Original Article

Indian Journal of Forensic Medicine and Pathology
Volume 13 Number 4, October - December 2020
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.13420.3

Magnitude of Morbidity and Mortality and Trends in Fatal Railway Injuries

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How to cite this article:
Ajay Vinayak Patil, Shailesh C Mohite. Magnitude of Morbidity and Mortality and Trends in Fatal Railway Injuries. Indian J Forensic Med Pathol. 2020;13(4):489–494.

Abstract

Background: Railway accidents that take human lives and economic toll are mostly underreported and go unnoticed and the victims of such incidences are poorly paid as well. Therefore it is important to pay due attention to the deaths of the Railway and devise effective policies to provide fair treatment to the victims of these incidents and also to make efforts to minimize them.

Aims: To assess and judge the exact magnitude of morbidity and mortality and trends in fatal railway injuries.

Materials and methods: This Retrospective study carried out at the mortuary of the teaching hospital on the incidence of railway deaths the material comprised of 298 victims who died exclusively of railway injuries.

Results: In our Institute, medicolegal autopsies constitute 35% of the total autopsies. Autopsies in cases of Railways constitute around 10% of the total medicolegal autopsies. Most of the victims were in the age group of 21 to 30 years, males contributed to 70% and females 30%, but still, then female, alcohol was detected in the body in 13% of cases, distribution of the external injuries showed that there are commonest in the head region(73%),More than one reason was involved in the majority of cases.

Conclusion: It is suggested that a set of preventive measures for a multipronged strategy to minimize railroad deaths.

Keywords: Railway accidents; Medicolegal autopsies; Preventive measures.

Introduction

The Indian railways are the biggest sector public sector undertaking in the county, has the second largest railway network in the world, and probably the most complex one. the scale of operations and the sheer size of activity is unbelievable. The total distance covered every day by the Indian railway is round 3.5 times the distance to the moon, with the increase in the number of trains passengers, an increase in the number of accident and casualties resulting there from is not unexpected.

Deaths have occurred in association with railway since the beginning of the rail industry. Rapid urbanization and expansion have put the population under different kinds of stress and strain. The changing and modern lifestyle has added further pressure. All these and many others increased the risk of un-natural death. According to the world health organization 10 lakh, people die annually worldwide due to suicide and homicide,

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other 25-lakh people die each year because of accidents.

Accidents represent a major epidemic of non-communicable disease in the present century, they are no longer considered an accident. They are part of the price we pay for technological progress.

Public and private transport injuries are an important cause of death amend disability in the less developed world. It is knowing that anywhere in the world, effective transportation like railways holds the key too infrastructural growth. The industrial and socio-economic development of any region depends on efficient, consumer-oriented communication and transport systems. The railway role in this aspect is highly appreciated, particularly in Indian conditions. Thus, railways play an important role as an infrastructural catalytic factor is quite known and duly recognized.

The problem of railroad fatalities has different trends countries and thesis because of the variations in the mean of transport. The number of people killed and injured as a result of railroad accidents, both in the united states and in Britain has decreased progressively over the last 40 yrs. this is because they prefer air - travel then railway as a means of transport. Again, better safety precautions and methods of working also has contributed in that, but the general downward trend is sometimes intermittently reversed by individual major accidents.[1,2]

The world health organization group selected a simple description for a working definition of the term accidents an unpremeditated event resulting in unrecognizable injury. Accidents besides causing fatalities on rare occasions more offer produce morbidity. Some of the morbid states lead to crippling and disabling conditions. Modern medical researchers have substantially reduced mortality due to infections. However, it is a paradox that this advantage has been more than nullified by the continuous or even steep rise in mortality and morbidity due to accidents and railway accidents collectively are viewed by the house of delegates of American medical association as a medical problem of major importance, affecting more persons than does all illness known today. Progressive industrialization, mechanization, and urbanization are the main causes of this rise in accidents. railway deaths in particular continue to endanger the society to an alarming degree. In a Mumbai based on the role of accidents in mortality studies 1848 cases of accidents head the list. after that as the trains and commuters and the population, in general, have increased tremendously, logically explaining increasing train fatalities.

