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Original Research Article

A CROSS-SECTION STUDY OF PATTERN OF RAILWAY INJURIES AMONG AUTOPSIES CONDUCTED AT MORTUARY, RIMS RAICHUR

Ravishankar M G[1], Sunil Kumar Kainoor[2], Priyanka A Ghuli[3]

[1]Assistant Professor, Department of Forensic Medicine and Toxicology, BMC & RC Ballari, Karnataka, India
[2]Assistant Professor, Department of Forensic Medicine and Toxicology, Raichur Institute of Medical Sciences, Raichur, Karnataka, India
[3]Assistant Professor, Department of Forensic Medicine & Toxicology, Apollo Institute of Medical Sciences and Research, Hyderabad, Telangana, India.
[4]Professor and HOD, Department of Forensic Medicine and Toxicology, Raichur Institute of Medical Sciences, Raichur, Karnataka, India

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Corresponding Author:
Dr. Ravishankar M G,
Email: dravimg@gmail.com

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ABSTRACT

Background: The study was conducted to know the pattern of railway injuries. The present study has been carried out in the department of Forensic Medicine and Toxicology, Raichur Institute of Medical Sciences, Raichur during the period of December 2017 to November 2018. This is one year Cross sectional descriptive study. **Materials and Methods:** The present study has been carried out in the department of Forensic Medicine and Toxicology, Raichur Institute of Medical Sciences, Raichur during the period of December 2017 to November 2018. This is one year Cross sectional descriptive study. Autopsy findings of 46 railway cases subjected for medico legal autopsy were studied and relevant statics were drawn from the cases. Proforma was used to collect history and particulars of case, data tabulated to Excel sheet for analysis. **Result:** Autopsy findings of 46 railway cases subjected for medico legal autopsy were studied and relevant statics were drawn from the cases. Performa was used to collect history and particulars of case, data tabulated to Excel sheet for analysis. Totally 371 autopsies were conducted and the study group accounted 46 cases (12.40%). Males (91.3%) outnumbered females (8.7%). Age group between 31 – 40 years (21.7%) and 41-50 years (21.7%) showed maximum number of fatalities. Maximum cases were found in Hindu religion (47.8%). Most of the victims were employed i.e. 21 cases (45.7%). **Conclusion:** It can be concluded from the current study that, although suicidal deaths cannot be entirely prevented, addressing the stressor, timely psychiatric couselling and familial support can definitely bring down the number of suicidal deaths. As opposed to accidental deaths, which are entirely preventable by enhanced surveillance activities and strict implementation of punishment for crossing tracks, foot board travelling, boarding or alighting from a running train. The anganwadi workers and social workers in rural areas can educate the rural population about the hazards of being on and around a railway track while herding the animals or to attend calls of nature. Building toilets at each and every house in villages should be encouraged. This practice not only prevents accidental run over deaths, but also improve the sanitation in villages.

INTRODUCTION

Railway Accidents in India is Not Uncommon, because India has the largest railway in the world.[1] Railways provide affordable, fast and reliable means of day-to-day transport and also a mode of travel for vacation and religious pilgrimage, that is spread across the Whole country. Every setup has its own flaws which at times breakdown and railways are also no exception. Railway accidents do occur and for which both human error and mechanical failures have always been blamed.[2] The increased railway traffic and its distribution over wide area of network across thousands of kilometers across the country covering, urban, rural and forest sectors pose a major contributing factor for the railway related accidents fatalities.[3,4] Moreover, Railway premises being the most suitable shelter for homeless and beggars, it also accounts for deaths due to natural causes in persons who are victims of poverty and trafficking.[2] The easy accessibility to the network has made a

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prominent choice for the suicide, resulting in mutilating injuries (decapitation, transaction, dismemberment, amputation etc). The majority of the dead bodies recovered as a result of railway accidents are in mutilated form, which needs careful evaluation of the primary, secondary impact injuries.

