ORIGINAL ARTICLE

Effectiveness of peer education intervention on knowledge, attitude, and practices regarding road safety among Adolescents in Kanpur nagar: A Randomized Controlled Trial

Vikas Pal[1], Garima Pal[2], Tanu Midha[3], Seema Nigam[4], Naresh Pal Singh[5]

Junior Resident[1,5], Department of Community Medicine, G.S.V.M Medical College, Kanpur, Uttar Pradesh, Professor[2] Department Prasuti Prasuti Tantra evm Stri Roga, Bharat Ayurved Medical College, Hospital & Research Centre, Muzaffarnagar Uttar Pradesh, Professor[3-4] Department of Community Medicine, G.S.V.M Medical College, Kanpur, Uttar Pradesh,

CORRESPONDING AUTHOR

Dr Vikas Pal, Department of Community Medicine, G.S.V.M Medical College, Kanpur, Uttar Pradesh
Email: vikaspalmbbs@gmail.com

CITATION

Pal V, Pal G, Midha T, Nigam S, Singh NP. Effectiveness of peer education intervention on knowledge, attitude, and practices regarding road safety among Adolescents in Kanpur nagar: A Randomized Controlled Trial. Journal of the Epidemiology Foundation of India. 2026;4(3):249-255.
DOI: https://doi.org/10.56450/JEFI.2026.v4i03.006

ARTICLE CYCLE

Received: 19/02/2026; Accepted: 07/09/2026; Published: 30/09/2026

COPYRIGHT STATEMENT

© The Author(s), [2026]. Published by the Journal of the Epidemiology Foundation of India (JEFI) under a Creative Commons Attribution 4.0 International License (CC BY 4.0)

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 Randomized control trial 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.

KEYWORDS

Knowledge Attitude and Practices (KAP), School-based intervention, Adolescent, Peer education Intervention (PEI), Traffic safety education

INTRODUCTION

Road traffic injuries (RTIs) represent a critical global public health crisis and a leading cause of preventable morbidity and mortality worldwide. According to the World Health Organization (WHO) Global Status Report on Road Safety 2023, road traffic crashes claim approximately 1.19 million lives annually. Strikingly, road traffic injuries have emerged as the single leading cause of death globally for children and young adults aged 5–29 years. Furthermore, low- and middle-income countries bear a disproportionate share of this burden, accounting for over 90% of global road fatalities despite possessing a significantly smaller fraction of the world's registered vehicles.(1)

The severity of this issue is particularly pronounced in India, which ranks first globally in terms of annual road accident fatalities. Official data from the Ministry of Road Transport and Highways (MoRTH) indicates that road accident fatalities in the country rose to over 1.77 lakh in 2024. This translates to a devastating toll of approximately 485 deaths every day—amounting to roughly 20 fatalities every hour. Within this context, adolescents and young adults are exceptionally vulnerable, with individuals aged 18–45 years constituting nearly two-thirds of all road accident fatalities nationwide. Gaps in knowledge, high-risk driving behaviors, peer pressure, and inconsistent adherence to fundamental safety measures—such as wearing helmets or seatbelts—escalate their susceptibility to severe traffic trauma.(2)(3)

To mitigate this burden, structured traffic safety education is essential for building sustainable safety habits at an early stage. Peer Education Intervention (PEI) offers a promising, participatory approach that leverages social networks to influence behavioral modifications positively. Because adolescents are deeply responsive to peer dynamics, peer-led education can effectively bridge existing information gaps and shape safety compliance more naturally than conventional pedagogical methods. Therefore, this randomized controlled trial was conducted to evaluate the effectiveness of a peer education intervention in enhancing the road safety knowledge, attitudes, and practices (KAP) among school-going adolescents in Kanpur Nagar, Uttar Pradesh.

AIM & OBJECTIVES 1-To Assess the KAP (knowledge attitude and Practice) among school going adolescent students about road safety. 2- 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:** Adolescents (students from 9th to 12th grade).**Study Period:** August 2023 to November 2023.**Study Area:** Government Schools and Intermediate Colleges in urban area of Kanpur Nagar (field practice area of Community Medicine, GSVM Medical College).

MATERIAL & METHODS

Study Design and Sample Size Calculation

A school-based randomized controlled trial was conducted in Kanpur Nagar, Uttar Pradesh. The required sample size was calculated using an expected change in the primary outcome (Road Safety Knowledge Score) based on a previous pilot study. Assuming a baseline standard deviation of 4.2 points, a minimum detectable difference of 2.5 points between the groups, a **statistical power (1- β) of 80%**, and a two-sided significance level (**α)** of 5%, the required sample size was determined to be approximately 45 students per group. To account for a potential 10% attrition or absence rate during follow-up, the final sample size was rounded up to **100 students (50 per group)**.

Participants and Sampling Strategy

The study included students aged 16–19 years enrolled in Class 11 across four designated sections who provided assent, alongside informed consent from their parents or guardians. Students who were absent during the primary data collection phases or refused to participate were excluded. Participants were initially selected from school attendance registers using a **systematic random sampling method**, where a random sampling interval (k)

was applied across the pooled student roster to select the 100 participants.

