RESEARCH PAPER

Effectiveness of Youth Emergency Preparedness Training on Knowledge and Practice of Basic Life Support among Senior Secondary School Students in Delhi NCR: A Pre-Experimental Study

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ABSTRACT

Background

Out-of-hospital cardiac arrest and other life-threatening emergencies continue to be major contributors to preventable mortality worldwide. Early recognition of emergencies, prompt activation of emergency medical services, and immediate initiation of Basic Life Support (BLS) substantially improve survival. Despite international recommendations advocating school-based BLS education, structured emergency preparedness training remains inadequately integrated into Indian school curricula. Senior secondary students constitute an ideal population for BLS education because of their cognitive maturity, physical capability, and potential role as community first responders.

Objective

To evaluate the effectiveness of Youth Emergency Preparedness Training on knowledge and practical skills related to Basic Life Support among senior secondary school students in selected schools of Delhi NCR.

Materials and Methods

A quantitative pre-experimental one-group pre-test–post-test research design was employed among 60 senior secondary students selected using convenience sampling from selected schools in Delhi NCR. Baseline knowledge and practical skills regarding Basic Life Support were assessed using a structured knowledge questionnaire and an observational practice checklist. Participants subsequently received a structured Youth Emergency Preparedness Training programme incorporating lectures, demonstrations, simulation-based practice, and supervised return demonstrations. Post-test assessment was conducted seven days after completion of the intervention. Descriptive statistics summarized demographic characteristics, while paired *t*-tests evaluated changes in knowledge and practice scores. Associations between demographic variables and baseline scores were analysed using Chi-square and Fisher's exact tests.

Results

The intervention demonstrated statistically significant improvements in both knowledge and practical performance. Mean knowledge scores increased from 13.85 ± SD during the pre-test to 28.25 ± SD during the post-test, while mean practice scores improved from 3.92 ± SD to 16.52 ± SD following training ($p < 0.001$). No statistically significant association was observed between baseline knowledge or practice scores and selected demographic variables.

Conclusion

Youth Emergency Preparedness Training significantly enhanced both theoretical knowledge and practical competency in Basic Life Support among senior secondary students. Incorporating structured BLS education into secondary school curricula may improve community emergency preparedness and increase the availability of competent lay first responders.

Keywords: Basic Life Support, Cardiopulmonary Resuscitation, Emergency Preparedness, Adolescents, School Health, Youth Training, Knowledge, Practice

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Introduction

Medical emergencies such as sudden cardiac arrest, choking, drowning, trauma, and respiratory failure constitute major public health challenges worldwide. Out-of-hospital cardiac arrest (OHCA) alone accounts for hundreds of thousands of deaths annually, with survival depending primarily on the timely initiation of Basic Life Support (BLS) by nearby individuals before the arrival of emergency medical services. Every minute of delay in initiating cardiopulmonary resuscitation (CPR) decreases the probability of survival by approximately 7–10%, whereas immediate bystander CPR can double or even triple survival rates. Consequently, improving community preparedness through widespread BLS education has become an important public health priority.[1,3]

Basic Life Support comprises a series of evidence-based emergency interventions aimed at maintaining airway patency, supporting breathing, and restoring circulation until advanced medical care becomes available. Contemporary international guidelines emphasize early recognition of cardiac arrest, activation of emergency medical services, high-quality chest compressions, effective rescue breathing when indicated, early defibrillation using an automated external defibrillator (AED), and management of foreign body airway obstruction. These interventions collectively constitute the "Chain of Survival," which has consistently been associated with improved neurological recovery and reduced mortality following cardiac arrest.[2,3]

Although emergency medical systems continue to evolve, survival following OHCA remains relatively poor in many low- and middle-income countries, including India. Low rates of bystander CPR, inadequate public awareness, delayed emergency response, and limited access to structured BLS education significantly contribute to preventable deaths. Previous studies have demonstrated that many members of the general public are unable to recognize cardiac arrest or perform appropriate resuscitative measures, despite being aware of the concept of CPR. Similar deficiencies have also been reported among healthcare students and professionals, highlighting the need for continuous educational interventions.[5,6,7]

