**Protocol**

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**Effect of teacher-led activity-based learning on road safety education among school children protocol for a mixed-methods study**

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**ABSTRACT**

**Background:** Road traffic injuries are the single biggest contributor of fatality among age 10 to 24 years worldwide. Also, there is no standardized education system for providing road safety education in schools. This study aims to check the effectiveness of teacher-led activity-based road safety educational intervention to the school children of age 11-15 years will improve their knowledge, attitude, self-reported practice and self-reported parent practice, compared to the existing curriculum and to find the feasibility, perception of children and teachers in implementing this intervention as a part of routine curriculum.

**Methods:** This mixed-methods study has stratified cluster randomized trial as quantitative part and focused group discussions as qualitative part. This will be carried out in co-education English medium schools located in urban Puducherry. Study participants are school children of age 11-15 years in the class 7, 8 and 9 of the selected schools. The data will be collected using pre-tested semi-structured questionnaire. Assessments will be done at three time points in the intervention schools and at baseline and end-line in the control schools. The module for intervention will be developed by principal investigator and provided to the teachers after prior sensitization.

**Conclusions:** This study protocol is designed to test the hypothesis that, the teacher-lead activity-based learning for school children will improve their road safety knowledge, practices and behavior compared to existing curriculum if any.

**Trial Registration:** The trial is registered in Clinical Trials Registry, India (REF/2018/01/016902).

**Keywords:** Road safety, Responsible drivers, Young drivers, India, Safety education

INTRODUCTION

Road traffic deaths and injuries in low- and middle-income countries are estimated to cause economic losses of up to 5% of Gross domestic product.1 Road traffic injuries are the single biggest contributor of fatality among age 10 to 24 years worldwide. In India, the total number of road accidents increased by 2.5 per cent in one year (2014-15). Accident severity (number of persons killed per 100 accidents) has gone up from 28.5 in 2014 to 29.1 in 2015.2 Road traffic accidents are ‘preventable’ and considering the importance of this public health issue, United Nations general assembly adopted a resolution in March-2010, proclaiming the ongoing decade (2011-20) as the “decade of action for road safety” with the goal to stabilize and reduce the fatalities due to road traffic accidents.3 For school children in India, inculcating the road safety awareness and its practices through teachers in schools can form an excellent way to build the future safe from road accidents.4 Various studies have shown that, the correct knowledge and attitude towards road safety is very poor among children and the adolescents.5,6 The importance of the road safety awareness needs to be incorporated at a very young age starting from the schools where the behavior change among school children can be brought about by simple educational interventions.7 The importance of school going children is that they are at an impressionable age, and hence, powerful educational messages can be passed on to them. Teaching the school children on road safety has to be an activity-based-learning and not simply a chalk and lecture method. The idea of activity-based learning is rooted in the common notion that children are active learners rather than passive recipients of information.8 It also improves road safety practices among their parents as, the school children have the potential for transmitting their newly acquired knowledge to their parents.9 Hence, we are planning a randomized controlled trial to determine the effectiveness of teacher-led Activity-based-learning on road safety among the school children of age 11-15 years. Also, we are planning to conduct focused-group discussions for the teachers and also the students to know the feasibility and importance of implementing the road safety education as a part of routine education curriculum for the school children. The purpose of this paper is to present the protocol planned for the study.

Methods

This study is a mixed-method study. The quantitative part of the study will be stratified cluster randomized controlled trial and the qualitative part is focused group discussions. The study setting will be Co educating English medium Government and Private Schools located in Urban Puducherry having class 7th, 8th and 9th comprising minimum strength of 100 students in those standards. All the students of class 7, 8, and 9 aged 11-15 years, among the selected schools in Urban Puducherry. The study duration will be for one year. The quantitative design of the study will be stratified cluster randomized controlled trial with clustering at the school level. The schools will be first stratified as government and private schools. Then the schools will be randomly allocated in either the control or in the intervention arm using simple randomization preferably lottery method or a coin toss. The intervention arm will receive the teacher led activity-based learning on road safety, while the control arm will follow the existing curriculum on road safety education. The qualitative component of the study will be focused group discussions.

