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A Randomized Control Trial on Effectiveness of Peer Education Intervention on Knowledge Attitude and Practices Regarding Road Safety Among Adolescents in Kanpur Nagar

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ABSTRACT

BACKGROUND: Road traffic injuries are a leading cause of morbidity and mortality among adolescents worldwide. Despite awareness of basic safety rules, gaps in knowledge, attitudes, and practices persist, increasing vulnerability. Structured educational interventions have been proposed as effective strategies to address these gaps.

MATERIAL AND METHODS: A quasi-experimental study was conducted among adolescents aged 16–17 years to evaluate the effectiveness of a structured road safety education program. Participants were divided into intervention and control groups. Demographic data were collected, and paired T-tests were used to compare pre-test and post-test scores across four domains: total score, knowledge, attitude, and practice.

RESULTS: The study population was predominantly female (55%), Hindu (79%), and middle-class (48%), with most commuting by vehicle (74%). The intervention group demonstrated statistically significant improvements ($p < 0.05$) across all domains: total score (12.52 to 25.73), knowledge (7.24 to 18.0), attitude (3.64 to 6.52), and practice (1.64 to 4.96). In contrast, the control group showed declines in all measures, including total score (13.9 to 12.4), knowledge (9.04 to 7.19), attitude (9.04 to 7.19), and practice (2.60 to 1.62).

CONCLUSION: Structured educational interventions are highly effective in improving adolescents' road safety knowledge, attitudes, and practices. The findings underscore the need to integrate road safety education into school curricula and policy frameworks, with emphasis on participatory and experiential approaches to foster sustainable behavioural change and reduce adolescent vulnerability to road traffic injuries.

INTRODUCTION

An accident has been defined as *"An unexpected, unplanned occurrence which may involve injury" or "unpremeditated event resulting in recognizable damage" or "Occurrence in a sequence of events which usually produces unintended injury, deaths or property damage"* ***Road traffic safety*** refers to methods and measures for reducing the risk of a person using the road network being killed or seriously injured**(1).**According to ***road safety report 2018***, road traffic accidents (RTAs) is a leading cause of death and injury across the world killing more than 1.35 million globally in 2016.As per the ***World Health Organization***, accident-related deaths are known to be the eighth leading cause of death and the first largest cause of death among children aged 5–14 years and adults aged 15–29 years**(2)**As per the ***Minister of Road Transport and Highways*** the Indian road accident scenario, with 415 deaths and many injured every day, is more severe than Covid-19.**Children and adolescents** are the most vulnerable groups for road traffic injuries in India (39%).*Hourly, forty youngsters die* in road traffic crashes. **Road safety education** aims at reducing this burden. **Peer education Intervention** (PEI) is a credible approach influencing students to modify their behaviour positively. This study aimed to evaluate the effectiveness of PEI in terms of knowledge and attitude toward road safety among adolescents.

AIM & OBJECTIVES

To Assess the KAP (knowledge attitude and Practice) among school going adolescent students about road safety

To evaluate the effectiveness of Peer Intervention (PI) regarding knowledge attitude and Practice about road safety among adolescents

MATERIAL AND METHODS

Study Design- Randomized control trial (RCT)

Study Subjects- Among adolescents (9th-12th) students of School.

Study Period- August 2023 to November 2023,

Study Area- At Government School and intermediate college of urban Area of Kanpur Nagar located in field practice area of department of Community Medicine GSVM Medical College Kanpur.

