

**Original research paper**

**Trends in suicidal deaths brought for medico legal autopsy at RCSM medical college Kolhapur: retrospective study**

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**Abstract**

Suicide is a major cause of death in today's world. The pattern of suicidal deaths in a particular area points not only to the quality of living but also the social and mental makeup of the population. The present study includes the cases which have been identified as suicidal deaths being brought for medico legal autopsy. Out of 527 cases of suicidal deaths majority of the cases were males belonging to the age group 21-30 years followed by age group 31-40. Poisoning and Hanging were the most common methods employed. Most of the victims were of lower socio economic class belonging to rural background. Economic instability and family conflict were the most common cause that led to suicides. Suicidal deaths are preventable by the combined effort of the Government agencies, adaption of healthy lifestyle, counselling facilities and change in the mindset of the people to adapt to all the difficult situations in life.

**Keywords** Suicide, Autopsy, poisoning, Economic instability, Counselling

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**Introduction**

Suicide (Latin suicidium, from sui caedere, "to kill oneself") is the act of intentionally causing one's own death. According to Durham, the French biologist, suicide is death resulting directly or indirectly from a positive or negative act of the victim himself, which he knows will produce this result [1]. Around 800,000 to a million people die by suicide every year, making it the 10th leading cause of death worldwide [2, 3]. Suicide and attempted suicide, while previously criminally punishable, is no longer in most Western countries. It remains a criminal offence in our country. With the advent of cut throat competition and mechanized upbringing with less emotional quotient the rate of suicides is on the way up which stands at 11.2 per 100000[4]. Thus suicide which is very much a by product of the advancements of society needs a careful and refined approach so as to study the factors related to it, the causes and if possible to find ways to prevent such a tragedy. Present study is an attempt to throw light on such issues.

**Material and methods**

The study was conducted at C.P.R. Hospital post mortem centre and FMT Dept. of RCSM Govt. Medical College, Kolhapur which covers almost entire district for Medico legal post mortems and unnatural deaths. The study period was from 1/1/2014 to 31/12/2014 which amounts to one year study. The study design comprised of thoroughly scrutinized information gathered from autopsy related documents, history of relatives of the deceased, hospital records, concerned investigating agencies and laboratory report of viscera and their contents, fluids, diseased tissues and organs and other relevant suspicious samples, available in our department. Suicide notes if any were also included.

**Aims and objectives**

The aim of our study was to ascertain suicidal death patterns in and around Kolhapur region and to analyse the data with respect to epidemiological and demographics presentation, methods used for committing suicide and to find out the underlying factors that led to it.

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**Observations and results**

A total of 1502 autopsies were carried out during the study period out of which cases were opined to be that of suicides which constituted 35.08% of the total cases (Table 1)

**Table No 1- showing suicides in relation to total autopsies**

Total Autopsies	Suicide Cases	Percentage	Others	Percentage
1502	527	35.08%	975	64.91%

The age group 21-30 years recorded the highest number of cases followed by 31-40 years with males numbering 366 and females 251 with a male female ratio of 1.45:1. In the age group 21-30 males constituted 28.68% of cases and females 34.66% while in the age group between 31-40 males consisted of 18.85% cases and females 30.67%. Least number of cases was observed in the age group above 60 years in both males and females.

Method of committing suicide

**Table No 2 showing suicides in relation to age and sex**

Age in yrs	Male	Percentage	Female	Percentage
1-10	0	0	0	0
11-20	10	0.02%	50	10.15%
21-30	105	28.68%	87	34.66%
31-40	69	18.85%	70	30.67%
41-50	45	12.29%	12	0.04%
51-60	30	0.08%	24	0.09%
>60	17	0.04%	8	0.03%

Poisoning was the method which accounted for the highest number of cases 209 (39.65%) followed by hanging 145 (27.51%) cases and thermal burns with 111 (21.06%) cases. Drowning accounted for 62 deaths. Table No 3 showing methods adopted for suicide.

Location

Methods committing suicide	Cases	Percentage
Poisoning	209	39.65%
Hanging	145	27.51%
Thermal Burns	111	21.06%
Drowning	62	0.11%

**Table No 3 showing suicides in relation to methods committing suicides**

Location	Cases	Percentage
Rural	363	68.88%
Urban	164	31.11%

The majority of the victims belonged to rural background with 363 cases (68.88%) and 164 cases (31.11%) belonged to those of urban background of victims.

**Table No 4 showing suicides in relation to location**

The lower class people were the majority of affected victims with 236 cases (44.78%) followed by the middle class 176 cases (33.39%) and last by the upper class people 115 cases (21.82%)

Economic Status	Cases	Percentage
Upper Class	115	21.82%
Middle Class	176	33.39%
Lower Class	236	44.78%

**Table No 5 showing economic status of victims**

Marital status	Cases	Percentage
Married	338	64.13%
Unmarried	189	35.86%

Of the 527 cases 338 cases (64.13%) were married while 189 cases (35.86%) were unmarried.

**Table No 6 showing marital status of victims.**

**Table No 7 showing profession of victims.**

The majority of the victims belonged to farmer by profession with 212 cases (40.22%), 125 cases (23.71%) belonged to housewife, 57 cases (0.10%) were unemployed and 44 (0.08%) were students.

Profession	Cases	Percentage
Farmer	212	40.22%
Housewife	125	23.71%
Worker	54	0.10%
Student	44	0.08%
Unemployed	57	0.10%
None	35	0.06%

Causes of suicide	Cases	Percentage
Economic crisis/Poverty	184	34.91%
Family Dispute	132	25.04%
Dowry	84	0.15%
Addicts	54	0.10%
Illness	38	0.07%
Not Known	35	0.06%

Economic crisis/poverty was the most common cause involved with 184 (34.91%) cases followed by family related conflicts or problems with 132 (25.04%) cases.

**Table No 8 showing causes of suicide**

Dowry was a cause with 84 cases (0.15%) cases. Addiction, illness were the other causes. In nearly 35 cases sufficient information regarding the cause could not be elicited.

## Discussion

In among the un-natural deaths, suicidal deaths account second leading cause of death next only to road traffic accidents in a developing country like ours. The increase in the population resulting in lack of job opportunities, frustration in life, chronic diseases / illness, dowry and ill-treatment by husband and in laws, lack of adjustment problems have resulted in enormous number of deaths.

