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Original Article

Impact of Health Education on Knowledge, Attitude of Adolescent School Student's Bystander Reach: (Response to Each) Stroke, Heart Attack and Sudden Cardiac Arrest - an Interventional Study

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ABSTRACT

Background: Cardiovascular diseases (CVD), including heart attack (HA) and stroke cause a notable impact on the population thereby detrimentally affecting their health. Risk factor (RF) reduction strategies employed early in life, like through school-based programs, offer opportunities to prevent these diseases in later life. However, their effectiveness needs to be assessed for facilitating wider adoption.

Objective: To assess the insights gained regarding CVD RF, HA, and stroke among school students to promote timely incorporation of desirable health habits.

Methodology: This prospective study enrolled 467 adolescent VIII grade school students from both genders. Baseline (pre-test) knowledge was assessed initially followed by three lecture/workshop sessions addressing 3 domains - CVD RF, HA, and stroke. Post-test knowledge assessment was done and results statistically analysed using McNemar test, with $p \leq 0.05$ indicating statistical significance.

Results: Maximum participation was seen in CVDRF domain (425 students) followed by HA and stroke domains (347 students each). A remarkable reduction in the 'poor' and 'average' score categories and improvement in the 'good' and 'excellent' score categories was observed in all domains which showed statistical significance ($p<0.001$). The mean pre-test insights about CVD RF, HA and stroke were 64%, 56% and 35%, respectively, which increased to 75%, 74% and 57,

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respectively, post intervention ($p<0.05$). The pre-test together with the post-test scores for all the three domains were higher in CBSE-syllabus, English-medium and private-sector schools compared to state-syllabus, Kannada-medium and government-aided schools, respectively
Conclusion: School-based program was associated with notable enhancement regarding insights and apprehensions of the students regarding CVD RF, HA, and stroke.

KEYWORDS: Adolescent, Cardiovascular disease, Health education, Mortality, Myocardial Infarction, Stroke

INTRODUCTION

Chronic non-communicable diseases (NCD) contribute to significant global morbidity and mortality and are amongst the main reasons responsible for preventable premature deaths, killing 41 million patients in a year, which equals 71% of the total mortalities worldwide.[1,2] Nearly 77% of all NCD deaths are present in countries of low to moderate income groups.[1,2] Cardiovascular diseases (CVD) are responsible for a large number of NCD deaths of about 17.9 million subjects per year.[1,2]This places a tremendous economic burden on the society, with the global cost of CVD expected to exceed USD 20 trillion between 2010-2030, out of which around 45% would be as a result of loss of efficacy due to disability, premature death, or absenteeism.[3]

Heart attack (HA) and stroke remain among the most cited reasons for death as well as disability in India.[4] However, they are mostly associated with modifiable behavioral and metabolic risk factors (RF).[1,2] Hence, a critical strategy for limiting these NCDs is focusing upon the reduction of the associated RF.[1,2] A recent study in India found that almost 80% of all study participants had ≥ 2 RF for CVD.[5]In line with World Health Organization's Global NCD Action Plan, India became the first country to develop specific nationaltargets and indicators aimed at achieving a 25% overall reduction in NCD-related mortality by 2025.[6]

The rising health issues of the population posed by CVDs warrants population-wide preventive strategies including inculcation of lifestyle practices that can reduce NCD RF and disease onset in later life.[7,8] Development of sustainable health-promoting behaviors in critical and sensitive periods during early-life development offers opportunities to establish low-risk trajectories for future NCD with far greater effect than traditional secondary strategies.[9]School-based programs designed to improve childhood andadolescent health conduct in addition to wellbeing significantly contribute to this agenda, since they target a significant life phase during which patterns of future health are established.[4,8] These programs should be multidisciplinary, utilizing both educational and health expertise.[4,8] However, designing and assessing the effectiveness of these programs is complex, requiring both short-term and long-term analysis of behavior change.[4,8]

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Therefore, the current study was performed for evaluating the insights and apprehensions regarding CVD RF, HA, and stroke among school students to promote timely incorporation of desirable health conduct.

METHODOLOGY

This prospective, non-randomized, school-based interventional study was performed in Bengaluru, Karnataka, India, from September 2017 to October 2018. Ethical clearance was obtained from the Institutional Review Board (Ref. no. SS-1/EC/70/2016) whereas the Board of Secondary Education, Government of Karnataka, India has also approved this study. Written informed consent was obtained from the principals of the participating schools and the parents of the participating students.