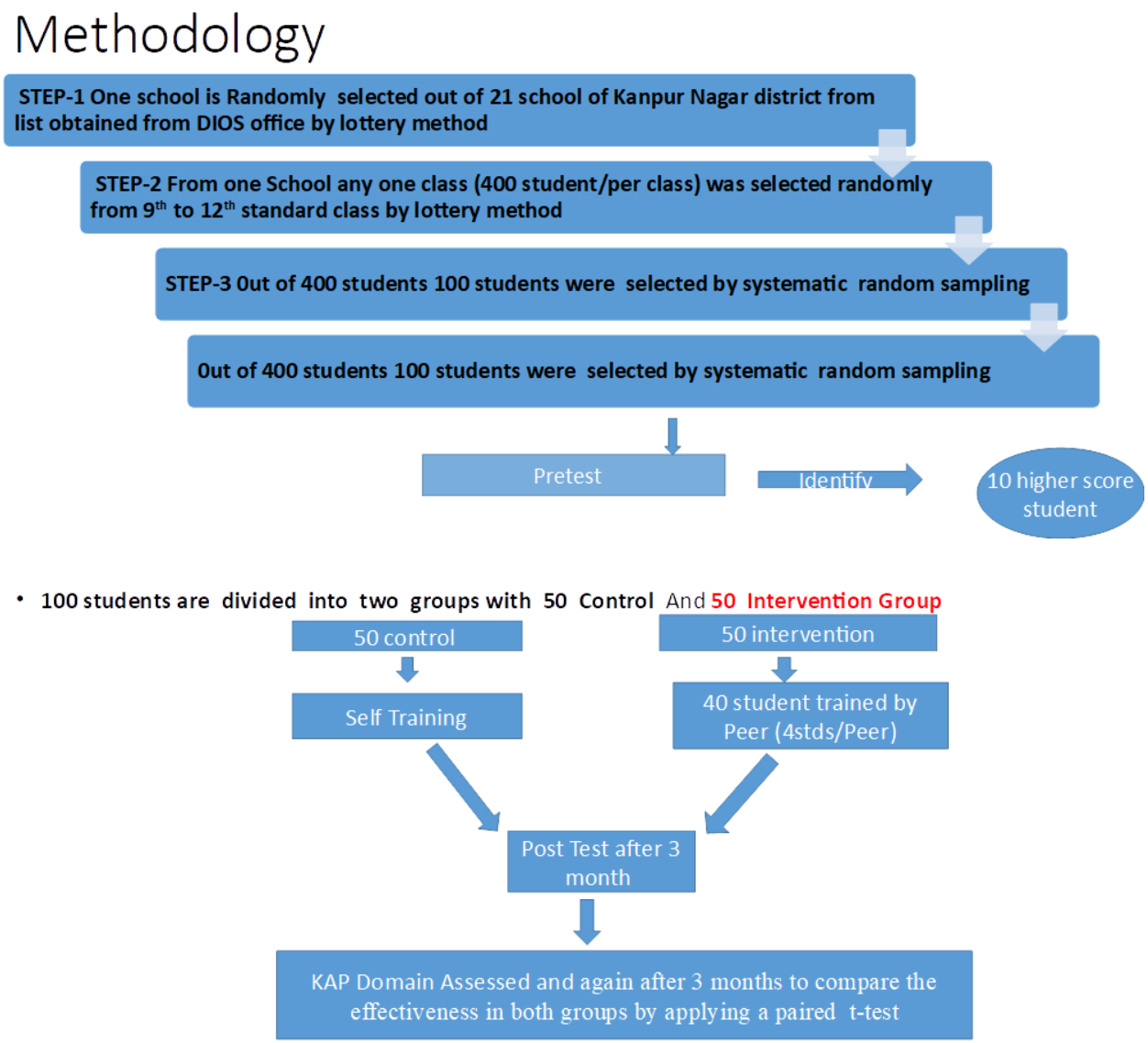
Sample Size-n=100

Methodology

This proposed study is a Randomized Control Trial was conducted among school going adolescent (9th-12th) students of Government School of Kanpur Nagar for a period of 3 months.

100 Participants was selected by systematic random sampling from attendance Register from class 11th 4 section (n~100).They will randomly assigned to two groups of 50 each and will administered a validated questionnaire to assess their baseline knowledge, attitudes and practices regarding road safety.

The top ten scorers in the ***intervention group*** will selected **as peer educators** who has to train 4 students each over a period of 3 months while the ***control group*** received road safety education from the research team. **INCLUSION CRITERIA –** (1) Students of age group16-19 year. (2) Those who will give their consent or willing to participate in the study **EXCLUSION CRITERIA -** (1) Students who will not give consent. (2) who will absent at the time of data collection.



KAP domains will be assessed again after 3 months to compare the effectiveness in both groups by applying a paired t-test. **Jamovi 2.3 28.0 Software** used for analysis.