Suicide cases account for nearly 35.08% of cases undergoing autopsy. This is slightly less to the findings of Santosh CS et al [9] who found suicides in nearly 44% of cases autopsied. However the relative large numbers of cases brings fore to the fact that suicide is now an inseparable part of medico legal autopsy.

### Age and Sex

Most of the victims belong to the age group between 21-30 and 31-40 years which is similar to the studies by Behera A et al [1], Singh H et al [5], Meera T et al [6], Sharija S et al [7] and Vijaykumari N [8]. This can be explained by the fact this age group is the most active and are entrusted with the responsibilities of the family leading to conflicts and economic distress which forces one to end his or her life.

As in our study the highest numbers of cases were observed in the males. Males being the bread winner of the family and many being farmers which is similar to the study conducted by B R Sharma [10] and Kh. Pradipkumar Singh. [11]. The higher incidence of males can be attributed to the demographic distribution in the area and also the financial responsibility heaped solely on the male in our society.

### Methods of committing suicide

In our study the most common method employed to die were poisoning, hanging, burns and drowning in the decreasing order which is similar to the study by Behera A and colleagues, Vikram Patel et. al. [12] Though the study by S K Dhatarwal [13], B R Sharma [10], were similar with regard to poisoning as the leading cause of death, burns was the second leading cause of death in their study. This distribution can be explained by the geographical location of the study area which is agriculture based and hence comes with

more number of agriculture poison use. Hanging is easily managed with use of garments and kerosene being commonly used kitchen oil is also used.

#### Location

Maximum number of people who committed suicide was from rural background in our study, which is similar to the study by B R Sharma [10] where many committing suicide were from rural area. This reflects that majority of people still live in villages than the cities.

#### Economic Status

Majority of the victims belonged to lower socioeconomic class in our study. This is similar to the study of Behera A et al [1]. This is due to the fact that economic crisis leads to poor quality of life leading to suicide

#### Marital Status

Majority of the cases in our study were married which is similar to the studies of Behera A et al [1] Singh H et al [5], Meera T et al [6], Sharija S et al [7], Vijaykumari N [8] and Santosh CS et al [9]. This is due to more responsibility and increases familial conflict among married people.

#### Profession

In our study the highest numbers of cases were observed in farmers by profession followed by housewives and unemployed. In farmers more deaths are due to economic imbalance, insufficient infrastructure, lack of support system to provide assistance and easy availability of pesticides. These findings are not similar to any study due to geographic and demographic variations.

#### Causes of suicide

In our study economic causes, poverty and familial conflicts are the leading causes which are similar to the studies of Behera A et al [1], Singh H et al [5], Meera T et al [6], Sharija S et al [7] and Vijaykumari N[8]. This is also similar to the NRCB [4] data. This finding is relevant as economic instability and indebtedness leads to the person being termed an outcast in the society which leads to suicide. Also Meera T et al [6] mentions illness as another important factor which is not consistent in our study The rising economic costs associated with treatment and insufferable misery leads the person to commit such a step.

#### Conclusion

Suicide is an escapist measure taken by a person whose cognitive abilities are completely masked and clouded by confusion and in whom death may appear to be the only immediate certainty upon which he can lay hands on. With the growing menace of this event the challenges lie ahead not only on the individual but also the society as a whole to tackle this problem.

A few suggestions are made:-

1. Creation of more employment opportunities for the weaker sections of the society
  2. Easy availability of credit services for the poor so that they do not have to depend upon moneylenders for credit.
  3. Cooperation between Government and Non-Government agencies in implementation and awareness of welfare programmes for the poor.
  4. To understand the need for psychiatric help and proper counselling for people showing signs of self-harm
  5. To reform the education system this puts a heavy price on marks and not on skill of a person.
  6. Stringent dowry laws which prevents familial conflict regarding the same.
  7. Better and vigilant policy of the Government on the sale and storage of pesticides and agriculture poisons.
  8. Though it is not possible to bring back those lives which are often lost in such a tragic manner but identifying the underlying factors in the social system which promote suicidal
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tendencies and improving the mental health of the community can certainly prevent such incidence further. As such a multidisciplinary approach is required to prevent the loss of many valuable lives and the recognition of suicide not as an unfortunate event but as a 'social epidemic'

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## **Original research paper**

### **Title- Study of Pattern of Fatal Head Injury in Kolhapur region.**

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In autopsy room of R.C.S.M. GMC Kolhapur, cases with fatal head injury brought for autopsy were on high side compared to other medicolegal cases. The present study was conducted over such fatal head injury cases at R.C.S.M. Govt. Medical College & CPR Hospital Kolhapur over the period of one year from 1 November 2014 to 31 October 2015. Total 1470 autopsies were conducted during study time out of which 340 (23%) cases of fatal head injury were observed and studied in detail. The post-mortem study revealed that males were outnumbered than female and highest number being in the age group of the 21-30 years. Road traffic accidents (282 cases 83%) were responsible for most of them, followed by accidental fall 31 (9.1%), homicidal assault deaths were recorded as the least 7 (2%).

Closed head injury 253 (74.41%) was observed frequently than open head injury 87 (25.58%). Alone head injury was observed in 102 (30%) cases while head injury associate with other surface injuries was most common presentation found in 187 (55%) cases. Head injury in the form of combination of scalp injury, skull fracture and intracranial haemorrhage were commonest findings i.e. in 107 (31.4%). Skull fractures were noted in 175 (51.47%) cases and fissured fracture of vault was most common fracture among them 83 (47.7%). Maximum 136 (40%) cases were survived less than hour or either brought dead to casualty. Brain injury in the form of cerebral contusion and / or laceration were observed in 140 (41.17%) cases. Amongst road traffic victims 237 (84%) of victims were not using helmets. On autopsy smell of alcohol was perceived in 12 (4.2%) out of 282 road traffic accident cases.

**Key Words** Head Injury, Fractures, Skull, Road traffic accident.

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**Key Words** Head Injury, Fractures, Skull, Intracranial Haemorrhages, Road traffic accident.

