



Effect of Educational Intervention on Road Safety Awareness and Practice among Medical Students in Chennai-A Cross-Sectional Study

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ABSTRACT

Background: Road transport is predisposing people to the risk of road accidents, injuries and fatalities. Road traffic injuries caused an estimated 1.24 million deaths worldwide, of which India alone accounted for 73%. This study was conducted to determine the improvement in the awareness of road safety measures post educational intervention.

Methods: This was a Cross-sectional study with a follow-up component. The study was conducted among undergraduate medical students in Chennai. The sample size was calculated as 220. Study tool consisted of two questionnaires; one of which was given as pre-test and post-test and other 4 weeks after educational intervention to assess behaviour. Frequency and paired t test were used for analysis.

Results: 46 (21%) did not have the habit of wearing helmet/seatbelt during every drive. 56 (25.5%) of them had used mobile phones while driving. Overall non-compliance to traffic rules was 25- 30%. 31 (14.1 %) faced road traffic accidents. The knowledge on road safety measures improved to 96% after educational intervention.

Conclusion: An educational intervention presented in this study is effective to improve knowledge, attitude and behaviour about road safety among the study participants.

Key words: Road traffic Accident, Driving, riding, Road safety, educational intervention.

INTRODUCTION

India with a well-connected road transport system has proven as one of the salient factors contributing to the development of economic activities like trade and employment. The contribution of transport sector to Gross Domestic Product is increasing day-by-day. This is also an indicator for socio-economic development of the country. But this development has come with a price to pay. Road Traffic accidents leads to high morbidity, mortality and also a huge financial burden to those families who are affected as

more than half people who die due to RTA are young adults between 15-44 years who are the breadwinners of family.¹

An accident can be defined as an unplanned event that results in injury, deaths, damage to property or some other losses. Accidental deaths can be due to forces of nature or due to deliberate/ negligent conduct of human beings (other causes). These types of accidental deaths caused by negligent conduct of human beings can be prevented or at least reduced by promotion of safety education and implementing

How to cite this article: Swetha NB, Sujitha P, Bhandari A. Effect of Educational Intervention on Road Safety Awareness and Practice among Medical Students in Chennai-A Cross-Sectional Study. Natl J Community Med 2021;12(10):325-330. DOI: 10.5455/njcm.20210907075441

Financial Support: None declared **Conflict of Interest:** None declared

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Date of Submission: 07-09-2021; **Date of Acceptance:** 26-10-2021; **Date of Publication:** 31-10-2021

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effective safety measures. In India a total of 7,01,324 cases of accidents due to 'Other Causes' were reported in 2019 which resulted in 4,12,959 deaths. Of these total deaths, 43.9% (1,81,113) were reported due to traffic accidents.² A total of 4,37,396 road accident cases were reported during 2019 in India. Among the total road traffic accidents, two wheelers accounted for 38%, 14.6% by trucks /lorries, 13.7% by cars and 5.9% by buses.³

The most common causes for occurrence of road traffic accidents in India are over speeding, over taking, careless driving, poor maintenance of vehicles, ignorance about safety measures, bad road condition, poor weather conditions, mobile use, driving under influence of drug/alcohol and many others. In a survey done in 2019 in India, it was reported that out of 1,54,779 fatal road accidents, 55.7% were caused due to over speeding (55.7%) and dangerous/careless driving or overtaking contributed 27.5%. Chennai accounted for 10.2% out of 67,228 cases of total road accidents reported in 53 mega cities followed by Delhi City (8%) and Bengaluru (7.0%) in 2019. Maximum number of accidents on State Highways in the country occurred in Tamil Nadu.^{3, 4}

The newly adopted 2030 Agenda for Sustainable Development has set an ambitious target of halving the global number of deaths and injuries from road traffic crashes by 2020.⁵ The Government of India has taken numerous measures in the form of legislations or programmes to attain this target. The Motor vehicle Act (1988) which was amended in 2015 governs the regulation of motor vehicular traffic throughout the country. Under the 11th five year plan, trauma care facilities are made available to the road-traffic accident victims within the golden hour. The programme Pradhan Mantri Surakshit Sadak Yojana has been working on eliminating dangerous spots on highways that are the sites of frequent accidents through better design and road engineering.⁶ With all these efforts taken by Government, still the disease-specific mortality and morbidity related to RTA's remain high. The salient requirement is to create awareness about road safety among general public. The cost-effective method to reduce this burden is by implementing road safety awareness programmes in general population. Adolescents and young adults are the population group which has just begun to drive. 35% of total victims of RTA were in the age group of 21-30 years. Imbibing in them about the importance of road safety by providing educational intervention will bring about some difference in their behaviour which can be enhanced by reinforcement.⁷ According to a study done among young college students, non-compliance of traffic rules ranged from 20.76% to 66.98%.⁸ With this background this study was conducted to assess the awareness and practice of road safety measures and to determine the improvement in the awareness and behaviour of road safety post educational intervention.

