EFFECT OF MANMADE FEATURES, ROADWAY CONDITION & TRAFFIC ON SAFETY OF ROAD

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Abstract:- India is a developing country and safety of road is still in a premature stage. Accident severity is increasing in increasing order due to increasing in vehicle population. Accident leads to disablement, death, damage to health and property, social suffering and general degradation of environment. The road accident situation in India is alarming. Records show that there is one death at every 2.75 minutes because of road accidents. The high accident rate is largely attributed to the inadequacy of the highways and other main roads to meet the traffic demands, road user behavior, vehicle defects, poor road geometrics and visibility. Road accidents inflict heavy economic loss to the country. Road Safety is necessary to reduce accident involving both human and vehicles there by making the road more safe and user friendly to traffic.

NH-55 is one of the major connectivity from Cuttack to Sambalpur which caters to the need of transportation of light goods to heavy goods and passengers. Study area was undertaken on road NH-55 from Angul to Bhushansteel plant with stretch Km 159/0 toKm157/0 in Odisha state. The coal based power plants and steel industries have been set up since 2006. The study Stretch is a major connectivity to no of heavy industries like Nalco, Bhushan steel, Jindal steel, Gmr, Essar steel, Adani power, Monnetand many more small scale industries based on Talcher coal mines. Theno of accidents is rising up every year due to increasing vehicles population. The location in a roadway where the traffic accident often occursis called a black spot. The accident data is analyzed using accident frequency and severity index method. The safety deficiencies were detected to minimize accidents and save the road users.

I. INTRODUCTION

Road crashes take away the right to life of 3,000 people every day. This is a global humanitarian disaster, and it is man-made. (Global Road Safety Partnership Annual Report 2015)

Road safety is one of the most important problems in our society. Every year 1.2 million of people are killed and between 20 and 50 million people are injured in road accidents. If current trends continue road traffic accidents are predicted to be third leading contributor to the global burden of Disease and injury by 2020(Torregrosa et al.,2012)

India had earned the dubious distinction of having more number of fatalities due to road accidents in the world. Road safety is emerging as a major social concern around the world especially in India (Shivkumar and Krishnaraj,2012).

Accidents are a drain on the national economy and may lead to disablement, death, damage to health and property, social suffering and general degradation of environment. To minimize the no of crashes by any kind and severity expected to occur on the entity during a specific period is known as road safety. Accidents and the fatalities on road are the result of inter-play of a number of factors. Road users in India are heterogeneous in nature, ranging from pedestrians, animal-driven carts, bicycles, rickshaws, handcarts and tractor trolleys, to various categories of two/three wheelers, motor cars, buses, trucks, and multi-axle commercial vehicles etc., The vehicle population has been
steadily increasing because of change in the style of living of people. Increase in vehicle population with limited road space used by a large variety of vehicles has heightened the need and urgency for a well thought-out policy on the issue of road safety. In India, the rate of accident is directly proportional to growth of vehicle population.

Road accidents are a human tragedy, which involve high human suffering. They impose a huge socio-economic cost in terms of untimely deaths, injuries, and loss of potential income. The ramifications of road accidents can be colossal and its negative impact is felt not only on individuals, their health and welfare, but also on the economy. Consequently, road safety has become an issue of national concern. Road Safety is a multi-sectoral and multi-dimensional issue. It incorporates the development and management of road infrastructure, provision of safer vehicles, legislation, and law enforcement, mobility planning, provision of health and hospital services, child safety, urban land use planning, etc. In other words, its ambit spans engineering aspects of both, roads and vehicles on one hand and the provision of health and hospital services for trauma cases in post-crash scenario. Road accident in India is shown in survey.

Causes of accidents and their contribution are as follows by statistics of Road accidents in India (2015)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drivers fault</td>
<td>77.5%</td>
</tr>
<tr>
<td>Defects in road condition</td>
<td>1.5%</td>
</tr>
<tr>
<td>Defects in motor vehicle</td>
<td>1.6%</td>
</tr>
<tr>
<td>Fault of bicyclist</td>
<td>1.3%</td>
</tr>
<tr>
<td>Fault of pedestrian</td>
<td>2.4%</td>
</tr>
<tr>
<td>Weather condition</td>
<td>1%</td>
</tr>
<tr>
<td>All other causes</td>
<td>14.8%</td>
</tr>
</tbody>
</table>

Road safety in India is the poorest in the world. According to MORTH 2013, India has the highest number of accidents in the world. Awareness among road users and safe design of road components is necessary to reduce accident involving both human and vehicles. Source: Road statistics of India (2015) 3

1.11 Road Safety & Various Causes of Accident

Road traffic safety refers to methods and measures for reducing the risk of a person using the road network being killed or seriously injured. The users of a road include pedestrians, cyclists, motorists, their passengers, and passengers of on-road public transport, mainly buses and trams. Best practice road safety strategies focus upon the prevention of serious injury and death crashes in spite of human fallibility. Safe road design is now about providing a road environment which ensures vehicle speeds will be within the human tolerances for serious injury and death wherever conflict points exist.

The various causes of accidents may be due to three factors shown in fig 1.1
(i) Driver
(ii) Vehicle
(iii) Environment

II. METHODOLOGY

Road Selected For Study:
Two-lane roads from Angul to Bhushan Steel on NH-55 was chosen.
For this study, the following stretches were selected for data collection. The study area is shown in fig. 3.1
(i) Angul to Turanga, Km159/0-Km164/0
Data Collection
The only information available for accident studies is the FIR (First Information Report) lodged in the police stations and data from PWD. The data from these records of last ten years (2006-2015) were extracted from the FIR record field under IPCno.279/337/338/304(A).

