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## RESEARCH ARTICLE

### AN EPIDEMIOLOGICAL AND MEDICOLEGAL STUDY OF DEATH ON RAILWAY TRACK: 5 YEARS RETROSPECTIVE STUDY IN VARANASI, INDIA

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#### ABSTRACT

**Introduction:** A train accident is defined as a collision, derailment, or any other event involving the operation of on-track equipments. Railway injuries are mostly accidental.

**Objective of the Study:** Aims to understanding the incidence and impact of railway fatalities in Varanasi, India as well as identifying preventive strategies to reduce their number and impact.

**Material & method:** The present retrospective study has been conducted for the period of 5 consecutive years i.e. 2009 to 2013 based on autopsy record of the unnatural death cases resulting from death on railway track. During study period total number of unnatural death cases was 10185 and death on railway track were 687.

**Result:** Railway fatalities reported 6.7% of all unnatural death. Most of the deaths in 21 to 30 years of age group total (26 %). In our study find that female death on railway track dominated over male in the ratio of male to female 1:1.3. In our study shows that most of the death on railway track is accidental in manner (88%), suicidal (10%), and unknown (1 %). Percentages of total death on railway track are average 20% per year. Death on railway track is more common in rural areas (97%) than urban areas (2%). Hindu death on railway track is most common i.e. 63%.

**Conclusion:** Analysis of data for retrospective study suggests that age, sex, habitat, marital status, religion and manner of death significantly affect community.

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## INTRODUCTION

Railway injuries are mostly accidental or sometimes suicidal. They may be caused when a person is crossing, walking on the railroad, working on the line, fall from moving train, travelling illegally on the roof of train may be injured by low over bridges (Mathiharan et al., 2005). Railway injuries are common in India and china because a wide network and unprotected crossing. It is a common mode of suicide, but accidents are common in children (Gautam Biswas, 2013). India carries one of the largest railway networks in the world and accidents accident from rail operations may not be unexpected. In general, any type of trauma can be seen in such accident. Certain features like extremely sever destruction of the body, wheel mark upon the body, dirt and grease contamination, and manner of severance of tissue deserve special observation (Krishanvij, 2011). Sometime, a person is killed and the body placed on the railway track to simulate suicide or accident. Examination of the scene of the crime and the body for mark of violence will often solve the problem (Narayan Reddy, 2012). In general injuries due to railway collision cause extreme destruction of body and may cause separation of limb, decapitation or extrusion of organs.

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Social forensic message don't have competition with running train while crossing, let it go first (Murty and Mohd Shah Mahmood, 2013). These are not uncommon, especially in countries with many "level crossings" (called grade crossings in the USA), where a public road crosses a railway track with either no barrier at all or with only a flimsy lifting pole. Many vehicles are struck each year by passing locomotives (Pekka Saukko and Bernard knight, 2004). The kinetic energy imparted by a moving train to a person is dependent upon the mass (m) and the velocity (v) of the moving train. (Kinetic energy =  $1/2 mv^2$ ). The mass of a train combined with the velocity results in an enormous amount of kinetic energy being transferred to the body of a person when struck, resulting in massive blunt force injuries (Rautji and Dogra, 2004). A train accident is defined as a collision, derailment, or any other event involving the operation of on-track equipments (Ramesh NanajiWasnik, 2010).

## MATERIALS AND METHODS

Present study is carried out at forensic medicine department, Institute Of Medical Sciences, Banaras Hindu University, Varanasi. Relevant information and subjective data like age, sex, habitat, marital status and manner of death on railway track of victims have been collected from medico legal autopsy register. Data are analyzed retrospective for periods of five years. Cases were included in group of death on railway track,

on the basis of confirmation by investigating officer and corroborative finding at medico legal examination.

### Objective of the study

My aims to understanding the incidence and impact of railway fatalities in Varanasi, India as well as identifying preventive strategies to reduce their number and impact. It is essential to evaluate prevention programmes in order to establish best practices and to suggest improvements of national and international guidelines for the prevention of railway fatalities.

