ROAD ACCIDENTS ANALYSIS ON NH-8 (DELHI-GURUGRAM)

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ABSTRACT

Road accidents are much higher in India as compared to the developed nations such as USA, Europe, Canada. Though, there is a huge network of highways in India but traffic density is also very high. Indian literacy is 74.04% and hence people are less aware of traffic rules. These factors have added in increasing in road accidents. From the analysis, it has been observed that mostly accidents were occurred from 00:01 AM in the night to 06:00 AM with the peak during 00:01 AM to 3:00 AM. It has been observed that mostly the cause of accidents is over speed and vehicle out of control. The mainly the type of accidents are rear end collision and head on collision. From the analysis a strong relation with accidents with speed, junctions, access roads can be seen and some black spots are also detected and proper measures are also provided to reduce the rate of accidents.

Keywords: Road Accident, Fatal.

I. Introduction

Vehicular accident in this country has become one of the growing concerns to most Indians in recent times. This is as a result of the tremendous effect of accidents on human lives, properties and the environment. Many researchers have come out with the causes, effects and recommendations to vehicular accidents. These causes include drink driving, machine failure and over speeding. Yet every year the ADSI report, W.H.O. report and other organizations would report an increase in vehicular accidents. The mere increase in the number of accidents is not enough for one to conclude that really there is an increase in vehicular accidents; hence the need to analyse the accidents data statistically to check whether there is any evidence of increasing road accidents as years go by resulting to large no of people losing their lives.

This research will consider road accidents and its impact on human lives and properties in the India. There are more than 4,50,900 recorded road accidents annually in India. These accidents cause over 1,46,133 people to lose their lives and about 400 losing lives daily. [1] Researchers have been modelling vehicular accidents with crash prevention models in various parts of the world. However, it is extremely difficult to just apply models which have worked somewhere to data obtained from different country due to the variations in the various factors pertaining in different countries. [2]

There has not been much statistical research in the field of road accident in India. This might have been as a result of the inadequate information available on road accidents and its impact on human live and properties in the country.

These road accidents have killed a lot of people in this country and as such it is described as one of the major causes of death in India. The causes of death of casualties in road accidents have been associated with secondary collision, improper handling of casualties and inadequate emergency services in the country. In these documents are certain factors which could be possible contributors of the death of casualties in road accidents in India. These factors include location of the accident, the type of vehicle involved in the accident, nature of the accident, weather conditions, the days of the week, the time of the day, and the causes of accidents.

The organization of present paper is as follow. Section II presents literature survey of causes of road accident. Section III describes the methodology used for proposed work . Result analysis is presented in section IV following the concluding remarks in section V.

II. Literature Review

There exists a serious lack of research and development work related to road safety in our country as well as abroad. Very little literature is available on safety assessment of a particular road and identification of causal factors of road accidents. Also, very little efforts have been done to develop a working model for prediction of accidents on a particular road.

Nirpinder Jain and Bharat Bhushan Jindal (2015) analyzed three year accident data of Mahipalpur junction. Percentage of fatal accidents in these 3 years has decreased from 32% to 27% steadily whereas rate of non-fatal accidents had increased from 68% to 84% (in 2013). In the night the accident percentage is ranging from 58% to 76% suggesting vehicles moving in night are involved in more number of accidents than during day. The accidents during day were in the range of 24% to 42%. Lighter vehicles like cars and heavier vehicles like Trucks are seen to be contributing to a greater extent to accidents.

Saransh and S.S Kazal (2015) analysed road accidents on NH-71A of year 2006-2015. The available literatures on accidents analysis indicates that 77.5 percent of road accidents in India are caused due to driver's error. Heavy vehicles like truck are involved in maximum no of accident on two-lane roads. It is estimated that fatalities caused by truck is 59% followed by other (26%) and bike (7%) and jeep (5%) and bus (3%).

Singh D et al. (2014) analysed post-mortem records of 709 RTA-related deaths in children (<18 years) in Chandigarh zone, undertaken at Post Graduate Institute of Medical Education and Research (PGIMER). The maximum number of fatalities was observed from the state of Haryana (36%) followed by the state of Punjab (34%), Chandigarh (13%).Maximum deaths were reported in the month interval in September–October (19.6%) followed by November–December (17.2%), while the months reporting the least number of fatalities were January– February (12.1%). However, no statistical significance in fatalities was detected between different month intervals. A vast majority of fatalities, (79.1%) was reported during daytime (8–8 pm). The maximum number of deaths was reported between 12–4 pm (29.9%) followed by 8–12 pm (21.5%). Least (2.5%) number of casualties was reported between 12–4 am.