Schools provide an ideal platform for developing community-based emergency preparedness because adolescents possess sufficient cognitive ability to understand emergency algorithms and adequate physical strength to perform effective chest compressions. International initiatives such as the Kids Save Lives campaign, endorsed by the World Health Organization and the International Liaison Committee on Resuscitation (ILCOR), recommend introducing compulsory annual BLS education for schoolchildren beginning at approximately 12 years of age. School-based BLS programmes have demonstrated significant improvements in students' knowledge, psychomotor skills, confidence, and willingness to intervene during medical emergencies. Furthermore, trained students frequently disseminate life-saving knowledge within their families and communities, thereby extending the impact of educational interventions beyond the classroom.[2,8,9,10]

Recent systematic reviews and meta-analyses indicate that structured BLS training significantly enhances theoretical knowledge, practical performance, confidence, and long-term retention among adolescents. Simulation-based education, instructor-led demonstrations, peer-assisted learning, and blended digital teaching approaches have all demonstrated effectiveness in improving CPR competence. However, repeated refresher sessions remain essential because psychomotor skills gradually decline without reinforcement.[11,12,13]

Despite increasing global recognition of school-based BLS education, implementation within Indian secondary schools remains inconsistent. Emergency preparedness programmes are rarely integrated into formal school curricula, and empirical evidence evaluating their effectiveness among Indian adolescents is limited. Most available Indian studies have focused on healthcare professionals, nursing students, or medical undergraduates, leaving a considerable evidence gap regarding senior secondary school students. Considering the growing burden of cardiovascular disease, trauma, road traffic accidents, and other emergencies in densely populated urban regions such as Delhi NCR, equipping adolescents with Basic Life Support skills has substantial potential to improve community resilience and emergency response capacity.[5,7,14]

The present study was therefore undertaken to evaluate the effectiveness of a structured Youth Emergency Preparedness Training programme on the knowledge and practice of Basic Life Support among senior secondary school students in selected schools of Delhi NCR. The findings are expected to provide evidence supporting the integration of standardized BLS training into secondary school

education and contribute to strengthening community-based emergency preparedness. The study was based on a pre-experimental one-group pre-test–post-test design involving 60 students and assessed changes in knowledge and practical skills before and after the intervention.

Materials and Methods

A quantitative research approach with a pre-experimental one-group pre-test–post-test design was employed to evaluate the effectiveness of Youth Emergency Preparedness Training on the knowledge and practice of Basic Life Support (BLS) among senior secondary school students in selected schools of Delhi NCR. The study was conducted from 16 March to 31 March 2026 after obtaining approval from the Institutional Ethics Committee of SGT University and administrative permission from the participating schools. A total of 60 students enrolled in Classes XI and XII were selected using a non-probability convenience sampling technique. Students who were willing to participate and provided informed consent were included, whereas those with prior formal BLS training, those absent during the intervention or assessment, and those medically unfit were excluded. Baseline knowledge was assessed using a 35-item structured multiple-choice questionnaire, while practical skills were evaluated using an 18-item observational practice checklist. The content validity of the knowledge questionnaire and practice checklist was established by seven subject experts, yielding Content Validity Index (CVI) values of 0.83 and 0.85, respectively, and internal consistency was confirmed using Cronbach's alpha ($\alpha = 0.85$). Following the pre-test, participants received a structured Youth Emergency Preparedness Training programme comprising interactive lectures, audiovisual presentations, live demonstrations, and supervised hands-on practice on Basic Life Support according to current resuscitation guidelines. A post-test using the same instruments was conducted seven days after the intervention to evaluate changes in knowledge and practical performance. Data were analyzed using IBM SPSS software. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize the data, while inferential statistics, including the paired t-test, Chi-square test, and Fisher's exact test, were applied to determine the effectiveness of the intervention and the association between baseline knowledge and practice scores with selected demographic variables. A p-value <0.05 was considered statistically significant.

Results

A total of 60 senior secondary school students completed both the pre-test and post-test assessments and were included in the final analysis. The effectiveness of the Youth Emergency Preparedness Training programme was evaluated by comparing participants' knowledge and practical skills related to Basic Life Support before and seven days after the intervention. Baseline associations between demographic characteristics and knowledge/practice were also examined.

The study population consisted of students enrolled in Classes XI and XII from selected schools in Delhi NCR. Demographic characteristics, including age, gender, academic stream, residence, family type, parental education, parental occupation, previous source of BLS information, and history of witnessing an emergency, were comparable across the study population and showed no statistically significant relationship with baseline knowledge or practice scores.