***Sample size calculation***

The sample size of 196 in each group (total 392) will be required to detect the proportion difference of change in knowledge between intervention and control group as 25%, with 95% CI and 90% power and design effect of 2 using and 5% loss to follow up and 10% non-response rate.10

***Randomization details***

There are around 123 high schools (both government and private together) in Puducherry. Our study will be among the English medium schools in urban region that has a minimum strength of 100 students in classes 7th, 8th, and 9th. Also, only schools with co-education system will be included in our study. Thus, only 12 schools that meets all of the above inclusion criteria are available to be included in our study. After stratification into government and private schools, two schools from each stratum will be selected using simple random sampling method. The schools will be randomized into either the intervention arm or the control arm by simple randomization. The details of randomization are explained in the flow chart (Figure 1).

List of High schools (Government and Private) from directorate of school education, Puducherry (N=123)

Schools satisfying inclusion criteria (Government and Private) (n =11)

**Inclusion Criteria**

* English medium School having 7, 8 and 9 standards
* Co education
* Urban region
* Minimum 100 students in 7th, 8thand 9th

Schools will be grouped into two

Two Government schools

Intervention Schools (one Government and one private)

Control Schools (one Government and one private)

Government schools (n=4)

Private schools (n=6)

Two private schools

Simple Random Sampling

Simple Randomization

**Figure 1: Details of randomization of the schools.**

***Intervention***

The intervention will be activity-based learning on road safety that will be provided by the teachers. The idea of providing road safety education using Activity-based learning is that children are active learners rather than passive recipients of information. When a proper environment is provided to them, their learning will not only be joyful but also be sustained. The activity-based learning will not only enable creative thinking but also improves the critical analyzing of the situations and will enable the learners to think and act accordingly. The conceptual framework of incorporating the road safety education in activity-based learning and the outcomes of the same is explained in the (Figure 2).

Phase 5

**Teachers will be motivated for self-initiated activities**

**Final Assessment**

**Immediate post-intervention assessment**

Phase 3

Phase 4

**Sensitizing and training** the teachers

Control Schools

**Intervention** (Six domains# covered over three month period)

Advising to follow the existing curriculum for road safety

Phase 2

**Baseline assessment**

Focused group discussions

Obtaining Permission from the selected Schools

Phase 1

Providing education materials for control school

Focused group discussions

Intervention Schools

**Figure 2: Conceptual diagram of activity-based learning concept on road safety education.**

The primary objective of the study is teacher-led activity-based learning on road safety for school children, which means teachers will be playing a prime role in providing the intervention to the students. The concept of involving teachers is because this study will set a milestone to include the road safety education as a part of their routine curriculum. The teachers are the ideal people to educate the students, and studies have shown that the teacher-led interventions have greater impact in changing the behavior of the school children. Thus, this study will involve teachers in to provide the intervention to the students. For this purpose, the principal investigator will conduct the brain-storming sessions with the teachers to develop the idea of activity-based learning. Focused group discussions will be conducted among the teachers and also the students at the baseline to know the feasibility of implementing this intervention as a part of routine curriculum. The teachers who are volunteering and willing to provide the intervention will be selected as facilitators of the intervention. The principal investigator will first conduct the sensitization sessions to the teachers, to make them familiar with the content of the intervention. The teachers will be sensitized to the concept of activity-based learning and also the different activities and sessions planned to teach the students throughout the course of intervention. The study flow chart is shown in (Figure 3).



**Figure 3: Flow diagram of study method.**

This study will be carried out in five phases: Phase one: Baseline assessment, Phase two: Intervention, Phase three: Immediate post intervention assessment, Phase four: End-line assessment and Phase five: Post-intervention focused group discussions. In phase one, baseline assessment of the student’s knowledge, attitude, self-reported practice and self-reported parents’ practice will be carried out using a pre-tested, semi-structured questionnaire by the principal investigator. Following which focused group discussions will be conducted among the teachers and also the students separately to know about the feasibility of implementing the intervention as a part of routine curriculum. Then brain storming sessions will be done with the teachers by the principal investigator to develop ideas and to improve the content of the intervention. By the end of this phase the teachers who are willing and volunteering will be chosen as facilitators to provide the intervention to the students.