JP Research India pvt ltd (2014) analysed 382 accidents on Mumbai- Pune expressway Trucks are highly involved in accidents on the expressway. Of all the vehicles/road users involved in accidents on the expressway, 54% are trucks. Run-off-road accidents are the accident type seen most frequently on the expressway, followed by collisions

between vehicles travelling in the same direction. Cars and trucks are the most affected road user types in accidents on the expressway.

A.N. Dehury, A. K. Patnaik, A. K. Das, U. Chattraj(2013) analysed the accidents and developed the accident prediction model. The accident per year was regressed with Density and Road side features. The accidents of 2002-2011 are taken and analysed which more accidents occurs in between 8PM to 9PM. The results indicate that 60 percent of fatalities are due to truck drivers followed by 25 percent by unknown driver, 7 percent by motor cycles, 5 percent by car and jeep,3 percent by bus.

Singh and Suman (2012) analysed 10 year data of road accidents on NH-77 from Hajipur to Muzaffarpur. Heavy vehicles were found involved in almost 48% accidents followed by two- wheelers 16%, car 12% and bus 10%. There was no definite trend for monthly variation. Accident rate in terms of number of accidents per km-year increased with traffic volume. The developed model for accident prediction represents that the number of accidents per-km-year increases with AADT and decreases with improvement in road condition.

Sharma and Landge, (2012) developed a predictive model for pedestrian accidents on NH-6 using GLM with NB models. The study showed that variables access density, Shoulder width and Lane width have significant impact on pedestrian safety.

III. Methodology

The Road Section of NH-8 i.e. the 1st part of Golden Quadrilateral from Dhaula Kuwa (New Delhi) to Hero Chowk (Gurugram, Haryana) has been identified for the study. Traffic volume, accidents and the data related to highway cross-section and number of accesses was collected on this road. For traffic volume data on NH-8, the teams were constituted and fresh traffic volume and spot speed data were counted and calculated 24x7 and traffic flow at point were also counted.

The FIR data of vehicle accidents were also collected from various Police headquarters and Police stations of New Delhi and Gurugram(Haryana). The nearby civil hospital and private hospital are also visited but no data found recorded in these hospitals. The expressway has 11 flyovers and overpasses with 47 km (29 mi) of service roads for local and slow moving traffic.

3.2 ACCIDENT DATA

Accidents :- An accident (collision, overturning or slipping) which occurred or originated on a road open to public traffic resulting in either injury or loss of life, or damage to property, in which at least one moving vehicle was involved. Traffic accident data was collected from FIRs and NHAI then it was compiled under following heads

1. Sr. No.
2. Date.
3. Month.
4. Year.
5. Time.
6. Accident location.

7. Nature of accident.
8. Classification of accident.
9. Cause.
10. Road features.
11. Road condition.
12. Weather condition.
13. Fatal injury.
14. Grievous injury.
15. Minor injury.
16. Non-injury.
17. No. of animals killed if any.
18. Help provided by Ambulance/Petrol Vehicle.

1. Sr. No.:-

It shows the ascending order of accidents from the FIR.

2. Date:-

It shows calendar date of the accident from the FIR.

3. Month:-

It shows calendar month of the accident from the FIR.

4. Year:-

It shows calendar year of the accident from the FIR.

5. Time:-

It shows calendar time of the accident from the FIR.

6. Accident location:-

It specifies the location of accident with change.

7. Nature of accident:-

It specifies the accidents in diff variations.

a. Overturning,
b. Head on Collision.
c. Rear end Collision.
d. Collision Brush/Side Wipe.
e. Right Turn Collision.
f. Skidding.
g. Left Turn Collision.
h. Other

8. Classification of accident:-

It specifies the harm caused by accident.

a. Fatal.
b. Grievous Injury.
c. Minor Injury.
d. Non- Injury.

9. Cause :-

It shows the reason behind the accident.

a. Drunken.
b. Over Speeding.
c. Vehicle out of control.
d. Fault of driver of motor vehicle/driver of other vehicle / cyclist / pedestrians.
e. Defect in mechanical condition of motor vehicle / road condition.

10. Road features:-

It specifies the road width and features on the place of accident.

a. Single Lane.
b. Two Lanes.
c. Three Lanes or more without central divider median.
d. Four Lanes or more with central divider.

11. Road condition:-

It specifies the road condition on the place of accident.

a. Straight road.
b. Slight curve.
c. Sharp Curve.
d. Flat road.
e. Gentle Incline.
f. Steep incline.
g. Thump.
h. Dip.