MATERIALS AND METHODS

Study design, area and study population: This was an Analytical Cross-sectional study with a follow-up component after 4 weeks. The study was conducted between January 2021 to June 2021, among undergraduate medical students from a medical college situated in Chennai.

Study sample size and sampling method: Based on a study done by Mukhopadhyay⁸ among college students, the noncompliance to traffic rules was seen in around 60% of students. With this the sample size was calculated to be 195 using the formula $n = 4pq/d^2$ with 7% absolute precision; and was rounded off to 200. To this adding 10% non-response, minimum sample size was calculated to be 220.

The medical college had 1000 undergraduate medical students from first to final year. Of these, only 740 students knew how to drive/ride a vehicle and were eligible for the study. Multi stage random sampling method was used. Firstly, using probability proportional to size sampling method the proportion of sample size to be achieved in each year of MBBS was known. Secondly, simple random sampling method was adopted to select the study participants.

Inclusion Criteria: Individual in age group of 18-25 years, those who know to drive four-wheeler vehicles and ride bikes/scooters and who gave written informed consent were included in the study

Exclusion criteria: Those who are not available for the follow-up visit were excluded from the study.

Ethical consideration, Study tool and Data collection method: Data collection was started after obtaining ethical clearance from the Institutional Ethical committee. A written informed consent was obtained from study participants. Study tool consisted of two questionnaires which were pre-tested and semi-structured. First questionnaire was distributed as pre and post-test questionnaire during educational intervention and second one was distributed four weeks after intervention to assess the behaviour changes. The first questionnaire had questions related to the socio-demographic profile, awareness about the traffic rules, non-compliance to traffic rules, driving/riding experience and history of road traffic accidents. This questionnaire was self-administered as pre-test following which an educational intervention was provided by the investigator to study participants after dividing them in smaller batches. The intervention was given as a power point presentation which included statistics related to RTA in India, traffic rules according to Motor Act, risk factors for RTA and also preventive measures to reduce RTA. Intervention was followed up immediately by a post-test.

Follow-up: Follow-up was done four weeks after intervention. The follow-up questionnaire consisted of ten structured questions with a binary response to be given by study participants. The questions were designed to assess the riding/driving behaviour after

intervention. Out of ten questions three were necessary component to be achieved; which included reduced intention to mobile phone use and drunken driving and increased intention to use helmet/wear seat-belt while driving/riding a vehicle. BARS (Behaviourally anchored Rating Scale)⁹ was used for scoring. BARS Scores: 0- 3 was considered below expectations, score 4-7-meets expectation and score 8 and above- exceeds expectation.

Statistical Analysis: Data was entered in Microsoft Excel and analysed using SPSS software version 21. Frequency and paired t test were used for analysis of pre-test and post-test responses. P value <0.05 was considered as statistically significant. The data was presented as tables and figures.

RESULTS

The study was conducted among 220 participants. Students from all the MBBS year of study were included. 122 (55.5%) were < 20 years and others above 20. Majority were females 127 (57.7%) and 93 (42.3%) were male students. 125 (56.8%) were day Scholars who travelled regularly to college and others stayed in hostel. 60 (27.27%) from 1st year, 49 (22.27%) from 2nd year, 52 (23.63%) from 3rd year and 59 (26.81%) from final year MBBS participated in the study.

Table 1 shows the driving/riding experience details of study participants. Majority of them 134 (60.9%) drove both two-wheeler and four-wheeler. 90 (40.9%) started driving/riding a vehicle before attaining age of 18 years. 157 (71.4%) of study participants drive/ride less than 10km /day. It was found that 97 (44.1%) participants started driving/riding before obtaining driving license. 160 (72.7%) learnt

driving/riding a vehicle either by self-practice or from parents or from relatives.