#### **Introduction**

In modern era many countries including India developed speedily in every sector and with development of different sectors all over India population based problems also rises in significant manner. Urbanisation and motorisation of transport system and good road system causes huge increase in road traffic accidents. In road traffic accident single most fatal occurrence is head injury.

Head injury has been defined as a morbid state resultin from gross or subtle structural changes in the scalp, skull, and/or the contents of the skull, produced by mechanical forces [1].

Cranio-cerebral injuries or head injuries one of the most important regional injuries, were known to human beings since history. A vehicular accident constitutes mainly two wheeler accidents as two wheeler constitutes main vehicle fleet in India. Head is most common site injured in road traffic accident as it is the most prominent and vulnerable part of human body by virtue of its situation and to sustain serious and fatal injuries owing to the great risk of striking the head. Two wheeler riders especially of scooter are more prone to developed head injury than other victim. The application of blunt force to the head may result in injury to the contents of the skull, either alone or with a fracture of the skull. The extent

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and degree of an injury to the skull and its contents is not necessarily proportional to the amount of force applied to the head.

The aim of present study is to find out the reasons behind fatal head injury, pattern of different haemorrhages and fractures observed during autopsy. Association with alcohol and use of helmet with fatal head injury was also touched in this study.

### **Material and Methods-**

Present study was conducted at the Forensic Medicine department of R.C.S.M. Government Medical College and CPR Hospital, Kolhapur from 01 November 2014 to 31 October 2015. All cases brought for post-mortem examination at mortuary labelled as head injury as a result of either because of road traffic accident, railway accident, and accidental fall or because of homicide were included in this study. Information was gathered from the relatives of the deceased and accompanying persons, police personnel, police inquest, hospital records and post-mortem findings. History of the incidence was studied in detail and a complete meticulous medicolegal autopsy was conducted on each of these cases. When indicated, histo-pathological examination of stained sections of organs/tissues and chemical analysis of routine viscera and blood were done and the results were analysed.

### **Observation & Results-**

It was observed in the study that most common age group affected was between 21 years to 30 years. Most of Males 76 (27.83%) were from age group 21 years to 30 years had fatal head injury. Followed by 31 years to 40 years and 41 years to 50 years age group each involving 59 (21.62%) males. Most of the female with fatal head injury were from age group 41 years to 50 years i.e. 19 (28.35%) in number. So most of deceased were from young age group and the male deceased were outnumbered than females. The overall gender ratio for male and female was 4.07:1.

**Table 1) Age and Gender wise distribution of fatal head injury cases.**

Age (yrs)	Males	Females	Total	Sex Ratio
0-10	8	1	9 (2.6%)	8:1
11-20	21	4	25 (7.3%)	5.25:1
21-30	76 (27.83%)	10	86 (25.2%)	7.6:1
31-40	59 (21.61%)	11	70 (20.5%)	5.36:1
41-50	59 (21.61%)	19	78 (22.9%)	3.01:1
51-60	18	12	30 (8.8%)	1.5:1
61-70	21	7	28 (8.2%)	3:1
>70	11	3	14 (4.1%)	3.6:1
Total	273 (77.35%)	67 (16.47%)	340	4.07:1

There were different reason for fatal head injury. Amongst all reasons, the road traffic accident was most common cause in males and present in 246 males out of total 273 (90.3%). It was also common cause in female deceased and affected 36 females out of 67 (53.37%). The second most common reason behind head injury is accidental fall and it is present in 31(9.1%) deceased. Head injury happen because of railway accident was observed in 20 (5.8%) cases. Homicidal head injury was observed in 5males and 2females. So in both males and females most common reason of head injury is similar i.e. road traffic accident.

**Table 2) Different reasons behind fatal head injury.**

Cause of head injury	Total	Male	Female
Road traffic accident	282 (83%)	246 (87.3%)	36 (12.7%)
Railway accident	20 (5.8%)	11 (55%)	9 (45%)
Accidental fall	31 (9.1%)	11 (35%)	20 (64.9%)
Homicidal (Assault)	7 (2%)	5 (71.4%)	2 (28.6%)
Total	340	273(80.29%)	67 (19.7%)

**Table 3) helmet use while riding vehicle.**

After interviewing the relatives, investigating officer and eye witness in some cases the information was gathered regarding the use of helmets. Out of 282 road traffic accident cases 157 (55.67%) deceased were not using helmet at the time road accident. And remaining were either driver or passenger of 4 wheel vehicle or pedestrians. In some cases data were not available.

Use of helmet	RTA victim died	Percentage
Yes	33	11.7%
No	157	55.67 %
4 wheeler vehicle / data not available	92	32.62%
Total	282	100%

In further study we observed the association of head injury with other body surface injuries. In majority of cases i.e. in 187 (55%) deceased head injury was associated with other body surface injury. In 51 (15%) cases head injury was present without any detectable other body injury. Head injury associated with some facial and neck injuries were observed in 102 (30%) deceased.

**Table 4) Association of fatal head injury with other body surface injuries.**

Injuries	No of cases	Percentage
Only head injury	51	15%
Head injury + facial & neck injuries	102	30%
Head injury + other body injuries	187	55%
Total	340	100%

Closed head injury was observed in 253 (74.41%) cases while open head injury with fracture was observed in 87 (25.58%) cases

Type of head injury	No of cases	Percentage
Closed head injury	253	74.41%
Open head injury	87	25.58%
Total	340	100%

**Table 5) Frequency of closed and open head injury.**

After detailed internal skull and brain examination certain patterns of head injury were observed. Only scalp

injury in the form of contusion and laceration was observed in 11 (3.2%) cases. In 35 (10.3%) cases we found scalp injury associated with any type of intracranial haemorrhages.