12. Weather condition:-

It specify the condition of weather.

a. Fin
b. Mist/Fog

c. Cloudy

d. Light rain

e. Heavy Rain

f. Hail/sleet

g. Snow

h. Strong wind

i. Dust storm

j. Very hot

k. Very Cold

l. Other extra Ordinary weather condition.

13. Fatal injury:-

It specifies the no. of fatalities occurred in accident.

14. Grievous injury:-

It specifies the no. of grievous or major injuries caused by accident.

15. Minor injury:-

It specifies the no. of minor injuries caused by accident.

16. Non-injury:-

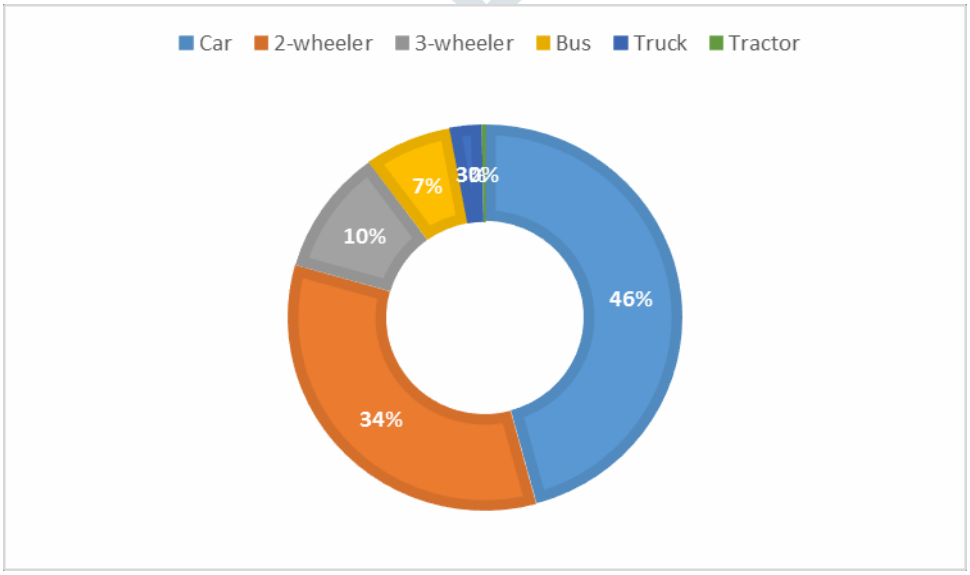
It specifies the no. of person who meet with the accident and went safe without any harm.

17. No. of animals killed if any:-

It specifies the animals and no. of animals killed in accident.

18. Help provided by Ambulance/Petrol Vehicle:-

It specifies whether the help is provided by ambulance or petrol vehicle or not.



Firstly the traffic volume and the spot speed data is plotted for both heavy and light traffic. The traffic count is done for both sides i.e. Delhi to Gurugram and vice versa. The traffic for both sides are shown by pi-charts as shown below.

Fig.1 Delhi to Gurugram Traffic Study

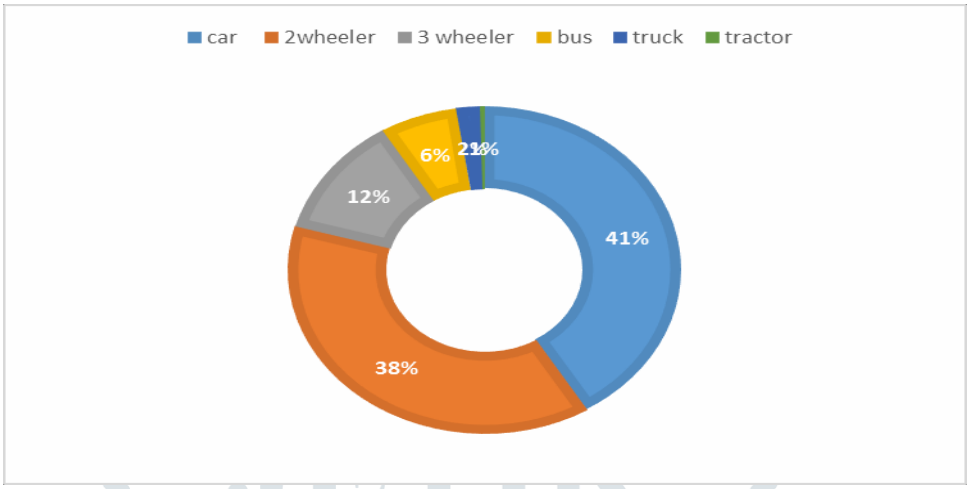


Fig. 2 Gurugram to Delhi traffic study

The speed data is plotted for individual vehicles and average speeds of each vehicle on the expressway for both light and heavy vehicles which are shown below in bar graphs in figures.