**Table 1: Tentative overview of sessions, objectives, activities that will be planned for the intervention.**

|  |  |  |
| --- | --- | --- |
| Topics | Objective | Activities |
| General awareness and importance of road safety | To create the awareness regarding road safety and to teach them the importance of following the Traffic rules. | Find the traffic signs and which you should follow while travelling from school to home |
| Traffic rules and signs | To teach students Traffic signs and Rules | An activity of traffic simulation and make students as traffic police and different road users to look for their mistakes and safe practices |
| Pedestrian and bicycler safety | To teach students regarding pedestrian safety, simple skills of crossing road safely, Bi-Cycler safety | Draw a safe route from home to school with all traffic signs and signals |
| Parents and road safety | To make understand the students regarding the involvement of their parents in Road Safety and arrange for parents’ students and teacher meeting if possible | Parent teachers meet and explain the importance of road safety.Debate or speech to know importance and safe or harmful road safety practice |
| High risk behavior and in case of emergency | To make them understand the term High Risk BehaviorTo teach them Emergency situations | Drawing competition showing high risk behavior and its dangerous outcome |
| My road to future | To Teach Safe Bus Riding behavior, as well as Boarding and Exiting techniques | Skit and role play by the students regrading road safety practices |

The content of the intervention will be developed using the existing curriculum in the existing module from Ministry of road transport and highways for the age 11-15 years, also based on the opinions from a group of experts (Involving experts from the field of community medicine and educators of school children).11 With the ideas from focused group discussions and brain storming sessions the module will be modified and upgraded to incorporate the activity-based learning. The content of the intervention will be developed focusing on six main domains of road safety viz., General Awareness and Importance of Road Safety, Traffic signs and rules, pedestrian and bi-cycler safety, involvement of parents’ in road safety and how to act in case of emergency. In the second phase, the intervention will be provided to the students of selected schools, by the teachers. The intervention will be so planned that it will have 12 sessions with two sessions covering each domain. Each session will take approximately for 30-40 minutes. the overall intervention will take around 3-4 months to get completed. The model lesson plan for the intervention is shown in the (Table 1). During this period, the principal investigator will periodically moderate the facilitators and also the students for their involvement in learning road safety. Also, the principal investigator will help the teachers in organizing and conducting the activities session. During this period the control schools will be motivated to carry on the existing curriculum if any. Following the intervention, immediate post-intervention assessment will be done in the intervention schools to assess the change in knowledge, attitude, self-reported practice and self-reported parents’ practice. The same questionnaire that used to collect the baseline data will be used. There will not be any intervention between third and fourth phase period and the teachers are free to implement their ideas and teaching if they are interested. The fourth phase will be an end-line assessment after a period of three months. This three-month free period will be provided to know if the teachers and students are motivated enough to continue the education on road safety awareness. Also, it helps in assessing whether students are able to retain their knowledge, attitude, self-reported practice and self-reported parents’ practice through one -time intervention. The results of this assessment will aid in deciding, whether continuous teaching programmes are necessary to help the students retain their knowledge and behavior towards practicing road safety measures. The study will be concluded by conducting the focused group discussions among the teachers and the students to assess their perception of this teacher-led teaching programme and also to know the effectiveness of using activity-based teaching methods. The materials and schedule that were used in the intervention schools will also be given to the control schools at the end of end-line assessment.

***Outcome measures***

Primary outcome: The primary outcome will be change in knowledge, attitude, self-reported practice and self-reported parent practice in road safety measures following the intervention. This will be measured by the change in mean scores compared with baseline and at the end of study period. Also, comparison will be done with the control group at the baseline and at the end of the study to know the effectiveness of this teacher-led activity-based learning on road safety in improving the in knowledge, attitude, self-reported practice and self-reported parent practice.

