ORIGINAL ARTICLE

Road Safety Awareness and Attitudes Among Undergraduate Students in a City of Western India

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ABSTRACT

Background: Road traffic injuries (RTIs) pose a major global public health challenge, causing significant morbidity, mortality and disability annually. India, despite having only 1% of the world's vehicles, contributes significantly to global road fatalities. Factors such as poor road conditions, inadequate driver training, lax enforcement of traffic laws, and risky driving behaviors exacerbate the issue. Young adults, due to their mobility and risk-taking tendencies, are particularly vulnerable. This study aimed to assess the awareness, attitudes, and behaviors of undergraduate students in Ahmedabad regarding road safety. **Methods**: A cross-sectional study was conducted among undergraduate students across five academic disciplines in Ahmedabad during the 2021–2022 academic year. A multistage random sampling method was employed, selecting colleges from different administrative zones. A structured questionnaire was administered online via Google Forms. The sample size was determined at 440 students, with additional considerations for non-response. Descriptive statistical methods, including Chi-square tests, were used to analyze the data. **Results**: The study included 446 respondents (51.3% males, 48.7% females) with a mean age of 20.84 years. Most students drove both two- and four-wheelers (52.2%), while 30.7% drove only two-wheelers. A majority (90.3%) held valid driving licenses. Risky behaviors such as underage driving (14.1%), use of mobile phones while driving (56.8% Bluetooth, 8.5% handset), and non-compliance with protective gear (39.5% always, 9.9% never) were noted. Over speeding and distracted driving were identified as significant accident contributors. A substantial proportion of respondents (59.2%) supported stricter enforcement of traffic laws. **Conclusion**: The findings highlight critical gaps in road safety awareness and behavior among undergraduate students. While most students recognize the dangers of reckless driving, non-compliance with safety measures remains prevalent. Strengthening road safety education, promoting responsible driving behaviors, and enforcing stricter regulations are essential to reducing RTIs among young adults.

KEYWORDS

Attitudes; Awareness; Road Safety; Road Traffic Accidents; Undergraduate Students; Western India,

INTRODUCTION

Road traffic injuries (RTIs) are a major global public health crisis, resulting in over 1.3 million deaths annually and leaving 20–50 million people injured or disabled. The World Health Organization (WHO) highlights the significant burden RTIs place on individuals, families, and societies worldwide (1). In addition to fatalities, RTIs lead to long-term health consequences, economic strain, and social disruption. The loss of productivity, high medical costs, and emotional distress caused by these injuries further exacerbate their impact on public health and national economies.

In India, rapid motorization has contributed to economic growth and development. However, this progress has come with significant human costs (2). Road traffic accidents remain a critical public health and socio-economic challenge, demanding urgent intervention (3). According to the Global Status Report on Road Safety 2018, despite accounting for

only 1% of the world's vehicles, India experiences a disproportionately high share of global road traffic fatalities (1). The severity of the problem necessitates a multifaceted approach, combining policy reforms, infrastructural improvements, and behavioral interventions to enhance road safety.

Several factors contribute to the high incidence of RTIs in India. Poor road conditions, inadequate signage, and insufficient maintenance create hazardous driving environments (4). Additionally, the lack of comprehensive driver training exacerbates risks on the road. Weak enforcement of traffic regulations, including those addressing speeding, impaired driving, and distracted driving, further compromises road safety (5). Human behaviors such as reckless driving, mobile phone use, driver fatigue, and aggressive driving significantly contribute to road accidents (6). Addressing these factors requires a combination of improved traffic law enforcement, infrastructure development, and public awareness initiatives.

Studies emphasize the critical role of human behavior in road safety outcomes (5). Research indicates that driver errors and risky behaviors account for a significant proportion of road accidents (6). Therefore, targeted interventions that promote safer driving habits are essential. Behavioral change initiatives, public education campaigns, and community engagement programs have proven effective in reducing road traffic risks (7, 8).

Young adults, particularly undergraduate students, are especially vulnerable to RTIs due to their higher mobility and risk-taking behaviors. Understanding their awareness, attitudes, and behaviors is crucial for designing effective interventions (10). This study aims to assess these aspects among undergraduate students in Ahmedabad, identifying knowledge gaps and behavioral patterns to develop targeted strategies for reducing accidents and fatalities. By addressing these gaps, policymakers and health professionals can create tailored interventions that foster safer road practices and ultimately reduce RTI-related morbidity and mortality.