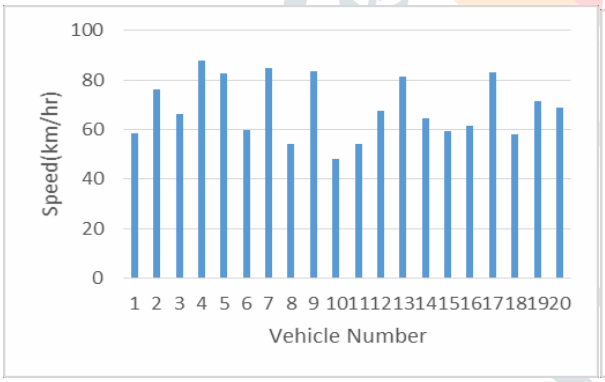


Fig. 3 Cars Speed Trend

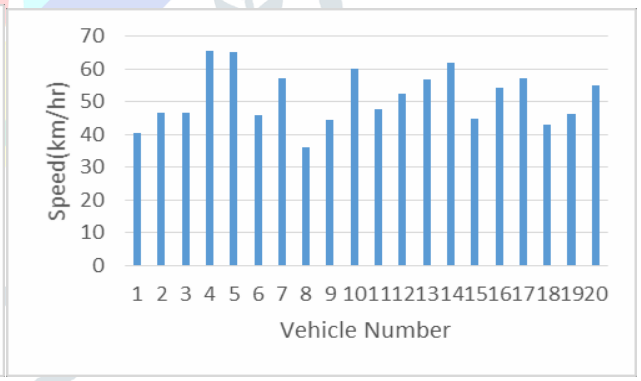


Fig. 4 Bikes Speed Trend

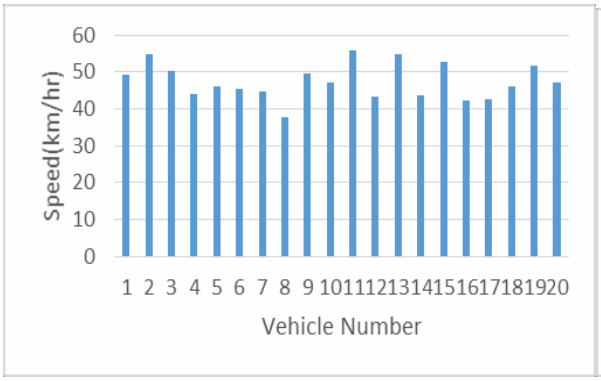


Fig. 5 Buses Speed Trend

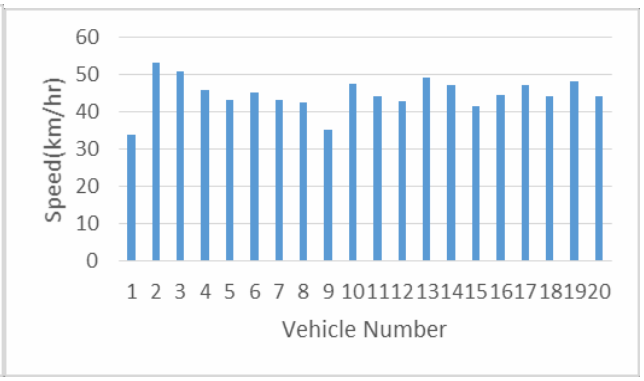


Fig. 6 Trucks Speed Trend

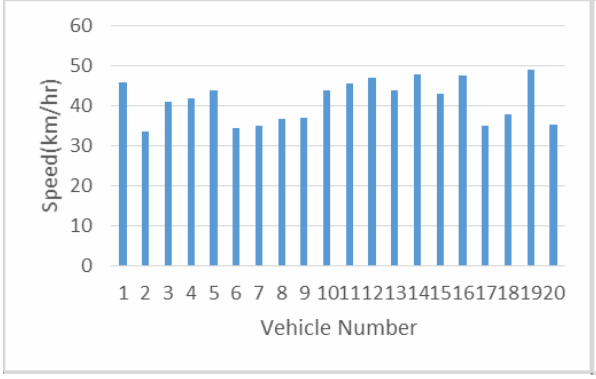


Fig. 7 3-Wheelers Speed Trend

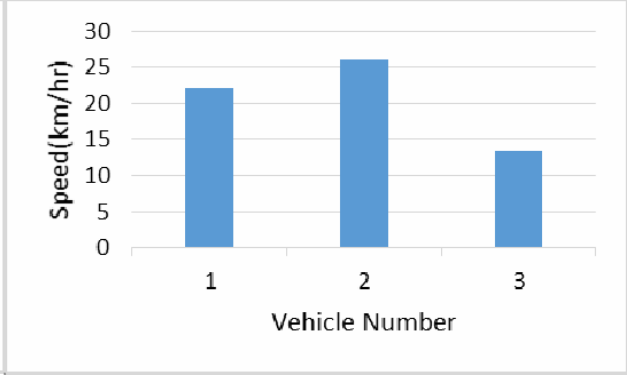


Fig. 8 Tractors Speed Trend

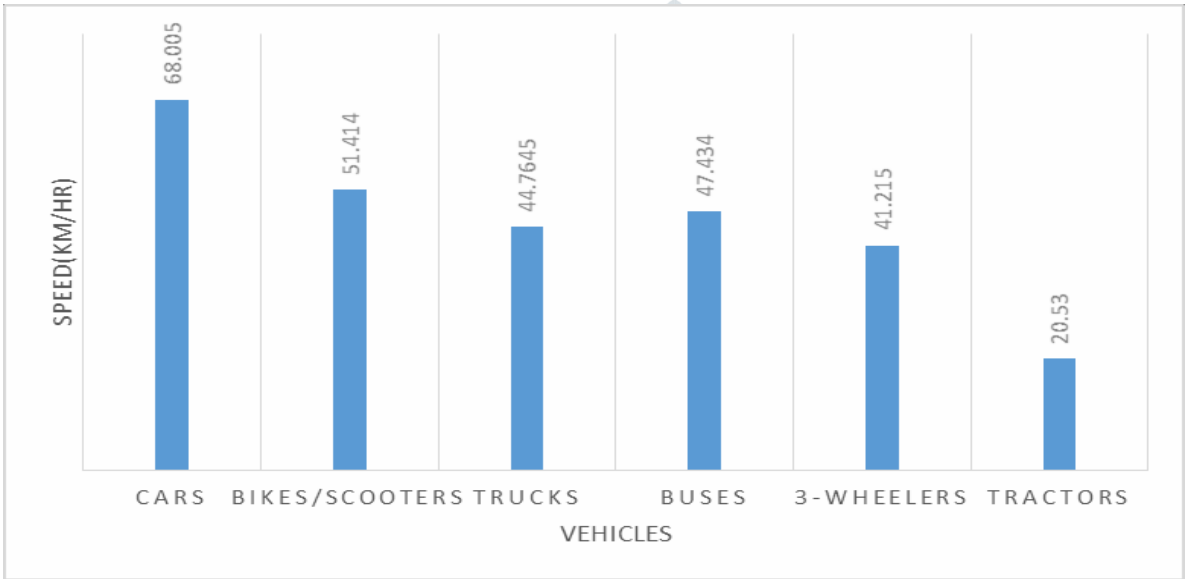


Fig. 9 Average Speeds

4.2 Months of the year

From FIR data sheets are month wise data of accidents, injuries and fatalities is being arranged and analysed. The month wise distribution of accidents, injuries and fatalities are shown below in fig. no.4.10, 4.11, 4.12 respectively. From the curves there is no general trend of Accidents and Injuries is observed but in fatality graph the maximum no. of fatalities are recorded in the month of July and February and May showing least no. of fatalities.