Railway fatalities include: 1. Those that occur within the train in which the passenger experiences impacts during a crash similar to those of any other unrestrained motor vehicle accident.[2] Those involving collisions between trains and other vehicles.[3] Those that involve people on or near the railway track. The last of these types of fatalities will produce pattern of injuries that depend upon the position of the victim and type of accident (impact, run over etc). The mass of train is such that even glancing blows can produce devastating injuries.[5] They have also been used to mask a homicide as the injuries in railway accidents produce extensive damage to the body that reconstruction is difficult and differentiating the homicidal injuries from railway impact injuries is almost impossible. Railway wheel mark, dirt & grease contamination, pattern of injuries over the body deserve careful observation to rule out criminal violence.[6] Accidental deaths on railway tracks are also a common occurrence. They are usually because of a person trying to cross the track/collision between trains, automobile accident in unmanned crossings, passengers who hang out of doors & are hit by trees/poles or during outbreak of fire.[7]

Source of data: The present study has been carried out in the department of Forensic Medicine and Toxicology, Raichur Institute of Medical Sciences, Raichur during the period of December 2017 to November 2018. This is one year Cross sectional descriptive study, based on autopsy reports analysis conducted in the Department of Forensic Medicine & Toxicology, RIMS, Raichur, during the same period. Autopsy findings of 46 railway cases subjected for medico legal autopsy were studied and relevant statics were drawn from the cases. The history related to the deceased was obtained from the close relatives and concerned police in each case. Thorough post-mortem examination was conducted, relevant photographs were taken, data entered in proforma separately for each case. Ethical clearance for this study was obtained from the Institutes Ethical Committee, Raichur Institute of Medical Sciences, Raichur. All the victims of Railway fatalities that were autopsied at RIMS, Raichur during the study period were included. Advanced putrefied bodies and mutilated bodies, where only fragments of body are subjected to autopsy were not included in the current study. All deaths in railway premises due to natural causes without any external injuries over body were excluded. Non Train accidents on railway premises but not connected to the movement of railway were excluded.

MATERIALS AND METHODS

The study material comprises of Victims of Railway accidents died in RIMS hospital or Victims of Railway accidents brought dead to the Mortuary. Information regarding the bio data of the deceased and various factors regarding the circumstances of accidents were gathered from all possible sources like, Police records, Hospital records, Direct interrogation with the investigating officer, Eye witnesses, Relatives and friends of the deceased accompanying the dead body.

The data thus obtained were recorded in predesigned & preformat which comprised relevant data that is concerned with objectives of the study to be analyzed. Statistical analysis of the data was done and presented in the tabular form.

Statistical Analysis: Descriptive statistics with proportion and percentage were used to describe the data.

RESULTS

Condition of Body During Autopsy

Among 46 cases of railway fatalities, in 28 cases (60.9%) the victim's body parts were intact and in 8 cases (17.4%) the body was observed in two parts, followed by in 6 cases (13%) body parts were found to be into three parts and lastly among 4 cases (8.07%) the bodies were found in multiple fragments respectively as shown in [Table 1].

Table 1: condition of the body during autopsy

Condition	Frequency	Percent
Body part intact	28	60.9
Two parts	08	17.4
Three parts	06	13
Multiple fragments	04	8.7
Total	46	100

Type and pattern of injuries among victims: Among 46 railway fatalities the pattern of external injuries as well as their type varied. Contusion + laceration + abrasion was found in 11 cases (23.9%). Followed by Fracture/ Crush/ Traumatic amputation of limb + Abrasion + Contusion + Laceration was found in 9 cases (19.6%). Crush injury of the head was observed in 4 cases (8.7%). Fracture / Crush / Traumatic amputation of one limb and abrasion and contusion was observed in 3 cases (6.5%). Fracture / Crush / Traumatic amputation of one limb and abrasion and laceration was observed in 3 cases (6.5%). Decapitation and Crush / Traumatic amputation of limb, Abrasion, Contusion and

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Laceration was observed in 3 cases (6.5%). Only abrasion and laceration observed in 2 cases (4.3%). Transaction of trunk, abrasion and laceration in 2 cases (4.3%). Decapitation and abrasion in 2 cases (4.3%). Rest all other types of injuries are seen in only 1 case (2.2%) respectively as depicted in Table no. 2.