Data Collected From Police Records:
With the prior permission of the concerned S.P, the accident data were collected on two-lane highways from three police stations.

Accident details during 2006-2015 on this road section are shown in Table 1.1. Accident data were collected year wise from each police station records then sorted out year wise.

Details of Accidents

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FATAL</th>
<th>MAJOR INJURY</th>
<th>MINOR INJURY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>15</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>2007</td>
<td>16</td>
<td>32</td>
<td>50</td>
</tr>
<tr>
<td>2008</td>
<td>10</td>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>2009</td>
<td>25</td>
<td>30</td>
<td>39</td>
</tr>
<tr>
<td>2010</td>
<td>22</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>2011</td>
<td>17</td>
<td>45</td>
<td>84</td>
</tr>
<tr>
<td>2012</td>
<td>5</td>
<td>25</td>
<td>61</td>
</tr>
<tr>
<td>2013</td>
<td>14</td>
<td>33</td>
<td>81</td>
</tr>
<tr>
<td>2014</td>
<td>16</td>
<td>32</td>
<td>84</td>
</tr>
<tr>
<td>2015</td>
<td>18</td>
<td>28</td>
<td>58</td>
</tr>
<tr>
<td>Total</td>
<td>159</td>
<td>297</td>
<td>579</td>
</tr>
</tbody>
</table>

III. ANALYSIS OF DATA AND DISCUSSION

Accident Investigation:
Accident type: Head-on collision
Location: Captive power plant gate, Nalco Angul
Date and Time: MAR 30, 2016; 4.30PM
Vehicle 1: Tata Truck no OR-06/ B-6545
Vehicle 2: Bajaj CT- 100 motor cycle no OR-05/U-3323
Fatalities/Injuries: One person dead and one person severe Injured.
Description: On 30th March 2016 one Bajaj motor cycle with two person collided with a aluminium loaded truck in front of captive power plant Nalco gate around 4.30PM. The motor cycle was coming from captive power plant and truck was moving on highway. The motor cycle rushed to the right side of truck front. The truck applied brake and turned towards left side. The bike fell down under the rear right wheels. The victims were severely injured. The rider lost his right leg completely and left leg scratched while other was under truck with severe knee and head injuries. The rider had used helmet and saved from head injury. The ambulance came after 30 minutes and took victims to the hospital. The victims were two brothers from Jajpur town and rider lost his life after two hour of incident. Cause of accident was due to presence of old banyan tree on the corner of T-junction and ditches of shoulder was filled with water. The motor cycle could not notice the truck due to that big tree and collided with truck on the highway. The tyre skid mark length was 11mt. Annual Variation In Accidents Of Total Stretch
YEARS FATAL MAJOR MINOR TOTAL NO OF ACCIDENTS

Vehicles Involved In Fatalities:
Vehicles users related to facilities during 2006-2015 are shown in pie chart in percent. The result indicate that 59% of fatalities are due to truck drivers followed by 26% by unknown driver, 7% by motorcycles, 5% by car and jeep, 3% by bus respectively as shown in Fig. 1.4. They consume alcohol and drugs in long driving. As a result reaction time increases and loss of control occurs during speed driving leads to fatalities.

Vehicle Involved In Fatalities

VEHICLES VEHICLE INVOLVED
Truck 59
Bus 3
Jeep/Car 5
Bike 7
Others 16

Trends Of Accidents:
The trend of accidents per million vehicle-kilometer-year (MVKY) on the road is shown in Fig. 1.2 from the figure it is found that accidents rate per MVKY increases in each subsequent year. The increase trend in accident rate may be due to increase in population due to town growth, industry growth, poor maintenance of shoulder, electric poles on road, transformer station on the shoulder, old girth trees on the shoulder, sight distraction obstruction due to trees, unsignalized intersection, on street parking of vehicles and lack of general awareness of road safety among road users.


IV. CONCLUSION

1) The available literatures on accident analysis indicate that 77.5 percent of road accidents in India are caused due to error.

2) 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%). Road safety awareness should be raised among road user.

3) Stretch IV has the highest no of accidents which accounts for 34.1% of total accidents. The accident rate can be decreased by road side clearance, proper maintenance of shoulders, lighting, and junction improvement. Speed limit should be brought down by providing humps near accident spots. Sight distance near curves should be obstruction free.

4) Stretch I have the second highest no of accidents accounts for 32.5% of total accident. The Accident rate can be reduced by providing signalized junction, junction improvement, and shoulder Clearance, installation of humps, shifting of poles, removal of trees near the edge of pavement etc.

5) No of accidents in stretch II accounts for 29.6% of total accidents. The accident rate can be minimized by clearing off shoulders, reducing speed limit, junction improvement, providing Signals on the median, shifting structures on the shoulder.

6) Stretch III has minimum no of accidents accounts for 3.7% of total accidents.

REFERENCES

1. Somchainuek et al.,(2013) Investigation Roadside Safety on Thai National Highways Indian Journal of Science and technology vol.6 issue 1
3. Torregrosa et al.,(2012) New geometric design consistency model based on operating speed profiles for road safety evaluation, Accident Analysis and Prevention Article in press AAP-2915 pp.1-10
4. Sivakumar, .Krishnaraj (2012).Road Traffic Accident (RTAs) Due To Drunken Driving In India. Challenges In Prevention international journal of research in management and Technology.ISSN:2249 9563 VOL. 2,pp.401-406