**Table 6) Classification of head injury cases as per pattern of cranio-intracranial injuries**

Type of head injury	Cases	Percentage
Injury to Scalp Only	11	3.2%
Scalp Injury +ICH	35	10.3%
Scalp Injury +Skull# + ICH	107	31.4%
Scalp Injury +ICH+ Brain Injury	72	21.17%
Skull# +ICH+ Brain Injury	29	8.5%
Only ICH	47	13.8%
Scalp Injury +Skull#+ICH+ Brain Injury	39	11.4%
Total	340	100%

Similarly the combination of scalp injury with skull fracture associated with intracranial haemorrhage was observed in 107 (31.4%) cases. This combination of injuries was the most common presenting feature in fatal head injury. While scalp injury with underlying brain injury along with internal haemorrhage without any skull fracture was observed in 72 (21.17%) cases. The combination of scalp injury, fracture of skull, intracranial haemorrhage and brain injury was observed in 39 (11.4%) cases. In 29 (8.4%) cases head injury was observed in the form of intracranial haemorrhage, brain injury and skull fracture without any scalp injury. Exclusive intracranial haemorrhage without any other associate findings was observed in 47 (13.8%) cases.

In 175 (51.47%) cases we observed the skull fractures and we categorised them in different groups according to type of skull fracture. We found fissure or linear fracture involving vault was most common type of fracture noted in 83 cases(47.42%). While linear fracture involving both vault and base was observed in 52 (19.7%) cases. Comminuted skull fracture was observed in 15 (8.57%) cases. While depressed fracture were observed in 15 (8.57%) cases.

Type of skull fracture	Cases	Percentage
Comminuted fracture of vault and base	15	8.5%
Fissured fracture of vault	83	47.42%
Fissured fracture of base	10	5.7%
Fissured fracture of vault and base	52	29.7%
Depressed Fracture	15	8.57%
Total	175	100%

**Table 7) Shows frequency of different types of skull fractures.**

After head injury 136 (40%) deceased were died on the spot. The 58 (17.1%) deceased survived for few hours between 1 to 6 hours and after that they either died on the way to hospital or in the casualty. The deceased survived for 6 to 24 hours were 55 (16.17%). Some

Survival time	No of cases	Percentage
Brought dead	136	40%
1 to 6 hours	58	17.1%
6 to 24 hours	55	16.17%
1 days to 3 days	62	18.23%
3 days to 1 week	15	4.41%
>1 week	10	2.94%
More than 6 months	4	1.17%

62 (18.23%) deceased were admitted for 1 to 3 days, and some 15 (4.41%) for more time i.e. from 3 days to 1 week. 10 (2.9%) deceased were admitted for more than week. The 4 (1.17%) victims of head injury were treated for long time up to 6 months in hospital and then they died due to late complications.

**Table 8) Time of survival after head injury.**

During study period we gathered information regarding smell of alcohol on opening different body cavities and on dissection of stomach. Smell of alcohol was perceived in 12 (4.2%) deceased of road traffic accident either on opening thoracic cavity or dissection of stomach.

### Discussion-

In this study, Males clearly outnumbered females with male to female ratio as 4.07:1. Similar findings were observed in other studies such as kumar et al, Patil et al, Shivkumar et al [11, 12, 13]. In the age group analysis of the victims, maximum incidence was in age group of 21 years to 30 years and least in group 0 to 10 years. Similar findings were observed by other researchers such as kumaret, Patil et al, Shivkumar et al and others [6, 7, 11, 12, 13]. This high prevalence of fatal head injury in young age group is because of social and physical activeness of individual from this age group. And they were either students or serviceman who wants to remain outside home and travel through vehicle most of the time.

Road traffic accident was the most common mode of the fatal head injury. The overall increase in vehicular traffic to the roads is responsible for automobile accidents being the most common mode of fatal injury. Similar findings were noted down in other studies. [2, 3, 4, 5]

Majority of the deceased (55.67%) were not using helmet while riding motorcycle at the time of accident, which suggested that use of the helmet, can be life saving measure during an accident. Shivkumaret al<sup>12</sup> having similar observations. Sirathranont and Kasantikul [2] noted that only 4% of the riders were wearing helmet at the time of accident matching with our observation. Pathak et al [8] in their study of 39 cases of two wheelers accidental deaths reported that 12.82% victims used helmet while 87.18% did not use helmet at all.

In majority of cases i.e. in 187 (55%) deceased head injury was associated with some other body surface injury. In 51 (15%) cases head injury was present without any detectable body surface injury. Head injury associated with some facial and neck injuries were observed in 102 (30%) deceased. Similar findings found with other studies [8].

The maximum number of victims 136 (40%) died on spot, followed by 62 (18.23%) victims survived for 1 to 3 days. Some 58 (17.1%) victims survived for 1 to 6 hours and died either on the way to hospital or in the casualty. Deceased survived between 6 to 24 hours and died in hospital were 55 (16.17%) in number. In this regards the present study is consistent with other studies. Patil et al, Shivkumar et al, Bahera C et al, Pathak et al [7, 10, 11, 12,]

Scalp injury with skull fracture along with intracranial haemorrhage was the most common presentation of head injury. These findings correlate with the other studies. [11, 13] Brain injury in the form of cerebral contusion and / or laceration were observed in 140 (41.17%) cases. In present study, linear fracture of skull was the commonest type of skull fracture. Other researchers found the similar findings. Shivkumar et al, Pathak&Vyas et al, Menon et al [6, 7].

On autopsy smell of alcohol was perceived in 49 (14.41%) cases. We preserved viscera for chemical analysis in suspected cases. But the report of such cases are awaited till date. So alcohol contribute as a major risk factor while driving a car or riding motorcycle.

### **Summary and Conclusion**

The current study was conducted and the data generated were compared in almost all respects with the studies conducted by previous researchers, which recognized males were prone to having fatal head injury and road traffic accidents as the predominant cause of fatal head injury due to blunt trauma. Blunt cranio-cerebral trauma was the predominant cause of death identified in this study. Many deceased of fatal head injury happen in road traffic accident were not using helmets. These fatalities could be avoidable.

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## Case report

### AUTOPSY IN EMBALMED BODY- A RARE CASE

Dr. H. S. Tatiya, Dr. A. A. Taware, Dr. V. T. Jadhao, Dr. S. B. Punpale, Dr. A. L. Bandgar,  
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## Case report

### **AUTOPSY IN EMBALMED BODY- A RARE CASE**

Dr. H. S. Tatiya, Dr. A. A. Taware, Dr. V. T. Jadhao, Dr. S. B. Punpale, Dr. A. L. Bandgar,  
Dr. R. C. Katariya

#### **Abstract:-**

Embalming is the procedure of cadaver preservation. In routine practise whenever postmortem examination is indicated, embalming should never precede it. However rarely postmortem examination has to be performed on embalmed bodies. Current case report discusses one such incidence with medicolegal issues of the scenario.