Railway disaster easily attracts public attention, like any catastrophe in which many peoples are injured or killed. Usually, it is a matter of technical investigation to classify the course of events and the accident. So an attempt is made here to affirm the factors responsible for railway accident deaths, to study the pattern and distribution of injuries in the decreased and to make some constructive too prevent the railway deaths and therefore to reduce mortality and mortality in day to day life.

Materials and Methods

The study was carried out at the mortuary of the teaching hospital, Mumbai. the material comprised of 298 victims who died exclusively of railway injuries. In this Retrospective study, the incidence of railway deaths, their season-wise distribution, daytime and night time occurrence of accidents age-wise distribution, sex distribution period of survival of patients after the injuries, references were also made of injuries body area-wise, external injuries type wise, injuries of the internal organs, the involvement of bones and or joints, traumatic lesions of the brain, fracture and or dislocation of the vertebral spine, the involvement of spinal cord, and incidence of deaths due to complication was studied all bodies were subjected to full complete autopsy examination blood alcohol levels were obtained for everyone except children and those who had spent a lengthy period in the hospital.

Histologic examination was made in each case including heart, lungs, liver, kidneys, spleen and brain, paraffin section. These histologic findings along with proper histories, clinical notes, external and internal examination in autopsy and chemical analysis report helped us to construct opinion in each case and these are the basic pillars in our study to fathom the actual problem of railway deaths.

The note was also made of the case where surgical aid was given. The literature on the subject was reviewed and observations made in the study were compared with the corresponding observation made by the other workers in the field.

Statically analysis is done with Microsoft excel. Frequencies, tables, and percentages are done.

Results

Table 1: Incidence of medicolegal autopsies.

Year	Total autopsies	Medicolegal autopsies	Incidence
1989	864	307	35.53%
1990	903	266	29.46%
1991	919	341	37.10%
1992	889	350	39.37%
1993	828	300	36.23%
1994	716	216	30.16%
1995	711	216	30.37%
1996	717	264	36.82%
1997	771	281	36.44%
1998	812	307	37.80%
Total	8130	2848	35.03%

In the present study, it is observed that an average of around 813 autopsies are performed every year in which 285 (medicolegal) autopsies every year, so medicolegal autopsies constitute around 35% of the total autopsies.

Table 2: Incidence of rail road /railway deaths.

Years	Total medicolegal autopsies	Total railway deaths	Incidence
1989	307	67	21.83%
1990	266	30	11.28%
1991	350	21	6.16%
1992	300	34	9.72%
1993	216	23	7.67%
1994	216	21	9.73%
1995	264	13	8.01%
1996	281	25	9.47%
1997	307	31	11.03%
1998	341	33	10.75%
Total	2848	298	10.46%

In the present study, it is observed that an average of around 285 medicolegal autopsies is performed every yr. Around 30 medicolegal autopsies in railroad are performed every yr. and autopsies in railroad deaths constitutes paper 10.5% of total medicolegal autopsies.

Table 3: Age-wise distribution of cases.

