



## Original Research Article

## Circumstances of death and pattern of fatal railway injury

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## ABSTRACT

**Background:** The progressive extension of railway networking and increasing number of passengers as well as goods train to meet the demands of rapid industrialization and growing urbanisation, results in an increase in the various modes of railway fatalities.

**Objective:** To evaluate the pattern and distribution of fatal railway injuries in relation to the circumstances of death in cases of railway related deaths.

**Materials and Methods:** The study was conducted at Forensic Medicine and Toxicology department of M.K.C.G. Medical College & Hospital, Berhampur for medico legal autopsy on selected cases of death due to alleged railway injuries, were subjected to thorough post mortem examination and the pattern of injuries noted.

**Results:** A total number of 1314 cases were brought for medico-legal autopsy during the study period, out of which 94 cases were selected for the present study having clear history of railway related deaths (in which either a train caused death or in which a body was found on the track) excluding all other causes of death (even the cases brought by the GRPS having natural deaths were not considered as study material).

**Conclusion:** The study conducted in the department of Forensic Medicine and Toxicology revealed that the number of railway related deaths, both accidents and suicides is substantial in the locality. Amongst these, accidental railway deaths (63.83%) outnumber the other manners of death. The ante mortem nature of the railway injuries could be well established in the present case study material.

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## 1. Introduction

With the progressive extension of railway networking and increasing number of passengers as well as goods train plying daily to meet the demands of rapid industrialization and growing urbanisation, the number of railway injuries is on the rise day by day all over the country. Competing with the ever-increasing number of railway accidents resulting in accidental deaths, the number of suicides on rail is also on rise due to stress, pressure of work, frustration and depression engulfing the present society.

Railway deaths are most often posing a major medico-legal problem both in civil as well as in criminal cases, to ascertain the manner of death as to suicidal, accidental or homicidal. The question of suicidal and accidental railway deaths is an important matter in civil cases, as according to the present law of the country, the Government of India has to pay compensation for each accidental fatality and to the injured persons. Similarly, it is also very important in criminal cases. Sometimes the body of a victim of homicide may be placed on the railway track as a suitable place for disposal, to simulate suicide or accident. Hence, it will not be proper to say that all bodies recovered from the railway track are the result of death from railway injuries and that all railway injuries are ante mortem in nature. As

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such, it is necessary to differentiate one from the other for the administration of justice. At times, no clear history of the case becomes available and at other times, there is possibility of misleading history given to autopsy surgeons with some malicious intention and specifically discovery of a body near the tracks with extensive laceration and traumatic mutilation of the extremity create a range of diagnostic problems for the autopsy surgeon to distinguish between the deaths due to track crossing, suicides or criminal violence leading to confusion in the minds of investigating officer and the judiciary to decide the manner of death. Considering the above facts, this study has been taken up to evaluate the pattern and distribution of injuries in relation to the manner of railway deaths.

## 2. Materials and Methods

The present prospective study was conducted on selected cases of death due to alleged railway injury brought to the Department of F.M.T. of M.K.C.G. Medical College & Hospital, Berhampur for medico legal autopsy, consecutively for a period of two years i.e. from 1<sup>st</sup> September 2016 to 31<sup>st</sup> August 2018.

Basing on the information of the circumstances and the occurrences reported by the driver of the train, eyewitnesses, co-passengers, friends and relatives, hospital records as well as suicidal notes recovered from the possession of the deceased and considering the ante mortem and post mortem features of the injuries the cases were classified as suicidal, accidental and homicidal for the purpose of systematic study. The case records, inquest reports, photographs, scene of offence are also examined when necessary.

Cases of natural deaths that occurred either in the train compartment or at the railway station were excluded from this study.

A consideration is also been given to alcohol intoxication, which was detected on the postmortem examination, and its role in the occurrence of death.

## 3. Results

A total number of 1314 cases were brought for medico-legal autopsy during the study period, out of which 94 cases were selected for the present study having clear history of railway related deaths (in which either a train caused death or in which a body was found on the track) excluding all other causes of death (even the cases brought by the GRPS having natural deaths were not considered as study material).

The incidence of railway related death cases was of 7.15% out of the total number of cases autopsied.

Table 1 reveals that the total number of autopsies is increasing with every passing year by year so also death due to railway injuries.

