Texila International Journal of Public Health
ISSN: 2520-3134
DOI: 10.21522/TIJPH.2013.12.03.Art055

Injury Patterns and Contributing Factors in Two-Wheeler Road Traffic Accidents: A Cross-Sectional Analysis from a Tertiary Care Hospital in Chengalpattu District, Tamil Nadu

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Abstract

Road traffic accidents are one of the world's major sources of death and injury, with low- and middle-income nations suffering the most from them, despite having 60% of the world's automobiles. Two-wheeler accidents lead to a high rate of fatalities and severe injuries, disproportionately affecting young, economically active individuals and resulting in a considerable loss of productive life years. The impact of this death toll on society's socioeconomic output is valuable. This study evaluated the causes and patterns of injuries associated with two-wheeler road traffic accidents in the Chengalpattu region. In a Tertiary Care Hospital in Chengalpattu district, 296 two-wheeler RTA victims participated in six-month cross-sectional research from January to June 2023. Interviews with accident victims were conducted using a pre-tested, semi-structured questionnaire intended for injury patterns in road traffic accidents. Data were analysed using SPSS version 22. Among the participants in the study, 17.1% of the cases were linked to traffic accidents; the majority 51.7% occurred in the under-32 age group, and 80.7% of the cases involved males. Head and neck injuries accounted for 54.4% of all injuries, with upper extremities coming in second with 28.4%. During a collision, alcohol was consumed by 25.7% of the drivers who were involved. The majority of accidents, 37.8%, occur during the night hours from 6 p.m. to 12 midnight. The data reveals a concerning trend of head and limb injuries predominating, highlighting the vulnerability of motorcyclists and scooter riders to severe trauma, particularly to the head and extremities.

Keywords: *Accidents, Driving Under the Influence, Traffic Collisions, Traffic.*

Introduction

A Major epidemic of non-communicable diseases is a road traffic accident. RTA ranks 4th among the majority of the top causes of death. About 10% of all deaths and 16% of all disabilities worldwide are caused by accidents [1]. According to WHO, 2.5% of all deaths are caused by traffic accidents. Despite accounting for about 60% of all automobiles worldwide,90% of all traffic fatalities occur in developing nations [2,3]. In 2022, there was 11.9 percent of road traffic accidents in India. Similarly, there was a notable rise in road accident-related fatalities and injuries, with increases of 9.4% and 15.3%, respectively. On average, the country experienced 1,264 accidents and 462 deaths each day, equating to 53 accidents and 19 fatalities per hour. The age group most affected by these incidents was 15 to 49 years [4].

In India, traffic accidents resulted in around 4.4 lakh injuries and 1.68 lakh fatalities in 2022. 90% of the 1.3 million RTI deaths that are determined to have occurred occur in middle-income and low-income countries. By 2030, RTAs are expected to rank as the fifth-highest

Received: 04.07.2024 ***Accepted: 08.08.2024*** ***Published on: 30.09.2024***

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contributor to the worldwide illness burden. In developing nations, where road users are most susceptible, the death toll is highest and continues to rise [5,6].

The cost of two-wheeler accidents is high in India and has major implications for social, economic, and health aspects of life. A significant number of young, economically active people are disproportionately affected by these incidents, which have a high fatality and serious injury rate and cause a significant loss of productive life years. There is a significant financial impact since victims and their families frequently fall into poverty as a result of exorbitant medical costs and lost wages.

The state with the most traffic accidents in 2022 was 13.9 % in Tamil Nadu, followed by Madhya Pradesh with 11.8%. In Tamil Nadu 10.6% and in Uttar Pradesh 13.4% were the two States with the most road accident fatalities [4]. It is possible to stop road traffic accidents (RTAs) from killing people or seriously injuring them. There are treatments for road safety that are effective, and addressing road safety necessitates a scientific, rigorous approach. Thus, the purpose of this study was to evaluate the causes and trends of injuries related to RTAs in the Chengalpattu district.