Table 2: type and pattern of external injuries among the victims

Type & pattern	Frequency	Percent
Abrasion + Laceration	02	4.3
Abrasion + Contusion+ Laceration	11	23.9
Fracture / Crush / Traumatic amputation of limb + Abrasion + Contusion	03	6.5
Fracture / Crush / Traumatic amputation of limb + Abrasion + Laceration	03	6.5

Fracture of limb bones among the victims: It was observed that among 46 railway fatalities, 25 victims did not had any fractures of limb bones i.e. (54.3%). 11 cases (23.9%) have involvement of combination of both upper and lower limb. 03 cases (6.5%) had fractures of left thigh and in 2 cases (4.3%) combination of lower limb fractures observed. And there was fracture of right arm in 1 case, right forearm i case, right hand 1 case, right leg 1 case, left leg in 1 case respectively as shown in [Table 3].

Table 3: fracture of limb bones among the victims

Fractures	Frequency	Percent
None	25	54.3
Right Arm	01	2.2
Right Forearm	01	2.2
Right Hand	01	2.2
Right Leg	01	2.2
Left Thigh	03	6.5
Left Leg	01	2.2
Combination of lower limb fracture	02	4.3
Combination of upper limb and lower limb fracture	11	23.9
Total	46	100

Type of fracture of cranial vault among the victims: Among the 46 railway fatalities, the highest cases had communited fractures i.e. 14 cases (30.4%), followed by crush injuries of cranial vault were observed in 13 cases (28.3%). Fissure fracture was seen in 11 cases (23.9%), no fracture of cranial vault showed in 7 cases i. e. 15.2% in 1 case despressed fracture was observed (2.2%). As shown in Table no. 4.

Table 4: type of fracture of cranial vault among the victims

Type	Frequency	Percent
None	07	15.2
Fissured	11	23.9
Depressed	01	2.2
Communited	14	30.4
Crushed	13	28.3
Total	46	100

Fracture of cranial base: Out of 46 railway deaths 33 cases had no fractures of cranial base which concluded 71.1%. 13 cases showed crush of cranial base i. e. 28.3%. [Table 5].

Table 5: fracture of cranial base among the victims

Fracture of cranial base	Frequency	Percent
None	33	71.7
Crushed	13	28.3
Total	46	100

Involvement of meninges among the victims: 25 cases had torn or lacerated meninges among 46 deaths, i.e. 54.3%. 21 cases had intact meninges among the victims as shown in [Table 6].

Table 6: involvement of meninges among the victims

Meninges	Frequency	Percent
Intact	21	45.7
Torn or lacerated	25	54.3
Total	46	100

Pelvic fracture among the victims: Highest number of cases showed no evidence of pelvic fracture i.e. 44 cases (95.7%). Only 2 cases had pelvic fracture i. e. 4.3% as observed in [Table 7].

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Table 7: fracture of pelvic among the victims

Fracture Pelvic	Frequency	Percent
Absent	44	95.7
Present	02	4.3
Total	46	100

Fracture of cranial base, pelvis and meninges: Among 46 railway fatalities 54.3% showed torn or lacerated meninges and 45.7% showed intact meninges. While observing fracture of pelvis 95.7% did not show fracture of pelvis only 4.3% cases showed pelvic fracture. Coming on to fracture of cranial base, in 71.1% of cases cranial base was crushed.

Traumatic Brain Lesions: Among 46 cases, 12 cases showed crushed lesion in the brain of the victims i.e. 26.1%. In 2 cases there was laceration observed i.e. 4.3% but in 32 cases (69.6%) there was no evidence of traumatic brain lesions as shown in [Table 8].

Table 8: traumatic lessions of brain among the victims

Traumatic lesions	Frequency	Percent
Crushed	12	26.1
Laceration	02	4.3
None	32	69.6
Total	46	100

Intracranial Haemorrhages Among YHE Victims: Among the cases of railway fatalities, 14 cases showed intracranial haemorrhages in the form of subdural haematoma, subarachnoid haemorrhage and intra cerebral haemorrhage i.e. 30.4%. 21cases showed subdural haematoma and subarachnoid haemorrhage i. e. 45.7%. In 5 cases only subarachnoid haemorrhage was present i.e. 10.9%. Lastly in 6 cases no haemorrhages were found among the victims as shown in [Table 9].

