



AN AUTOPSY-BASED STUDY ON THE PATTERN OF INJURIES IN RAILWAY FATALITIES CONDUCTED AT PATNA MEDICAL COLLEGE

Dr. Pankaj Kumar

Professor And Hod, Dept. Of Fmt, Patna Medical College

Dr. Damini Chandra

Junior Resident-iii, Dept. Of Fmt, Patna Medical College

Dr. Vikash Kumar Jha

Junior Resident-iii, Dept. Of Fmt, Patna Medical College

ABSTRACT

The Indian Railways is one of the largest railway networks in the world, with millions of people relying on it for daily transportation. The progressive extension of railway networking and increasing number of passengers as well as goods trains to meet the demands of rapid industrialisation and growing urbanisation, increases the various modes of railway fatalities. Out of the total 100 autopsies performed, the number of unknown cases were more than the known cases due to multiple factors like extreme mutilation of the body making it highly difficult even for the immediate family members to recognise the dead body. Maximum fatalities were reported among 21-40 years of life followed by 41-60 years and 61-80 years. Most of the railway-related deaths happen to be accidental in nature (63.83%). To reduce Railway Accidents, Government has to create awareness program in relation to the safety guidelines, which in turn requires equal co operation from the general population. In matters of railway safety, there has to be an attitudinal change — from the conventional approach of fault-finding and punishment to one of shared commitment to ensure complete safety at all levels

KEYWORDS : Railway Accidents, Derailment, Collision, Railway Protection Forces.

INTRODUCTION

The Indian Railway Network, one of the largest and busiest national railway networks in the world, is governed by the Ministry of Railways, Government of India. The total route length is 68103 km (42317 miles) as of 31st March 2022, 83% of all the broad-gauge routes are electrified with 25 kV 50 Hz AC electric traction as of 1 April 2022.

Regarded as the largest, most active and the only reliable source of transportation on land in the world, it is accessible to the farthest corners of the country, covering all states unstirred by the weather. It is more suitable for carrying cumbersome cargo over long journeys. Railways are the most popular means of long-distance transportation in India, hence the IR is often described as the backbone of this nation's economy. Over the years, the Indian Railways has shown immense growth in parameters like infrastructure, expenditure and freight.

Despite its feasibility, Indian railways are more prone to accidents, which has brought a significant amount of attention. The cause of accidents is various factors working together.

The evolution of mass rapid transport systems in the form of suburban railway networks has increased railway casualties in the cities as the railroads pass through residential and commercial zones.

They are mostly because of human errors and equipment defects & the statistics of accidents have increased exponentially.

Due to their weight, mass and force, anything in the path of a train is in grave danger.

They cause devastating damages and personal injuries including death due to the speed and tremendous weight of the railway machinery.

The percentage of types of accidents like collisions, falls from trains, accidents near level crossings etc are discussed in this paper.

A train accident is defined as a "collision, derailment, or any

other event involving the operation of on-track equipment".

Bernard Knight has classified railway accidents into three groups:

- 1. Train Accidents:** Accidents to trains and rolling stock on or affecting passenger lines and failures of rolling stock, track, and structures.
- 2. Movement Accidents:** Accidents to people caused by the movement of railway vehicles, excluding those due to train accidents.
- 3. Non-movement Accidents:** Accidents to people on railway premises, but not connected with the movement of Railway vehicles.

Out of the three groups, train accidents in the 1st group do not happen very often, but they can be extremely catastrophic when they do.

The 2nd group i.e. movement accidents has been taken up for the study in this paper as the number of fatalities cumulatively are far more than those from the other two groups combined and further challenges faced by forensic experts.

Railway accidents have occupied an important role in the medical and legal disclosures on trauma and traumatic disorders and have augmented the burden of a Forensic Medicine expert.

Most of the cases of railway deaths that were reported were either hit by the moving train or had fallen from a moving train. The identification of the victim is the most strenuous issue for a medico-legal expert as most of the reported cases are unknown and are in mutilated or in badly mauled condition. The challenge doubles up if there are any signs or suspicion of homicide followed by disposing off the body on the railway track so that the injuries may be concealed. Regardless, most railway fatalities are accidents or suicides. During an autopsy, the railway pattern of injuries should be differentiated from other injuries and ante-mortem from the post-mortem.

Hence, the present study aims to analyse the cases of Railway fatalities brought to the mortuary of PMCH Patna for autopsy. This study is an analytical study of the injuries that caused death and the manner of death.

Aim Of The Study

- 1. To examine the injuries caused due to railway accidents in detail-in terms of pattern, nature, and distribution & hence make a comparative study to arrive at a reasonable conclusion on their contribution to the deaths.
- 2. To comprehend the pattern of certain injuries or other autopsy findings that are characteristic of railway accidents.
- 3. To analyse the possibility of differentiating the manner of death specifically bound to the pattern & type of injuries.
- 4. To suggest preventive measures that can be adopted to prevent railway accidents & preserve human life.