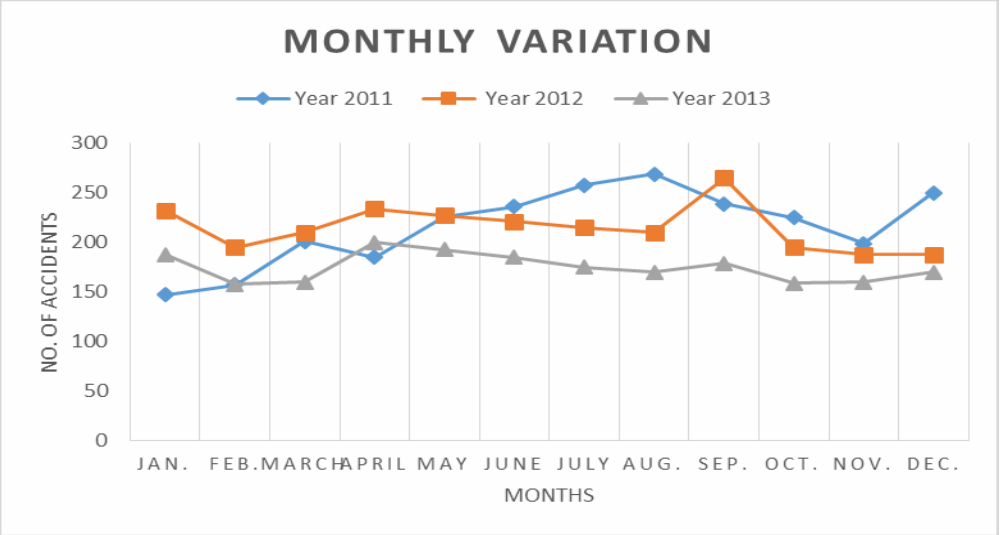


Fig. 10 Monthly Variation of Accidents

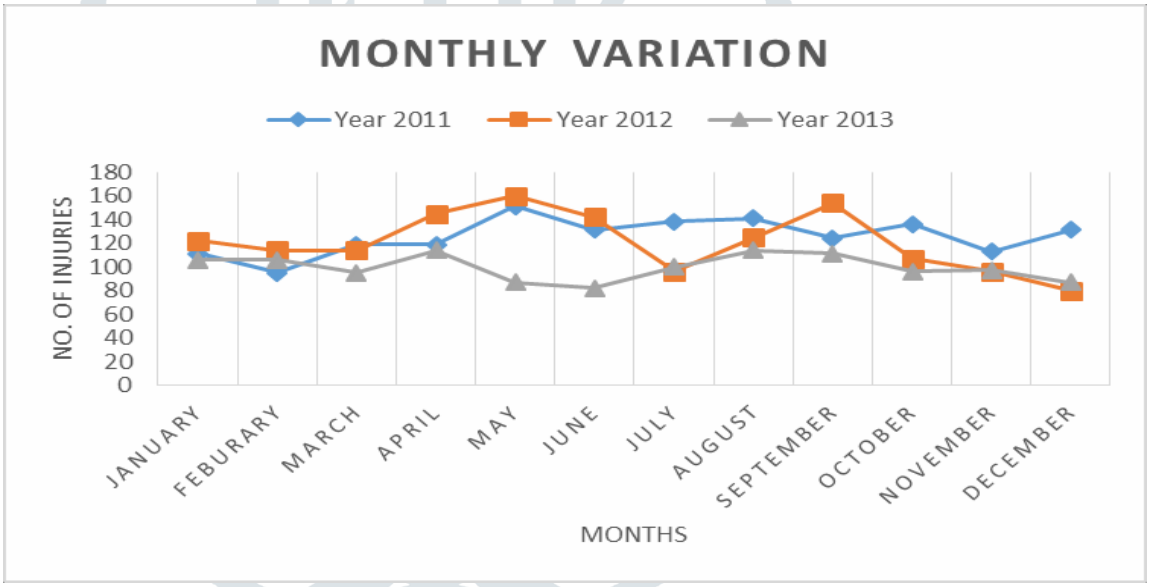


Fig.11 Monthly Variations of Injuries

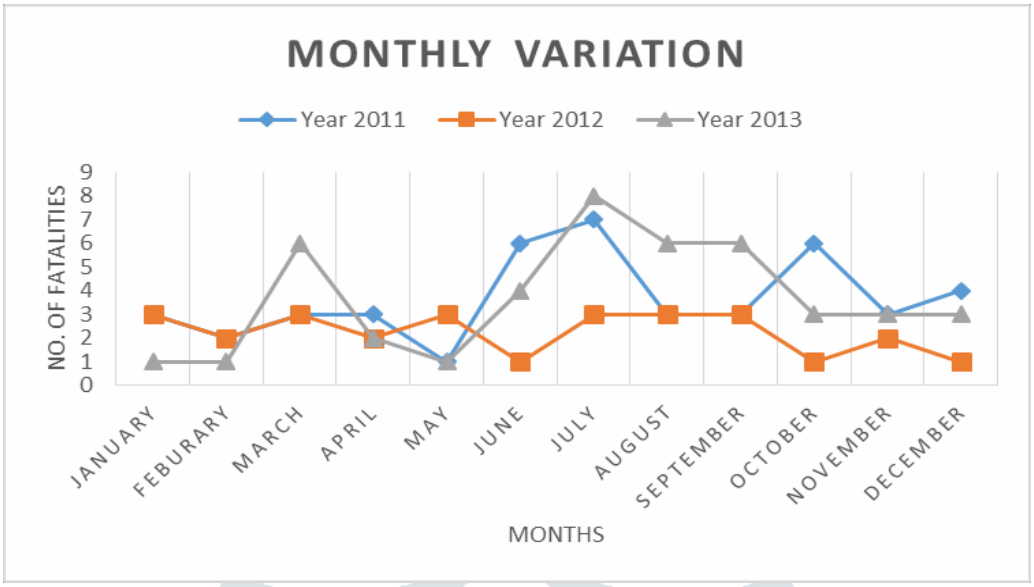


Fig. 12 Monthly Variation of Fatalities

NO. OF FATALITIES

From the FIR data sheet the fatality wise accidents data is being arranged and analyzed. The pi-chart for fatality wise accidents analysis is shown below in fig. no. 4.15. From the chart the minor injury constitutes 79%, the fatal accidents 3% and Major injury constitute 18 %.

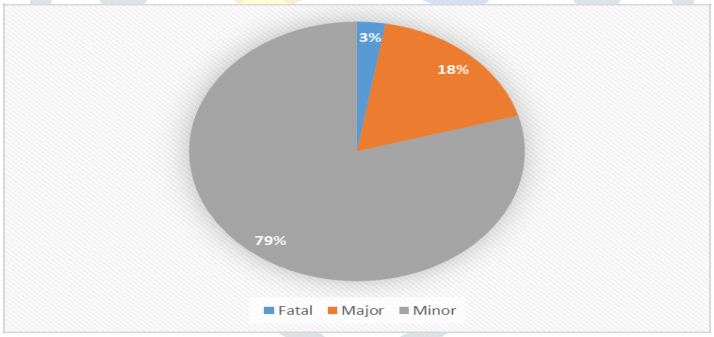


Fig. 15 Fatality Wise Variation

CAUSE OF ACCIDENT

From the FIR data sheet the cause wise analysis data is being arranged and analyzed. The pi- chart for cause wise analysis is shown below in fig. no. 4.16. From the chart it was observed that