Randomization, Allocation Concealment, and Blinding

Following baseline assessment, the 100 sampled students were randomly assigned to either the Intervention Group (n=50) or the Control Group (n=50). An independent school counsellor generated the allocation sequence using a computerized random number table**.**

Allocation Concealment: To prevent selection bias, allocation was concealed using sequentially numbered, opaque, sealed envelopes (SNOSE). The counsellor opened the envelopes sequentially only after a participant's baseline data was fully locked.

Blinding: While participants could not be blinded to the nature of the educational intervention, strict assessor blinding was maintained. The research assistants who administered and scored the baseline and 3-month post-intervention questionnaires were entirely unaware of the participants' group assignments.

Instrument Validation

Knowledge, Attitudes, and Practices (KAP) regarding road safety were evaluated using a structured, self-administered questionnaire. The instrument underwent rigorous validation:

Content Validity: A panel of five experts (comprising public health professionals and traffic safety experts) evaluated the initial items, yielding a **Content Validity Index (CVI) of 0.88**.

Construct Validity & Reliability: The questionnaire was pilot-tested on 20 non-participating school adolescents. Internal consistency analysis demonstrated a **Cronbach's alpha of 0.79** for the knowledge domain and **0.74** for the attitude scale, indicating acceptable psychometric reliability.

Intervention Protocols & Addressing Peer Selection Bias

Intervention Group (Peer Education Intervention): The top ten scorers from the intervention group's baseline knowledge test were selected to act as peer educators.

Addressing Selection Bias: While selecting top baseline scorers ensured high accuracy in peer-led instruction, it introduced a potential peer selection bias, as these individuals already possessed higher baseline awareness and motivation compared to the peers they trained.

Each peer educator was trained extensively by the research team for one week on core road safety modules, defensive pedestrian habits, and communication skills. Each educator then delivered interactive training sessions to a sub-cluster of four peers over a three-month period.

Control Group Protocol & Decline Dynamics: The control group did not remain completely unexposed; instead, they received conventional road safety education delivered directly by the research team via a static lecture-and-pamphlet format at baseline.

Explaining the Control Group Decline: Any post-intervention stagnation or slight decline observed in the control group's KAP scores over the three-month period can be attributed to the "decay effect" of one-off pedagogical teaching, which lacks the continuous reinforcement, social modelling, and interactive accountability inherent to the peer-led framework.

Statistical Analysis: Data were cleaned and analysed using Jamovi (Version 2.3.28.0)**.** Baseline demographic variables and KAP scores between the intervention and control groups were compared using independent (t)-tests for continuous data and Chi-square tests for categorical parameters to evaluate baseline equivalence. Within-group pre and post-intervention scores were analysed using paired (t)-tests**,** reporting explicit mean differences, 95% confidence intervals (CI), (t)-statistics, (p)-values**,** and standardized effect sizes via Cohen's(d) to quantify the magnitude of the educational impact.

RESULTS

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)

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 increased from 2.24 (SD = 0.831) to 3.62 (SD = 0.80)
- 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 except attitude domain. (Table-2).

Table-1 Distribution of Study Subjects

Age Group (years)	Percentage (%) (N)
16	40
17	60
Gender **Percentage (%) (N)**	
Male	45
Female	55
Religion **Percentage (%) (N)**	
Hindu	79
Muslim	11
Shikha	7
Others	3
Mode of Transport **Percentage (%) (N)**	
By walking	26
By Vehicle	74
Mode of Riding **Percentage (%)**	
Self-riding	33.3
By Parents	39.4
With Friend's vehicles	0
Not Applicable	27.3
Exposure to Injury **Percentage (%) (N)**	
Once	17
Twice	9
> 2times	5
Never	69
Socioeconomic class **Percentage (%) (N)**	

Upper Class	24
Upper Middle Class	21
Middle class	48
Lower middle Class	6
Lower class	1

Table-2 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 (0.51)	Positive shift
	Control	2.24 (0.831)	3.62 (0.80)	Increased
Practice	**Intervention**	1.64 (0.57)	4.96 (0.74)	Strong improvement
	Control	2.60 (0.50)	1.62 (0.57)	Decline

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)**(4) 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)**(5) 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)**(6) 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)**(7) 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)**(8) 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

The study confirms that structured educational interventions are highly effective in improving adolescents' road safety knowledge, attitudes, and practices. The intervention group demonstrated statistically significant gains across all domains (KAP), while the control group regressed. These findings highlight the critical role of targeted, school-based programs in shaping safer behaviours among adolescents.

By aligning with previous research, the study strengthens the evidence base that structured, and peer-led approaches can bridge gaps in knowledge, foster positive attitudes, and encourage safer practices. The results underscore the interdependence of knowledge, attitude, and practice, showing that improvements in one domain reinforce progress in the others. In essence: Road safety education, when systematically delivered, is not only impactful but essential. Embedding such interventions into school curricula and policy frameworks can reduce adolescent vulnerability to road traffic injuries and contribute to long-term behavioural change.

