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Original Article

Pattern of Road Traffic Accidents in Bhubaneswar, Odisha

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ABSTRACT

Introduction: The surge in motorization coupled with expansion of the road network has brought with it the challenge of addressing adverse factors, such as the increase in Road accidents in India. Significant variation exists within the country. Bhubaneswar, the capital of Odisha, has seen liberalized economic policies of the government, increasing purchasing power of the people, and easy availability of the loans, which have contributed to the changing transportation system and increase vulnerability to Road Traffic Accidents (RTA). The present study aims to establish the baseline information on RTA in Bhubaneswar.

Objectives: (1) To estimate the incidence and distribution of RTA in the year 2012. (2) To determine the epidemiological variations of accidents in the city. (3) To suggest recommendations to the traffic police and administration.

Methodology: It is a descriptive secondary data analysis of police records of reported RTA of the year January–December 2012 collected from all the police stations within the administrative region of Bhubaneswar, urban and rural inclusive. The data thus collected were analyzed for various epidemiologic factors, which were found contributory to the accidents.

Results: Total number of RTA reported for the year was 625, thus accounting for the incidence of vehicular accidents for Bhubaneswar city, which had a 9.07/10,000 population; majority of the accidents had occurred during 9–12 am in both urban and rural areas. Grievous injury accounted to 38% of the total while fatality due to RTA was nearly 30%. The epidemiological trends that emerged were that 84% occurred in urban areas and mainly on the National Highways (46.7%); 18% of RTA occurred during rainfall, though no significant association could be made out and much is attributed to under reporting of data; motor cars (37%) and trucks (19.1%) were predominately involved. Majority of the victims were in the productive age group, 18–24, years and mainly constituted males (68%). Data were analyzed for statistical inferences using proportions and graphs. Recommendations were shared with the Traffic police department and Health

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departments and it was suggested that yearly trends may be discussed so that problem areas may be identified and action initiated.

Conclusion: The results hint at the necessity for routine analysis of the police records in a collaborative and integrated approach across many sectors like health, traffic police, transport, and law enforcers.

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A Road Traffic Accident (RTA) involves high human suffering and socioeconomic costs in terms of premature deaths, injuries, loss of productivity, etc.¹ During 2008, road traffic injuries (RTI) ranked fourth among the leading causes of death in the world.² Globally, we are now striving to eradicate communicable diseases, control the noncommunicable diseases, and injuries or RTA that are now the third challenge added in this endeavor.

In India, the motor vehicle population is growing at a rate faster than the economic and population growth. According to the World Health Organization (WHO), RTI are the sixth leading cause of death in India with a greater share of hospitalization, deaths, disabilities, and socioeconomic losses in the young and middle-aged population.³ The problem in India is underrated as it is masked by the benefits of globalization, which currently appears as a bigger priority to policy makers. But along with the economic development, wherein most of the middle-level cities are now becoming big commercial hubs and the big cities are attaining astronomical proportions, we are forgetting that we also have to look into the enforcement of laws and regulations for community safety, do capacity-building of our police and traffic department as well as plan the city well. We also have to ensure a robust health system that can manage the road traffic emergencies, if at all they happen, in the absence of which mortality due to RTA is fairly high.

The problem is not yet perceived as a public health burden and curbing of this menace is not a snap solution but a mutidepartmental strategy that needs stringent implementation.

Bhubaneswar, the capital of Odisha, has seen liberalized economic policies of the government, increasing purchasing power of the people and easy availability of the loans, which have contributed to the changing transportation system and increase in vulnerability to RTA. However, till date no mappings of the RTAs and recommendations thereof have been given to improve the situation in the city.

The present study aims to establish the baseline epidemiological information on RTA in Bhubaneswar.

1. Objectives

1. To estimate the incidence & distribution of RTA in the year 2012.
2. To determine the epidemiological variations of accidents in the city.

3. To suggest recommendations to the traffic police and administration

2. Methodology

The city of Bhubaneswar, capital of the state of Odisha, is facing rapid urbanization since the last few years and a lot of structural changes in terms of expansion of the city, roadways, and construction of highways; and thereby, there has been deployment of Police and traffic police personnel at appropriate areas. The city has a major District hospital (Capital Hospital) and 3 private medical colleges across the city (come up since 2007) to take care of the injured in the accidents. Review of literature of both in-State directorate as well as various publication websites did not show any review of the city's assessment of its RTA burden and steps or suggestions taken thereof. As per 2011 Census, the population of the city was nearly 8,31,000 lakh, which would be used to calculate the incidence rate of accidents in the city in the year 2012 for every 10,000 population.