Materials and Methods

A cross-sectional analytical study of 6 months duration (January 2023 to June 2023) was conducted in the Tertiary Care Hospital, Chengalpattu district. Complete enumeration sampling was conducted to include all two-wheeler RTA victims attending the RHTC in the study. A total of 296 two-wheeler RTA victims were included in the study during its period. For the study, RTAs were defined as any injury resulting from a road traffic crash irrespective of the severity and outcome. One individual declined to take part in the research. All persons who were involved in traffic accidents throughout the research period met the inclusion criteria. The exclusion criteria included injuries that happened on the road without a vehicle (such as slip-and-fall incidents) or injuries that included stationary automobiles (like injuries sustained during auto repair). Road traffic accident-related deaths were also excluded from the research. Patients who passed away before the interview or refused to provide informed permission were not included in the research Furthermore, individuals who were hemodynamically unstable or unconscious were not included. The patients' socio-demographic profiles, the accident site, the time of the incident, the type of vehicle involved, and the outcome of RTA were documented, as soon as RTA casualties had stabilized. At the hospital's casualty or wards, accident victims were interviewed using a pre-tested proforma created specifically for this purpose. In cases when the victims' condition did not justify an interview, the family or attendants were questioned. To facilitate the collection of data, medical personnel at the tertiary care hospital have explained the study's objectives and provided training on the various components of the questionnaire. Personal identifying information, the time, date, and type of the cars engaged in the RTA, the protective gear used, and the category of road users were among the data gathered. The case sheets and medicolegal documents were referenced to gather further data and, if needed, cross-checking.

Results

During the study period, the total number of cases seen in the casualty of tertiary care hospitals was about 1738 cases and road traffic accidents were about 296 (17.1%). Tables: 1 & 2 show that the male victims are 239 (80.7%) and About 51.7% of the individuals involved in accidents belong to the age group of less than 32 years. Table 2 displays the distribution of RTA occurrences with the weekdays of 65.9% by days on the week, Monday having the highest valve. The junction saw the highest proportion of accidents (33.8%), with the highway and main road having proportions of

17.9% and 12.3%, respectively. A significant percentage of the 296 victims,118 in total know that ambulances were utilized in the instances (39.9%). Victims of road traffic accidents indicated that there was a blockage on the road, ie.23 (7.7%) which led to the accident. The majority of these impediments consisted of animals sitting or crossing the road, people, and other stationary items like tree branches., etc., The study results also showed that one-third, (34.8%) of The RTI victims lacked a helmet. The use of alcohol 6 hours before the accidents was found to be one-fourth of 76(25.7%). After the RTI victims' injuries were assessed, it was discovered that 118 (39.9%) had critical injuries and about 178(60.1%) had non-critical injuries. The pattern of injuries among the RTI sufferers included in the research is shown in Figure 1. It can be observed that, for around 161 (54.4%) of the victims, the most prevalent pattern of damage was on the upper extremities. The next most common ailment was a head injury, which affected 84 individuals (28.1%). 29 people (9.8%) had lower extremity injuries, 12 people (4.1%) had chest and abdomen injuries, and 10 people (3.3%) had multiple organ injuries. By analyzing the time distribution of accident trends, it was found that the hours between 6:00 PM to 12:00 PM had the highest number of accidents shown in Figure 2.

Table 1. Demographic Profile of the Victims Involved in Two-Wheeler Accidents

Variable	**Category**	**N**	**%**
Gender	Male	234	79.1
	Female	62	20.9
Age	<32	153	51.7
	>32	143	48.3

Table 2. Risk Factor Distribution for Two-Wheeler Road Traffic Accidents

Variable	**Category**	**Frequency**	**%**
Days	Weekdays	195	65.9
	Weekends	101	34.1
Site of accident	Highway	53	17.9
	Main Road	38	12.8
	Junction	99	33.4
	Street	106	35.8
Ambulance	Yes	118	39.9
	No	178	60.1
Use of helmet	Yes	103	34.8
	No	193	65.2
Alcohol consumption within the 6 hours preceding the accident	Yes	76	25.7
	No	220	74.3
Over-Speeding	Yes	188	63.5
	No	108	36.5
Driving on the wrong side	Yes	19	6.4
	No	277	93.6
Jumping red light	Yes	43	14.5
	No	253	85.5
Use of mobile phone	Yes	25	8.4
	No	271	91.6

Table 3 shows the association between the severity of the injury with various risk factors. Around 70(59.3%) of them are critical injuries belonging to the age group less than 32 years and the correlation was determined to be significant statistically (p-values <0.05) with an odd ratio of 1.63(95%CI-0.98-2.737). It was found that those who had critical injury had 1.6 times increased odds of accident when compared to those aged greater than 32 years. Around 22(28%) of the critical injuries are female and it is statistically significant (P<0.05) with the odds of 1.72 (95%CI-1.056-2.804). It was found that those who had critical injuries had 2.2 times increased odds of accidents on weekends when compared to weekdays. About 52.5 % of people with critical injuries have access to ambulance services compared to non-critical ones and it was significant statistically (p<0.05)