Years	Birth-10yrs	11–20yrs	21–30 yrs.	31–40 yrs.	41–50 yrs.	51–60yrs	60–70 yrs.	71–80	81yrs onwards	Total
1989	2(3%)	2(3%)	36(54%)	12(18%)	8(12%)	6(9%)	1(%)	Nil	Nil	67
1990	Nil	Nil	15(50%)	9(30%)	5(17%)	1(3%)	Nil	Nil	Nil	30
1991	Nil	2(10%)	5(23%)	5(23%)	3(16%)	5(23%)	1(5%)	Nil	Nil	21
1992	Nil	1(3%)	9(27%)	14(41%)	4(12%)	5(15%)	Nil	1(3%)	Nil	34
1993	Nil	3(13%)	11(46.5%)	4(18%)	1(4.5%)	2(9%)	1(4.5%)	1(4.5%)	Nil	23
1994	Nil	Nil	8(38%)	9(43%)	4(19%)	Nil	Nil	Nil	Nell	21
1995	Nil	1(7.5%)	5(40%)	3(24%)	2(15%)	1(7.5%)	Nil	1(7.5%)	Nil	13
1996	Nil	2(8%)	6(24%)	8(32%)	4(16%)	3(12%)	2(8%)	Nil	Nil	25
1997	Nil	2(6%)	13(45%)	11(34%)	1(3%)	3(9%)	Nil	1(3%)	Nil	31
1998	Nil	1(3%)	8(24%)	13(40%)	9(27%)	1(3%)	1(3%)	Nil	Nil	33
	2(0.7%)	14(5%)	116(39%)	88(30%)	41(14%)	27%)	6(2%)	6(1.4%)	Nil	298

Railroad deaths vary significantly in different age groups. The commonest age group observed in Railroad death is 3rd decade of life

Table 4: Season wise distribution of cases.

Years	Winter		Summer		Monsoon		Total
	October	January	February	May	June	September	
1989	25	(37%)	20	(30%)	22	(33%)	67
1990	10	(33%)	8	(27%)	12	(40%)	30
1991	11	(52%)	2	(9%)	8	(39%)	21
1992	13	38%)	7	(21%)	14	(41%)	34
1993	9	(39%)	3	(13%)	11	(48%)	23
1994	10	(48%)	5	(21%^)	14	41%)	21
1995	3	(23%)	4	(13%)	6	46%)	13
1996	13	(52%)	6	(24%)	6	(24%)	25
1997	9	(29%)	9	29%)	13	(42%)	31
1998	14	(42%)	9	(27%)	10	(31%)	33
Total	117	(39%)	73	(24%)	108	(37%)	298

There is seasonal variation in railroad deaths,Railroad deaths are commonest in winter, closely followed by monsoon and there are comparatively rare in the summer season. There is no significant variation in railroad deaths during daytime (51%) and night time (49%).

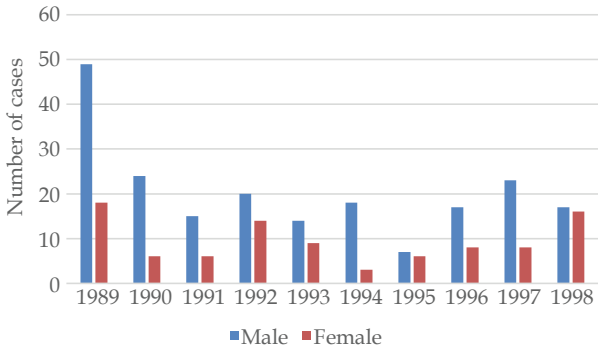

Fig. 1: Gender-wise distribution of cases.

In Railroad deaths gender plays a significant role in statistics, Males(70%), outnumber females (30%) significantly.

Table 5: Accidents associated with alcohol consumption.

Years	Total no of cases of railroad deaths	No of the cases detected positive for alcohol	Percentage of total
1989	67	9	14%
1990	30	4	14%
1991	21	2	10%
1992	34	4	12%
1993	23	3	13%
1994	21	2	10%
1995	13	2	16%
1996	25	4	16%
1997	31	4	13%
1998	33	5	15%
Total	298	39	13%

Alcohol was detected in the body in 13% of the cases.

Table 6: Distribution of external injuries in the study.