Material & Methods

This cross-sectional study was conducted during the 2021–2022 academic year among undergraduate students in Ahmedabad. The study included students from five academic disciplines: Medicine, Engineering, Arts, Commerce, and Science. Ethical approval (No: GCSMC/EC/Research project/APPROVE/2021/298 dated 26.03.21) was obtained from the institutional ethics committee, and all participants provided informed consent before taking part. In addition, necessary permissions were secured from the respective colleges involved in the research.

To ensure a diverse and representative sample, a multistage random sampling approach was adopted. Ahmedabad, under the jurisdiction of the Ahmedabad Municipal Corporation, is administratively divided into six zones: North, East, West, South, New West, and Central. From each of these six zones, one ward was randomly selected. Afterward, each selected zone was assigned a specific academic stream, ensuring representation from different disciplines. Colleges that offered the assigned academic stream within the selected wards were then identified randomly for participation. In cases where a college declined to participate, another institution from the same ward was chosen using the same randomization procedure.

Since no prior research in the local context provided a definitive estimate of prevalence, a prevalence rate of 50% was assumed for sample size determination. Using a 95% confidence level and a 5% margin of error, the necessary sample size was calculated to be 440 students. Additionally, a 10% non-response rate was considered to ensure the adequacy of the sample. As a result, approximately 80 students were randomly selected from each of the six participating colleges, covering the five academic streams.

Data collection was carried out using a structured questionnaire adapted from the work by Mukhopadhyay J et al (10), which was designed to assess students' awareness, attitudes, and behaviors related to road safety. To enhance accessibility and efficiency, the questionnaire was administered online. The survey was structured into different sections, including demographic information, knowledge of road safety rules and regulations, attitudes towards road safety measures, and self-reported road safety behaviors.

For data analysis, descriptive statistical methods were employed to summarize the levels of awareness, attitudes, and behaviors related to road safety among the students. Proportions were calculated, and Chi-square tests were performed to determine statistically significant differences between groups. The primary aim of this analysis was to identify trends, patterns, and associations that could contribute to the development of targeted interventions to improve road safety awareness and practices among undergraduate students in Ahmedabad. The findings from this study have the potential to inform road safety policies and educational programs designed to promote safer driving behaviors among young adults in the region.

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RESULTS

In the present study, the proportions of males (51.3%, n=229) was almost the same as of females (48.7%, n=217) out of the total 446 respondents. The mean age of the respondents was 20.84 years (Standard Deviation of 2.86 years). The commonest undergraduate course of the participants were of the BBA (n=25) followed by BA (n=19) and B Tech (n=15). Rest of the courses did not form significant numbers, except BCA and BDS.

Majority of the respondents drive both two and four wheeler vehicles (n=233, 52.2%), while participants only driving two wheelers formed the second highest numbers (n=137, 30.7%). . [Table 1] On the other hand, 55 of them (12.3%) reported driving a four-wheeler and 21 of the respondents (4.7%) did not drive any vehicle, Out of 446 respondents, 164 (36.8%) reported not needing glasses, while 282 (63.2%) reported needing glasses, while driving.

Out of the total respondents, 63 (14.1%) started driving before 16 years old, 267 (59.9%) started between 16-18 years old, 103 (23.1%) started after 18 years old, and 13 (2.9%) do not drive. In the present study, n= 253 (56.8%) use Bluetooth, n= 38 (8.5%) use the handset directly, n=90 (20.2%) do not drive, n= 24 (5.4%) use hands-free devices, and n= 41 (9.2%) use other gadgets.

It was observed that 176 (39.5%) always wear protective equipment, 18 (4.0%) do not drive, 44 (9.9%) never wear protective equipment, 143 (32.1%) often wear it, and 65 (14.6%) rarely wear it. Out of 446 respondents, 403 (90.3%) were licensed to drive, while 43 (9.7%) were not. Respondents reported the following approximate times of travel if driving themselves: 15-30 minutes (195, 43.7%), more than 30 minutes (145, 32.5%), not applicable (31, 7.0%), and up to 15 minutes (75, 16.8%). [Table 1]

Regarding major causes of road traffic accidents, respondents agreed (167, 37.4%) or strongly agreed (241, 54.0%) that over speeding and distracted driving are significant factors. When asked about being fined for violating traffic rules, 23 (5.2%) do not drive, 303 (67.9%) have not been fined, and 120 (26.9%) have been fined. Regarding underage driving, respondents agreed (226, 50.7%) or strongly agreed (190, 42.6%) that serious steps should be taken against it.