Table-1 Distribution of Study Subjects

Age Group (years)	**Percentage (%)**
16	40
17	60
Gender	
Male	45
Female	55
Religion	
Hindu	79
Muslim	11
Shikha	7
Others	3
Mode of Transport	
By walking	26
By Vehicle	74
Mode of Riding	
Self-riding	33.3
By Parents	39.4
With Friend's vehicles	0
Not Applicable	27.4
Exposure to Injury	
Once	17
Twice	9
> 2times	5
Never	69
Socioeconomic class	
Upper Class	24
Upper Middle Class	21
Middle class	48
Lower middle Class	6
Lower class	1

Result

Table -2

Paired T Test Comparison of pre and post test Total Score

	Intervention group		Control Group	
Total Score	Mean	Standard Deviation (SD)	Mean	Standard Deviation (SD)
Pre Test	12.52	2.468	13.9	2.11
Post Test	25.73	2.36	12.4	2.47

Table -3

Paired T Test Comparison of pre and post test Knowledge intervention

	Intervention group		Control Group	
Knowledge	Mean	Standard Deviation (SD)	Mean	Standard Deviation (SD)
Pre Test	7.24	1.27	9.04	1.21
Post Test	18.0	0.735	7.19	1.27

RESULT

Demographic Characteristics

The study sample consisted of adolescents aged 16–17 years, with the majority being 17 years old (60%) and the remainder 16 years old (40%). Females represented 55% of the population, while males accounted for 45%. In terms of religion, participants were predominantly Hindu (79%), followed by Muslim (11%), Sikh (7%), and Other (3%). Socioeconomic analysis revealed that nearly half of the participants belonged to the middle class (48%), with substantial representation from the upper class (24%) and upper middle class (21%). Smaller proportions were from the lower middle class (6%) and lower class (1%). Transportation data indicated that 74% of students travelled to school by vehicle, while 26% walked. Regarding riding modes, 39.4% were transported by parents, 33.3% self-riding, and 27.4% reported not applicable. Exposure to injury was minimal, with 69% reporting no exposure, while 17% had experienced injury once, 9% twice, and 5% more than twice. **(Table-1)**

The results show a clear difference between the intervention group and the control group:

Table-2: Total Score (Pre vs. Post)

- **Intervention group**: Mean score rose from 12.52 to 25.73, nearly doubling, with relatively stable standard deviations. This indicates a strong positive effect of the intervention.
- **Control group**: Mean score dropped slightly from 13.9 to 12.4, suggesting no improvement and even a decline.

Table-3: Knowledge Score (Pre vs. Post)

- **Intervention group**: Mean score increased dramatically from 7.24 to 18.0, showing substantial knowledge gain. The lower post-test SD (0.735) suggests more consistent performance among participants.
- **Control group**: Mean score decreased from 9.04 to 7.19, with similar variability, indicating no benefit from the absence of intervention.

Interpretation

- The intervention group demonstrated **significant improvement** in both total and knowledge scores, while the control group showed **no improvement or decline**.
- The paired T-test results strongly support the effectiveness of the intervention in enhancing knowledge and overall performance.

Would you like me to also explain the **statistical significance** aspect of these results (e.g., what the T-test implies about reliability), or keep the focus on the practical interpretation?

Result

Table -4

Paired T Test Comparison of pre and post test Attitude

	Intervention group		Control Group	
Attitude	Mean	Standard Deviation (SD)	Mean	Standard Deviation (SD)
Pre Test	3.64	2.47	9.04	1.21
Post Test	6.52	0.735	7.19	1.27

Table -5

Paired T Test Comparison of pre and post test Practice intervention

	Intervention group		Control Group	
Practice Score	Mean	Standard Deviation (SD)	Mean	Standard Deviation (SD)
Pre Test	1.64	0.569	2.60	0.500
Post Test	4.96	0.375	1.62	0.571

The results in these two tables highlight the impact of the intervention on **attitude** and **practice scores**:

Table-4: Attitude (Pre vs. Post)

- **Intervention group**: Mean score increased from 3.64 to 6.52, showing a clear improvement in attitude. The post-test SD (0.735) is much lower, suggesting participants became more consistent in their responses after the intervention.
- **Control group**: Mean score decreased from 9.04 to 7.19, indicating a decline in attitude without intervention.