**Key words:** - Postmortem examination, embalmed body, legal provisions.

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#### Abstract:-

Embalming is the procedure of cadaver preservation. In routine practise whenever postmortem examination is indicated, embalming should never precede it. However rarely postmortem examination has to be performed on embalmed bodies. Current case report discusses one such incidence with medicolegal issues of the scenario.

**Key words:** - Postmortem examination, embalmed body, legal provisions.

Dr. H. S. Tatiya, Dr. A. A. Taware, Dr. V. T. Jadhao, Dr. S. B. Punpale, Dr. A. L. Bandgar, Dr. R. C. Katariya

#### Introduction:-

Embalming is the method of treating dead body by chemicals to prevent decay and preserve its pre-mortem appearance.<sup>1</sup> Embalming is the treatment of the dead body with antiseptics and preservatives to prevent putrefaction. By this process tissues are fixed, organs are bleached and hardened and blood is converted into brownish mass. Embalming alters the appearance of body, tissues and organs, making it difficult to interpret any injury or disease<sup>2</sup>.

Public transportation of the dead body to distant place, anticipating delay in funeral, future dissection/teaching purposes, and preservation of body form of important personalities for public viewing are some of the important indications for embalming. Embalming can be done on both autopsied and non-autopsied bodies, though the former requires a more a more specific approach in terms of body preparation<sup>3</sup>.

In normal circumstances embalming should not precede autopsy as it can destroy vital medicolegal evidences<sup>4</sup>.

We here discuss one such rare case in which postmortem examination was done after embalming procedure.

#### Case History:-

A 38 years old male deceased was brought to the Department of Forensic Medicine, Sassoon General Hospitals for postmortem examination. The deceased died two days back in Singapore after falling in sea, while he was working over cruise. Cause of death given by Singapore authorities was – Death due to drowning after preliminary enquiry and without postmortem examination. Then dead body was embalmed and handed over to his relatives for funeral procedures in India. However after bringing the body back to India, relatives requested to conduct post-mortem examination on dead body. The case was registered as medico-legal case by local police authorities. Police did inquest and requested this department to perform postmortem examination to know the exact cause of death.

On external examination-

- Body was stiff and condition of rigor mortis and livor mortis could not be commented. Postmortem stitched wounds were present over right side of neck and both inguinal regions as a part of embalming procedure.

On internal examination-

- All organs were hardened and strong smell of formalin was perceived. Specific opinion and comments could not be made, hence pieces of lungs, brain, liver, spleen, kidneys and whole heart was kept for histopathological examination. Histopathology revealed significant pulmonary oedema. However cause of death as drowning could not be ruled out.

### **Discussion:-**

Looking in the literature we could find only two cases in which postmortem examination was done after embalming of the dead body. Few questions raised in our minds as-

### **Who can ask for the postmortem examination in embalmed bodies?**

In a case reported by Biplab shee et al, post-mortem was done after 16 days on the cadaver, which was donated to anatomy department. It was done after one of the relatives complained to police regarding cause of death. Special permission of Honourable high court was obtained by police officials for the same<sup>5</sup>. In another case reported by Jatin Bodwal et al, 71 year old lady died due to chronic renal disease. Body was kept in cold storage for three days after embalming procedure in order to preserve the body. However body was unclaimed after three days and hence MLC was registered and postmortem was done after police inquest and requisition<sup>4</sup>. In the present case the doubt in minds of relatives regarding cause of death made them to make the case as medicolegal one and made to perform postmortem examination. Thus there are no specific legal guidelines for conducting postmortem examination on embalmed bodies.

### **What are the merits and demerits of performing postmortem examination on embalmed body?**

In cases reported by Jatin bodwal et al and Biplab Shee et al, causes of death were pathological and hence were preserved due to the procedure of embalming<sup>4,5</sup>. But in present case findings of drowning could not either be made out or ruled out with confidence due to embalming. Regarding toxicological analysis it is reported that, during embalming many chemicals are introduced to the body which pose problem in differentiation of many poisons and may also lead to false positive results<sup>6</sup>.

However Alunni perret and co-workers have detected heroin from bile and liver in embalmed bodies<sup>7</sup> and Steinhauer has devised an useful test for detection of ketosis in such cadavers<sup>8</sup>. In addition to the specific issues discussed above, if we talk in general, there is difficulty in doing autopsy on an embalmed because of fumes of the formalin make autopsy hall obnoxious. Also, there may problem in DNA fingerprinting as the tissues were stained with formalin which will denatured the protein. Only small molecular weight genomic DNA (5µg) can be recovered from formalin fixed tissues. These fixed tissues cannot be utilized for DNA typing unless short sequences are amplified PCR techniques<sup>9</sup>.

### **What are legal provisions in such cases?**

Before performing embalming it is necessary to ascertain cause of death. If death is due to unnatural cause or if there is no proper death certificate indicating cause of death as natural, embalming should not be performed<sup>1</sup>. Embalming prior to medicolegal autopsy may invite charge of destruction of evidence according to section 201 of IPC<sup>4</sup>. Delhi Anatomy Act 1953 mentions that the hospital authority can utilize an unclaimed body for the purpose of conducting anatomical examination and dissection or other similar purpose. As per this act unclaimed body means a person who dies in hospital, prison or public places, which has not been claimed by any of his near relatives or personal friends within the prescribed timeline of 48 hours. After this period body can be cremated by the hospital authorities if not required for academic purpose. However when there is any doubt regarding the cause of death or when for any reason the authorized officer considers it expedient so to do, he shall forward the unclaimed body to the police officer referred to in section 174 of the Code of Criminal Procedure, 1898 (Central Act V of 1898)<sup>4, 10, 11</sup>.