the highest accidents are due to over speed contributing 64.04% accidents followed by 28.95% accidents due to vehicle out of control and 6.2 due to Fault of driver/ driver of other motor vehicle /cyclist/pedestrians and 0.79% due to mechanical fault in motor vehicle or in road condition.

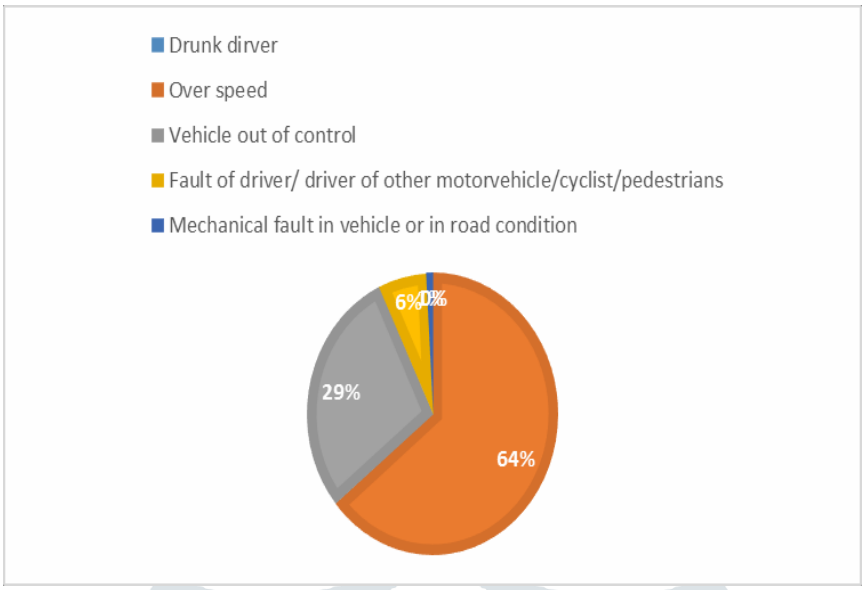


Fig.16 Cause Wise Variation

4.7 TYPES OF ACCIDENT

From the FIR data sheet the type of accident data is being arranged and analyzed. The pi- chart for type of accidents is shown below in fig no. 4.17. From the chart it is observed that the highest accidents are Rear end collision type contributing 57.9% following with 19.08% are of Head on collision type and 17.09% due to pedestrians and cyclists, 4.67% are of skidding, 1.11% are of side wipe and 0.15% are of right turn/left turn collision.