Table 1. Distribution of Knowledge Levels Before and After Youth Emergency Preparedness Training (n = 60)

Knowledge Level	Pre-test n (%)	Post-test n (%)
Competent	19 (31.7)	52 (86.7)
Needs Improvement	27 (45.0)	6 (10.0)
Not Competent	14 (23.3)	2 (3.3)

Before the intervention, nearly half of the participants (45.0%) demonstrated knowledge requiring improvement, while only 31.7% were categorized as competent. Following Youth Emergency Preparedness Training, the proportion of competent students increased markedly to 86.7%, whereas the proportions requiring improvement and categorized as not competent declined to 10.0% and 3.3%, respectively. These findings demonstrate substantial improvement in theoretical knowledge following the educational intervention.

Table 2. Distribution of Practice Levels Before and After Youth Emergency Preparedness Training (n = 60)

Practice Level	Pre-test n (%)	Post-test n (%)
Competent	0 (0.0)	42 (70.0)
Needs Improvement	24 (40.0)	12 (20.0)
Not Competent	36 (60.0)	6 (10.0)

At baseline, practical competency in Basic Life Support was poor. None of the participants demonstrated competent practical skills, while 60.0% were classified as not competent. Following the intervention, 70.0% achieved competency, whereas only 10.0% remained in the not competent category. These findings indicate that the structured training programme substantially enhanced participants' psychomotor performance related to Basic Life Support.

Table 3. Comparison of Pre-test and Post-test Knowledge and Practice Scores (n = 60)

Variable	Pre-test Mean ± SD	Post-test Mean ± SD	t-value	p-value
Knowledge	13.85 ± 4.59	28.25 ± 2.78	22.36	<0.001
Practice	3.92 ± 1.33	16.52 ± 0.85	55.98	<0.001

Paired t-test analysis demonstrated a statistically significant improvement in both knowledge and practical performance following the Youth Emergency Preparedness Training programme. The mean knowledge score increased from 13.85 ± 4.59 to 28.25 ± 2.78, representing an improvement of approximately 104%. Similarly, the mean practice score increased from 3.92 ± 1.33 to 16.52 ± 0.85, corresponding to an improvement of more than 320%. Both improvements were highly statistically significant ($p < 0.001$), confirming the effectiveness of the intervention.

Table 4. Association Between Pre-test Knowledge Level and Demographic Variables (n = 60)

Variable	Statistical Test	p-value	Interpretation
Age	Fisher's Exact Test	0.716	Not Significant
Gender	Fisher's Exact Test	0.517	Not Significant
Class	Chi-square Test	0.657	Not Significant
Stream	Fisher's Exact Test	0.835	Not Significant
Residence	Fisher's Exact Test	0.866	Not Significant
Family Type	Chi-square Test	0.631	Not Significant
Father's Education	Fisher's Exact Test	0.758	Not Significant
Mother's Education	Fisher's Exact Test	0.724	Not Significant
Father's Occupation	Fisher's Exact Test	0.798	Not Significant
Mother's Occupation	Fisher's Exact Test	0.869	Not Significant
Source of Information	Chi-square Test	0.423	Not Significant
Witnessed Emergency	Chi-square Test	0.726	Not Significant

No statistically significant association was observed between baseline knowledge and any demographic characteristic (all $p > 0.05$). These findings indicate that students entered the study with comparable levels of Basic Life Support knowledge irrespective of age, gender, academic class, educational stream, residence, family background, parental education, parental occupation, source of information, or previous exposure to emergency situations.

Table 5. Association Between Pre-test Practice Level and Demographic Variables (n = 60)

Variable	Statistical Test	p-value	Interpretation
Age	Fisher's Exact Test	0.571	Not Significant
Gender	Chi-square Test	0.423	Not Significant
Class	Chi-square Test	0.887	Not Significant
Stream	Chi-square Test	0.945	Not Significant
Residence	Fisher's Exact Test	0.835	Not Significant
Family Type	Chi-square Test	0.789	Not Significant
Father's Education	Chi-square Test	0.995	Not Significant
Mother's Education	Chi-square Test	0.969	Not Significant
Father's Occupation	Fisher's Exact Test	0.514	Not Significant
Mother's Occupation	Fisher's Exact Test	0.952	Not Significant
Source of Information	Chi-square Test	0.861	Not Significant

Witnessed Emergency	Chi-square Test	0.718	Not Significant

Baseline practical competency was not significantly associated with any demographic variable (all $p > 0.05$). Students demonstrated similarly low practical performance before the intervention regardless of demographic characteristics, suggesting a uniformly inadequate level of Basic Life Support skills across the study population.