Years	Head	Thorax	Abdomen	Pelvic	Limbs	Total railroad deaths
1989	51(77%)	19(77%)	24(36%)	17(25%)	9(13%)	67
1990	21(70%)	20(67%)	6(20%)	4(14%)	3(10%)	30
1991	13(62%)	4(2%)	7(4%)	2(1%)	4 (2%)	21
1992	19(57%)	12(36%)	11(33%)	3(9%)	4(12%)	24
1993	17(74%)	6(36%)	9(39%)	6(26%)	6(26%)	23
1994	16(80%)	11(55%)	10(50%)	2(10%)	8(40%)	21
1995	9(70%)	2(16%)	2(16%)	1(8%)	3(24%)	13
1996	21(84%)	4(12%)	11(44%)	7(28%)	9(36%)	25
1997	25(81%)	108(37%)	9(29%)	6(20%)	10(32%)	31
1998	24(72%)	–	13(39%)	9(27%)	2(6%)	33
Total	216(73%)	186(62.8%	102(34%)	57(19%)	58(19%)	298

External injuries showed that there are commonest in the head region, (73%) followed by thorax (37%) abdomen (34%) pelvis (19%), and limbs(19%) of the total victims.

Table 7: Involvement of bone and joints in fatal railway accidents.

Yrs.	Skull	Clavicle	Humerus shoulder joints	Radius cartilages and strum	Ribs cartilages and sternum	Pelvis help joint	Femur knee joint	Tibia fibula ankle joint	Small bones of hands	Small bones of feet	Total no of railroad deaths
1989	48(72%)	20(30%)	7(11%)	5(8%)	19(28%)	16(24%)	4(16%)	3(5%)	16(24%)	10(15%)	67
1990	17(57%)	5(17%)	2(7%)	Nil	12(40%)	2(7%)	2(7%)	Nil	4(14%)	3(11%)	30
1991	10(50%)	6(30%)	4(20%)	1(5%)	4(20%_)	2(10%)	3(15%)	Nil	2(10%)	1(5%)	21
1992	16(47%)	10(29%)	5(14.5%)	3(9%)	13(39%)	3(9%)	4(12%)	1(3%)	7(21%)	1(3%)	34
1993	15(65%)	14(63%)	7(30%)	4(18%)	16(70%)	6(27%)	6(27%)	2(9%)	6(27%)	5(22%)	23
1994	16(80%)	5(25%)	11(55%)	5(25%)	13(65%)	2(10%)	7(35%)	3(15%)	10(50%)	8(40%)	21
1995	9(72%)	2(16%)	2(16%)	1(8%)	6(48%)	1(8%)	1*(8%)	Nil	5(40%)	4(32%)	12
1996	20(80%)	8(32%)	10(40%)	3(12%)	21((84%)	6(24%)	5(20%)	2(8%)	8(32%)	5(20%)	25
1997	24(78%)	17(55%)	10(32%)	12(39%)	18(58%)	6(19%)	7(23%)	5(16%)	15(49%)	9(29%)	31
1998	23(69%)	22(66%)	2(6%)	1(3%)	15(45%)	9(27%)	6(18%)	5(15%)	10(30%)	9(27%)	33
Total	198(67%)	109(37%)	60(20%)	35(12%)	137(46%)	53(18%)	45(15%)	21(28%)	83(28%)	55(18%)	298

More than one region was involved in the majority of cases. nothing the involvement of bones and / or joints, skull bones were the commonest (67%), followed by ribs cartilage and sternum (46%), clavicles (37%), and other bones of the day more than one bone and /or joint showed the fracture.

Discussion

Railway accidents take a fairly large toll of human lives, in terms of both, mortality and morbidity. they are commonly met worth in those areas through which railway tracks run, particularly in suburban are as adjoining big cities. This is a retrospective study of 10 years, i.e. From 1989 to 1998. The average autopsies career accounts for around 815. A total of 8130 autopsies were performed in the 10 years. Total medicolegal autopsies per annum accounted to be around 285. Hence, medicolegal autopsy is in this Institute amounted to be around 35% of the total autopsies. (Table 1 and Table 2) Most of the victims were in the age group of 21–30 yrs followed by 31–40 yrs. age groups birth 10 yrs and 71–80 yrs. (Table 3). In the study, males contributed to 70% and females 30% but still, then female's n contributed much more as compared to their studies. (Fig. 1). In Ashwini Narayan K study age group between 21–30 years was the most vulnerable, which corresponds with various other studies.[4,5,6] Males victims accounted for the bulk of casualty in this group. This could be explained by the above-mentioned reason and also because of a general disregard for rules in the younger age group, oppositional defiant behavior, and risk-taking behavior amongst the youth, especially the males. Male pre ponderance is consistent with numerous other research carried out.[7,8] Railway network being vast, providing regular travel intervals and affordability is the chosen mode of a working individual's commuting. Therefore males are more vulnerable than females being the predominant working community in Indian society.