Table 9: intracranial haemorrhages among the victims

Haemorrhage	Frequency	Percent
None	06	13
Subarachnoid haemorrhages	05	10.9
Subdural haematoma + SAH	21	45.7
Subdural haematoma + SAH + Intra cerebral haemorrhage	14	30.4
Total	46	100

Internal Injuries to Thorax: Switching on to injuries to the thorax among the 46 victims, in 20 cases there were ribs fractures only i. e. 43.5%. 7 cases showed rib fractures and lung lacerations i.e. 15.2%, in one case rib fracture, lung laceration and heart injury was present contributing to 2.2%, in 3 cases there were injuries to ribs, lugs, sternum and heart i. e. 6.5%.In only one case rib and sternum injury was noted i. e. 2.2% but in 14 cases no injuries were appreciable to entire thorax as shown in the [Table 10].

Table 10: internal injuries to thorax among the victims

Organ	Frequency	Percent
None	14	30.4
Ribs	20	43.5
Ribs + Lungs	07	15.2
Ribs + Lungs + Heart	01	2.2
Ribs + Sternum + Lungs + Heart	03	6.5
Ribs + Sternum	01	2.2
Total	46	100

Inernal injuries to abdomen: In 30 cases injuries were present to the abdomen internally i. e. 65.2%. One case showed liver injury i. e. 2.2 %. 2 cases showed spleen injury i. e. 4.3%. 5 cases showed liver, spleen injury i. e. 10.9%. 2 cases showed injuries to liver, kidney and spleen i.e. 4.3%. 6 cases showed injury to liver, spleen, kidney, bladder i.e. 13% as observed in [Table 11].

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Table 11: internal injuries to abdomen among the victims

Organ	Frequency	Percent
None	30	65.2
Liver	01	2.2
Spleen	02	4.3
Liver + Spleen	05	10.9
Liver + Spleen + Kidney	02	4.3
Liver + Spleen + Kidney + Bladder	06	13
Total	46	100

Involvement of spine and cord: No injuries were appreciable in 37 cases as shown in the [Table 12].

Table 12: involvement of spine and spinal cord among the victims.

Spine involvement	Frequency	Percent
Cervical	03	6.5
Lumbar	03	6.5
None	37	80.4
Thoracic	01	2.2
Thoracic Lumbar Sacral	02	4.3
Total	46	100

Cause of deaths among the victims: Head injury was the cause death in 23 cases i.e. 50%. Decapitation observed in 3 cases i.e. 6.5%. Crush / traumatic amputation of limbs in 2 cases i.e. 4.3% injury to vital organs seen in 2 cases i.e. 4.3%. Multiple injuries (shock and haemorrhages) observed in 13 cases , i.e.28.3% as shown in [Table 13].

Table 13: cause of death among the victims

Cause of death	Frequency	Percent
Head injury	23	50
Decapitation	03	6.5
Transaction of abdomen	03	6.5
Crush / Traumatic amputation of limbs	02	4.3
Injury to vital organs	02	4.3
Multiple injuries (shock and haemorrhage)	13	28.3
Total	46	100

Cause of death versus manner of death: Head injury occurred in 19 accidental cases i.e. 55.9% and head injury with suicidal cases were in 4 cases i.e. 33.3%. Decapitation was observed in 3 suicidal cases i.e. 25%. Transaction of the abdomen was seen in 2 accidental deaths (5.9%) and in one case in suicidal death i.e. 8.3%. Traumatic amputation of limbs occurred in 2 accidental cases (5.9%), no cases in suicidal deaths. Injury to vital organs observed in 2 accidental deaths i.e. 5.9% but none in suicidal deaths. Multiple injuries observed in 9 accidental cases i.e. 26.5% and in 4 suicidal deaths (33.3%). [Table 14] depicting the same.

Table 14: cause of death versus manner of death

Cause of death	Accidental		Suicidal		P valve
	N	%	N	%	
Head Injury	19	55.9	04	33.3	0.051
Decapitation	00	0.0	03	25.0	
Transaction of abdomen	02	5.9	01	8.3	
Crush/ Traumatic amputation of limbs	02	5.9	00	0.0	
Injury to vital organs	02	5.9	00	0.0	
Multiple Injuries (shock and haemorrhage)	09	26.5	04	33.3	
Total	34	100.0	12	100.0	

Victim precrash behaviour versus manner of death: Precrash behaviour – Knocked down while walking along the track was observed in 16 accidental cases i.e.47.1% and 3 cases found in suicidal deaths i.e. 25%.

Fall from running train was observed in 18 cases among accidental deaths (52.9%) and one death in suicidal deaths i.e. 8.3%. Lying on track, no accidental death observed but 8 cases in suicidal deaths was seen (66.7%) the same is depicted in [Table 15].