Discussions

The present study demonstrated that the Youth Emergency Preparedness Training (YEPT) programme significantly improved both the knowledge and practical skills of Basic Life Support (BLS) among senior secondary school students. The mean knowledge score increased from 13.85 ± 4.59 during the pre-test to 28.25 ± 2.78 in the post-test, while the mean practice score increased from 3.92 ± 1.33 to 16.52 ± 0.85 after the intervention. Furthermore, the proportion of students categorized as competent increased substantially in both knowledge (31.7% to 86.7%) and practice (0% to 70%). These findings indicate that structured BLS training is highly effective in enhancing adolescents' preparedness to respond to medical emergencies and supports the inclusion of emergency preparedness programmes within school health education.

The improvement observed in the present study is consistent with previous international research demonstrating the effectiveness of structured cardiopulmonary resuscitation (CPR) and Basic Life Support training among school students. Perkins et al. reported significant gains in CPR knowledge and confidence following systematic school-based training programmes, emphasizing that adolescents can rapidly acquire life-saving competencies through structured educational interventions. Likewise, Nas et al. found that instructor-led BLS education significantly improved students' theoretical understanding and confidence in performing CPR, while Cortegiani et al. demonstrated that both traditional classroom instruction and integrated learning approaches produced substantial improvements in knowledge acquisition among secondary school students. Similar findings have also been reported in systematic reviews by Yeung et al., who concluded that structured BLS education consistently enhances knowledge, practical skills, and willingness to provide bystander CPR across different educational settings.[15-18]

Practical competency also improved remarkably following the intervention, highlighting the importance of hands-on skill training. In the present study, 70% of participants achieved competency after training compared with none before the intervention. These findings agree with Woollard et al., who reported significant improvements in CPR psychomotor performance among schoolchildren after practical BLS instruction. Oermann et al. further demonstrated that simulation-based CPR education significantly enhanced students' skill proficiency and long-term competence, while Anderson et al. found that real-time feedback during CPR practice improved compression quality and overall performance accuracy. The substantial improvement observed in the present study may be attributed to the combination of demonstrations, supervised return demonstrations, interactive learning sessions, and repeated practice using mannequins, all of which facilitate psychomotor skill acquisition and retention.[19-21]

Another important finding of the present study was the absence of statistically significant associations between demographic characteristics and baseline knowledge or practice scores. Variables including age, gender, academic class, educational stream, residence, parental education, parental occupation, source of information, and previous exposure to emergencies did not influence participants' learning outcomes, suggesting that the Youth Emergency Preparedness Training programme was equally effective across different demographic groups. Similar observations have been reported by Sanati et al. and Connolly et al., who concluded that demographic characteristics have minimal influence on the effectiveness of standardized CPR education among adolescents. Collectively, these findings support the implementation of universal school-based BLS training programmes irrespective of students' demographic backgrounds. Integrating structured emergency preparedness education into the secondary school curriculum may substantially improve community readiness, increase bystander CPR rates, and ultimately contribute to better survival outcomes following out-of-hospital cardiac arrest and other life-threatening emergencies.[22,23]

Conclusion

The present study demonstrated that the Youth Emergency Preparedness Training (YEPT) programme was highly effective in improving both the knowledge and practical skills of Basic Life Support (BLS) among senior secondary school students. Statistically significant improvements were observed in post-test knowledge and practice scores following the structured educational intervention ($p < 0.001$), indicating that adolescents can rapidly acquire essential life-saving competencies when provided with standardized, hands-on BLS training.

The findings further revealed that demographic characteristics such as age, gender, academic class, educational stream, residence, parental education, parental occupation, previous source of information,

and prior exposure to emergencies were not significantly associated with baseline knowledge or practice. This suggests that the training programme was equally beneficial across different groups of students, supporting its universal applicability in school settings.

Overall, the study highlights the importance of integrating structured Basic Life Support and emergency preparedness training into senior secondary school curricula. Early acquisition of BLS knowledge and psychomotor skills has the potential to increase bystander response during emergencies, strengthen community resilience, and contribute to improved survival outcomes following out-of-hospital cardiac arrest and other life-threatening conditions. The findings provide evidence for educational policymakers, school administrators, and nursing professionals to advocate for the routine implementation of school-based emergency preparedness programmes.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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