Table 3. Association Between the Risk Factors and the Severity of Injury

S.no	Variable	Severity of injury		Total (N = 296)	Chi-square	Unadjusted odd's ratio (95% CI)	P Value
		Critical n (%) n = 118 (39.9%)	Non-Critical n (%) n = 178 (60.1%)				
1.	**Age of the individual involved in the accident**						
	<32 years	70 (59.3%)	83 (46.6%)	153 (51.7%)	4.57	1.669 (1.042-2.673)	0.03*
	>32years	48 (40.7%)	95 (53.4%)	143 (48.3%)		1	
2.	**Gender of the individual involved in the accident**						
	Female	33 (28%)	29 (16.3%)	62 (20.9%)	5.8	1.721 (1.056 – 2.804)	0.02*
	Male	85 (72%)	149 (83.7%)	234 (79.1%)		1	
3.	**Days of the Accidents**						
	weekends	49 (41.5%)	52 (29.2%)	101 (34.1%)	4.78	2.900 (1.605 – 5.239)	0.001*
	weekdays	69 (58.5%)	126 (70.8%)	195 (65.9%)		1	
4.	**Access to an Ambulance at the time of the accident**						
	Absent	56 (31.5%)	122 (68.5%)	178 (60.1%)	13.15	0.415 (0.256-0.670)	0.001*
	Present	62 (52.5%)	56 (47.5%)	118 (39.9%)		1	

Table 4 shows the association between traffic rule violations and the severity of injuries. It was found that individuals not using a helmet have three times increased odds of critical injury compared to those who wear helmets. About 87 (73.7%) of these critical injuries occurred while driving the two-wheeler above 80 km/h, with the association being

statistically significant (p-value < 0.05) and an odds ratio of 2.13 (95% CI 1.29-3.54). About 13 (11%) of the critical injuries resulted from driving on the wrong side of the road, showing statistical significance (P < 0.05) with odds of 3.54 (95% CI 1.306-9.622). Furthermore, approximately 26 (22%) of critical injuries were from jumping red lights, with a statistically significant association (p-value < 0.05) and an odds ratio of 2.13 (95% CI 1.29-3.54). The study also found that individuals using a mobile phone while driving have three times increased odds of critical injury compared to those who do not use their phone while driving, and this association was statistically significant (p < 0.05).

Table 4. Association between Traffic Rule Violations and the Severity of the Injury

S.no	Variable	Severity of injury		Total (N = 296)	Chi-square	Unadjusted odd's ratio (95% CI)	P Value
		Critical n (%) n = 118 (39.9%)	Non-Critical n (%) n = 178 (60.1%)				
1.	**Using a helmet at the of accidents**						
	Absent	87(73.7%)	106(59.6%)	193(65.2%)	6.2	1.906(1.147-3.167)	0.012*
	Present	31(26.3%)	72(40.4%)	103(34.8%)		1	
2.	**Drunken while driving**						
	Present	36(30.5%)	40(22.5%)	76(25.7%)	2.40	1.515(0.894-2.565)	0.12
	Absent	82(77.5%)	138(77.5%)	220(74.3%)		1	
3.	**Over speeding**						
	Present	87(73.7%)	101(56.7%)	188(63.5%)	8.83	2.13(1.29-3.54)	0.003*
	Absent	31(26.3%)	77(43.3%)	108(36.5%)		1	
4.	**Driving on the wrong side**						
	Present	13(11%)	6(3.3%)	19(6.4%)	6.90	3.54(1.306-9.622)	0.012*
	Absent	105(89%)	172(96.7%)	277(93.6%)		1	
5.	**Jumping red light**						
	Present	26(22%)	17(9.5%)	43(14.5%)	8.9	2.67(1.379-5.193)	0.003*
	Absent	92(78%)	161(90.5%)	253(85.5%)		1	
6.	**Use of mobile phone**						
	Present	17	8	25(8.4%)	9.01	3.576(1.49-8.58)	0.004*

	Absent	101	170	271(91.6%)		1	

Table 5. Logistic Regression Analysis between Severity of Injury and Associated Risk Factors