A comprehensive survey was conducted to assess various aspects of traffic behavior and attitudes among respondents. [Table 2] Regarding the issue of underage driving, a majority of respondents expressed agreement (226, 50.7%) or strong agreement (190, 42.6%) that serious measures should be taken to address this issue. When asked about their preferred activities while driving, a significant number of respondents indicated listening to music (182, 40.8%) and engaging in phone conversations while listening to music (64, 14.3%). In evaluating the traffic management system in Ahmedabad, respondents predominantly rated it as adequate (244, 54.7%) or bad (98, 22.0%). Negligence towards traffic rules was identified as the most significant challenge to the traffic management system, as indicated by 173 respondents (38.8%). Additionally, a substantial proportion of respondents agreed (264, 59.2%) or strongly agreed (149, 33.4%) that traffic rules and fines should be enforced more strictly.

In terms of the condition of the vehicles driven by respondents, the majority reported driving old but well-maintained vehicles (303, 67.9%) [Table 3]. When asked about the major causes of road accidents, the respondents overwhelmingly cited people's behavior (297, 66.6%) as the primary factor. Despite these perceptions and attitudes towards traffic behavior, a significant proportion of respondents (297, 66.6%) reported that they had not been victims of road accidents themselves. Furthermore, when asked about their parking habits, the majority stated that they never (252, 56.5%) or rarely (159, 35.7%) parked their vehicles in 'No Parking' zones. In terms of observing others' behavior, respondents reported witnessing frequent violations of traffic rules, with 292 (65.5%) stating that they often witness such violations. Despite these observations, only a minority of respondents (178, 39.9%) reported keeping a first aid kit in their vehicles. [Table 3]

Table 1 Demographics and Driving Characteristics of Respondents (N=446)

Characteristic	Category/Statistic	n	Percentage
Gender	Male	229	51.30%
	Female	217	48.70%
	Standard Deviation	2.86	N/A
Vehicle Usage	Two & Four Wheeler	233	52.20%
	Two Wheeler Only	137	30.70%
	Four Wheeler Only	55	12.30%
	No Vehicle	21	4.70%
Need for Glasses While Driving	Yes	282	63.20%

Characteristic	Category/Statistic	n	Percentage
	No	164	36.80%
Driving Experience	Before 16	63	14.10%
	16-18	267	59.90%
	After 18	103	23.10%
	Does Not Drive	13	2.90%
Device Usage While Driving	Bluetooth	253	56.80%
	Handset	38	8.50%
	Does Not Drive	90	20.20%
	Hands-Free	24	5.40%
	Other Gadgets	41	9.20%
Protective Equipment Use	Always	176	39.50%
	Does Not Drive	18	4.00%
	Never	44	9.90%
	Often	143	32.10%
	Rarely	65	14.60%
Driving License	Licensed	403	90.30%
	Not Licensed	43	9.70%
Typical Driving Time	15-30 minutes	195	43.70%
	>30 minutes	145	32.50%
	Not Applicable	31	7.00%
	Up to 15 minutes	75	16.80%

Table 2 Respondent Attitudes and Perceptions on Road Safety and Traffic (N=446)

Question	Strongly Agree/ Excellent	Agree/ Good	Disagree/ Average	Strongly Disagree/ Unsatisfactory
Perceptions of Road Safety Issues				
Major causes of road accidents are over speeding and distracted driving	241 (54%)	167 (37.4%)	0 (0.0%)	38 (8.5%)
Serious steps should be taken against underage driving	190 (42.6%)	226 (50.7%)	9 (2.0%)	21 (4.7%)
Major cause of road accidents is... (Lack of training/People's behavior/Road factors/Poor light)	70 (15.7%)	297 (66.6%)	29 (6.5%)	50 (11.2%)
Opinions on Traffic Enforcement				
Traffic rules and fines should be applied with more strictness	149 (33.4%)	264 (59.2%)	17 (3.8%)	16 (3.6%)
Evaluation of Traffic Management System				
Rating of the traffic management system in your city	5 (1.1%)	80 (17.9%)	244 (54.7%)	117 (26.2%)
Challenges to Traffic Management				
Most important challenge to the traffic management system is... (Mixed traffic/Negligence/Poor attention/Underage driving)	41 (9.2%)	173 (38.8%)	130 (29.1%)	102 (22.9%)

Table 3 Respondent Experiences and Behaviors Related to Road Safety and Driving (N=446)

Behavior/Experience	Category/Statistic	n	Percentage
Fined for Traffic Violations	Yes	120	26.90%
	No	303	67.90%
	Does Not Drive	23	5.20%
Music/Phone Use While Driving	Listening to Music	182	40.80%
	Phone & Music	64	14.30%
Victim of Road Accident	Yes	149	33.40%
	No	297	66.60%
Parking in 'No Parking' Zones	Never	252	56.50%