Figure 1 depicts the road safety practice behaviour of study participants. 46 (21%) did not have the habit of wearing helmet/seatbelt during every drive. 35 (16%) have been caught by traffic police; and most common reasons was not wearing helmet followed by not carrying driving licence. 211 (96%) had the habit of switching on the indicator during every turning. It was found that risky behaviour while driving was seen among the students. 56 (25.5%) of them had used mobile phones while driving and 73 (33.2%) had crossed the speed limit while driving / riding a vehicle. Overall non-compliance to traffic rules was 25- 30%.

Table 1: Driving/riding experience details of Study Participants (n=220)

Parameter	Participants (%)
Type of vehicle	
Two-Wheeler	65 (29.5)
Four-Wheeler	21 (9.5)
Both	134 (60.9)
Years of Driving Experience	
<2 years	108 (49.1)
>2 years	112 (50.9)
Age at which Started Driving/riding a vehicle	
<18 years	90 (40.9)
>18 years	130 (59.1)
Riding/Driving distance per day	
<10 km	157 (71.4)
>10 Km	63 (28.6)
Started driving/riding after obtaining driving license	
Yes	123 (55.9)
No	97 (44.1)
Mode of Learning driving/riding a vehicle	
Self/parent/relative	160 (72.7)
Driving school	60 (27.3)

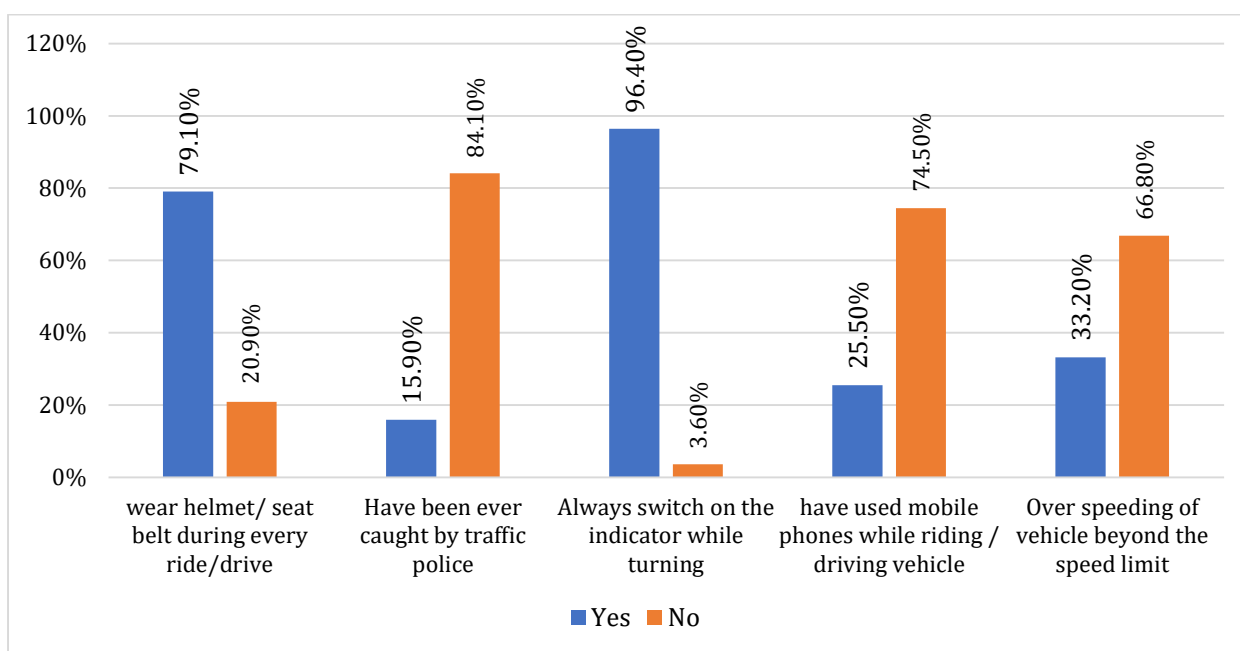


Figure 1: Practice of Road safety measures among study participants (n=220)

Table 2: Effect of Educational Intervention on Road safety Awareness (n=220)