Table-5: Practice (Pre vs. Post)

- **Intervention group**: Mean score rose sharply from 1.64 to 4.96, reflecting a strong positive change in practice behaviors. The reduced SD (0.375) again shows more uniform improvement among participants.
- **Control group**: Mean score dropped from 2.60 to 1.62, suggesting deterioration in practice without intervention.

Interpretation

- The **intervention group consistently improved** across both attitude and practice measures, with gains accompanied by reduced variability (greater consistency).
- The **control group showed declines** in both areas, reinforcing that the observed improvements are attributable to the intervention rather than natural progression.

- Together with earlier results on total and knowledge scores, these findings strongly support the effectiveness of the intervention in enhancing knowledge, attitude, and practice.

a consolidated view of the intervention's impact across **all four dimensions** (Total Score, Knowledge, Attitude, Practice):

Table-6 Knowledge, Attitude, Practice (KAP) Pre & post Test in (*Intervention vs control)*

Measure	Group	Pre-Test Mean (SD)	Post-Test Mean (SD)	Change
Total Score	Intervention	12.52 (2.47)	25.73 (2.36)	↑ Large improvement
	Control	13.9 (2.11)	12.4 (2.47)	↓ Decline
Knowledge	Intervention	7.24 (1.27)	18.0 (0.74)	↑ Strong gain
	Control	9.04 (1.21)	7.19 (1.27)	↓ Decline
Attitude	Intervention	3.64 (2.47)	6.52 (0.74)	↑ Positive shift
	Control	9.04 (1.21)	7.19 (1.27)	↓ Decline
Practice	Intervention	1.64 (0.57)	4.96 (0.38)	↑ Strong improvement
	Control	2.60 (0.50)	1.62 (0.57)	↓ Decline

Intervention Outcomes

Paired T-test analysis revealed statistically significant improvements in the intervention group across all domains ($p < 0.05$):

- Total Score: Mean increased from 12.52 (SD = 2.47) to 25.73 (SD = 2.36).
- Knowledge: Mean increased from 7.24 (SD = 1.27) to 18.0 (SD = 0.74).
- Attitude: Mean increased from 3.64 (SD = 2.47) to 6.52 (SD = 0.74).
- Practice: Mean increased from 1.64 (SD = 0.57) to 4.96 (SD = 0.38).

In contrast, the control group demonstrated declines across all measures, with differences also statistically significant ($p < 0.05$):

- Total Score: Mean decreased from 13.9 (SD = 2.11) to 12.4 (SD = 2.47).
- Knowledge: Mean decreased from 9.04 (SD = 1.21) to 7.19 (SD = 1.27).
- Attitude: Mean decreased from 9.04 (SD = 1.21) to 7.19 (SD = 1.27).
- Practice: Mean decreased from 2.60 (SD = 0.50) to 1.62 (SD = 0.57).

Within this context, the intervention was highly effective, producing statistically significant improvements ($p < 0.05$) in knowledge, attitude, practice, and overall performance. The control group, in contrast, exhibited regression across all domains. (Table-6).

Discussion

The findings of the present study are consistent with earlier research on adolescent road safety knowledge, attitudes, and practices. **Ranjan DP et al. (2018) [5]** reported that just over half of adolescents had adequate knowledge of road safety rules, with age and gender significantly associated with knowledge adequacy, but very few possessed valid driving licenses. Similarly, **Jothula and Sree Harshika et**

al. (2001) [6] highlighted gaps in practice, noting that while most participants knew the minimum age for obtaining a license, adherence to road signs and consistent helmet use remained poor, especially for short-distance rides and pillion riders. In younger populations, **Ceeba Francis et al. (2019) [7]** demonstrated the effectiveness of structured teaching programs, showing significant improvements in knowledge scores among school children following intervention. This aligns closely with the present study, where structured education produced measurable gains in knowledge, attitude, and practice. **Sharma et al. (2020) [8]** further reinforced that while college students generally had good attitudes toward road safety, knowledge gaps persisted, particularly regarding blood alcohol concentration limits, and only a portion consistently followed safe practices such as seatbelt or helmet use. More recently, **Masilamani et al. (2022) [9]** showed that peer-led education significantly improved knowledge and attitudes among adolescents, with a positive correlation between the two. This supports the present study's observation that improvements in knowledge were accompanied by parallel gains in attitude and practice, underscoring the interdependence of these domains.