There is no significant variation in railroad deaths during daytime (51%) and night time (49%). (Table 4) In other studies,accidents occurred more during the morning hours which agrees with the study done by Valsala K, C. S. Sreedevi, Sreelekshmi J9,and least during the night hours.

In this study, alcohol was detected in the body in 13% of the cases, (Table 5). In Ashwini Narayan K 3 observation, epilepsy, natural diseases, and use of drugs or alcohol, dizziness was the precipitating factors in 5(15.62%) cases and 4(12.50%) of victims showed pre-existing illness. The presence of alcohol was confirmed in 2 cases and a history of anti-hypertensive medication found in 4 cases. Symonds[10] identified alcohol as a major risk factor, but he stated that alcohol contributed less in railway-related accidents. Similar findings were noted by authors.[11]

Distribution of the external injuries showed that there are commonest in the head region, (73%) followed by thorax (37%) abdomen (34%) pelvis (19%), and limbs (19%) of the total victims. (Table 6) More than one region was involved in the majority of cases. nothing the involvement of bones and / or joints, skull bones were the commonest (67%), followed by ribs cartilage's and sternum (46%), clavicles (37%), and other bones of the day more than one bone and /or joint showed fracture. (Table 7). A study conducted by M.I. Sheikh, L.V. Shah and Rajesh Patel, which showed that out of 262 cases, (79.32%) of the victims died of multiple injuries, head injury, decapitation, crushing of body in parts, blunt injuries transaction of the body into two parts.[12]

Considering the enormous magnitude of railway accident mortality concerted efforts are needed towards research -experimentation, and legislation. Most of the Railway fatalities are not properly investigated and enough effort is not made by the Police to establish the identity of the victim. Timely establishment of Identity helps in handing over the body to the right relatives and also helps to a very great extent in getting all the needed information to establish the motive behind the death and also the manner of death. The inquest report becomes the main linking evidence in the interpretation of manner of death in the later part of the investigation before and after autopsy. Hence an investigating officer must actively take part in the investigation with integrity. The scene should be investigated properly and photographs should be taken from different angles as far as possible before shifting the body for autopsy.

Railway accidents can be avoided by educating the public, awareness, use of media, Strict enforcement of the railway rules avoiding ticketless traveling, Rail walking, and crossing, learning from windows, and traveling outside the railway compartments. Posting Railway Guards at most vulnerable level Crossings chosen by people committing suicide and that would help to prevent these. Footboard traveling should be punishable and improvement of the design of railway carriages, railway tracks, signal systems. Accountability of staff, continuing education programs for staff to minimize/ reduce human errors. Publication of data regarding prosecution and punishment(e.g. To stone-pelters). Prompt transportation to hospital and treatment by experts.

Conclusion

The primary impact of rail injuries are related to

the head and arms, chest, trunk as it is usually get struck from the side, which are usually multiple and extensive and the secondary injuries are due to been thrown down and run over resulting in the crushing and deep injuries. In our country it is becoming an increasing practice to kill a person by other modalities and keeping the dead body on a railway track or besides railway track to mimic it as a case of suicidal or accidental railway injury. Certain factors in the investigation of train accidents and subsequent autopsy examination may give rise to some definite conclusions in forming opinions. The various factors such as examination of scene of death/crime, nature of various injuries, postmortem staining on dependent parts and presence of rigor mortis gives helpful information in coming to the conclusions.

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.

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