Secondary outcome: Secondary outcomes will include the change in knowledge, attitude, self-reported practice and self-reported parent practice in road safety measures from baseline, at the end of three months and at the end of six month of intervention in the intervention arm to know the need for reinforcement of the education program to achieve sustained outcome. The feasibility of implementing this intervention as a part of routine educational curriculum, and also the perception of the teachers and the students will be reported based on the results of focused group discussions that are done at the baseline, and at the end of the study duration.

***Assessments***

The assessments will be done at baseline, immediate post intervention and at the end of study period in the intervention arm. In the control arm the assessments will be done at the baseline and at the end of the study period. The assessments will be carried out using pre-tested and semi-structured questionnaire. This will be conducted by the principal investigator at same time for all the students in a school, thus covering both intervention and control schools within a week period. The total duration of the assessment will be half-an-hour. The answers will not be discussed to the participants since same questionnaire will be used in the end line for data collection. Focused group discussions will be conducted by the principal investigator who is trained in qualitative research and fluent in local language. The vocal and willing participants will be selected for focused group discussions. This will be conducted in their respective schools at their convenient place and time. After obtaining the informed written consent from the participants, these discussions will be audio recorded and field notes will be taken during the discussions. The number of discussions will be continued till the data saturation is arrived. Verbatim transcript will be transcribed in Tamil first and then it will be translated into English within three days to prevent loss of information. At the end of the session, discussion summary will be presented to the participants for participant validation. The study will begin after obtaining the informed written consent by the principal investigator, from the teachers, and assent form for the children from their parents. The parents will be informed about the intervention and the study procedure and then will be provided option to get enrolled their children in their study. Only the principal investigator will have the access to the data set and confidentiality of the dame will be maintained throughout the study. the model consent form and the informed consent document to be used in this study is attached in the additional file 2.

***Plan for data analysis***

All the data collected will be entered in EpiData software v 4.4.and will be analyzed using Stata v 14.12,13 For the intention-to-treat analysis missing data will be substituted by the last-observation-carried-forward method. The continuous data will be summarized as Mean (SD) in case of normal distribution and as Median (IQR) in case the distribution is non-normal. Categorical data will be summarized as proportions. The knowledge component will be summarized as scores as Mean (SD) in case of normal distribution and as Median (IQR) in case the distribution is non-normal. The attitude, and practice components will be measured as 4- point Likert scale and 3-point Likert scale respectively and will be summarized as scores. In the intervention arm, comparison of knowledge, attitude, self-reported practice and self-reported parent practice between the baseline and at the end of intervention will be tested using paired ‘t’ test and for three time points repeated measures ANOVA will be used for testing the statistical significance. Whereas comparison between the intervention and control arm at baseline and at the end of the study will be tested using unpaired ‘t’ test. Finally, the comparison of change in knowledge, attitude, self-reported practice and self-reported parent practice scores from baseline to the end of the study between the intervention arm and the control arm will be tested using difference-in-difference analysis. For the focused group discussions, following the verbatim transcripts codes will be generated using the specific quotes and thematic content analysis will be performed.

Discussion

All standard protocol items that are recommended for clinical trials are taken into consideration according to the SPIRIT (Standard Protocol Items: Recommendations for Interventional Trials) checklistfor quality reporting.14 These recommendations addressing the ethical, scientific, and administrative elements are presented in the additional file 1. The study results will be presented in conferences and will be reported in publications. If this teacher-led activity-based learning on road safety found to be beneficial, the same will be presented to the concerned authorities for further actions.

***Implications for policy and practice***

This study will help in identifying the lacunae and shortcomings in existing road safety polices in the country and also helps in building newer guidelines for introducing road safety education for the school children.

conclusion

This study protocol is designed to test the hypothesis that, the teacher-lead activity-based learning for school children will improve their road safety knowledge, practices and behavior compared to existing curriculum if any.

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*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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