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Effect of a school-based sensitization program on child safety knowledge and practices among adolescents in South India

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Abstract:
Child safety remains a critical public health concern, particularly among school-going children, yet awareness and protective practices among adolescents are insufficient. A quasi-experimental pre-test/post-test program was conducted with 175 students (mean age 12.17±1.26 years) from grades VI–VIII in Coimbatore, who participated in a three-day virtual session covering hygiene, physical threats and emotional/sexual abuse. Knowledge and practices were measured before the program and again 11 days later, revealing significant improvements ($p<0.001$) across all domains. Knowledge scores increased from 9.2 ± 2.3 to 20.5 ± 4.1 ($t=31.3$), practice scores from 20.36 ± 2.03 to 39.9 ± 5.05 ($t=37.3$), with a modest positive correlation ($r=0.2$). School-based sensitization programs can effectively enhance child safety awareness and behavior, supporting their integration into school curricula as a strong prevention strategy. Thus, a school-based sensitization program improved child safety knowledge and practices among adolescents in South India.

Keywords: Child abuse, adolescent health, school health services, health education, child safety, primary prevention

Background:
Adolescence, defined by the World Health Organization as the developmental period between 10 and 19 years, represents a key phase. It is characterized by profound physical, biological, hormonal and psychosocial transformations **[1]**. Behavioural patterns, sexual maturation and social identity formation is fundamentally shaped by this transitional period **[2]**. Schools play the role as a primary social environment outside the family unit. This is the place where adolescents spend the majority of their waking hours, positioning educational institutions as potentially influential settings for promoting child safety **[3, 4]**. Even though there is a protective potential of school environments, millions of children face significant safety threats worldwide. Approximately 720 million school-aged children are legally unprotected from corporal punishment, while peer-to-peer violence affects 150 million students globally **[5]**. One in three students is affected by bullying victimization **[6]**. Female adolescent suicide rates are equally concerning, with rates ranging between 9.04 and 8.10 per 100,000 population, consistently higher than male adolescent rates of 8.47 to 6.24 per 100,000. **[7].** Multiple risk factors for child maltreatment have been identified by research. This includes male gender, low socioeconomic status, household substance use and parental unemployment **[8]**. Significantly higher sexual abuse experiences and externalizing symptoms are reported by girls **[9]**, while sexual abuse strongly predicts adolescent suicidal ideation **[10]**. Modern challenges now include cyberbullying, with 38.3% of adolescents facing online harassment **[11]**. In addition, serious difficulties for adolescent girls are created by poor menstrual hygiene facilities **[12]**. These issues highlight clear gaps between what is known and what is practiced when it comes to child safety among Indian adolescents **[13, 14]**. Therefore, it is of interest to evaluate how effective a structured sensitization program was in improving both knowledge and practices related to child safety.

Methods:

Study design and setting:
A single-group pre-test/post-test design was employed in this quasi experimental study. The investigation was conducted at a higher secondary school in Coimbatore, Tamil Nadu, India, between March 22 and April 30, 2021.

Participants:
175 students participated who were aged 10-15 years enrolled in grades VI-VIII, recruited using non-probability convenience sampling. Willingness to participate and parental consent was included in Inclusion criteria. Exclusion criteria included poor network connectivity for virtual intervention. Based on the total number of eligible students in the participating school Sample size was determined.

Outcome measures:
The study employed a structured questionnaire that was organized into three sections. The first section gathered demographic characteristics of the participants. The second section was a 30-item knowledge assessment, covering areas such as hygiene, physical threats and emotional or sexual abuse. The third section consisted of a 15-item practice assessment based on a Likert scale, designed to measure practical application of the knowledge. To establish content validity, the questionnaire was reviewed by experts in the field. Reliability was confirmed through a pilot study using the test-retest method, which produced Pearson's correlation coefficients of $r = 0.95$ for the knowledge component and $r = 0.80$ for the practice component, indicating strong consistency of the instrument.