Recommendation

Targeted Commuter Training: Deploy specific defensive riding and two-wheeler safety modules tailored to the **74% of adolescents utilizing vehicle transit** (including the 72.7% engaged in self-riding or parental transport).

Subsidized Safety Gear: Utilize institutional partnerships to distribute certified, subsidized helmets rather than relying on friction-inducing financial penalties, optimizing compliance within this predominantly **middle-class cohort (48%)**.

Early Curricular Anchoring: Institutionalize peer-led interventions at the **commencement of Class 11 (targeting 16–17-year-olds)** to cement safe road practices before students transition to legal, solo motorized licensing.

Peer Safety Networks: Capitalize on the intervention cohort's substantial cognitive and behavioral gains (**mean overall score: 12.52 to 25.73**) by formalizing high-scoring students as active peer safety monitors.

Active Pedagogy Implementation: Eliminate passive, lecture-based instructional formats to eliminate the severe **information decay and behavioral regression observed in the control group** (overall score: 13.9 to 12.4).

Preventative Practical Frameworks: Exploit the cohort's high baseline receptivity (**attitude mean increase: 2.24 to 3.62**) to build preventative, hands-on risk-assessment skills among the **69% of students with zero prior injury exposure**.

Limitation of the Study

Contamination Risk: Because the randomized intervention and control participants attended the same school and mixed freely during breaks, there was an unavoidable risk of information (contamination), where control students may have learned safety concepts informally from intervention peers. This could potentially underestimate the true effect size of the PEI.

Short-Term Follow-Up: The study evaluated outcomes exactly three months post-intervention. Consequently, it captures immediate cognitive and attitudinal shifts but cannot verify the long-term sustainability of these safe road practices into adulthood.

Social Desirability Bias: Because safety practices were self-reported via a questionnaire rather than observed objectively on the road, participants may have over-reported compliance (e.g., helmet or seatbelt usage) to align with social expectations or researcher approval.

Generalizability (External Validity): This trial was localized to a single cohort of Class 11 students in Kanpur Nagar. The demographic profile, local urban infrastructure, and traffic enforcement realities of this region may limit the generalizability of these findings to rural areas or different socio-economic school settings in India.

Authors Contribution

All authors have contributed equally.

Financial Support and Sponsorship

Nil

Conflict of Interest

There are no conflicts of interest.

Declaration Of Generative AI And AI Assisted Technologies In The Writing Process

The author has not used any generative AI/AI assisted technologies in the writing process

References

1. Global status report on road safety 2023 [Internet]. [cited 2026 Oct 25]. Available from: https://www.who.int/teams/social-determinants-of-health/safety-and-mobility/global-status-report-on-road-safety-2023
2. ROAD ACCIDENTS IN INDIA 2023 ROAD ACCIDENTS IN INDIA 2023 Be a Rah-Veer (Good Samaritan).
3. ROAD ACCIDENTS IN INDIA 2024 GOVERNMENT OF INDIA MINISTRY OF ROAD TRANSPORT AND HIGHWAYS TRANSPORT RESEARCH WING NEW DELHI www.morth.gov.in. [cited 2026 Oct 25]; Available from: www.morth.gov.in
4. Ranjan DP, Fahim MA, Kirte RC. A cross sectional study to assess the knowledge, attitude and practice towards road traffic safety among adolescent students of a selected Pre-University college in Raichur city. Int J Community Med Public Heal [Internet]. 2018

© 2026 JEFI

May 22 [cited 2026 Feb 14];5(6):2446. Available from: https://www.researchgate.net/publication/325304497_A_cross_sectional_study_to_assess_the_knowledge_attitude_and_practice_towards_road_traffic_safety_among_adolescent_students_of_a_selected_Pre-University_college_in_Raichur_city

5. Jothula K, Sreeharshika D. Knowledge, attitude, and practice toward road safety regulations among college students in Telangana state. J Educ Health Promot [Internet]. 2021 Jan 1 [cited 2026 Feb 14];10(1):25. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7933689/
6. School PE, Francis C, Dasarathan I, Shanmugam R. A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE REGARDING ROAD SAFETY AMONG 5TH STANDARD CHILDREN AT M. Int J Dev Res [Internet]. 2019 [cited 2026 Feb 14];09:26060–6. Available from: http://www.journalijdr.com
7. Sharma S, Sharma N, Vyas S, Semwal J. A cross-sectional study to assess the knowledge, attitude, and practices towards road traffic safety regulations among college going students of himalayan region, Uttarakhand, India. J Public Heal Prim Care [Internet]. 2020 [cited 2026 Feb 14];1(1):30. Available from: https://www.researchgate.net/publication/348137492_A_Cross-Sectional_Study_to_Assess_the_Knowledge_Attitude_and_Practices_towards_Road_Traffic_Safety_Regulations_among_College-Going_Students_of_Himalayan_Region_Uttarakhand_India
8. Masilamani N, Kothandan P, Basker M, Immanuel S. Effectiveness of Peer-Led Education on Knowledge and Attitude among Adolescents regarding Road Safety. Indian J Community Med Off Publ Indian Assoc Prev Soc Med [Internet]. 2022 Jul 1 [cited 2026 Feb 14];47(3):356. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9693951/