In case of unclaimed dead body lying in the hospital, where death has occurred due to natural cause, the hospital authority should send telegraphic messages to the available addresses. If the dead body is unclaimed after 72 hours, it is legally authorized to dispose of the dead body. In view of the above, the dead body is declared unclaimed for the purposes of organ retrieval after 48 hours as per the Transplantation of Human Organs Act 1994 (Act No. 42 of 1994)<sup>4</sup>. As per the Police Manual the dead body is declared unclaimed only after 72 hours<sup>12</sup>. Thus it can be said that he organ can be retrieved after 48 hours but there should not be disposal of any unclaimed body before 72 hours. When all efforts fail and it is established that no one is likely to claim the dead body, then only a body can be declared as unclaimed and organs can be retrieved as per the Human Organ Transplantation Act, 1994<sup>4</sup>.

In case reported by Jatin bodwal et al, only because the body was not claimed identified a medico-legal autopsy was conducted after 19 days. The sole reason for getting autopsy done was to keep DNA samples for identification. The Delhi Anatomy Act 1953 says that, hospital authorities should inform the authorized officer without any undue delay. In this case police was informed about non claimant of her body after three days of death. Police could not trace the address the deceased. In the meantime body was kept lying in mortuary and embalming got done by the hospital authorities on ninth day. It appears that lack of knowledge and over enthusiasm of hospital administration was responsible for the embalming in that case prior to postmortem examination.

So there is need to formulate certain criteria on such cases regarding-

- Who should do inquest in such cases?
- Who can ask for such postmortem examination after embalming?
- Up to what time duration after death and embalming such cases can be referred for postmortem examination?
- Whether such cases be autopsied by panel? If yes then who all should be the members of the panel?
- What additional documents should be seen prior to postmortem examination?
- What procedure should be followed if cause of death is already issued?
- Whether samples should be preserved for chemical analysis/ DNA analysis? If yes then which samples and under what preservatives?

**Conclusion:-**

There is need to formulate guidelines in such cases. Though the postmortem examination in embalmed body is a rare phenomenon a medicolegal expert must be well worse with this situation. Hence care must be taken in all cases to avoid embalming prior to postmortem examination.

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**Case report**

**Common household products can be fatal: a case report of death due to shampoo ingestion.**

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### Case report

## **Common household products can be fatal: a case report of death due to shampoo ingestion.**

Dr. S. S. Waghmare, Dr. H. R. Thube, Dr. K. U. Zine.

### Abstract

In our daily routine we use various chemicals for household and body care purpose. One example is shampoo which is viscous liquid used for purpose of washing hairs and it is relatively harmless. The shampoo contains various chemical such as surfactant sodium lauryl sulfate or sodium laureate sulfate, with a co-surfactant, most often coc-amido-propyl betaine in water. Another type of shampoo is anti-lice shampoo, which contains sometimes potentially danger organophosphate chemical compounds in trace amount. Accidental ingestion of such products were common in children but usually it is not danger to life. We reported a case of 2 year old baby who accidently ingested shampoo at home. Baby was admitted for few hours in hospital and received basic treatment. But she succumbed to death. So presenting this unusual case of death due to ingestion of household chemical in the form of common shampoo.

**Key words** Shampoo, Accidental poisoning, Surfactant, Fatality, Sodium lauryl sulfate.

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#### **Abstract**

In our daily routine we use various chemicals for household and body care purpose. One example is shampoo which is viscous liquid used for purpose of washing hairs and it is relatively harmless. The shampoo contains various chemical such as surfactant sodium lauryl sulfate or sodium laureate sulfate, with a co-surfactant, most often coc-amido-propyl betaine in water. Another type of shampoo is anti-lice shampoo, which contains sometimes potentially danger organophosphate chemical compounds in trace amount. Accidental ingestion of such products were common in children but usually it is not danger to life. We reported a case of 2 year old baby who accidently ingested shampoo at home. Baby was admitted for few hours in hospital and received basic treatment. But she succumbed to death. So presenting this unusual case of death due to ingestion of household chemical in the form of common shampoo.

#### **Introduction**

In India various natural products were used as a hair care preparation since ancient times. With the introduction of western culture in era of colonial government use of different chemicals in body care products had increased. One example is shampoo. Shampoo is a hair care product used primarily for the removal of dandruff, oils, dirt, skin particles, environmental pollution and/or other contaminant particles that gradually build up in hair. Shampoo having different types which includes routine hair care shampoo, Anti-lice shampoo, medicated anti-dandruff shampoo, animal shampoo etc. These products are relatively harmless but there are few reported cases of poisoning due to use of anti-lice shampoo. (1)

**Contents of shampoo** The more important ingredients in shampoo formulations are water, detergents, foam boosters, thickeners, conditioning agents, preservatives, modifiers, and special additives. Common primary detergents used in shampoos are ammonium lauryl sulfate, sodium lauryl sulfate, and sodium lauryl ether sulphate. Propylene Glycol (PG, Polyethylene Glycol (PEG), and Ethylene Glycol (EG) are all petroleum derivatives that act as solvents, surfactants, and wetting agents. Typical materials include lauramide DE or cocamide DEA as foam booster. (2)

The allergens most commonly present, in order of prevalence are as follows: fragrance, cocamidopropyl betaine, methylchloroisothiazolinone/methylisothiazolinone, formaldehyde releasers, propylene glycol, vitamin E, parabens, benzophenones, iodopropynyl butylcarbamate, and methyldibromoglutaronitrile/phenoxyethanol. (3)

Current anti-dandruff agents primarily have an antimicrobial mode of action, and inhibit growth of *Malassezia* spp. (4) Animal shampoo as well as some anti-lice shampoo contains pyrethrin as a base contain. (2)

#### **Case report**

2 year old girl brought by her parent to casualty of government medical college Aurangabad in un-conscious state. Parents gave history of accidental ingestion of common shampoo at home 2 to 3 hours back. On clinical examination her pulse was weak and rapid. She

was responding to only deep stimuli, pupils sluggishly reacting to light. There was no oozing from mouth or nose. On duty medical officer try to resuscitate her with basic ABC management but after few minutes she succumb to death. Medical officer sent the body to morgue for autopsy.

### Autopsy findings

#### External examination-

In autopsy room, corpse of well-nourished baby was in supine position. Face of the deceased was congested. Eyes were partially closed, pupils fixed and dilated, while conjunctiva shows congestion. Nails of upper limbs shows frank cyanosis. There was no oozing from mouth or nose. There were no injuries present over body. Post-mortem lividity present over back ,back of upper and lower Limbs, buttocks except pressure points and is fixed.



