Original Research Article

Epidemiological profile of fatal vehicular accidents in rural region of Maharashtra

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ABSTRACT

Accident is "An unfortunate incident that happens unexpectedly and unintentionally, typically resulting in damage or injury." With the rise in global urbanization and motorization, vehicular accidents induced injuries have become major worldwide public health problems. The Prospective study of fatal vehicular accidents was carried out at Rural Medical College and Hospital in Maharashtra during the period of May 2016 to April 2020. Total 216 cases were studied. Age group 51-60 years (20.4%) was most commonly affected. Males were more affected than females with male: female ratio of 8.8:1. Maximum deaths were found in illiterate (30.6%) and were laborers and students by occupation. Maximum (32.4%) mishaps occurred on national highways. Majority (38%) of the fatal vehicular accidents occurred in evening hours. Most common category of victim was Motor Cycle Rider (35.2%), followed by pedestrians (30.6%). Keeping in view the results of this study, multi factorial approach is needed to prevent vehicular accidents and to minimize their consequences.

1. Introduction

A Vehicular accident can be defined as an event that occurs on a way or street open to public traffic; resulting in one or more persons being injured or killed, where at least one moving vehicle is involved. Rapid urbanization, motorization, lack of appropriate road engineering, poor awareness levels, lacking injury prevention programs, and poor enforcement of traffic laws has exacerbated the situation.[1] According to a report by World Health Organization, over 1.2 million people died from Vehicular accidents each year in the world and about 50 million were injured. It was predicated that the injuries related to Vehicular accidents will rise to become the fifth leading cause of death by 2030.[2] Injuries caused due to vehicular accidents is the leading cause of death among people aged between 5 and 29 years. 90% of the world's fatalities on the roads occur in low and middle income countries, even though these countries have approximately 60% of the world's vehicles.[3] This study is conducted in a rural region of Maharashtra where people were adapted to village roads since a long time. The road accident report of 2018 showed that West Bengal topped the list of pedestrian fatalities with 2618 deaths followed by Maharashtra 2515 deaths.[4] The problems of people living in rural region are different from urban area regarding vehicular accidents. Many studies have been conducted to study epidemiological factors, distribution and patterns of fatal vehicular accidents in metro cities and urban areas. Hence in this study, a sincere effort has been made to study epidemiology of fatal vehicular accidents in rural region and to suggest measures to be taken to decrease it.

2. Aims and Objectives

To study epidemiological factors such as age, sex, religion, education, occupation, diurnal and seasonal distribution, categories of victims and contributing factors related to fatal

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vehicular accidents.

3. Material and Methods

A Prospective study was carried out in the mortuary of Department of Forensic Medicine, Swami Ramanand Teerth Rural Government Medical College and Hospital, Ambajogai Dist. Beed, Maharashtra, India during the period of May 2016 to April 2020.

3.1. Inclusion criteria

All Fatal Vehicular Accidents cases brought for autopsy.

3.2. Exclusion criteria

All cases other than Fatal Vehicular Accidents.

Proforma for study was prepared and various information and findings were collected like age, sex, religion, education, occupation, diurnal and seasonal distribution, categories of victims and contributing factors related to fatal vehicular accidents. Additional information was derived from police investigation report and statements of the relatives. The information was compiled, tabulated and analyzed statistically.