Question	Pre-test correct response (%)	Post-test correct response (%)	P value
Symbol for No entry for vehicles	96 (43.6)	125 (56.8)	0.001
Symbol for Zebra crossing	219 (99.5)	220 (100)	0.318
Symbol for Slippery Road	94 (42.7)	154 (70)	0.001
Symbol for Give way	111 (50.5)	159 (72.3)	0.001
Symbol for Overtaking prohibited	154 (70)	172 (78.2)	0.001
Type of lighting to be used at night drive/ride- Low beam	121 (55)	161 (73.2)	0.001
Which side of the road should the vehicle be driven/ ridden in India?	164 (74.5)	190 (86.4 [^])	0.001
Which side should a vehicle be overtaken by another?	195 (88.6)	194 (88.2)	0.848
Good maintenance of the vehicle will help in avoiding accidents	217 (98.6)	220 (100)	0.083
Rear seat passengers are required to wear seat-belt	206 (93.6)	212 (96.4)	0.014

Table 3: Effect of Educational intervention on Road safety attitude of study participants (n=220)

Question	Pre-test correct response (%)	Post-test correct response (%)	P value
I have to slow down the vehicle near a zebra crossing			
Strongly agree	198 (90)	198 (90)	0.848
Agree	22 (10)	22 (10)	
Disagree	00	00	
Helmet use for pillion riders has to be made mandatory through-out the country			
Strongly agree	167 (75.9)	183 (83.2)	0.043
Agree	53 (24.1)	37 (16.8)	
Disagree	00	00	
Prohibiting mobile use during diving /riding has to be legalized			
Strongly agree	147 (66.8)	185 (84.1)	0.001
Agree	26 (11.8)	29 (13.2)	
Disagree	47 (21.4)	6 (2.7)	
Wearing seat-belt is safe although it is uncomfortable			
Strongly agree	166 (75.5)	191 (86.8)	0.001
Agree	48 (21.8)	26 (11.8)	
Disagree	6 (2.7)	3 (1.4)	

Table 4: Response to Road safety Behaviour questions after 4 weeks follow-up (n=194)*

Question (Has the Intervention)	Yes (%)	No (%)
Increased positive attitude towards seatbelt and helmet use (Necessary component)	190 (97.9)	4 (2.1)
Reduced intentions to use mobile phones while driving (Necessary component)	184 (94.8)	10 (5.2)
Reduced intentions of drunken driving (Necessary component)	186 (95.9)	8 (4.1)
Reduced intentions to drive in excess of the speed limit	186 (95.9)	8 (4.1)
Increased knowledge of road safety symbols	190 (97.9)	4 (2.1)
Reduced intentions of breaking traffic signals	184 (94.8)	10 (5.2)
Increased the intention of slowing the speed of vehicle at zebra crossing	186 (95.9)	8 (4.1)
Increased the intention to maintain the vehicle in good condition	190 (97.9)	4 (2.1)
Reduced intention of unsafe overtaking of vehicles while driving	184 (94.8)	10 (5.2)
Increased the intention to follow rules as a pedestrian	188 (96.9)	6 (3.1)

*Only 194 students were available for follow up.

Among 220 study participants, 31 (14.1 %) faced road traffic accidents; 27 of them had minor injuries. Most common reasons were improper overtaking, over speeding, Poor lighting of roads, bad condition of roads and mobile phone usage.

Effect of Educational Intervention on Road safety measures among the study participants

Among the study participants, 117 (53.3%) had attended road safety educational programs in different platforms. To assess the knowledge component of road safety measures of study participants questions related to symbol, lighting and others were asked. The frequency of correct responses of pre-test and post-test is shown in table 2. It was found that there was significant improvement in identification road

safety symbols after the educational intervention. Improvement was also seen in the awareness about the type of lighting to be used while driving/riding a vehicle, importance of wearing the helmet and seat-belt and also about the correct lane to drive in India. Overall the knowledge on road safety measures improved to 96% after educational intervention.

Table 3 depicts the effect of educational intervention on road safety attitude of study participants. Attitude towards few road safety measures was assessed. There was significant change in the attitude related to road safety after the educational intervention. More number of participants had positive attitude towards helmet use for pillion riders, prohibiting mobile use during diving /riding and safety with wearing seat-belt.

The change in Driving/riding Behavioural after 4 weeks of Educational Intervention among the study participants. BARS (Behaviourally anchored Rating Scale) was used for scoring the change. 10 questions related to change in behaviour with; 3 questions being necessary component was included in questionnaire. 177 (91%) of study participants' responses showed an exceeding expectation in driving/riding behaviour change and 13 (7%) showed below expectations. Table 4 shows the frequency of responses given by study participants for the ten road safety behaviour associated questions.