**Figure 1. Bubbles seen in the gastric content**

#### Internal examination-

On dissection internal organs were congested.



Both lungs were congested and heavy. On cut section lungs shows oozing of blood tinged fluid with copious froth. Trachea and upper respiratory tract shows full column of copious, whitish & shiny froth along with thick blood tinged mucus (figure no. 2). Oesophagus contains vomitus material in the form thick liquid with froth.

**Figure 2. copious, whitish & shiny froth along with thick blood tinged mucus**

Whole respiratory tract shows congestive mucosa. On opening stomach shows 100 cc to 200 cc whitish viscous fluid admixed with bile and mucus. There were large amount of bubbles present in upper GI Tract (figure no. 1). Morphologically all other organs were in

normal limits. Viscera was preserved and sent to forensic science laboratory for chemical analysis. Cause of death was given as asphyxia following aspiration of viscous liquid however samples kept for chemical analysis.

### Discussion

Shampoo or other household chemical are generally considered as non-toxic or mildly toxic agent which is intended for external use only to clean the hair, body or to treat certain diseases. In Chan T et al reported poisoning cases due to household chemicals. He noted the percentage of agents involved in poisoning was "Dettol" liquid (46%), cleaning products (19%), pesticides (14%), and shampoos (10%). (5) This kind of reporting is missing in India scenario.

The most common deleterious effects of modern cosmetics are occasional allergic reactions and contact dermatitis (6)

Brand R et al report a patient with widespread dermatitis caused by contact allergy to Kathon CG and cocamidopropyl betaine in used in shampoo. (7)

Hui Han et al noted in his case report of shampoo ingestion that shampoo led to the osmotic pressure rise in the gastrointestinal tract, which in turn resulted in diarrhoea and vomiting. Substantial body fluid loss resulted in hypovolemic shock. (8) Wax PM et al reported a fatality associated with the inhalational exposure to a pyrethrum shampoo causes sudden irreversible bronchospasm. (9)

Two children were admitted to the paediatric intensive care unit due to organophosphate acetylcholine esterase inhibitor poisoning after exposure from a home-made shampoo that was used for the treatment of head lice. (10)

Differ from these case report we noted a death due ingestion of shampoo. Shampoo when rinsed on hair it will produce copious amount of froth with thick bubbles which do not get easily burst and to get rid of them we have to use ample of water. So if anybody ingested the shampoo it will cause thick layer all over oesophagus and when it will come in contact with any other liquid such as gastric lavage fluid or water it produces thick column of froth. One of the reason for fatality in the above stated case may be aspiration of this thick mucus. Or another reason may be hypovolemic shock due to thick viscous liquid ingestion followed by passive flooding of tracheal lumen with froth in peri-mortem or in agonal period.

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## **Case Report**

### **An Unusual Fatal Crushing of Worker in Paddle Mixer of Chemical Fertilizer Manufacturing Industrial Unit**

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## **Case Report**

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#### **Abstract**

A peculiar case of crushing injuries by compression of the body of a worker in a Paddle mixer machine used for mixing the raw material in a Chemical fertilizer production Industrial unit. Crushing injuries in mixer machine are relatively less in frequency of occurrence. This case is peculiar in the sense that the complete body was crushed into pieces involving bones of skull, pelvis, spine and all limbs. The patterns of injuries were also unusual because though it was caused by compression by rotating blades having a large surface area, the appearance of injuries were also altered by the raw material present in the machine admixed with the injuries. The workers engaged in working place with any sort of industrial machinery, there is always a potential risk of injuries or death in the event of an accident, so workers need to ensure that they must operate the machine in specified correct manner and not to divulge the safety precautions.

#### **Key Words**

Fatal industrial accident, Crushing injuries, Autopsy in industrial death, Industrial safety and precautions.

## Case Report

### **An Unusual Fatal Crushing of Worker in Paddle Mixer of Chemical Fertilizer Manufacturing Industrial Unit**

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#### **Abstract**

A peculiar case of crushing injuries by compression of the body of a worker in a Paddle mixer machine used for mixing the raw material in a Chemical fertilizer production Industrial unit. Crushing injuries in mixer machine are relatively less in frequency of occurrence. This case is peculiar in the sense that the complete body was crushed into pieces involving bones of skull, pelvis, spine and all limbs. The patterns of injuries were also unusual because though it was caused by compression by rotating blades having a large surface area, the appearance of injuries were also altered by the raw material present in the machine admixed with the injuries. The workers engaged in working place with any sort of industrial machinery, there is always a potential risk of injuries or death in the event of an accident, so workers need to ensure that they must operate the machine in specified correct manner and not to divulge the safety precautions.

#### **Key Words**

Fatal industrial accident, Crushing injuries, Autopsy in industrial death, Industrial safety and precautions.

#### **Introduction**

The deaths at industrial work place are not uncommon. During 2014, the total number of death by factory/machine accidents in India was 797. The top 10 states/UT's accounted for accidental deaths in industries were Gujarat, Rajasthan, Madhya Pradesh, Maharashtra, Uttar Pradesh, Tamil Nadu, Chhattisgarh, Punjab, Haryana and Delhi in descending order[1]. The most common reason for such accidental deaths in industries were lack of adequate care and safety precautions while handling such machinery resulting in fatal injuries. Reporting herewith, an unusual case of fatal crushing of a worker in Paddle mixer of a chemical fertilizer industry, which vigorously mixes various raw materials. In this case, apparently, the deceased worker had not taken proper precautions while on work, resulted in accidental fall in mixer, spin inside it, got severe tearing and crushing of the body parts leading to instantaneous death. Such complete crushing of the body into small pieces is a very rare incidence.

#### **Case History**

The victim worker was a 38 year old male, working in a small scale industrial unit dealing with production of chemical fertilizers like DAP, Urea etc (fig.-7). There were no eyewitnesses who actually observed how the victim was trapped within the machine and had his body crushed.

**Figure1- Gunny bag containing body parts**



However, co-worker gave testimony that when the machine suddenly stopped rotating though the machine was on he inspected & found the stuck human body parts in the blades of the Paddle mixer machine obstructing the normal functioning of machine. It was evident that, the victim's body was jammed in the machine, who was working alone near the mixer machine.