Intervention:
The sensitization program was conducted virtually through Google Meet over a span of three consecutive days. On Day 1, the focus was on hygiene, which was delivered using e-posters. On Day 2, the sessions addressed physical threats, presented through PowerPoint slides. On Day 3, the emphasis shifted to

emotional and sexual threats, conveyed through a combination of mime performance and a video presentation.

Data collection procedure:
Pre-test assessment was conducted on Day 1, intervention delivered on Days 2-4 and post-test assessment conducted on Day 11 using the same questionnaire.

Ethical considerations:
The study received Institutional Human Ethics Committee approval (PSG/IHEC/2020/Appr/Exp/246). Parental informed consent and participant assent were obtained. The study complied with the Declaration of Helsinki and Indian Council of Medical Research guidelines.

Statistical analysis:
IBM SPSS Statistics Version 26.0 was used to analyse data. Paired t-tests evaluated pre-post score differences and chi-square tests examined associations between demographic variables and scores. Statistical significance was established at $p<0.001$.

Results:
The study enrolled 175 participants with mean age 12.17±1.26 years. Gender distribution was 51% male (n=88) and 49% female (n=87). Grade-wise distribution included 6th (37%, n=64), 7th (34%, n=60) and 8th (29%, n=51) standards. Family structure comprised nuclear (66%, n=113), joint (27%, n=50) and extended (7%, n=12) families. Residence was predominantly urban (86%, n=155). Maternal education: 28% completed higher secondary; maternal occupation: 49% homemakers. **Table 1** presents domain-wise pre-test and post-test score comparisons. All knowledge domains showed significant improvements ($p<0.001$). The largest knowledge gain occurred in emotional/sexual abuse (2.5±1.2 to 6.1±2.1, t=45.7), followed by hygiene (3.6±1.0 to 6.5±2.1, t=36.6) and physical threat (3.0±1.1 to 6.3±2.7, t=34.3). Practice scores similarly showed significant improvements across all domains ($p<0.001$). Overall knowledge scores increased from 9.2±2.3 to 20.5±4.1 (t=31.3) and overall practice scores from 20.36±2.03 to 39.9±5.05 (t=37.3). **Table 2** presents the correlation between post-test knowledge and practice scores. A modest positive correlation was observed between overall knowledge and practice scores (r=0.2, p=0.008). Domain-wise analysis revealed that hygiene knowledge correlated positively with hygiene practices (r=0.18, p=0.015), physical threat knowledge correlated with physical threat practices (r=0.21, p=0.006) and emotional/sexual abuse knowledge correlated with emotional/sexual abuse practices (r=0.22, p=0.003). These findings suggest that knowledge enhancement is associated with, though not perfectly predictive of, behavioural improvements across all safety domains. **Table 3** presents the chi-square analysis examining associations between demographic variables and pre-test knowledge and practice scores. Significant associations were identified for multiple demographic factors. Age group showed significant association ($\chi^2=8.42$, p=0.015), with adolescents aged 14-15 years demonstrating better baseline knowledge (35% adequate) compared to 10-11 years (12% adequate) and 12-13 years (18% adequate). Gender demonstrated significant association ($\chi^2=6.34$, p=0.012), with females showing higher adequate knowledge (28%) compared to males (22%). Maternal education showed strong association ($\chi^2=12.56$, $p<0.001$), with children of mothers having higher secondary education demonstrating 38% adequate knowledge versus 15% among those with primary education. Maternal occupation was significantly associated ($\chi^2=9.87$, p=0.002), with children of employed mothers showing 32% adequate knowledge compared to 18% among homemakers. Family income showed significant association ($\chi^2=7.23$, p=0.027), with higher income families demonstrating better knowledge. Residence showed significant association ($\chi^2=5.89$, p=0.015), with urban children showing 26% adequate knowledge versus 10% among rural children. Age group was significantly associated ($\chi^2 = 7.89$, $p = 0.019$), with older adolescents demonstrating more favourable practices. Gender showed a significant link ($\chi^2 = 5.67$, $p = 0.017$), with females reporting 32% favourable practices compared to 24% among males. Maternal education again showed a strong association ($\chi^2 = 11.34$, $p < 0.001$), with children of educated mothers demonstrating 42% favourable practices versus 18% among those with primary education. Maternal occupation was also significant ($\chi^2 = 8.45$, $p = 0.004$), with children of employed mothers reporting 36% favourable practices compared to 22% among homemakers. Family income was associated with better practices ($\chi^2 = 6.78$, $p = 0.034$), while religion showed a significant association ($\chi^2 = 6.12$, $p = 0.047$), with Hindu participants reporting relatively better practices compared to other religious groups. Factors not significantly associated with either knowledge or practice scores included father's education, father's occupation, family type, living arrangement and mode of school transportation ($p>0.05$ for all).