4. Results

During the study period a total of 1934 autopsies were conducted, out of which 1385 (71.62%) were unnatural. Out of these unnatural deaths 216 (15.60%) cases were because of vehicular accidents. Predominance of males were seen in 194 cases (89.8%) with male: female ratio of 8.8:1. Age group 51-60 years was more commonly involved i.e. 44 cases (20.4%) followed by age group 21-30 years i.e. 42 cases (19.4%) (Figure 1). After applying statistical test, mean age was 39.9 years and mode was 40 years. Predominance of Hindus were observed in 192 cases (88.9%) (Table 1). 66 cases (30.6%) were illiterate followed by those completed primary and intermediate school; 58 cases (26.9%). Least cases were noted in post graduates; 14 cases (6.5%) (Table 2). 40 cases (18.5%) were laborer by occupation and students were also 40 (18.5%) in number, followed by farmers (16.7%) and owners of private business (16.7%) (Table 3). In 76 cases (35.2%) victim was Motor Cycle Rider followed by pedestrians in 66 cases (30.6%) (Table 4). Maximum accidents were occurred on national highways (32.4%), followed by village roads (25%), city roads (22.2%) and state highways (20.4%) (Figure No. 2). Maximum deaths i.e. 82 (38%) were noted in the evening hours (06.00 PM – 08.59 PM), followed by 40 cases (18.5%) during 09.00 PM – 11.59 PM (Figure 3). More deaths were seen in winter season i.e. 76 cases (35.2%) (Figure 4). It was evident that rash driving i.e. human error was responsible for mishaps in 98 cases (45.4%), followed by no use of safety measures in 36 cases (16.7%) (Figure 5).

Table 1: Religion wise distribution of cases (N=216)

S. No.	Religion	Total	%
1	Hindu	192	(88.9%)
2	Muslim	24	(11.1%)
3	Total	216	(100%)

Table 2: Education wise distribution of cases (N=216)

S. No.	Education Status	Total	%
1	Uneducated	66	(30.6%)
2	1st Std. – 10th Std.	58	(26.9%)
3	11th Std. – 12th Std.	34	(15.7%)
4	Graduate	44	(20.4%)
5	Post Graduate	14	(6.5%)
6	Total	216	(100%)

Table 3: Occupation wise distribution of cases (N=216)

S. No.	Occupation	Total	%
1	Farmer	36	16.7
2	Worker/Laborer	40	18.5
3	Drivers	16	7.4
4	Students	40	18.5
5	Government Servant	32	14.8
6	Private Business	36	16.7
7	Others	16	7.4
8	Total	216	100.0

Table 4: Distribution of cases based on different categories of victims (N=216)

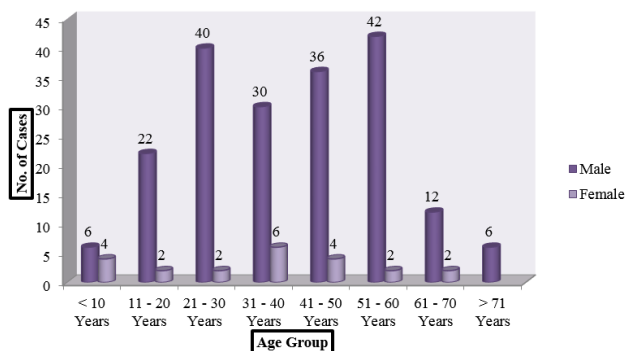| S. No.	Category of Victim	Total	%
1	Pedestrian	66	30.6
2	Pillion Rider	24	11.1
3	Motor Cycle Rider	76	35.2
4	3W & 4W Drivers	10	4.6
5	Passengers	34	15.7
6	Multi-axle Vehicle Driver	06	2.8
7	Total	216	100.0

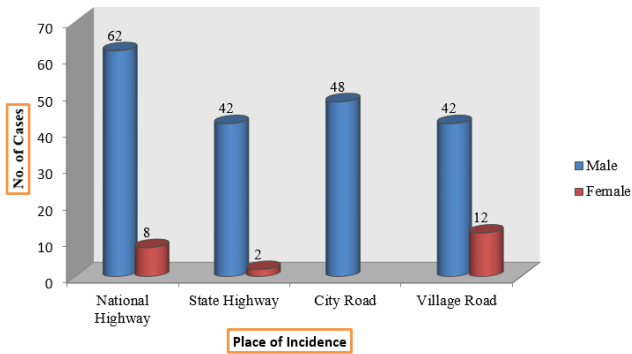**Fig. 1:** Age and gender wise distribution of cases