## RESULTS

The present study was undertaken from 1<sup>st</sup> January 2009 to 31<sup>st</sup> December 2013. Table 1: Out of 10185 medico-legal autopsy cases conducted during the study period total of 687 cases (6.7%) of death on railway track were recorded at Institute of Medical Sciences, Banaras Hindu University, Varanasi Uttar Pradesh, India. Table 2: Describes age and sex wise distribution of death on railway track. Most of the deaths in 21 to 30 years of age group total (26 %) in both male (28 %) and female (18 %) and before this age group and after this age group case are progressively less in number. Table3: Distribution of death on railway track in relation to marital status. In male married are nil i.e. (0 %), male unmarried are (2%), and most of the case are male of unknown marital status i.e. (98%) of total male cases. In female 55% are married, 15 % of female are unmarried and in rest marital status is unknown i.e. (31%). In our study female death on railway track dominated over male in the ratio of male to female 1:1.3.

**Table1. Incidence of death on railway track**

Total no. of autopsy conducted in 5 year 2009 to 2013	death on railway track	%
10195	687	6.7

**Table 2. Age and sex wise distribution of death on railway track**

Age (in year)	Total		Male		Female	
	NO.	%	NO.	%	NO.	%
0-10	13	2%	7	1%	6	5%
11-20	79	11%	59	11%	20	15%
21-30	178	26%	154	28%	24	18%
31-40	149	22%	126	23%	23	18%
41-50	107	16%	86	15%	21	16%
51-60	104	15%	85	15%	19	15%
61-70	43	6%	31	6%	12	9%
>71	14	2%	9	2%	5	4%
Total	687	100%	557	100%	130	100%

Table 4: Incidence of death on railway track in rural areas (62%) is more common than urban areas (2%) and unknown habitat status in (35%) cases. Table 5: Describes distribution of death on railway track in relation to manner of death. In our study shows that about most of the death on railway track is accidental in manner (88%), suicidal (10%), and unknown (1 %). Homicidal cases are nil. Table 6: Year wise frequency of total autopsy in relation to death on railway track from 2009 to 2013 are follows as 19%, 20%, 19%, 20% and 21% respectively. This correlated with death on railway track death as 21%, 17%, 19%, 20% and 23% respectively. Percentage of

total autopsy is more or less static and percentages of total death on railway track are average 20%. Table7: Distribution of death on railway track on the basis of religion. In Hindu death on railway track are most common i.e. 63%, in Muslim are 1%, unknown 35% and in Christians are nil.

**Table 3. Distribution of death on railway track in relation to marital status**

Marital Status	Male		Female		Total	
	NO.	%	NO.	%	NO.	%
Married	Nil	Nil	71	55%	71	10%
Unmarried	13	2%	19	15%	32	5%
Unknown	544	98%	40	31%	584	85%
Total	557	100%	130	100%	687	100%

**Table 4. Incidence of death on railway track in rural and urban areas**

Habitat	Total	%	Male	%	Female	%
Rural	428	62%	340	61%	88	68%
Urban	17	2%	15	3%	2	2%
Unknown	242	35%	202	36%	40	31%
Total	687	100%	557	100%	130	100%

**Table 5. Distribution of death on railway track in relation to manner of death**

Manner	Total	%
Accidental	606	88%
Suicidal	71	10%
Homicidal	Nil	Nil
Unknown	10	1%
Total	687	100%

**Table 6. Year wise frequency of total autopsy in relation to death on railway track**

year	NO. of total autopsy	%	Total death on railway track	%
2009	1986	19%	144	21%
2010	2025	20%	117	17%
2011	1974	19%	130	19%
2012	2081	20%	136	20%
2013	2129	21%	160	23%
Total	10195	100%	687	100%