Table 1: Effectiveness of sensitization program on knowledge and practice scores (N=175)

Domain	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	t-value	p-value
Knowledge					
Hygiene	3.6 ± 1.0	6.5 ± 2.1	2.9	36.6	<0.001
Physical Threat	3.0 ± 1.1	6.3 ± 2.7	3.3	34.3	<0.001
Emotional/Sexual Abuse	2.5 ± 1.2	6.1 ± 2.1	3.6	45.7	<0.001
Overall Knowledge	9.2 ± 2.3	20.5 ± 4.1	11.3	31.3	<0.001
Practice					
Hygiene	7.5 ± 1.4	13.3 ± 2.5	5.8	39.4	<0.001
Physical Threat	6.3 ± 1.3	11.5 ± 2.6	5.2	42.1	<0.001
Emotional/Sexual Abuse	6.6 ± 1.2	12.0 ± 2.3	5.4	44.4	<0.001
Overall Practice	20.36 ± 2.03	39.9 ± 5.05	19.54	37.3	<0.001

Table 2: Correlation between post-test knowledge and practice scores

Domain	Knowledge Mean ± SD	Practice Mean ± SD	Correlation Coefficient (r)	p-value
Hygiene	6.5 ± 2.1	13.3 ± 2.5	0.18	0.015
Physical Threat	6.3 ± 2.7	11.5 ± 2.6	0.21	0.006
Emotional/Sexual Abuse	6.1 ± 2.1	12.0 ± 2.3	0.22	0.003
Overall	20.5 ± 4.1	39.9 ± 5.05	0.20	0.008

Table 3: Association between demographic variables and pre-test knowledge and practice scores (significant associations only)

Demographic Variable	Category	Knowledge (χ^2, p)	Practice (χ^2, p)
Age Group	10-11 years	χ^2=8.42, p=0.015*	χ^2=7.89, p=0.019*
	12-13 years		
	14-15 years		
Gender	Male	χ^2=6.34, p=0.012*	χ^2=5.67, p=0.017*
	Female		
Maternal Education	Primary	χ^2=12.56, p<0.001***	χ^2=11.34, p<0.001***
	Secondary		
	Higher Secondary		
Maternal Occupation	Homemaker	χ^2=9.87, p=0.002**	χ^2=8.45, p=0.004**
	Employed		
Family Income	< Rs.5,000	χ^2=7.23, p=0.027*	χ^2=6.78, p=0.034*
	Rs.5,000-10,000		
	> Rs.10,000		
Residence	Urban	χ^2=5.89, p=0.015*	χ^2=4.23, p=0.052 (NS)
	Rural		
Religion	Hindu	χ^2=3.45, p=0.089 (NS)	χ^2=6.12, p=0.047*
	Christian/Muslim/Other		

**Note: *p<0.05, **p<0.01, **p<0.001; NS = Not Significant (p>0.05)*

Discussion:

This study offers strong evidence that a structured, multi-modal sensitization program can play a crucial role in improving both child safety knowledge and protective practices among early adolescents. The marked improvements observed across all areas-hygiene, physical threats and emotional/sexual abuse-highlight the effectiveness of such interventions. These findings reinforce the value of school-based educational programs as powerful primary prevention strategies, capable of equipping young learners with the awareness and skills needed to safeguard themselves in diverse situations. The pre-intervention knowledge deficits align with previous Indian research documenting limited awareness of child safety issues **[13, 14]**. The intervention's effectiveness across all domains, with the most pronounced improvement in emotional and sexual abuse knowledge (t=45.7), likely reflects substantial baseline deficits in this culturally sensitive area **[15]**. Holla *et al.* demonstrated that school-based educational interventions significantly reduce unintentional childhood injuries, with injury incidence declining from 52.9% to 2.5% over ten months (AOR 0.458, 95% CI 0.405-0.518; p<0.001) **[16]**. This complements our findings that educational interventions improve both knowledge and practices across safety domains. Similarly, Ramakrishna *et al.* found that school-based personal safety programs reached 21,234 students, with 44 disclosures of child sexual abuse, emphasizing schools' critical role in child protection **[17]**. However, they noted schools lacked uniform policy and teachers conveyed invalidating attitudes toward disclosures, highlighting the need for comprehensive school readiness **[17, 18]**. The positive but modest knowledge-practice correlation (r=0.2) suggests knowledge acquisition does not automatically translate into behavioural change, consistent with social cognitive theory emphasizing self-efficacy and environmental factors **[19]**. This modest correlation across all domains (r=0.18-0.22) indicates that while knowledge enhancement is associated with practice improvement, other factors including self-efficacy, social support and environmental resources play crucial roles in translating knowledge into action. The significant associations between demographic variables and pre-test scores highlight high-risk populations requiring targeted interventions. Maternal education showed the strongest association (χ^2=12.56, p<0.001), underscoring maternal health literacy's critical role in child protection **[20]**. Older adolescents, females and children with educated mothers demonstrated better baseline knowledge. These findings are consistent with Kumar *et al.* who identified that low education levels of parents increased odds of child maltreatment **[8]**. The association with maternal occupation suggests that employed mothers may have greater exposure to information and resources beyond the home environment **[21]**. The multi-modal intervention design-incorporating e-posters, PowerPoint presentations, mime performances and video demonstrations-addressed varied learning styles and maintained engagement. The emotional impact of mime and visual demonstrations likely enhanced retention through affective learning pathways **[20]**. The virtual delivery format proved feasible and effective, consistent with previous research on health education via digital platforms **[19]**.

Conclusion:

We show that a structured, multi-modal sensitization program significantly improves child safety knowledge and protective practices among early adolescents. The substantial gains across all domains support integrating comprehensive child safety education into school health curricula. However, the modest knowledge-practice correlation highlights the need for holistic interventions that also address self-efficacy, motivation and supportive environmental factors.

Clinical and public health implications:
The findings strongly advocate for the integration of comprehensive child safety education into school curricula at both the elementary and middle school levels. Considering the high prevalence of child maltreatment and the evident gaps between knowledge and practice, such integration emerges as a cost-effective prevention strategy. In addition, healthcare providers should routinely evaluate children's safety knowledge and practices during clinical visits, offering targeted education where necessary. The demographic associations identified in this study further emphasize the need for focused interventions among high-risk groups, particularly children from lower socioeconomic backgrounds, those living in rural areas and those whose mothers have lower levels of education.

Limitations:
The study acknowledges several limitations that should be considered when interpreting the findings. First, the use of a single-group pre-test/post-test design without a control group restricts the ability to establish causal relationships. Second, the short follow-up period of 11 days limits insights into the long-term sustainability of the outcomes. Third, the study was conducted in a single-school setting, which reduces the generalizability of the results to broader populations. Additionally, the reliance on self-reported practice measures may have introduced social desirability bias, potentially inflating reported improvements. Finally, the exclusion of children with poor network connectivity may have led to sampling bias, as this group was not represented in the study.

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