S.no	Variable	P Value	Adjusted Odds Ratio	95% CI
1.	Age of the individual involved in the accident	0.059*	1.639	.98-2.73
2.	Gender of the individual involved in the accident	0.015*	2.155	1.1-3.9
3.	Days of the Accidents	0.005*	2.256	1.2-3.9
4.	Using a helmet at the time of accidents	0.001*	3.001	1.6-5.4
5.	Over speeding	0.026*	2.607	1.4 – 4.6
6.	Driving on the wrong side	0.004*	2.404	1.3 - 4.3
7.	Jumping red light	0.001*	3.549	2.1 – 6.1
8.	Mobile phone usage while driving	0.022*	3.203	1.7 – 5.8

The logistic regression analysis revealed several significant associations between various risk factors and the severity of injuries sustained in road traffic accidents. Gender emerged as a statistically significant factor ($p = 0.015$), indicating that males are more likely to experience severe injuries compared to females. Notably, the absence of helmet usage during accidents was strongly associated with higher odds of severe injury ($p = 0.001$), highlighting the protective role of helmets. Additionally, behaviours such as overspeeding ($p = 0.026$), driving on the wrong side ($p = 0.004$), jumping red lights ($p = 0.001$), and using mobile phones while driving ($p = 0.022$) were significantly linked to increased odds of severe injury. This underscores the importance of adhering to traffic regulations and avoiding distractions while driving. Moreover, the days of the accidents were also found to be a significant predictor ($p = 0.005$), suggesting that certain days may pose a higher risk of severe injury. While the age of individuals involved in accidents showed a trend towards significance ($p = 0.059$), it did not reach conventional levels, indicating that further investigation may be warranted. Overall, these findings underscore the multifaceted nature of factors influencing the severity of injuries in road traffic accidents, emphasizing the need for comprehensive interventions targeting behavioural and environmental risk factors to mitigate injury severity and improve road safety (Table 5).

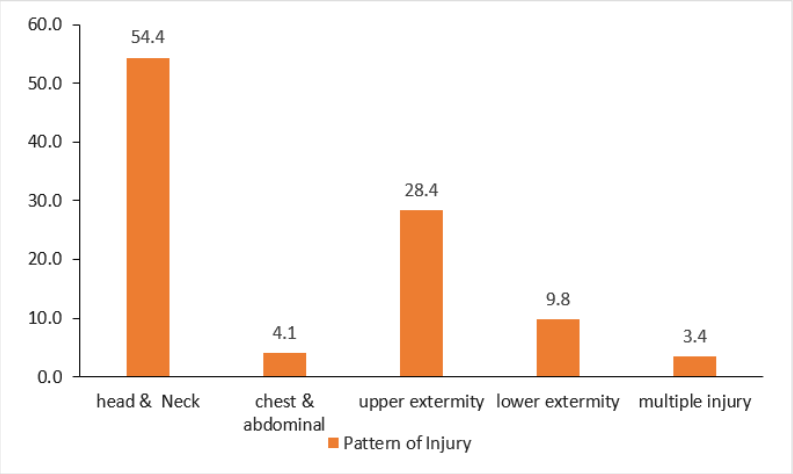

Figure 1. Pattern of Injuries During the Time of Accidents

The bar graph in Figure 1 illustrates the distribution of different injury patterns among victims during road traffic accidents. The most common type of injury reported is to the head and neck, comprising 54.4% of the total injuries. This is followed by injuries to the upper extremity, accounting for 28.4%. Injuries to the lower extremity represent 9.8% of the cases. Chest and abdominal injuries are less frequent, constituting 4.1% of the injuries, while multiple injuries are the least common, observed in 3.4% of the cases.