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Behavior/Experience	Category/Statistic	n	Percentage
	Rarely	159	35.70%
	Often	17	3.80%
	Always	9	2.00%
Witnessing 'No Parking' Violations	Often	338	75.80%
	Always	50	11.20%
	Rarely	39	8.70%
	Never	19	4.30%
Witnessing Traffic Rule Violations	Often	292	65.50%
	Always	119	26.70%
	Rarely	22	4.90%
	Never	13	2.90%
Keeping a First Aid Kit in Vehicle	Yes	178	39.90%
	No	268	60.10%
Vehicle Condition	Old but Well-Maintained	303	67.90%

DISCUSSION

The gender balance among respondents—51.3% male and 48.7% female—ensures a well-rounded perspective on traffic-related issues. Research has shown that understanding gender differences can be key to improving road safety policies (11,12). Participants came from diverse academic backgrounds, including BBA, BA, and B Tech, with fewer from BCA and BDS. This variety suggests that exposure to traffic education and safety awareness may differ based on one's field of study (13). A majority (52.2%) reported driving both two-wheelers and four-wheelers, while 30.7% used only two-wheelers, highlighting the need for better road safety measures. Additionally, 63.2% needed glasses while driving, reinforcing the importance of good vision in preventing accidents—something research has long emphasized (14,15).

One concerning finding was the age at which many respondents started driving. While most (59.9%) began at 16-18, which aligns with legal driving ages, 14.1% admitted to starting before 16. This raises concerns about underage driving and highlights the need for stricter enforcement and better education on traffic laws (16). On a positive note, 56.8% of drivers used Bluetooth devices for calls, signaling a shift toward hands-free communication, though 8.5% still used handheld phones—a known risk for distracted driving. Studies confirm that hands-free devices help but don't eliminate distractions (17,18).When asked about travel habits, most respondents spent between 15-30 minutes (43.7%) or more than 30 minutes (32.5%) on the road daily, increasing their exposure to potential hazards.

Over speeding (54.0%) and distracted driving (37.4%) emerged as top causes of accidents, consistent with global research on road safety risks (19). Meanwhile, 26.9% admitted to receiving fines for traffic violations, suggesting that while most follow the rules, there's still room for improvement. Underage driving remains a serious concern, with 50.7% agreeing and 42.6% strongly agreeing that stricter actions should be taken—an issue that past studies also highlight (20).As for traffic system, opinions were mixed. While 54.7% found it adequate, 22.0% rated it poorly. Negligence toward traffic rules was a common complaint (38.8%), and an overwhelming majority (92.6%) believed stricter enforcement of fines and penalties is necessary. This reflects findings from previous studies that stress the importance of law enforcement in improving road safety (21,22).

CONCLUSION

This study comprehensively evaluated driving behaviors, traffic attitudes, and perceptions among respondents. The gender distribution was nearly equal, with participants representing diverse educational backgrounds, primarily professional undergraduate courses. Driving practices indicated that many respondents drove both two-wheelers and four-wheelers, with a notable proportion requiring glasses for safe driving. Most started driving between 16 and 18, preferring Bluetooth for communication. While many reported frequent use of protective equipment, a significant proportion admitted to rarely or never using it. Well-maintained older vehicles were commonly used. Traffic management systems were generally rated adequate, yet negligence toward traffic rules remained a critical challenge. Over speeding and distracted driving were widely acknowledged as major causes of accidents, underscoring the need for stricter enforcement of traffic regulations. Additionally, concerns about underage driving and the importance of road safety education were highlighted.

Recommendation

To address these issues, authorities should enforce stricter penalties for traffic violations, including over speeding, distracted driving, and underage driving. Road safety education should be integrated into school curricula to instill responsible driving habits. Campaigns must emphasize consistent use of protective gear, hands-free communication, and behavioral change strategies. Public awareness initiatives will reinforce adherence to traffic rules, promoting safer roads for all.

Limitation of the Study

While the study's primary aim was not comparative, gender distribution is balanced allowing room for future subgroup analysis. The objectives of the current study focused on describing prevalence and patterns of behaviors, these patterns were analyzed using chi-square tests to examine associations, which are appropriate for the exploratory nature of this phase. Regression modeling could be planned in future studies to identify predictors and causal inferences. Confidence intervals can be included in future iterations for further depth.

Relevance of the Study

This study adds valuable insights into the interplay between driving behaviors, traffic attitudes, and safety perceptions in a diverse population. By highlighting gaps such as underuse of protective gear, prevalence of distracted driving, and persistence of underage driving, it underscores the urgent need for targeted road safety education and stricter enforcement of traffic regulations.

Authors Contribution

All authors have contributed equally.

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Nil

Conflict of Interest

There are no conflicts of interest.

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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