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Table 15: victim pre – crash behaviour versus manner of death

VPCD	Accidental		Suicidal		P valve
	N	%	N	%	
Knocked down while walking along the track	16	47.1	03	25.0	<0.01
Fall from running train	18	57.9	01	8.3	
Lying on track	00	0.0	08	66.7	
Total	34	100.0	12	100.0	

DISCUSSION

Condition of body during autopsy: Among 46 cases of railway fatalities, in 28 cases (60.9%) the victim's body parts were intact and in 8 cases (17,4%) the body was observed in two parts, followed by in 6 cases (13%) body parts were found to be into three parts and lastly among 4 cases (8.7%) the bodies were found in multiple fragments. In the study conducted by Valsala K8 Body as a whole with injuries were brought in majority of cases 65 (62.5%), where as in 19.2% of cases the body was mutilated and in 18.2% it was in a mangled state. In the study conducted by Sabale PR et al,[9] observed that the mutilation is severe in railway fatalities. In the study conducted by Basu R et al,[10] observed 68% transacted bodies. Since in our study accidental deaths were more common who sustained blunt force trauma either hit by train/ crossing, and fall from running train which could be a reason for intactness of the body.

Type and pattern of injuries among victims: In our study among 46 railway fatalities the pattern of external injuries as well as their type varied. Contusion laceration abrasion were found in 11 cases (23.9%). Followed by Fracture/Crush/ Traumatic amputation of limb + Abrasion + Contusion + Laceration was found in 9 cases (19.6%). Crush injury of the head was observed in 4 cases (8.7%) Fracture /Crush/Traumatic amputation of one limb and abrasion and contusion was observed in 3 cases (6.5%). Fracture /Crush/Traumatic amputation of one limb and abrasion and laceration was observed in 3 cases (6.5%). Decapitation and Crush/ Traumatic amputation of limb, Abrasion, Contusion and Laceration was observed in 3 cases (6.5%). Only abrasion and laceration observed in 2 cases (4.3%). Transaction of trunk, abrasion and laceration in 2 cases (4.3%). Decapitation and abrasion in 2 cases (4.3%). Rest all other types of injuries are seen in only 1 case (2.2%). In the study conducted by Puttaswamy11 40 of 70 cases of suicide (57.14%) showed decapitation & 30 cases showed hemi section of body at thoraco - abdominal level (42.85%). In 25 cases of accidents (26.31%) which involved multiple injuries splitting the body into several pieces with oil and grease stains is present.[11] In the study conducted by Ashwini NK et al,[12] In case of suicide, decapitation was found to be the predominant fatal pattern of injury 19/50(38%) followed by hemi section at thorax and abdomen 14/50(28%). Amongst the accidental deaths mutilating injuries with a combination of head and facial injury, decapitation, transaction, crush and limb injuries were found in 12/40(30%) victims. In the study conducted by Tirmizi SZA et al,[13] Laceration and fractures were the two most common types of injuries observed in 94(77.68%) and 90(74.38%) victims of railway related deaths correspondingly. This was followed by abrasion, crushed injuries with rupture of internal organs, amputation and bruise observed in 62(51.24%), 48(39.67%), 45(37.19%) and 43(35.53%) cases respectively. In the study conducted by Malick S et al,[14] Abrasions being the most common pattern of injuries were found in all the 138 (100%) cases, of which Grazed abrasions were present in 114 (82.61%), while Impact abrasions were seen in 24 (17.39%) cases. In the study conducted by Patil et al,[15] observed Abrasion in 81% followed by laceration in 69%. In the study conducted by Das G et al,[16] found contusion as commonest injury in 92.59% cases. In the study conducted by Sahoo PC et al,[17] observed contusion as common injury in 92.59% cases. In the study conducted by Sabale P.R et al,[9] observe laceration in 79.52%, Abrasion in 66.42%, crush/ traumatic Amputation in 42.99%, Decapitation in 5.54% and Transactions of trunk in 7.56% cases.