This is a **descriptive secondary data analysis of police records** of reported RTA of the year January–December 2012 collected from all the police stations within the administrative region of Bhubaneswar, urban and rural inclusive. The study was duly approved by Institutional ethics committee and the administrative approval of Police Authority of Main branch of Police Commissionerate of Bhubaneswar was sought. Both urban and rural administrative divisions of Bhubaneswar were included.

The **operational definition of RTA** for this study was '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.'¹ Thus RTA is a collision between vehicles; between vehicles and pedestrians; between vehicles and animals; or between vehicles and geographical or architectural obstacles.' The current study would be taking into account vehicular accidents as only such accidents are reported at Police station, and the police system too has an official format to note it. Only those accidents were included where residents of Bhubaneswar were involved so that the incidence rate in the city could be calculated. The data were limited to accidents, both major and minor, that came under Police jurisdiction of Bhubaneswar. The limitation of the study was that alcohol influence in the accident could not be judged, as the documentation for this parameter was not very appropriately done in the records. The data were analyzed using SPSS

Fig. 1 – Classification of accidents.

Timing N = 625	Urban	Rural
6 am–9 am	63(12.2%)	19(17%)
9 am–12 pm	110(21.4%)	28(25%)
12 am–3 pm	64(12.5%)	13(11.6%)
3 pm–6 pm	69(13.5%)	23(20.5%)
6 pm–9 pm	66(12.8%)	17(15.1%)
9 pm–12 am	49(9.5%)	7(6.2%)
12 am–3 am	45(8.7%)	2(1.8%)
3 am–6 am	47(9.3%)	3(2.8%)
Total	513(100%)	112(100%)

13 to determine the patterns of RTA detected in a newly urbanized city like Bhubaneswar.

3. Results

The total number of major and minor vehicular RTA reported during the year January–December 2012 was 625, and in terms of total number of persons affected, it was 754, out of which 24.4% (184) lost their lives. In terms of maximum injuries, i.e. 37.5% were grievous while nearly 29% were fatal (Fig. 1). Thus the incidence of vehicular accidents for Bhubaneswar city was 9.07/10,000 population.

Severity of the accidents, which is calculated as the number of persons killed per 100 accidents, turns out in this case as 29.4, which is higher than the national average calculated in 2011 as 28.6.¹ The male to female ratio regarding morbidity was 6.4:1 and mortality was 3:1.

Table 1 shows that in urban areas nearly 21% of all the accidents occurring is between 9 am and 12 pm, it is similar in the case of rural areas, where it is 25% of the total. The urban to rural ratio is 4:1. The explanation could be underreporting in very late hours or due to heavy rush in the mornings.

Fig. 2 elucidates that in most cases the nature of accident is not discernible, i.e., in nearly 43% of cases. However, out of those where it is obvious, maximum accidents are due to head-on collisions followed by overturning, i.e., nearly 21% and 17%, respectively.

Fig. 3 shows that nearly 36% of fatal cases are those where cause or nature of accident could not be decided followed by

right-angled collision and overturning (nearly 30% and 27%, respectively). Data also reflected that 39.4% of the accidents were on National Highways followed by unsurfaced roads, i.e., 32.8%. Out of those registered cases, least were reported from State Highways. Fatality too was noted as maximum in the accidents on National Highways, i.e., 47% and least for those on the State highways, i.e., 10%.

Fig. 4 shows that motor cars were mainly involved in accidents and fatality too was maximum, closely followed, in terms of fatality, by trucks. From the police records an interesting fact came out that vehicles recently purchased

Fig. 2 – Nature of the accidents reported in city and associated fatality.

Fig. 3 – Associated fatality and type of accidents in Bhubaneswar.

Fig. 4 – Type of vehicles involved in RTA and outcomes in Bhubaneswar.

Table 2 – Age of drivers involved in RTA.

Age group	Male	Female
<5 years	0	0
6–9 years	10(5.3%)	0
10–14 years	14(7.4%)	0
15–17 years	26(13.8%)	2(6.9%)
18–20 years	37(19.7%)	7(24.1%)
21–24 years	40(21.3%)	10(34.5%)
25–34 years	34(18%)	6(20.7%)
35–44 years	18(9.7%)	4(13.8%)
45–54 years	7(3.8%)	0
55–64 years	2(1%)	0
65 & above	0	0
Total	188(100%)	29(100%)

were more involved (4 times) in accidents, i.e., <1 year old vehicles as compared to vehicles older than 10 years.

Table 2 shows that almost 72% of drivers aged from 18 to 44 years; 11% of drivers below 15 years have also been involved in accidents. Among females, most of the accident causing drivers were of the age range 21–24 years, i.e. 34.5%, and this was similar for males, i.e., 21.3%. This hints at reckless driving or perhaps early learners to be involved in accidents, and as this is a retrospective study, we could not ascertain the alcohol involvement. It was also seen that age of driver or licensed drivers did not have any association with RTA or its severity.