DISCUSSION

Road traffic accidents are one of the leading causes of death among young population in the world. Low-income and middle-income countries contribute to 85% deaths and 95% of annual Disability Adjusted Life years (DALY) due to RTA.¹⁰ Epidemiological triad of RTA has human, vehicular and environmental factors which play a pivotal role during and after road traffic accident. Of these, vehicular factors and human behavioural factors which contribute to most of the accidents (90-95%) can be prevented by simple cost-effective measures.¹¹ Whereas environmental factors are not usually under the control of an individual. This is mostly concerned with policy makers and those who are responsible for implementation of preventive measures. The prevention includes four aspects. Reducing the risk of occurrence, Reduction of injury during occurrence of RTA and prevention of serious consequences post injury by early diagnosis and treatment. By utilizing this integrated approach, we will be able to reduce the burden of morbidity and mortality associated with RTA's.¹²

Road safety awareness and improvement on educational intervention

Recent studies have shown that with improved educational approaches will bring about a small but statistically significant reduction in road accidents.¹³ In our study, 117 (53.3%) students had attended road safety educational programs which is similar to a study by Mukhopadhyay et al⁸ where 52% attended road safety educational programs. Our study found that the study participants were aware of most common traffic signals like zebra crossing, no horn and others. But traffic signs like No entry, slippery road were known to around 40-45% of students which was significantly improved after educational intervention. This is similar to a study done by Mahawar et al.⁷ among school going teenagers where knowledge of traffic signs was significantly improved after educational intervention. In contrast to our study only 21% knew about the zebra crossing symbol in the pre-test. 98% of study participants were in agreement about prohibition of mobile phone usage during driving/riding as it can be detrimental. But in study by Mahawar et al⁷ only 72.3% responded positively about it. The use of low beam lights at night

drive was known to 55% of study participants which significantly increased to 73.2% after intervention. Attitude towards helmet use was improved by 10% (which was statistically significant) after educational intervention which shows that repeated reinforcements can improve the utilization of helmet among bike riders. A study by Mahawar et al. showed that intervention increased knowledge of road safety to 82.2%.⁷

Practice of road safety measures

Over-speeding can give way to occurrence of deadly accidents – as faster a vehicle travels, the greater is its impact. Overspeed contributes up to one-third of road traffic injuries. In our study 33.2% of study participants reported over speeding. Preventive measures include road designing, implementing and monitoring speed limits by installation of cameras, traffic and continuous reinforcement by educational programmes.¹⁴ Wearing helmet properly while riding a bike can reduce the risk of mortality by nearly 40% and the risk of severe injuries by more than 70%. Wearing a seat-belt will reduce the risk of serious injuries in the front-seat passengers by 40-60% and of rear-seat passengers by 25-75%.¹⁵ In our study 21% of study participants were not practicing regular use of helmet and wearing seat belt. 25.5% of study participants reported usage of mobile phones while driving which is similar to a study by Mukhopadhyay et al⁸ where it was 21.7%.

In cause-wise distribution of road accidents in India, it shows that drivers' fault is the single most important factor responsible for accidents (78%).¹⁶ In our study out of 31 study participants who reported road traffic accidents, majority responded overtaking and over-speeding as the reason, which was similar to a study by Mukhopadhyay et al.⁸ where it was 28 out of 200 students reported RTAs.

Driving Behaviour 4 weeks after educational intervention

Our study reported that 177 (91%) of study participants' responses showed an exceeding expectation in driving/riding behaviour change and 13 (7%) showed below expectations. Approximately >95% of the study participants responded with positive behaviour for the three necessary component to be achieved; which included reduced intention to mobile phone use and drunken driving and increased intention to use helmet/wear seat-belt while driving/riding a vehicle.

CONCLUSION

Comprehensively, it can be noticed that there is a significant change in the knowledge, attitude and behaviour about road safety among the study participants after educational intervention. But this change can continuously change. Hence, we need to reinforce road safety measures among adolescent and young adults by utilizing well designed educational

programmes. This knowledge can be imbibed earlier by implementing and providing road safety education to the school going children. Rather criticizing about the causes related to environmental factors, we need to concentrate more on the human and vehicular factors which can be eliminated by simple cost-effective measures. Scrutiny at every level is necessary; beginning with strict process of issuing licence, rejuvenating the traffic control and implementing traffic rules with strict penalty on breaking traffic rules is the need of hour.

ACKNOWLEDGEMENT

Authors would like to thank the following for their invaluable support & guidance. Dean of SBMCH, Head of department of Community medicine and our colleagues and postgraduates of the department of community medicine, SBMCH

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