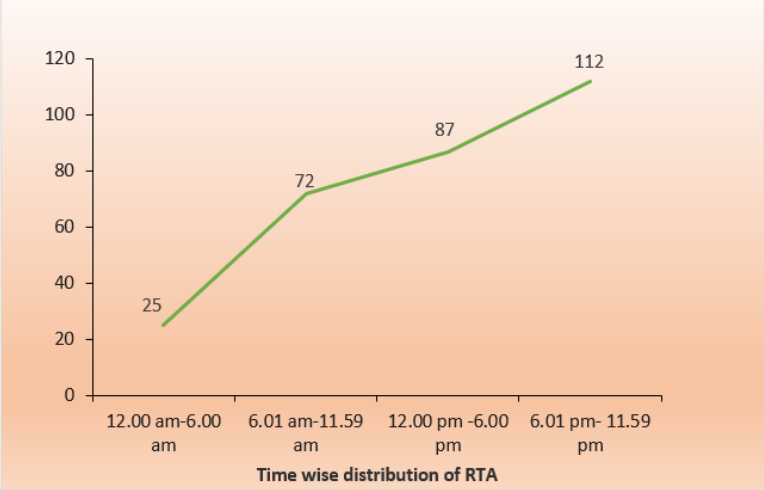

Figure 2. Time-wise Distribution of Road Traffic Accidents among the Victims

Figure 2 illustrates the time-wise distribution of road traffic accidents (RTA) among victims, showing a clear trend in the frequency of incidents across different times of the day. The number of RTAs is lowest during the early morning hours (12:00 am - 6:00 am) with 25 incidents. The frequency increases significantly to 72 accidents between 6:01 am and 11:59 am. The trend continues upward with 87 accidents from 12:00 pm to 6:00 pm. The highest number of accidents, 112, occurs in the evening to early night (6:01 pm - 11:59 pm).

Discussion

According to the most recent data, the age range of 18 to 32 accounts for 51.7% of road traffic accident (RTA) fatalities. Pathak [7], Kakkar [8], and Solanki [9] studies yielded comparable findings. This age group may be more likely to be involved in accidents since they frequently disobey traffic regulations and

don't wear seatbelts and helmets. They also have a higher tendency for dangerous behaviours including speeding, driving while intoxicated, and distracted driving (texting and driving, for example).

The bulk of the victims in hospital-based research conducted by Adavikottu[10] were between the ages of 18 and 37.5. This demonstrates that the most productive and energetic age group participates in RTAs, which causes a significant financial loss to the community. Similar findings were also reported by Balogun JA[11]. It should come as no surprise that men made up the vast majority of the victims in our study (79.1%). This is because men are more likely to be seen on the streets. Studies have consistently shown that males tend to engage in riskier driving behaviours compared to females. This includes behaviours such as speeding, aggressive driving, and a higher likelihood of driving under the influence of alcohol or drugs. These risky behaviours increase the chances of being involved in accidents. Physiologically, research indicates that males often have a higher propensity for sensation-seeking and thrill-seeking behaviours, which may translate into a greater willingness to take risks on the road. Moreover, there are differences in spatial abilities and risk perception between males and females, with males generally exhibiting a higher tolerance for risk. A study conducted in Albania, however, reveals contradictory findings, including a higher frequency of female participation in RTA, which may be related to socioeconomic factors [12].

Weekends (Saturday and Sunday) accounted for 34.1% of all reported accident incidences in the present survey, while weekdays (Monday through Friday) accounted for 65.9%. Some research indicates that the number of accident instances increases on weekends [13,14]. This is due to First of all, weekday traffic volumes are usually higher because of business activity and commuting to work or school. Peak-time traffic congestion can increase the risk of accidents, especially during rush hour when drivers may be more agitated and irritated. Another study conducted in Delhi found that the highest number of RTAs occurred on Mondays and Wednesdays [15].

According to the current study, 25.7% of the drivers involved in the collision were intoxicated when it happened. This is a greater percentage than that of a study by Neeluri [16], which discovered that 22.5% of the participants were intoxicated at the time of the accident. It is often known that alcohol can make driving more difficult. Also, as blood alcohol content rises, so does the degree of impairment. Additionally, at a given blood alcohol level, children have a larger risk of accidents than senior persons [17].

The study revealed that the majority of injuries (54.4%) involved the head and neck, followed by the upper and lower extremities (28.4% and 9.8%, respectively), and the chest and abdomen (4.1%). Multiple-site injuries were observed in 3.4% of cases. Patan's research indicated that head injuries comprised 68.8% of all injuries, followed by lower leg and knee injuries at 32.7%, and upper arm and shoulder injuries at 23.9% [18]. Similarly, Neeluri found that 40.7% of patients sustained lower limb injuries, 22.10% suffered head and face injuries, and 17.80% had multiple injuries [16]. These findings contrast with Ravi Kiran's study in Mangalore, which identified the abdomen as the most common site of injury (49%). Al-Thaifani reported that lower limb injuries were the most prevalent (42.18%), followed by head injuries (17.93%) and thoracic injuries (11.81%) [19]. The higher frequency of head injuries among two-wheeler users may be attributed to the lack of helmet usage. Similarly, the increased incidence of upper body injuries among drivers may be due to non-compliance with seat belt usage, leading to a forward thrust during accidents and elevating injury risks.

