs. A study from Palestine showed that the bulk of deliberate poisonings involved pharmaceutical agents.<sup>49,50</sup> In majority of cases victims hanged themselves inside their dwellings. Similar findings were observed in the similar studies conducted elsewhere.<sup>51-53</sup> Terminating life by hanging indoors reflects the fact that victims preferring isolation and privacy at their own dwelling.

Fifty nine percent of victims sustained burns during day time. This may be due to the fact that people are usually occupied in their work during daytime and therefore the burns are sustained in the course of their activities.<sup>54</sup>

The percentage of burn over 40% was observed in most of the cases (90%). In a study from Egypt the overwhelming majority of the victims had more than 50% of total body surface area (TBSA) burns indicating the incompatibility with life even at a tertiary care center. Studies from Angola revealed 100% mortality over 40% TBSA.<sup>55</sup> Similarly 80% mortality rate in burns over 40–50% TBSA has been reported from India, Albania and Saudi Arabia.<sup>57-58</sup> Most of the burn victims succumbed within 10 days of sustaining burns. In an Egyptian study 72% cases died within a few minutes to 24 hours, signifying that the burns are rapidly fatal.<sup>14</sup> Similarly Virendra et al. and; Vilasco and Bondurand emphasizes death from burns within a week.<sup>56,59</sup> Early death, i.e., death within 48 hours of sustaining burns is mostly due to inhalation injury.<sup>60-63</sup> Other significant causes of death resulting from burns are multiorgan failure, sepsis, pneumonia, ARDS, and pulmonary embolism.

Most of the suicide victims have a psychiatric illness, which is in concurrence with the studies across the globe.<sup>64,65</sup> Factors that increase the vulnerability to suicide include psychiatric disorders, drug misuse, psychological states, cultural, family and social situations, genetics, previous attempted suicide, the ready availability of a means to commit the act, a family history of suicide, or the presence of traumatic brain injury.<sup>66-68</sup> Mental disorders are often present at the time of suicide with estimates ranging from 27% to more than 90%.<sup>67,69</sup> Half of all people who die by suicide may have major depressive disorder; having this or one of the other mood disorders such as bipolar disorder increases the risk of suicide 20-fold.<sup>69</sup> Other conditions implicated include schizophrenia (14%), personality disorders (14%), bipolar disorder, and posttraumatic stress disorder.<sup>67,69,70</sup> About 5% of people with schizophrenia die of suicide.<sup>70</sup> Thought of suicide is connected with the unbearable psychosomatic anguish resulting in a constriction of thinking that leaves the individual to see only two ways out, death or the continuance of unbearable and inevitable distress.<sup>72</sup>

In majority of cases, preferred method of killing used by the miscreants was by inflicting mechanical injury, which is in accordance with the studies reported from Surat and Bangalore.<sup>73-75</sup> In sixty percent of the mechanical injury linked homicide preferred choice of weapon was sharp weapon. The increasing use of sharp cutting weapons by the people of this region could well be explained by the fact that these weapons are more dangerous than blunt weapons and are easily available due to agricultural background and at the same time non availability of firearms. In study conducted at District Government Hospital, Mangalore, Karnataka 49% of the cases, the victims had sustained sharp force injuries while in 35% blunt force injuries were present.<sup>76</sup> A study reported from India, North America, Britain, Malaysia, and Ireland observed sharp weapons as dominant method used in homicide.<sup>77-81</sup> Study conducted at Government Medical College, Jagdalpur, Chhattisgarh revealed blunt force as the most common method of homicide, which is in concurrence with the research conducted in central Delhi and in the region of Honshu

island of Japan.<sup>82-84</sup> In the United States, firearms are used in most of the homicides, over quarter of all assaults, and almost half of all suicides.<sup>85</sup> This trend of dominance of firearm in homicide related incidents observed in other developed and developing countries alike.<sup>86-91</sup>

## Conclusion

The law and order situation in a particular area of jurisdiction that is the basic reason to plan such studies for situational analysis of unnatural deaths in the region of study for comparison to the national & global statistics in order to find out the possible remedies for minimizing the incidence of unnatural deaths. Gender predominance, rampant age group, causes and manners of unnatural deaths in our study are more or less similar to the pattern found in most of the national studies. The study set the goal of improving the situation by planning new reforms in terms of traffic regulations, improving literacy rate & socioeconomic resolution

**Source of Funding:** None.

**Conflict of Interest:** None.

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**How to cite this article:** Deepak M, Shetty B, Monteiro F N.P, Castelino KP, Xavier AP, Shetty T, Spectrum of unnatural deaths: autopsies conducted at A. J. Institute of medical sciences & research centre, mangalore. *Int J Forensic Med Toxicol Sci* 2019;4(4):111-7.