Laceration and fractures were the two most common types of injuries encountered in 114 (82.60%) and 128(92.75%) victims of railway related deaths respectively. This was followed by contusion (71.01%), rupture of internal organs (62.31%), crushed injuries (52.89%), and amputation (23.91%) observed in railway fatalities. The massive blunt trauma and involvement of multiple regions in railway accident is due to speedy massive train transferring enormous amount of kinetic energy to the body on strike. The kinetic energy transferred by a moving train to a pedestrian is proportional to the mass and velocity of the train. Therefore, an enormous amount of energy is transferred to the body during impact, resulting in massive blunt force injuries and a high mortality rate. Abrasions, contusions, Lacerations and fractures are the most commonly encountered injuries in our study then followed by Crushed injuries with rupture of internal organs, amputation or mutilation of various degrees on different regions and bruises occur more or less in similar proportion.

Site wise distribution of injuries among victims: In our study it was observed that cases had different site involvements i.e. 19 cases (41.3%) showed head, neck, face trunk, upper limb and lower limb involvement, 8 cases showed (17.4%) head, neck, face and upper limb involvement.6 cases showed injuries all over the body i.e. (13%). 4 cases showed only head involvement (8.7%). Head, neck, face and head, neck, face and lower limb, trunk and lower limb of the body observed in 6 cases (4.3%). Head, Neck, Face + Trunk observed in 1 case only (2.2%). Head,

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Neck, Face + Trunk + Lower limb was also observed in 1 case only (2.2%). Neck + Upper limb + Lower limb observed in 1 case (2.2%). In the study conducted by Tirmizi SZA et al,[13] In 90.91% of cases more than one body part was affected and only few cases (9.09%) showed involvement of single region of the body in the accident which is similar in our study. In the study conducted by Das G et al,[16] observed 74.07% injuries to head and face. In the study conducted by Ruatji R et al,[18] found 77.95% of victim's sustained injuries to head and neck. In the study conducted by Basu R et al,[10] observed Head as commonly injured body part in 91.30 %. In the study conducted by Patil A et al,[15] observed Head as commonly injured body part in 73% cases. In the study conducted by Sabale PR et al,[9] observed injuries to head, face and neck region in 91%. It is clearly indicating that railway accidents are associated with poly trauma and subsequent fatality.

Fracture of limb bones among the victims: It was observed that among 46 railway fatalities, 25 victims did not had any fractures of limb bones i.e. (54.3%). 11 cases (23.9%) has involvement of combination of both upper and lower limbs. 3 cases (6.5%) had fractures of left thigh and in 2 cases (4.3%) combination of lower limb fractures observed and there was fracture of right arm in 1 case, right forearm 1 case, right hand 1 case, right leg 1 case, left leg in 1 case. In the study conducted by Wasnik RN,[19] Crush injuries were found mostly over lower limbs followed by the upper limb then over the face and head such finding was not observed in our study.

Type of fracture of cranial vault among the victims: Among the 46 railway fatalities, the highest cases had communited fractures i.e. 14 cases (30.4%), followed by crush injuries of cranial vault were observed in 13 cases (28.3%). Fissure fracture was seen in 11 cases (23.9%), no fracture of cranial vault showed in 7 cases i.e. 15.2%. In one case depressed fracture was observed (2.2%). Totally 85% of skull fractures were observed. In the study conducted by Tirpude BH. et al,[20] Fractures of the skull vault were observed in 9 cases (12.16%). Fissured fracture alone was observed in 22.97% cases, skull vault was crushed in 13,51% cases. Combination of Fissured+ Depressed+ Comminuted fracture and, combination of Depressed+ Comminuted fracture was noted in 2.70% cases each respectively. No single case was found having either depressed and comminuted fracture alone. In the study conducted by Valsala K,[8] Fracture of the skull bone was present in 66.6% of backspace cases. In the study conducted by Malick S et al,[14] In 30 (21.7%) cases skull is fractured. Sabale PR et al,[9] observed fissure fracture of skull alone in 23.25% cases. In our study 85% of skull fractures were present overall when compared with aforementioned author studies.

Fracture of cranial base, pelvis and meninges: Among 46 railway fatalities 54.3% showed torn or lacerated meninges and 45.7% showed intact meninges. While observing fracture of pelvis 95.7% did not show fracture of pelvis only 4.3% cases showed pelvic fracture. Coming on to fracture of cranial base, in 71.1% of cases there was no involvement of fracture of cranial base, only 28.3% cases cranial base was crushed. In the study conducted by Sabale PR et al,[9] observed fracture of base of skull in 58.67 % cases. Meninges were intact in 66% of cases.