MATERIALS & METHOD

The present original research study was approved by the Institutional Ethics Committee of Patna Medical College, Patna, Bihar.

It is a retrospective study of 100 cases of railway fatalities out of the total 244 cases which were brought to the mortuary of Patna Medical College, Patna in the Department of Forensic Medicine and Toxicology during the entire year of 2023 i.e. 1st January 2023 to 31st December 2023.

The initial data regarding the identity of the person, where, when and by whom was the body first found, the position of the body and injuries on the body was collected from inquest reports. Photographs of the deceased were collected. In cases of hospital deaths, case sheets & treatment records were collected.

A detailed history was collected from relatives about the emotional status, psychiatric conditions, addictions, any physical disabilities and socio-economic condition. All the findings of the autopsy were noted and relevant photos at the time of the autopsy were taken.

Inclusion Criteria :

All cases of fatalities due to railway accidents were brought for autopsy in the mortuary department of forensic medicine & toxicology, PMCH, Patna.

Exclusion Criteria :

- 1. Deaths due to other cases except Railway accidents autopsied at PMCH.
- 2. Deaths due to derailments, train collisions & burns in train accidents.
- 3. Deaths due to electrocution at railway stations or railway tracts.

OBSERVATIONS & DISCUSSIONS

A total of 2964 numbers of medico-legal autopsies were performed in the Department of Forensic Medicine & Toxicology, PMCH, Patna during the study period from 1st January 2021 to 31st December 2021, of which, 244 cases were deaths due to railway track incidents accounting for 8.23% of total autopsies that were performed.

DISTRIBUTION OF RAILWAY FATALITIES ACCORDING TO AGE

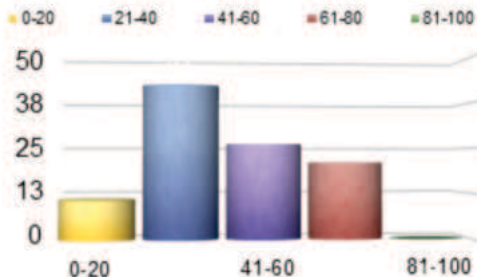


Table 01

(The Figures In The Above Bar Exceed The Total Number Of Cases Due To The Presence Of More Than One Injury Pattern In The Same Victim)

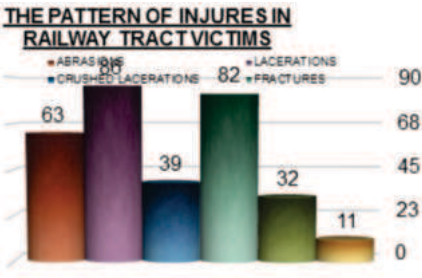


Table 02

DISTRIBUTION OF RAILWAY FATALITIES ACCORDING TO SEX

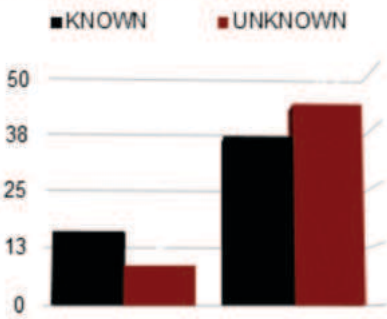


Table 03

Table 04 Activity At The Time Of Death

ACTIVITY	TRAIN KNOWN/U KNOWN	NO. OF CASES	TOTAL CASES	PERCENTAGE (%)
HIT BY TRAIN WHILE CROSSING	Known	32	56	56
	Unknown	24		
HIT BY TRAIN	Known	18	34	34
	Unknown	16		
HIT BY FREIGHT TRAIN	Known	2	2	2
HIT BY ENGINE	Known	3	3	3
OTHERS	Unknown	5	5	5

Table 05 Body Part Involved In Separation

BODY PART	NUMBER	PERCENTAGE (%)
HEAD	10	23.25
NECK	6	13.95
THORAX	1	2.32
ABDOMEN AND PELVIS	2	4.65
UPPER LIMB	20	46.51
LOWER LIMB	15	34.88