**fig.2- On opening the bags, body parts mixed with raw materials**



**Fig. 3- After vigorously washed**

Co-workers found that the victim hadn't been wearing any safety headgear in the form of a helmet and even not maintained the proper distance from the mixer machine. The probable sequence of events reconstructed after the visit to the scene of incidence by the authors was that the left Lower limb of the victim got entangled with the greenish thread (fig.-4) and the deceased

suddenly fall over the open / uncovered portion of paddle mixing machine which was in running mode. The Paddle mixing unit (fig.-8) is a large horizontally placed mixer having 12 feet long, 2.5 feet wide and 2feet deep iron metallic box like structure having two rods on which blades are fitted in a spiral fashion.

**Fig.4- Antemortem wound of left leg**

Each blade is long and is obliquely placed the blades are thick and are not sharp and moves in divergent fashion so that the raw material is properly mixed and pushed forward. The mixer has openable top cover which must be kept covered in all situations; however in this case the middle part of covering area of 6 feet was open. Due to the loud noise of these machines like mixer and dryers, the co workers couldn't hear any call for help and when they rushed to inspect suddenly non-functioning mixer, till that time the deceased already had received the fatal crushing of body parts. The whole body was crushed into small pieces and even mixed with the raw material.



### **Autopsy Findings**

The two gunny bags were brought by police, containing the crushed body pieces (fig.-1).

The pieces were of human as few larger size body parts were completely bearing the anatomical & morphological characteristics of male human. The torn clothes were mixed with body parts and the raw material i.e. grayish whitish irregular mixed size granules measuring from less than 1mm x 1mm to 0.8 cm x 1cm (fig.-2).

**Fig.5- Antemortem wound of left arm lower third**



**Fig.6- Antemortem wound of left part of lower jaw**

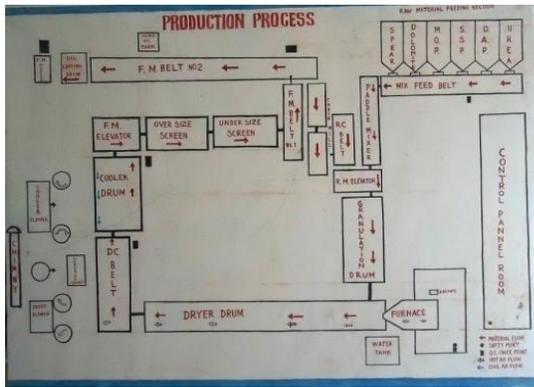
The limbs were crushed to pieces. The scalp, face, neck was not identifiable as bones were completely crushed and tissues were torn and severed irregularly. Initially the clothes were identified and separated. The body parts were washed vigorously with water. One greenish nylon thread, routinely used for stitching the pre-filled bag, was found entangled in the left foot great toe and second toe and crushed upper part near the left knee (fig.-4).

It was 240cm long. The injuries over body parts showed mixed pattern of cuts and stretch lacerations, fractures of the underlying bones to pieces and most of the wounds did not show any vital reaction or blood staining. On careful observations, injuries of following body parts (fig.4-6) showed blood infiltrations in the tissues i.e. the left leg in its lower one third, the left arm near elbow joint, the right forearm and left part of lower jaw, indicating their occurrence before the death. The opinion as to the probable cause of death was shock due to multiple crush injuries.

### **Discussion**

A crush injury occurs when a body part is subjected to severe degree of sustained force or ressure, usually after being trapped between two heavy objects or hard surfaces [2]. Crush injuries are produced by static or quasi-static applied forces, which are defined as those that occur over a longer period of time (>200 ms) and are applied over a large area (as opposed to a point).

Crush injuries are usually described in the context of industrial accidents & road traffic accidents [3]. However, various other case reports have described compressive injuries to head and or thorax and abdomen are as in various other scenarios. Crush injuries in natural disasters, such as earthquakes, have been described, but these situations are uncommon in clinical practice.



Takeshi et al [4] have reported seven cases of crushing head injury out of which one patient had sustained crushing of the head by a press machine and the said patient expired after 4 days. Multiple temporal and parietal bone fractures have been observed in the said patient.

**Fig. 7 Industrial production process unit diagram**

Russell and Schiller [5] have carried out clinical and experimental observations on crushing injuries to the skull in which, bi-temporal compression of the head was experimentally shown to produce a bilateral narrowing and antero-posterior elongation of the skull. Clinical cases described by them included case of head being caught between hatches, head crushed by fall of rock in mine, head crushed between railway carriages, head crushed between backing lorry and wall,



**Fig. 8- the Paddle mixer machine**

head crushed between two motor vehicles, head crushed under the axle of a motor vehicle, head crushed under an overturned lorry, head crushed under oil drums, head crushed under several 100-lb. Shells and head crushed under gun-wheel. In these cases, transverse fracture of the base of the skull was observed, running in the direction of the compression.

However the crushing to such multiple pieces is rarely seen and is rarely reported. Medico-legally such cases are important and need proper identification of antemortem wounds, their distribution on body and presence of any natural disease (that may cause giddiness, fall or even death). In the present case, most of the antemortem wounds were situated on left side, indicating the person had fall on his left side. From autopsy finding, it appeared that the diseased might have fall in the moving machine either while using as short cut or due to accidental entangling with green packing thread in his left foot toes. As the organs were crushed to pieces hence it was very difficult to comment on the disease process. Viscera analysis ruled use of any intoxicant like alcohol. Accident was considered as the most probable manner of death, suicide or homicide cannot be ruled out from post mortem examination.

### Conclusions

In industries, where workers have to work with any sort of industrial machinery, there is always potential risk of injuries or death in the event of an accident. Hence it is necessary to ensure that workers must endow with proper medical checkup facility, also must provide proper safety measures to minimize the risk of injuries and most importantly workers needs to ensure that they

operate the machine in only correct manner and must not bring their bodies in close proximity to moving parts of the machinery [6]. Presence of safety equipment and headgear would be of more helpful in preventing injuries and death, however less helpful in cases where the bodies or parts of bodies get entrapped within heavy machinery.

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