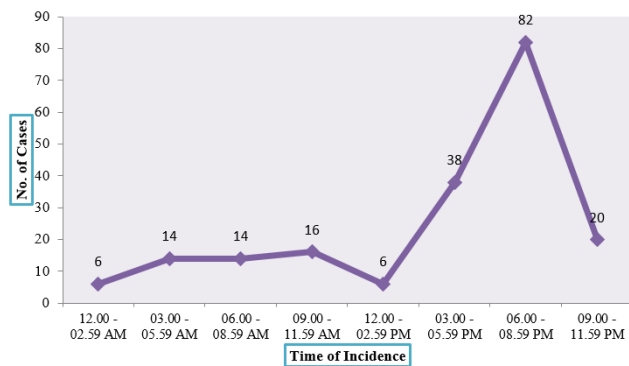**Fig. 2:** Distribution of cases based on place of incident

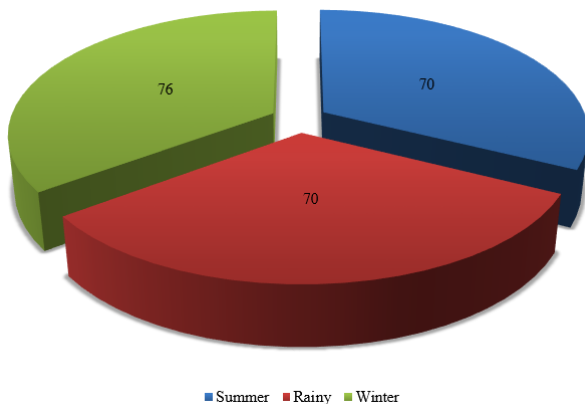**Fig. 3:** Distribution of cases based on time of incidence

Fig. 4: Season wise distribution of cases

5. Discussion

We observed the predominance of males in 194 cases (89.8%) with male: female ratio of 8.8:1. Males being the earning member in majority of families in rural area are exposed more frequently to outdoor activities than females. Similar results were also noted by Harnam Singh,[5] Amit Patil,[6] Tanuj Kanchan[7] and Swapnil Akhade.[8]

Age group 51-60 years was more commonly involved i.e. 44 cases (20.4%) followed by age group 21-30 years
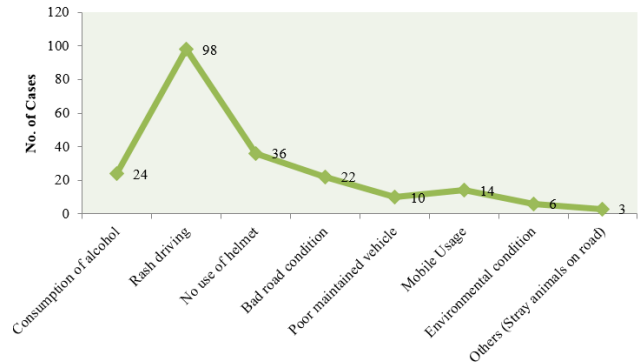

Fig. 5: Distribution of cases based on contributing factors for accident

i.e. 42 cases (19.4%). The reasons could be unavailability of footpaths for aged people to walk due to encroachment of shops, illegal constructions etc. Rash driving by vehicle users add burden to this problem. Other factors could be slower reflexes, weakening of eyesight and physique of people in this age group. Similar result was observed by Supriya Keisham.[9]

In this present study, we observed the predominance of Hindus in 192 cases (88.9%). It is due to more numbers of Hindus are located in and around the region where study is conducted. This study is in accordance with Rajeev Kumar Banzal,[10] Ananda Reddy[11] and Vishal Koulapur.[12]

It was observed that, 66 cases (30.6%) were illiterate followed by those completed primary and intermediate school were 58 cases (26.9%). If considered below secondary education, cases were more than half i.e. (57.5%). Low education implies no knowledge regarding traffic rules, traffic signs and boards, lack of sense of lane discipline, wrong attitude and rash behavior. These results are in accordance with Ananda reddy.[11] Amrendra kumar[13] and Aditya Baruah.[14] Least cases were noted in post graduates i.e. 14 cases (6.5%). This may be because of their higher education and morals.

Maximum victims (18.5%) were laborer by occupation and students (18.5%), followed by farmers (16.7%) and owners of private business (16.7%). Ananda Reddy[11] and Jha N[15] observed similar results.