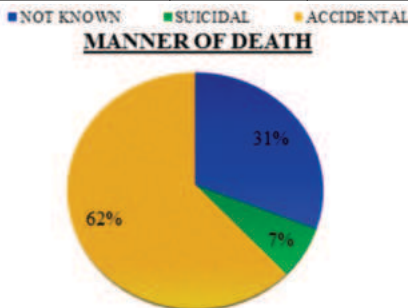


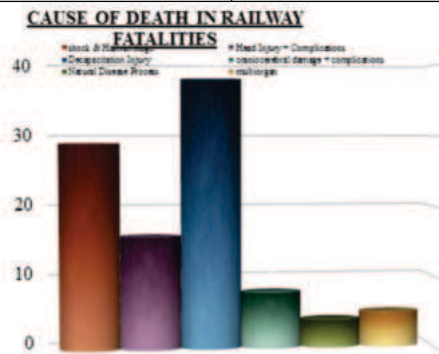
Table 06 Distribution Of Injuries

Table 07 Crush Injuries In Different Body Parts

BODY PART	NUMBER
HEAD	58
NECK	1
THORAX	41
ABDOMEN + PELVIS	29
UPPER LIMB	1
LOWER LIMB	7

Table 08 Manner Of Death

BODY PART	NUMBER
HEAD	18
FACE	9
NECK	7
THORAX	5
ABDOMEN + PELVIS	8
UPPER LIMB	R-15 L-12
LOWER LIMB	R-7 L-7

**Table 09****Table 10 Time Since Death**

TSD	NUMBER	PERCENTAGE
6-12 HOURS	8	8
12 HOURS	1	1
12-24 HOURS	12	12
24 HOURS	58	58
24-36 HOURS	8	8
24-48 HOURS	2	2
2-3 DAYS	5	5
3-4 DAYS	4	4

Table 11 Month Wise Cases

MONTHS	NO. OF CASES	PERCENTAGE
JANUARY	4	4
FEBRUARY	9	9
MARCH	5	5
APRIL	7	7
MAY	8	8
JUNE	4	4
JULY	11	11
AUGUST	13	13
SEPTEMBER	9	9
OCTOBER	13	13
NOVEMBER	9	9
DECEMBER	8	8

Table 12 List Of Police Stations Which Brought Railway Accidents To Pmch

POLICE STATION	NUMBER	PERCENTAGE
PATNA JUNCTION	26	26
PIRBAHORE	17	17
PATNA SAHIB	16	16
RAJENDRA NAGAR	10	10
FATUA	9	9
GULZARBAGH	6	6

BANKAGHAT	3	3
TAREGNA	3	3
PARSA BAZAAR	2	2
OTHERS	5	5

CONCLUSION

In 2021, falling from a train or collision of trains with people on the tracks accounted for the majority of railway accident deaths in India, at 67.2%.

The Indian Railways registered a big increase of around 38.2% in accidents in 2021 compared to the previous year. Most such accidents were reported from Maharashtra, accounting for 19.4% of the reported 17,993 accidents. "Maharashtra reported 3,488 railway accidents," according to the National Crime Records Bureau (NCRB).

The findings of the present study in most of the aspects are similar to that of Sabale PR, Basu R et al. who both got laceration as the highest injury but different from Chandru K et al who got crush injury as the highest injury. The variation may be due to differences in the type and frequency of trains, speed of movement and safety measures prevalent in those places.

Maximum fatalities were reported among 21-40 years of life followed by 41-60 years and 61-80 years. No fatalities were reported in >81 years of age. The age group 21-40 years is primarily of the people who go out into the city to earn their livelihood. Therefore, the death of such people becomes extremely difficult to cope with for not only the family as in most cases that person is the primary breadwinner in that family but also the country as the workforce contributing to the growth of the economy is lost.

Most of the railway-related deaths happen to be accidental in nature (63.83%) although suicidal deaths are not uncommon (35.11%) and on 1 occasion, a case of homicide with post-mortem railway injury was detected. In the present study, it is observed that males are the common victims of railway-related deaths(%) irrespective of the manner of death, Which may account to the nature of the work that requires frequent travelling either for household or personal work.

Out of the 100 cases taken up for this study, 46 bodies were of known persons and 54 were unknown dead bodies. The number of unknown cases were more than the known cases due to multiple factors like extreme mutilation of the body making it highly difficult even for the immediate family members to recognise the dead body, early decomposition changes due to multiple injuries and lack of efficient procedure with the police personnel to trace out the unknown. In some cases, people travel to the city from far-off places and travel alone and when they meet with an accident it becomes very hard for the police personnel to trace the victim.

The activity at the time of accidents in railway fatalities during the study period has shown that the most number of accidents happened while crossing the railway track. People are in such a hurry that they seriously misjudge the speed of the train while crossing the railway track, especially near the platforms where they have to change lines to catch another train & eventually get hit by the train and succumb to their injuries.

The main crux of medico-legal problems is the establishment of the identity of the deceased. Most of the cases reported are unknown in a badly mauled, mutilated, condition where the definite identification from external features is not possible, but all efforts should be made to identify the victim from the clothes and other personal effects. A proper coordination between the Medical Officer and Investigating Officer supplemented by good photography at the scene and during autopsy might prove to be of immense help in establishing

identity and more particularly in arriving at a conclusion regarding the manner of death.