It is apparent from the Table 2 that accidental railway related death is most common, followed by suicidal and

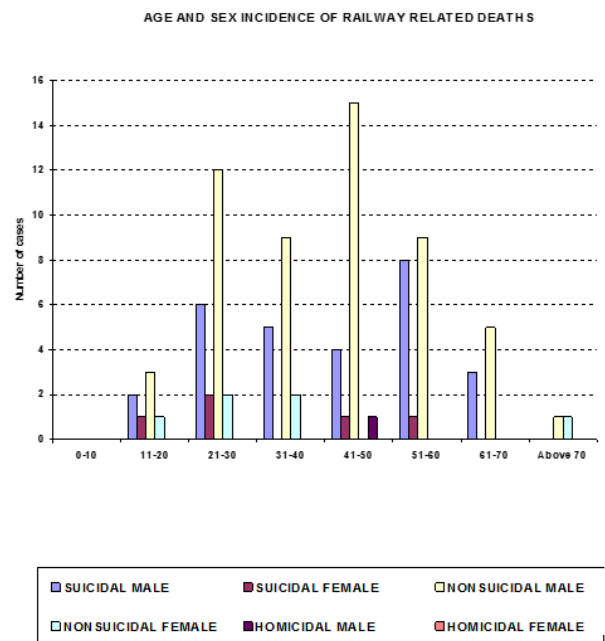
**Table 1:** Incidence of railway related autopsy

Year	Total autopsy	Railway related autopsy	Percentage (%)
2016-2017	621	44	7.08
2017-2018	693	50	7.21
Total	1314	94	7.15

**Table 2:** Manner of railway related deaths

Manner of death	No. of cases	Percentage (%)
Suicidal	33	35.11
Accidental	60	63.83
Homicidal	1	1.06
Total	94	100

very rarely homicidal. However, in the present study only 1 case of homicide was detected where death was due to strangulation followed by post mortem traumatic transaction at the level of trunk as a means of disposal and to mislead the police investigation.



**Fig. 1:** Age and Sex incidence of railway related deaths

This graph shows that in both suicidal and accidental railway deaths, males are the common victims accounting for about 88%.

It is apparent from the graph that the most common victims committing suicide are males and of age group 51-60 years, followed by 21-30 years, whereas in accidental deaths the vulnerable age group is 41-50 years and 21-30 years. Mean age of the study is 42.17 years, mean age for males is 42.95 years and for females is 36.27 years.

Minimum age reported for suicidal and non-suicidal is 14yrs and 18 yrs while maximum age reported is 66 and 85 yrs respectively. The railway injuries are less common in extreme age groups, on either side.

**Table 3:** Identity of cases

Identity of cases	Suicidal	Accidental	Homicidal
Known	13(39.39)	36(60.00)	1
Unknown	19(57.57)	22(36.67)	-
Unknown, made known	1(3.04)	2(3.33)	-

It is found in Table 3 that most of the deceased, who have committed suicide in railways, remained unidentified, while majorities are found to be known in cases of accidental death.

**Table 4:** oCircumstances of death

Circumstances	Suicidal	Accidental
Walking on the track	-	8( 3.33)
Crossing the track	-	16(26.67)
Walking by side of track	-	5(8.34)
Jumping in front of a train	2(6.06)	-
By lying over the track	31(93.94)	-
Falling from a train	-	29(48.33)
Leaning out of door/window	-	-
Travelling on the roof of train	-	2(3.33)

As observed in Table 4 suicidal death occurs most commonly by lying over the track and in few cases by jumping in front of the train, whereas the most common circumstance of accidental railway related deaths was due to falling off from the train which accounted for 48.33%, followed by crossing the track. The two cases, which died while on the roof of the train, were due to electrocution (contact with high voltage traction line passing above the bogies).