In 76 cases (35.2%) victim was Motor Cycle Rider followed by pedestrians in 66 cases (30.6%). Number of two wheeler vehicles is more in rural region due to low economy. Motor cycles are used to carry moderate to heavy weight which disturbs the balance leading to accidents. Rash driving as discussed earlier is also important factor. Supriya Keisham,[9] Vishal Koulapur,[12] Aditya Baruah[14] and Khajuria B[16] also found similar results.

Maximum accidents were occurred on National Highways (32.4%), followed by village roads (25%), city roads (22.2%) and state highways (20.4%). National

highways are being constructed in this rural region in recent times as part of National Highway Development Program. People living in this area are not yet adapted to such roads. Lack of knowledge regarding traffic rules and discipline of lanes, more fatal accidents were occurred on national highways. Village roads are old conventional roads with bad condition. Many a times they are not repaired and fatalities happened at these roads especially of farmers and pedestrians. Incidence of vehicular accidents on national highways was observed as 56.6%, 55.6% and 83.05% by Honnungar,[17] Bharath Kumar Guntheti[18] and Archana Kaul[19] respectively. This finding is not in accordance with our study as their studies were conducted in metro cities where number of national highways are more.

During this study we note that 82 cases (38%) were occurred in the evening hours (06.00 PM – 08.59 PM), followed by 40 cases (18.5%) during 09.00 PM – 11.59 PM. Evening hours is the time of congestion over roads, coupled with the fact that as everybody is in hurry to return back to home from their jobs during evenings and lighting conditions are poor on most of the roads, particularly on the outskirts of city as well as surrounding sub urban and rural areas. Similar results were observed by Aditya Baruah,[14] Anuj Gupta,[20] Suresh Katageri[21] and Akhilesh Pathak.[22]

In this study more deaths occurred in winter (35.2%), followed by summer and rainy season (32.4%) each. There is no significant difference in season wise distribution of cases in this study. Harnam Singh[23] and Kh. Pradipkumar Singh[24] noted similar results.

It was evident that rash driving i.e. human error was responsible for mishaps in 98 cases (45.4%), followed by no use of safety measures in 36 cases (16.7%), consumption of alcohol in 24 cases (11.1%). Over speeding and rash driving combined with alcohol intoxication is more dangerous leading to increased mortality. None of the motor cycle rider brought for autopsy wore helmet. Ananda Reddy[11] found rash driving in 15% cases. Bharath Kumar Guntheti[18] found human error i.e. rash driving as the commonest contributing factor. James JVP Kalougivaki[25] observed human behavioral error in (93.1%) cases.

6. Conclusion

1. The incidence of fatal vehicular accident is 15.60%.
2. Fatal vehicular accident has male predominance with more victims from age group 51-60 years followed by 21-30 years.
3. Maximum deaths were found in illiterate. They were laborers and students.
4. Maximum mishaps occurred on national highways and occurred in evening hours.
5. Most common category of victim was Motor Cycle Rider, followed by pedestrians.
6. We recommend the following suggestions based on our observations.

7. Suggestions

We can do a lot to reduce vehicular accidents as they are preventable. Multi factorial approach is needed to prevent vehicular accidents and to minimize their consequences. Some simple suggestions are as follows.

1. Safety education must begin from school level. Drivers need to be trained in an authorized center dealing with proper maintenance of vehicles, safety measures such as wearing seatbelts and use of other car safety measures such as head restraints and use of first aid.
2. Strict enforcement of law is a need of hour.
3. Unauthorized and illegal encroachments on the roads should be dealt with strict measures.
4. Sign boards, lane markings, and road signals must be properly maintained.
5. Without knowing a cause, you cannot find a cure. So, accurate collection of evidences from the site and its analysis is required.

There is no complete cure that will prevent all vehicular accidents. An organized team work by people in many disciplines such as engineers, medical practitioners, psychologists and law enforcing agencies is required for effective prevention of road accidents and to minimize their consequences.

8. Conflict of Interest

None.

9. Source of Funding

None.

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