Hence, railway fatalities can pose great challenges to the medicolegal expert and investigating officer if they are investigated properly and autopsies conducted by observing everything carefully. A proper coordination between the Medical Officer and Investigating Officer supplemented by good photography at the scene and during autopsy might prove to be of immense help in establishing identity and more particularly in arriving at a conclusion regarding the manner of death.

Suggestions

Railway fatalities taking toll of human lives and economy are often underreported and go unnoticed and the victims of these incidences are also ill compensated. It is therefore necessary to pay adequate attention to Railway fatalities and formulate appropriate policies for giving equal treatment to the victims of these events and also to make efforts for mitigating these.

The study revealed that the human error associated factors are the major contributors towards accidents in Indian Railway. It is suggested that due emphasis should be given towards skill enhancement of the staff through periodic trainings. The inclusion of computerized management systems for scheduled maintenance of railways throughout the country would be fruitful in eliminating the accidents occurring due to improper/lack of maintenance. Ambulances with para-medics should be present in every stations. Public awareness regarding railway safety should be spread by involving various social groups, media etc. Self-vigilance on the part of the passengers and adherence to the rules & regulations safe practices will help prevent railway accidents. This effectively includes avoiding crossing of rail-tracks, no hanging outside trains, no sitting on train roof-tops and no jostling while boarding or alighting from the trains, especially moving trains.

To reduce Railway Accident Government has to create awareness program in relation to the safety guidelines, which in turn requires equal co operation from the general population. The Government has to invest in the up gradation of the infrastructure, which will improve the safety features.

In matters of railway safety, there has to be an attitudinal change — from the conventional approach of fault-finding and punishment to one of shared commitment to ensure complete safety at all levels.

Greater public awareness and preventive measures may reduce the tremendous human and financial loss incurred due to deaths due Railway Fatalities. Preventive measures should be taken up by installing low lying level crossing gates, alarms, signal lights, warning sign boards etc.

Therefore to reduce Railway fatalities, a comprehensive and sustainable system should be established by promoting safety engineering and law enforcement particularly in metropolitan railway system.

Unsafe and adventurous practices like getting up or down a running train, travelling on roof tops and standing or leaning from the doors of the compartments, should be discouraged by educating the public and if required should be penalized.

Public should be encouraged to use foot-over bridges instead of jumping from platforms and crossing the tracks to reach their platform. Strong and immediate punishment should be given to those who don't follow this to create the sense of safety. Even at unmanned gates, steps should be taken to install warning devices like sirens, so that the public know that the train is

approaching.

Self-vigilance on the part of the passengers and adherence to the rules & regulations safe practices will help prevent railway accidents.

Funding:

"This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors".

Conflict Of Interest:

The authors declare that there is no conflict of interest.

REFERENCES:

1. https://en.wikipedia.org/wiki/Indian_Railways
2. Davis GG, Alexander CB, Brissie RM. A 15-Year Review of Railway-Related Deaths in Jefferson County, Alabama. *American Journal of Forensic Medicine and Pathology*. 1997; 18: 363-368.
3. Amakiri CN, Akang EE, Aghadiuno PU, Odesanmi WO. A prospective study of coroner's autopsies in UCH, Ibadan Nigeria. *Med Sci Law* 1997; 37:69-75.
4. Etebu EN, Nwosu SO. Medicolegal autopsies in University of Port Harcourt, Nigeria. *Niger J Orthop Trauma* 2003; 2:33-35.
5. Schmidtke A. Suicidal behaviour on railways in the FRG. *Soc Sci Med*. 1994;38(3):419-26.
6. Spaite D. Railroad accidents: a metropolitan experience of death and injury. *Ann Emerg Med*. 1988;17(6):620-5.
7. Shapiro MJ. Traumatic Train Injuries. *AMJ Emerg Med*. 1994;12(1):92-3. doi:10.1016/0735-6757(94)90210-0.
8. Agalar F. Train-pedestrian accidents. *Eur J Emerg Med*. 2000;7(2):131-3.
9. Ozdogan M. The epidemiology of railway related casualties. *Ulus Travma Acil Cerrahi Derg*. 2006;12(3):235-41.
10. Odesanmi WO. Forensic pathology in Nigeria: The Ife experience. *Med Sci Law* 1982; 22:269-74.
11. Akhiwu WO, Nwosu SO, Aligbe JU. Homicide and suicide in Benin City, Nigeria. *Ani Aggra Internet J Foren Med Tox* 2000; 1:1-5.
12. Thompson IG. Homicide and suicide in Africa and England. *Med Sci Law* 1980; 20:99-103.