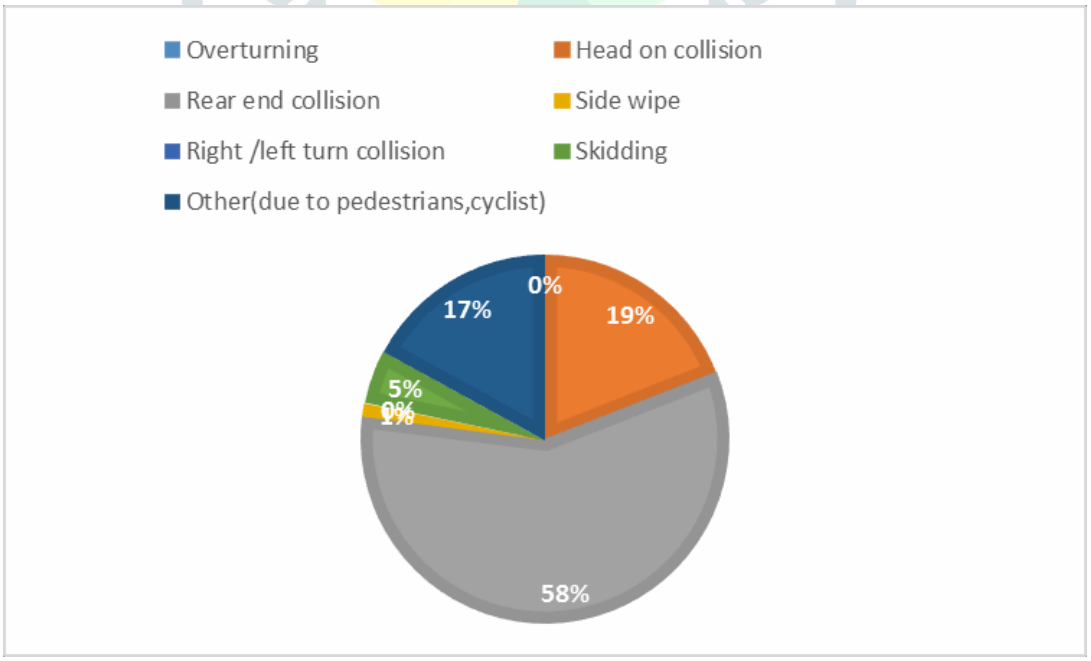


Fig. 17 Types of Accident Wise Variation

IV. Conclusion

From year wise accident analysis, the no. of accidents in year 2011, 2012, 2013 are 2592, 2580 and 2096 respectively. So we can clearly see the slight declining trend of accidents from 2011 to 2012 but huge declining trend from 2012 to 2013. The main reason is removal of toll plaza from the expressway seems to have a positive impact for road safety and other reason is be due to increasing road safety awareness propagandas of Govt. and people reaction towards them. So further the accidents can be removed by increasing awareness among people.

From the time wise analysis, it has been observed that mostly accidents occurred from 00.01 AM in the night to 06:00 AM with a peak during 00:01 AM to 03:00 AM. This high toll of Accidents may be due peak hour's traffic, drowsiness of drivers, drunken driving or fatigue of drivers due to night driving and absence of proper lighting in the night. So the proper lightning, continuous rumble strips are designed to alert inattentive drivers to potential danger by causing a tactile vibration and audible rumbling, transmitted through the wheels into the vehicle's frame. From the fatality wise accidents, it has been observed that the minor injury constitutes 79%, the fatal accidents 3% and Major injury constitute 18 %. The fatalities and severe accidents can be reduced by providing proper footpaths, bi-cycle lane, signs and signals and drivers must be encouraged for safe driving i.e. use of seat belts for cars, bus and trucks and helmet for 2-wheelers. From cause wise analysis, it has been observed that the highest accidents are due to over speed contributing 64.04% accidents followed by 28.95% accidents due to vehicle out of control and 6.2 due to Fault of driver/ driver of other motor vehicle /cyclist/pedestrians and 0.79% due to mechanical fault in motor vehicle or in road condition. Technically speaking, speeding does not directly lead to an accident. However, the higher the speed, the less time is available for the driver to react. Hence, in the event of a crash due to speeding, usually it is a sudden steering maneuver (to change lanes, avoid an obstruction, etc.), a burst tire at speed, or not enough time to react that leads to the accident. Driving too slow is likewise an indirect contributor to crashes. Other drivers (especially speeding drivers) can come up on a slow vehicle faster than expected, forcing an avoidance maneuver.

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