As Fig. 5 depicts, the cases are reported all through the year with peaks observed in April and December months, and further analysis showed that most, i.e. 82% of the accidents, were reported when weather was fine. Only 10% of cases were reported in the months of heavy rains. This analysis could be explained that the traffic is normally heavy when weather is fine. However, we cannot rule out underreporting of cases in bad weather.

4. Discussion and conclusion

The secondary data analysis of RTA cases reported in Police stations in one year has brought forward strong points, like, in the year 2012, in Bhubaneswar area, nearly 37% grievous vehicular accidents occurred, where 24% of the 754 people involved were killed. In a similar study done at Assam (whose socioeconomic profile is very similar to Odisha cities) in 1998, 463 RTAs occurred, which caused 659 (91%) injuries and 65 (9%) deaths.⁴ In another study done in Chandigarh, 148 crash

episodes involving 298 persons have happened in the reporting year, i.e., 2004.⁵ Comparing these two regions, Bhubaneswar figures were much higher and hence hints at an alarming situation and the pressure generated on the health systems on account of serious accidents. The attending health facilities should be adequately equipped with trauma centers and associated departmental set-up to attend to such emergencies, which is largely lacking in Bhubaneswar. It has only three newly built medical colleges, where academic activities are more prominent and specialized services are just building in. Moreover accidents being medicolegal cases, their acceptance in a private set up is very cumbersome. Thus the load falls on the lone district hospital, which is already facing severe shortage of manpower and is struggling with various government initiatives. Thus precious human life is lost but some efforts can be made to salvage the conditions.

In this study, head-on collisions were most fatal, i.e., in 37% of cases and a similar situation was cited in the Assam study too. In neither study, no association was seen with seasonal variation. In our study, the predominant timing was 9 am to 12 pm (nearly 25%) while in Assam the accidents (nos./h) reported were maximum (50%) in twilight (light phase of night), followed by day light (34%) and dark phase of light (16%).⁴ This brings out an area of concern, especially for Bhubaneswar, i.e., accidents are being reported only in daytime while reporting at other hours of the day is fairly low. This requires strengthening of traffic police patrols in the twilight and other vulnerable times of the day.

Age of drivers involved in accidents both male and female, is 21–24 years, and in the Assam study, it is 15–44 years. Some of the particular high-risk behavior like alcohol consumption, driving in high speed, etc., is common in this specific group. All national reports and independent studies conclusively point out that men are killed and injured in greater numbers with male to female ratios varying from 4:1 to 5:1, which is similar to the reports of our study. According to the NCRB report of 2005,⁶ 64.3% of deaths occurred in the age group of 15–44 years with children and the elderly accounting for 6.4% and 8.2% of deaths, respectively. So, adult males are commonly involved in RTAs as is also cited in studies by Jha et al. [7] and Patil et al. [8].

A similar study attempted in Nagpur reported 63.5% of accident victims because of sideways collision followed by 22.4% due to head-on collisions⁹; while in this study in 43% of the cases, cause of the accident has been noted as unknown followed by 21% being identified as head-on collisions. This also points out the loopholes in the recording system and the

Fig. 5 – Seasonal variation of RTA in 2012.

documentation of accident reports wherein the cause of the accidents are not decided upon clearly.

5. Recommendations given to the system

- Reporting of the accidents should be made as per the formats generated at the national level.
- A mapping of accidents area wise should be done by police to identify vulnerable points and patrolling reinforced in those areas.
- Strict reinforcement of laws for rash driving, as side and head-on collisions have been identified as the major causes of RTA.
- As the productive age group is being affected, especially the teens, some counseling programs and Awareness Drives should be initiated regarding this.
- There should be a yearly assessment in liaison with the health facility so that other concerns can be brought out and effective management of the injured can be planned.
- Timings of accidents should be kept in mind while deputing traffic personnel, and for the late timings also, a back-up plan should be devised.
- Urban and rural plans should be made, as problems are different in both.

Thus it is obvious that studies from different regions have different outcomes but the final inference that can be made is that RTA are emerging as a worrisome health hazard. It needs sensitive handling at the local level and central administration should reinforce stringent regulations and directives for its control and addressal. All these findings offer only a dipstick measure of the problems and strongly suggest that an integrated approach should be chalked out by the Road, Police and Health Department where the epidemiology of the accidents can be chalked out, so that consistent preventive measures can be worked out. RTA causes tremendous anxiety

to the person and the family, as well as loss of life, but fortunately, it is preventable. So a targeted approach is likely to yield better results and bring down the burden of this rising formidable problem.

Conflicts of interest

The authors have none to declare.

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