Traumatic brain lesions: Among 46 cases, 12 cases showed crushed lesions in the brain of the victims i.e. 26.1%. In 2 cases there was laceration observed i.e. 4.3% but in 32 cases (69.6%) there was no evidence of traumatic brain lesions. In the study conducted by Sabale et al,[9] observed contusion was the commonest traumatic lesion of brain and followed by laceration. In the study conducted by Patil A et al,[15] found 53 cases of contusion of brain followed by laceration in 8%. In the study conducted by Amit P et al21 observed the cerebral contusion in 62.96% followed by laceration of brain in 26.45 %.

Intracranial haemorrhages among the victims: Among the 46 cases of railway fatalities, 14 cases showed intracranial haemorrhages in the form of subdural haematoma, subarachnoid haemorrhage and intracerebral haemorrhage i.e. 30.4%. 21 cases showed subdural haematoma and subarachnoid haemorrhage i.e. 45.7%. In 5 cases only subarachnoid haemorrhage was present i.e. 10.9%. Lastly in 6 cases no haemorrhages were found among the victims. In the study conducted by Tyagi S et al,[22] intracranial haemorrhages due to Head injury (47.05 %) was most common cause of death. In the study conducted by Tirpude BH et al,[20] It was observed that combination of subdural + subarachnoid haemorrhages was the most common pattern seen in railway or deal; it was observed in 16 (21.62%) cases, followed by combination of all types of intracranial haemorrhages in 9 cases. In the study conducted by Ruatji R et al,[18] Observed subdural haematoma in 61.42% as the most common intracranial haemorrhage. In the study conducted by Patil A et al,[15] found 56% subarachnoid, and 30% subdural haemorrhage. In the study conducted by Sabale PR et al,[9] found 52.52% subarachnoid haemorrhage and 38.1% subdural haemorrhage and also 23.25% cases showed both subdural and subarachnoids haemorrhages. In the study conducted by Amit P et al,[21] observed showed both subdural and sub arachnoids haemorrhages as commonest type in 59% cases.

Internal injuries to thorax: Switching on to injuries to the thorax among the 46 victims, in 20 cases there were ribs fractures only i.e. 43.5%. 7 cases showed rib fractures and lung lacerations i.e. 15.2%, in one case rib fracture, lung laceration and heart injury was present contributing to 2.2%, in 3 cases there were injuries to ribs, lungs, sternum and heart i.e. 6.5%. In only one case rib and sternum injury was noted i.e. 2.2% but in 14 cases no injuries were appreciable to entire thorax. In the study conducted by Malick S et al,[14] most commonly seen fracture is ribs fracture in 96 cases (69.56) followed by lower limbs fracture femur 38 cases (27.53%) and tibia, fibula 27 case (12.31%). Skull, Ribs and Limbs fractures were seen

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in 28(20.28%) cases. Maximum numbers of fatalities were due to injuries to vital organs i.e.84 (60.14 %). In the study conducted by Patil et al15 observed 46% rib and sternum fracture, 6% cases of lung injury and 3% cases of injury to heart. In the study conducted by Sabale PR et al,[9] observed 42% rib fracture, 6.64% of sternum fracture, 33.76% of lung injury and 5.35% of injury to heart.

Internal injuries to abdomen: In 30 cases no injuries were present to the abdomen internally i.e. 65.2%. One case showed liver injury i.e. 2.2%. 2 cases showed spleen injury i.e. 4.3%. 5 cases showed liver, spleen injury i.e. 10.9%. 2 cases showed injuries to liver, kidney, and spleen i.e. 4.3%. 6 cases showed injury to liver, spleen, kidney, bladder i.e. 13%. In the study conducted by Sabale et al,[9] observed that liver was the commonest organ involved of about 22.69% followed by spleen injury in 14.2%. In the study conducted by Patil A et al,[15] observed liver as the commonest injured organ in 36% cases. In our study liver injury alone is only 2.2%, the combination of liver, spleen injury was 10.9%, and the combination of liver, spleen, kidney was 4.3%, and lastly the combination of liver, spleen, kidney, bladder was observed in 13%. So over all liver was the commonest organ involved in 30.4% cases.