**Table 5:** Pattern of fatal injury

Cause of death	Suicidal	Accidental
Decapitation	16(48.48)	-
Decapitation with multiple injuries	4(12.12)	4(6.67)
Transection	8(24.24)	-
Transection with multiple injuries	2(6.06)	4( 6.67)
Multiple fatal injuries	3(9.1)	34(56.66)
Blunt trauma to		
Head	-	9(15.0)
Thorax	-	5(8.33)
Abdomen	-	4(6.67)

It is observed from Tables 5, 6 and 7 that in the present study decapitation and transection wounds without associated injuries are found in case of suicidal railway

**Table 6:** Site of fatal injury

Body Part Involved	Number of cases		Total ( % ) N =93
	Suicide (%)	Accidental (%)	
Head	5(15.15)	44( 73.33)	52.68
Neck	19( 57.57)	8 (13.33)	29.03
Thorax	7( 21.21)	17(28.33)	25.80
Abdomen	9( 27.27)	13(21.67)	23.65
Extremities	10(30.3)	37 (61.67)	50.53

deaths, whereas multiple injuries involving multiple vital organs were detected in most of the accidental railway deaths. In few cases of suicide as well as in all accidental decapitation and transection, wounds are found along with other injuries on the body. In cases of suicide, the neck and trunk are mostly involved whereas in accidental deaths, the head and extremities were injured in majority of cases with or without other associated injuries.

#### 4. Discussion

Fatality of railway injuries is high, irrespective of their manner of production. Though sufficient measures for prevention are being taken; the incidence of accidents by trains is still increasing, which is reflected in the present study (Table 1) amounting 7.08% of the total autopsy in the year 2016-17 going up to 7.21% in the year 2017-18. This indicates that increasing number of people are traveling by train or diverting their attention to railway track for committing suicide.

Most of the railway related deaths happen to be accidental in nature (63.83%) although suicidal deaths are not uncommon (35.11%) and in 1 occasion, a case of homicide with post mortem railway injury was detected. Our observation is almost similar to the observation of other authors like S.J.Cina.,<sup>1</sup> (92%), G.G.Davis.,<sup>2</sup> (74.41%), M.K.Mohanty.,<sup>3</sup> (80.7%), P.Ravi Kumar.,<sup>4</sup> (72.12%), T. Mohit Kumar Moses.,<sup>5</sup> (63%), B.Patil.,<sup>6</sup> (69%).

In the present study, it is observed that males are the common victims of railway related deaths irrespective of the manner of death. Such a finding is identical to the findings of other authors in their studies like A.Schmidtke.,<sup>7</sup> (71.75%), D.Spaite.,<sup>8</sup> (90%), M.J.Shapiro.,<sup>9</sup> (87%), G.G.Davis (88%), F.Agalar.,<sup>10</sup> (68%), M.K.Mohanty (79.5%), and M.Ozdogan,<sup>11</sup> P.Ravi Kumar (93.65%), T. Mohit Kumar Moses (87%).

It is found in Table no. 3 that most of the deceased, who have committed suicide, remained unidentified while the majority is found 'known' in cases of accidental death. In the present study, a substantial group of railway suicidal deaths belongs to persons unknown to the locality. The victims of suicide are usually the persons who remain away from their native place in search of job or business and when they suffer a setback while struggling for success, solitarily

**Table 7:** Circumstances of death and pattern of fatal injury

Circumstances of death	DC.	DWMI	TS.	TWMI	MFI	BTH	BTT	BTA
Walking on the track	-	-	-	-	8	-	-	-
Crossing the track	-	1	-	1	9	2	1	2
Walking by side of track	-	-	-	-	4	1	-	-
Jumping in front of train	-	-	-	-	2	-	-	-
By lying over the track	16	4	8	2	1*	-	-	-
Falling from a train	-	3	-	3	13	4	4	2
Leaning out of window	-	-	-	-	-	-	-	-
Travelling on the roof	-	-	-	-	-	2**	-	-

DC- Decapitation, DWMI- Decapitation with multiple injuries, TS- Transection, TWMI- Transection with multiple injuries, MFI- Multiple fatal injuries, BTH-Blunt trauma head, BTT-Blunt trauma thorax, BTA-Blunt trauma abdomen

\*The only case lying on the track without decapitation or transection was due to the body lying on the track without touching any portion of the rail lines and it was a case of alcoholic intoxication where the deceased might have sleeping longitudinally or obliquely on the track due to intoxication.

become depressed and frustrated to commit suicide, as there were no other friends and relatives with him to share his problem. Some times a known person also remains unidentified, as no one comes forward to involve himself in any future police litigations.

The present work reveals that the persons committing suicide on rail tracks mostly prefer to lie down over the track (93.93%), where as a small numbers attempted jumping in front of a running train; however, in accidental railway related deaths the most common observation is falling down from the train (48.33%). This finding is almost similar to the findings of other workers like D. Spaite (falling from train 56%) and F. Agalar (59%).