CONCLUSION

Majority of the participants were aware of road safety regulations but have Poor attitude was observed for wearing helmet for short-distance ride, pillion rider wearing helmet, and drink and drive. The peer education intervention on road safety was effective for school students. The study findings reflect that there is a significant gain in the post-test level of knowledge among students regarding road traffic safety and road signs through peer education intervention approach. This implies special and continuous health education for school/college students using innovative methods of teaching (Peer education intervention) in their formative year could improve their knowledge and help in developing a positive attitude towards road traffic safety. Thus, eventually leading to reduction of road traffic accidents Adolescents is an age group in which peers influence each other, it could also be used by students for promoting positive and negative behaviour or adopt dangerous habits of riding/driving vehicles without a license, speeding the vehicles, disobeying rules and regulations, drug abuse, alcohol consumption, which can put their life in danger. Hence, adequate guidance and supervision of student is mandatory and cannot be ignored.

RECOMMENDATION -

Road safety education should be formally integrated into ***school curricula***, ensuring adolescents consistently receive structured training. Embedding these programs at the secondary level will help bridge knowledge gaps and foster safer behaviours. ***Peer-led approaches*** are strongly recommended, as adolescents are highly influenced by their peers. Involving students in teaching and reinforcing safety practices can make interventions more relatable and effective. Learning should be experiential and practical, with demonstrations, simulations, and supervised practice sessions complementing classroom teaching. This ensures that knowledge translates into real-world safe practices. Teachers must be trained and equipped with appropriate resources to deliver road safety education effectively. Continuous professional development will strengthen program delivery. ***At the policy level***, government and education authorities should prioritize adolescent-focused initiatives, allocating resources and institutional support to sustain these interventions. Finally, community and parental involvement is essential to extend safe practices beyond school. Regular monitoring and evaluation should be conducted to assess effectiveness and guide improvements.

The similar study can be used on larger sample size to increase validity and generalization of finding.

In spite of having positive attitude toward road safety measures by participants, they could not translate attitude into practice

REVIEW OF LITERATURE

Ranjan DP et al(2018) conducted an study to assess the knowledge, attitude and practice towards road traffic safety among adolescent students of a selected PreUniversity college in Raichur city 196 participants (52.8%) had adequate knowledge on the road safety rules and regulations. Only 25 participants (7.7%) were driving with a valid driving license. The most common reason for motor vehicle accidents was high speed. Knowledge adequacy about road safety rules and regulations had statistically significant association with age and gender.

Jothula and Sreeharshika et al (2001) conducted an study of: Knowledge, attitude, and practice toward road safety showing that 81.1% of the participants knew the minimum age to obtain driving license. Only 16% follow the road signs strictly and 76% wear helmet for long-distance ride. Poor attitude was observed for wearing helmet for short-distance ride, pillion rider wearing helmet, and drink and drive.

Ceeba Francis et al. (2019) A study to assess the effectiveness of structured teaching programme on knowledge regarding road safety among 5th standard childrenat M.P.E.V E.M school, Visakhapatna Majority of school children – 20(60%) had inadequate knowledge on road safety. The mean value obtained for the existing level of knowledge regarding road safety among school children for control group was 34.4 and for experimental group was 35.7. The mean pre test knowledge score was 35.7with Standard Deviation 3.92 and the post test the mean knowledge score was 40.7. Standard deviation 3.45. Paired t test value was -7.56.

***Sharma, et al.:(2020*)** conducted an study on 102 college going students regrading KAP study on road traffic safety regulations , : 91.3% of the college students knew the right age for getting a driving license but only 24.5% students responded correctly for the blood alcohol concentration while driving. Most of the study participants had good attitude towards road traffic rules and regulations, driving license, road signs & symbols. 63-65% of the study participants responded that they always wear belt or helmet while driving and keep a specific speed limit while driving, and never used mobile phone or play loud music while driving

Masilamani, et al (2022) conducted an study on Impact of peer led education on road safety among adolescents : Post PLE, the mean knowledge score of subjects increased from 10.5 to 17.5 with a significant mean difference of −6.9 ($P < 0.001$). The mean attitude score of subjects had increased from 46.7 to 48.1. Apositive statistically significant correlation ($P = 0.04$) between knowledge and attitude and associations between certain sociodemographic variables were noted

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