Cause of death among the victims: Head injury was the cause of death in 23 cases i.e. 50%. Decapitation observed in 3 cases i.e. 6.5%. Transaction of Abdomen in 3 cases i.e. 6.5%. Crush/traumatic amputation of limbs in 2 cases i.e. 4.3%. Injuries to vital organs are seen in 2 cases (4.3%). Multiple injuries (shock and haemorrhages) observed in 13 cases, i.e. 28.3%. In the study conducted by Wasnik RN19 Maximum victims (84.38 %) died due to haemorrhage and shock following injuries to the vital organs, contrary to our study which showed 23 cases, i.e. 50% as head injury. In the study conducted by Tyagi S et al,[22] studies showed Intracranial haemorrhage due to Head injury (47.05 %) was most common cause of death, which is similar to the study observed by us. A similar observation was also seen in the study conducted by Tirmizi SZA et al,[13] Major cause of death was found to be head injury and with or without shock accounted for 33.88% of cases. It was followed by poly trauma (33.06%), shock and injuries to vital structures (12.4%) respectively. In the study conducted by Malick S et al,[14] Maximum numbers of fatalities were due to injuries to vital organs i.e.84 (60.14 %), followed by head injury in 28 (20.28 %) cases, Shock and haemorrhage accounts for 26 (18.84 %) cases, which is contradictory to our study.

Cause of death versus manner of death: Head injury occurred in 19 accidental cases i.e. 55.9% and head injury with suicidal cases were in 4 cases i.e. 33.3%. Decapitation was observed in 3 suicidal cases i.e. 25%. Transaction of the abdomen was seen in 2 accidental deaths (5.9%) and in one case in suicidal death i.e. 8.3%. Traumatic amputation of limbs occurred in 2 accidental cases (5.9%), no cases in suicidal deaths. Injury to vital organs observed in 2 accidental deaths i.e. 5.9% but none in suicidal deaths. Multiple injuries observed in 9 accidental cases i.e. 26.5% and in 4 suicidal deaths (33.3%). In the study conducted by Puttaswamy,[11] said Decapitation & hemi section of the body at thoraco-abdominal level were more common in suicidal deaths. Head injury accounted more in accident deaths.40 of 70 cases of suicide (57.14%) showed decapitation & 30 cases showed hemi section of body at thoraco - abdominal level (42.85%), which is almost similar to our study. In the study conducted by Ashwini NK et al,[12] also observed similar findings i.e in case of suicides, decapitation was found to be the predominant fatal pattern of injury 19/50 (38%), followed by hemi section at thorax and abdomen 14/50 (28%). In the study conducted by Mohanty MK et al,[23] 13 out of 17 suicide cases showed a decapitation wound over the neck, with or without associated fatal injuries. In 61 (85.9%) cases of accidental death, a fatal injury was present on the head which do coincide with our study.

Victim precrash behaviour versus manner of death: Precrash behaviour -Knocked down while walking along the track was observed in 16 accidental cases i.e. 47.1% and 3 cases found in suicidal deaths i.e. 25%. Fall from running train was observed in 18 cases among accidental deaths (52.9%) and one death in suicidal deaths i.e. 8.3%. Lying on track, no accidental deaths observed but 8 cases in suicidal deaths was seen (66.7%). In the study conducted by Rodbo H et al,[24] among the suicides, 16/41 cases (39%) were hit adjacent to platforms, while in 9 cases collision occurred at places some distance from the platform, but probably accessed from the platforms as well. One case was hit close to a level crossing, which is contradictory with our study which is only 25%. With regards to the accidents our study shows 47.1% cases while Helena Rodbo et al,[24] says 8 cases (19.51%) occurred adjacent to platforms.

CONCLUSION

It can be concluded from the current study that, although suicidal deaths cannot be entirely prevented, addressing the stressor, timely psychiatric couselling and familial support can definitely bring down the number of suicidal deaths. As opposed to accidental deaths, which are entirely preventable by enhanced surveillance activities and strict implementation of punishment for crossing tracks, foot board travelling, boarding or alighting from a running train. The anganwadi workers and social workers in rural areas can educate the rural population about the hazards of being on and around a railway track while herding the animals or to attend calls of nature. Building toilets at each and every house in villages should be encouraged. This practice not only prevents accidental run over deaths, but also improve the sanitation in villages.

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