**Table 7. Distribution of death on railway track on the basis of religion**

Sr.No.	Religion	No. of death on railway track	%
1	Hindu	436	63%
2	Muslim	10	1%
3	Christian	Nil	Nil
4	Unknown	241	35%
	Total	687	100%

## DISCUSSION

Table1: Show that incidence of death on railway track on was 6.7% in our study which is significantly more than (5.99%) result of the other study<sup>11</sup> and in few studies the incidence was significantly much more i.e. 25.79%. This difference in the incidence may be due to geographical variation in the population, availability of facility of rail road and awareness of people. Varanasi railway station is the major rail hub in the

Indian state of Uttar Pradesh. It is one of the busiest and important railway stations in India. It is one of the largest stations in Uttar Pradesh. Varanasi Cant is the highest revenue generating station of Indian Railways, as the station records a rush of more than 363,000 passengers and more than 260 trains passing through here on a daily basis. India is considered to be a developing country estimated population 1.2 billion inhabitants. Varanasi is the district province in India occupying an area of 4535 km<sup>2</sup>. It accommodates almost 367684 [2011 census] of the total Indian population. It is inhabited by people of different cultural background<sup>10</sup>. Table 2: Shows that most of the death on railway track (26%) is common in 21 to 30 years age group, followed by the age group 31 to 40 years (22%) in our study, which is comparatively less than (30.53%) the other study, another study<sup>11</sup> where most common age group is 20-45 years and railways fatality are 69.34%. Table 3: Shows that total married persons 10% and total unmarried persons 5%. In our study female death on railway track dominated over male, in the male to female ratio of 1:1.3, this difference may be because of female are more exposed to stress and occupational hazard compared to male, which is contrast to other study, which show male are so much higher ratio than females (Rautji and Dogra, 2004; Demography of India). Table 4: Shows that in our study death on railway track are more common in rural areas (97%) than urban areas (2%). This difference may be due to unawareness in safe traveling.

In this regard our study contrasts with other study where this value reverses rural area (29.48%) much less than urban area (70.52%). Table 5: Accidental railway fatality was the commonest manner than others accounting to (88%), cases while the suicide seen in only 10 % cases. whereas none of the homicidal cases recorded in the railway fatalities, and these are consistent with the finding of various studies (Demography of India). The accidental railway fatalities are due to the fall from the running train, while boarding a running train, while going hanging on the doors etc mostly done by the males, dashed by a passing train while walking or crossing along the railway tracks, shunting accidents, collisions or derailment etc..Table 6: Shows that on the basis of year wise study from 2009 to 2013, five year study. In our study the average number of total death on railway track 20% per year, which is 5<sup>th</sup> most common cause of death after road traffic accident, burns, poisonings, violent asphyxial death. Table 7: Shows that most of the death on railway track victims was Hindus (63%) followed by Muslim (1%), unknown case are 35% and in Christian's case are nil. This is due to religious basis and more percent of Hindu population than other in and around Varanasi area.

### Conclusion

- Indeed, traveling by train is relatively safe; however, much more can be done to reduce the consequences for passengers, both physically and psychologically. The focus of the article, thus, investigates possible mitigation measures that would reduce these harmful consequences in future crashes.
- Incidence of death on railway track on was 6.7% in our study.

- In the present study death on railway track was 5<sup>th</sup> most common cause of death after road traffic accident, burn, poisoning, Violent Asphyxial death, in Varanasi region.
- Most of the deaths in 21 to 30 years of age group total (26 %).
- In our study female death on railway track dominated over male, in the male to female ratio of 1:1.3.
- Death on railway track is more common in rural areas (97%) than urban areas (2%).
- Average number of total deaths on railway track 20% per year.
- Most of the death on railway track victims was Hindus (63%) followed by Muslim (1%).

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### Conflict of Interest: Nil

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**Ethical Clearance:** The present study was approved by "Institutional Ethical Committee" of Institute of Medical Sciences, Banaras Hindu University, Varanasi. All the information has been taken under consideration of medical ethical committee.

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