A further noteworthy finding that underscores the shortcomings of public health

care is that around 60% of people do not have access to ambulances in the event of an accident, because of this, sufferers are more likely to get inadequate and delayed medical care, with 31.5% of them suffering catastrophic injuries. About 72% of participants in different research done in Tamil Nadu did not have access to emergency ambulance services [20]. This absence highlights more general problems, such as inadequate emergency response systems or difficulties in quickly deploying assistance to accident scenes.

65.2 percent of the accident victims in this research who were riding two-wheelers at the time of the occurrence lacked helmets. While Trivedi's study showed that 88.5 percent of two-wheeler riders did not wear helmets during accidents, Jha et al. revealed that 71 percent of riders lacked protective helmets. In a similar vein, Neto et al. discovered that 50 percent of motorcycle riders were not wearing helmets when they were involved in collisions [21,22]. According to Neto et al.'s findings, 50 percent of motorcycle riders were not wearing helmets when they were involved in a collision [23]. Investigations conducted in Bangalore, Nagpur (with a compliance rate of 74%), and Haryana (with a compliance rate of 100%) in India further illustrated that drivers were failing to adopt safety measures [24–26]. The majority of drivers are ignorant of safety precautions and seldom apply them. Some drivers may also find helmets heavy or uncomfortable, particularly in warm weather or on quick excursions. These factors might contribute to the failure to utilize safety precautions at the scene of an accident.

In the study at hand, the bulk of accidents occurred during the evening period (6 PM to midnight), accounting for 37.8%, followed by the afternoon (29.3%) and morning (24.3%) periods, with the night accounting for 8.4%. The evening hours typically witness heightened activity as people travel to and from various destinations such as schools, workplaces, factories, and commercial establishments. Factors such as reduced visibility, glare from headlights, and adverse weather conditions significantly contribute to the heightened risk of accidents during this time. Neeluri's study yielded similar results [16].In comparison to Shah's findings, where the majority of accidents occurred in the morning hours (from 6 AM to 12 PM) [27], Shrestha's study also revealed a similar trend, with 50% of accidents happening during the morning period (from 6:00 AM to 12:00 PM)[28], followed by 31.2% between 12:00 PM and 6:00 PM.

Our most recent survey indicates that speeding and other infractions of traffic laws were the primary cause of the majority of accidents. Among the risk factors contributing to two-wheeler traffic accidents were using mobile phones, driving on the wrong side of the road, and jumping red lights. The majority of traffic rule breaches that result in RTA proceedings are related to over-speeding. In the present study, 63.5% of road traffic injuries are caused by speeding, and 46.2% of those injuries are catastrophic. Incomparable research conducted in Iran [29], 65.3% of participants had injuries from road accidents as a result of speeding. Depending on the characteristics of the roads in various places, limiting the speed of cars can lessen the severity of traffic accidents by increasing safety and reducing damage.

Similarly, in a study done in the UK for the assessment of law enforcement views on the public in 2018 [30], the usage of mobile phones leading to road traffic accidents (RTA) was found to be 10.3%, which is similar to our current study. It is essential to enact strict rules and enforce them strictly; the consequences of using a mobile device while driving should be severe enough to discourage this risky conduct. It's important to consider technological solutions to reduce the severity of road traffic accidents. Sophisticated driver-assistance systems that warn drivers when they are not paying enough attention to the road, as well as applications that prohibit the use of mobile phones while driving, can play a significant role

in preventing accidents and promoting road safety. Embracing such technological advancements can potentially save lives and prevent injuries on the road.

Conclusion

Based on a recent study, it has been found that younger people and energetic men are more likely to be involved in traffic accidents. Two-wheelers, such as motorcycles and scooters, are particularly at risk, and many of these accidents involve intoxicated drivers. The study data highlights a worrying trend of head and limb injuries being predominant, which underscores the vulnerability of motorcyclists and scooter riders to serious accidents, especially to their head and body parts. The accident rate is higher during evening hours, most likely due to increased traffic.

Strength

The study's geographical applicability and significance are increased by the diversity of victim addresses within districts, which facilitates the simpler extrapolation of findings to populations outside of districts.