The individuals who commit suicide choose to lie down on the track because of guaranteed and instantaneous death, presuming it to be painless. Most railway related fatalities are due to falling off from a train, usually while boarding or getting down from a running train, or while standing and leaning forward at the door of a moving train, due to either loosening of the grip or missing steps.

It is apparent in the present study that, decapitation injury, i.e. separation of the head from the trunk or transection of the trunk without other associated major injuries, is almost always suicidal in nature. Whereas decapitation with multiple injuries may be either suicidal or accidental in nature, transection of the trunk with multiple injuries occurs more frequently in accidental cases. Multiple fatal injuries without decapitation or transection and solitary injury to the head, thorax or abdomen are more in favour of accidental railway deaths. Decapitation and transection injuries with other associated injuries will be caused when a person lies undisturbed on the railway track placing his neck or trunk to be crushed by running train. This position indicates fearlessness and strong determination of the victim to commit suicide (un-accidental nature of the injury).

As regards the sites of fatal injury, the present study demonstrated the neck is the suitable part for the purpose of suicide where as head injury is the commonest in case of accidental railway related deaths. Injury to the extremities is frequently found as additional injuries in both suicides

and accidents. Our finding is similar to M.K.Mohanty (decapitation more in cases of suicide; head is commonly involved in accidents), Valsala. K.,<sup>12</sup> (head injuries are common), G.Kejlaa<sup>13</sup> (majority of accidents have head and cerebral injuries), S.J.Cina (in 88% cases massive blunt trauma is present) and F.Agalar (extremity amputations and fractures frequently encountered). In case of suicides, if a person lies horizontally on both the rail lines there is chance that the decapitation will be associated with traumatic amputation of the lower limbs and if body is placed in a bit oblique manner on the tracks, the decapitation injury will be associated with traumatic amputation / avulsion-laceration of the upper extremity along with shoulder. Similarly, in case of accidental railway deaths, an injury to the extremities with mutilation is a frequent observation, considering the relative position of the person, the moving train and the manner of impact.

## 5. Conclusion

The study was conducted in the department of Forensic Medicine and Toxicology, M.K.C.G. Medical College, Berhampur for a period of 2 years i.e. 2016-2018 to ascertain the pattern of injury in railway related deaths and it revealed as follows-

Fatalities due to railway related deaths are on a steady rise with every passing year amounting to 7.15% of the total autopsies done at M.K.C.G. Medical College, Berhampur. Amongst these, accidental railway deaths (63.83%) outnumber the other manners of death. Homicidal event is extremely rare. Male persons falling between the 3<sup>rd</sup> to 6th decades of their life are the most common victims (73%) with the mean age being 42.17 years. Extreme age groups are relatively less vulnerable. At times, identity was a problem in suicidal deaths. Pedestrians crossing the track and persons falling from the running train are particularly susceptible to railway traffic accidents and those preferring to commit suicide opt to lie down over the track. Instantaneous death is almost always the rule in suicidal deaths (100%).

Commonest trademark pattern of fatal injury marked in railway suicide is decapitation or transection wound with none or minimal associated injuries. Head and extremities involvement was found to be a feature of accidental railway deaths.

In the present study, the following conclusions are derived

1. The number of railway related deaths, both accidents and suicides is substantial in this locality.
2. Several factors played a role in the occurrence of suicides. Of course, the easy availability of the track with busy traffic of trains was another factor to choose this mode of death.
3. Accidents occurred mainly due to hurry, negligence, overconfidence, ignorance, carelessness, adventurous approach etc
4. Overcrowding, ticket less journeys especially on the roof of bogies or near the door were potentially dangerous, in occurrence of accidents.
5. Decapitation and transection of the body are in favour of suicides, but a crime scene visit should be considered to help in reconstruction of the incident. The crime scene examination in Railway injury cases often revealed blood staining on the track and spurting of blood over the metal and the track. Thus, the ante mortem nature of the railway injuries could be well-established in the present case study material.
6. Soiling of the clothing of the deceased was invariably observed with the black engine oil and lubricant grease in railway fatalities in the present study.
7. Especially in deaths due to multiple injuries, it was difficult to locate primary impact, secondary impact and secondary injuries in railway fatalities.

## 6. Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

## 7. Source of Funding

None.

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