Recommendation

The following finding shows how critical it is to encourage riders to wear helmets and other safety gear, as well as to enhance traffic safety features including designated lanes, traffic management strategies, and more strict enforcement of speed limits and other traffic laws. In addition, fostering a culture of safety and respect for other road users requires extensive education and awareness efforts directed at both riders and other road users. A comprehensive strategy incorporating engineering, law enforcement, and education is required to tackle the unique injury trends found in two-wheeler rear-end collisions. Significant progress may be achieved in lowering the number of fatalities from these collisions and improving everyone's safety on the roads by putting these strategies into practice.

Acknowledgement

We sincerely acknowledge all participants for their invaluable contributions.

Conflict of Interest

Nil

References

[1]. Khalaf, M., Rosen, H., Mitra, S., Neki, K., Mbugua L, Hyder A, Paichadze N Estimating the Burden of Disability From Road Traffic Injuries in 5 Low- and Middle-Income Countries: Protocol for a Prospective Observational Study JMIR Res Protoc 2023;12:e40985 https://www.researchprotocols.org/2023/1/e40985

[2]. Road traffic injuries. (n.d.). Retrieved April 25, 2024, from https://www.who.int/news room/fact-sheets/detail/road-traffic-injuries

[3]. Transportation Safety | Transportation Safety | Injury Center | CDC. (2023, July 24). https://www.cdc.gov/transportationsafety/index.html

[4]. Ministry of Road Transport and Highways releases Annual Report on 'Road Accidents in India-2022". (n.d.). Retrieved July 23, 2024, from https://www.pib.gov.in/www.pib.gov.in/Pressreleaseshare.aspx?PRID=1973295

[5]. SDG Target 3.6 | Road traffic injuries: By 2030, halve the number of global deaths and injuries from road traffic accidents. (n.d.). Retrieved April 30, 2024, from https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-groupdetails/GHO/SDG-target-3.6-road-traffic-injuries

[6]. Global status report on road safety 2018. (n.d.). Retrieved April 30, 2024, from https://www.who.int/publications-detail-redirect/9789241565684

[7]. Pathak, A., Dev, R., & Awasthi, P., 2020, Study of Injuries among Road Traffic Accidents Victim at LLR Hospital, GSVM Medical College, Kanpur U.P.

[8]. Kakkar, R., Aggarwal, P., Kakkar, M., Deshpande, K., & Gupta, D, 2014, Road traffic accident: a retrospective study. Indian Journal of Scientific Research.

[9]. Solanki, L., & Mittal, H., 2016, an epidemiological study of road traffic accident cases at a tertiary care hospital in Udaipur. International Journal of Current Research and review.

[10]. Adavikottu, A., & Velaga, N. R., 2023, Analysis of speed reductions and crash risk of aggressive drivers during emergent pre-crash scenarios at unsignalized intersections. Accident Analysis & Prevention, 187, 107088. https://doi.org/10.1016/j.aap.2023.107088

[11]. Balogun, J. A., & Abereoje, O. K., 1992, Pattern of Road Traffic Accident Cases in a Nigerian university teaching hospital between 1987 and 1990. The Journal of Tropical Medicine and Hygiene, 95(1), 23–29.

[12]. Qirjako, G., Burazeri, G., Hysa, B., & Roshi, E., 2008, Factors associated with fatal traffic accidents in Tirana, Albania: Cross-sectional study. Croatian Medical Journal, 49(6), 734–740. https://doi.org/10.3325/cmj.2008.49.734

[13]. Gicquel, L., Ordonneau, P., Blot, E., Toillon, C., Ingrand, P., & Romo, L., 2017, Description of Various Factors Contributing to Traffic Accidents in Youth and Measures Proposed to Alleviate Recurrence. Frontiers in Psychiatry, 8. https://doi.org/10.3389/fpsyt.2017.00094

[14]. Ivascu, L., & Cioca, L.-I., 2019, Occupational Accidents Assessment by Field of Activity and Investigation Model for Prevention and Control. Safety, 5(1), Article 1. https://doi.org/10.3390/safety5010012

[15]. Misra, P., Majumdar, A., Misra, M. C., Kant, S., Gupta, S. K., Gupta, A., & Kumar, S., 2017, Epidemiological study of patients of road traffic injuries attending the emergency department of a trauma center in New Delhi. Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine, 21(10), 678.

[16]. Neeluri, R., & Anga, V. S., 2018, A study on victims of road traffic accidents attending casualty in a tertiary care hospital, Khammam. International Journal of Community Medicine and Public Health, 5(7), 3034. https://doi.org/10.18203/2394-6040.ijcmph20182644

[17]. Zhao, X., Zhang, X., & Rong, J., 2014, Study of the Effects of Alcohol on Drivers and Driving Performance on Straight Road. Mathematical Problems in Engineering, 2014, e607652. https://doi.org/10.1155/2014/607652

[18]. Patan, S., Narapureddy, B. R., C., C., Hussain, R., & Basha, K., 2018, A study on injuries of road traffic accident victims attending a tertiary care hospital, Tirupathi. International Journal Of Community Medicine And Public Health, 5, 2357. https://doi.org/10.18203/23946040.ijcmph20182158

[19]. Al-Thaifani, A. A., Al-Rabeei, N. A., & Dallak, A. M., 2016, Study of the Injured Persons and the Injury Pattern in Road Traffic Accident in Sana'a City, Yemen. Advances in Public Health, 2016, 1–5. https://doi.org/10.1155/2016/4138163

[20]. Shrivastava, S. R., Pandian, P., & Shrivastava, P. S., 2014, Pre-hospital care among victims of road traffic accident in a rural area of Tamil Nadu: A cross-sectional descriptive study. Journal of Neurosciences in Rural Practice, 5(Suppl 1), S33–S38. https://doi.org/10.4103/0976-3147.145198

[21]. Jha, N., Srinivasa, D., Roy, G., Jagdish, S., & Minocha, R., 2004, Epidemiological Study of Road Traffic Accident Cases: A Study from South India. Indian Journal of Community Medicine, 29(1).

[22]. Trivedi, A., & Rawal, D., 2011, Prevalence of road traffic accidents and driving practices among young drivers. Healthline, Journal of Indian Association of Preventive and Social Medicine.

[23]. Morais Neto, O. L. de, Malta, D. C., Mascarenhas, M. D. M., Duarte, E. C., Silva, M. M. A. da, Oliveira, K. B. de, Lima, C. M., & Porto, D. L., 2010, [Risk factors for road traffic injury among adolescents in Brazil: National Adolescent School-based Health Survey (PeNSE)]. Ciencia & Saude Coletiva, 15 Suppl 2, 3043–3052. https://doi.org/10.1590/s1413-81232010000800009

[24]. Gururaj, G., 2002, Epidemiology of traumatic brain injuries: Indian scenario. Neurological Research, 24(1), 24–28. https://doi.org/10.1179/016164102101199503.

[25]. Ganveer, G. B., & Tiwari, R. R., 2005, Injury pattern among non-fatal road traffic accident cases: A cross-sectional study in Central India. Indian Journal of Medical Sciences, 59(1), 9–12.

[26]. Ranjan, Dr. R., kumar, Dr. D., & Lal, D., 2017, Pattern And Distribution of Injuries in Fatal Road Traffic Accident Cases. IOSR Journal of Dental and Medical Sciences, 16, 71–74. https://doi.org/10.9790/0853-1603027174.

[27]. Shah, A., & Jarwani, B., 2014, Research article Study of patients of road traffic accidents arriving in the emergency department (ED) of V.S. hospital at Ahmedabad city, single centre pilot study. https://www.semanticscholar.org/paper/Research-article-Study-of-patients-of-road-traffic-Shah-Jarwani/011a9b6891c361d26638c48c998cf204516c1be1.

[28]. Shrestha, V. L., Bhatta, D. N., Shrestha, K. M., Gc, K. B., & Paudel, S., 2017, Factors and Pattern of Injuries Associated with Road Traffic Accidents in Hilly District of Nepal. Journal of Biosciences and Medicines, 05(12), 88–100. https://doi.org/10.4236/jbm.2017.512010.

[29]. Nasiri, N., Nazari, P., Kamali, A., Sharifi, A., & Sharifi, H., 2019, Factors contributing to fatal road traffic accidents in the South of Kerman during the period from 2013 to 2017, Iran. Journal of Occupational Health and Epidemiology, 8, 6–11.https://doi.org/10.29252/johe.8.1.6.

[30]. Rolison, J. J., Regev, S., Moutari, S., & Feeney, A., 2018, What are the factors that contribute to road accidents? An assessment of law enforcement views, ordinary drivers' opinions, and road accident records. Accident Analysis & Prevention, 115, 11–24. https://doi.org/10.1016/j.aap.2018.02.025.