Following convenient sampling, 467 adolescent VIII grade school children were selected from ten schools in northwestern part of Bengaluru. To maintain confidentiality, each school was given a unique identity number ranging from 1-10, allocated randomly.

Baseline information was collected from all the students in the same way using the same questions and data collection methods. The initial survey assessment questionnaire (pre-test) was administered over a period of 30 minutes. This was followed by three different sessions to create awareness among the students regarding three healthcare domains: (i) CVDRF, (ii) heart attack, and (iii) stroke. Each session was allocated 120 minutes and addressed one domain through standardized didactic lecture presentations and activity-based interactive workshops.

Each didactic session covered topics like definition, prevalence, pathophysiology, symptoms, bystanders' response, importance of early intervention, impact, risk factors, preventive resources, and benefit of healthy lifestyle. The delivery methods used during interventional phase remained uniform across all schools and were performed by the same physicians. The delivery language was selected depending upon the medium of teaching followed by the participating schools.
The investigators designed the questions objectively and data collection procedures were followed uniformly to obtain accurate information about the baseline and post-intervention information from the students.

Statistical analysis

Data analysis was performed using SPSS software version 18. Descriptive statistics of scores based upon the insights and apprehensions regarding cardiovascular diseases risk factors, heart attack and stroke were analyzed and categorized into poor, average, good and excellent. The improvement in the insights and apprehensions after intervention were summarized in terms of percentage. Comparative studies were done with the related scores of the insights and apprehensions using McNemar test on the three domains pre-intervention as well as post-intervention. A p-value ≤ 0.05 indicates statistical significance.

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RESULTS

The study consisted of 467 adolescent VIII grade students, comprised of 57% boys and 43% girls (M:F = 1.3:1). Table-1 presents the gender distribution of subjects belonging to each school. While 6 schools saw greater participation from boys, two schools showed greater participation by girls. The total boys and girls who participated from both the schools were equal in number. The maximum boys were 77% and minimum were 46.3%. The maximum girls were 53.7% and minimum were 13%.

The actual number of students who participated in the current study varied for each session due to absence from school for personal reasons on the day of the program. Maximum participation was seen in domain 1 (425 students) followed by domains 2 and 3 (347 students each). The mean pre-test insights of CVD RF, HA and stroke were 64%, 56% and 35%, respectively, which increased to 75%, 74% and 57%, respectively, post intervention ($p<0.05$). Table-2 presents the descriptive statistics of scores in each domain. It was noted that 75 (17.6%) subjects had poor pre-test scores in the CVD RF-domain initially, of which, 34 (45.3%) converted to excellent post-test score category after the intervention. Furthermore, 85 (24.5%) subjects had poor pre-test scores in the HA-domain initially, of which, 14 (16.5%) converted to excellent post-test score category after the intervention. Moreover, 194 (55.9%) subjects had poor pre-test scores in the stroke-domain initially, of which, 25 (12.9%) converted to excellent post-test score category after the intervention.

Table-3 summarizes the comparative analysis between scores in each domain before as well as after the test. Using McNemar test, a notable reduction was observed in the ‘poor’ and ‘average’ score categories whereas enhancement was seen in the ‘good’ and ‘excellent’ score categories in all domains which was of statistical significance ($p<0.001$), implying remarkable development in the insights and apprehensions of the participants after the intervention.

Table-4 presents the statistical analysis of schools based on syllabus, language medium and sector. The pre-test together with the post-test scores for all the three domains were higher in CBSE-syllabus, English-medium and private-sector schools compared to state-syllabus, Kannada-medium and government-aided schools, respectively.

DISCUSSION

Given the enormous health effects caused by NCDs, especially CVDs at individual as well as population levels, there is immense need to address these issues at grassroot level. However, in a developing nation like India, absence of apprehensions together with insufficient availability of diagnosis caused increased patient numbers requiring tertiary care. Strategies which focus upon preventing and treating the disease at secondary level, address the disease once the RF have emerged. While these approaches help to reduce morbidity and mortality, and should continue, some are prohibitively costly, particularly in lower income countries. Hence, involvement of primary health approaches to prevent incidence of NCDs which would retard the exponential

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development of NCD burden globally by prohibiting the progression of RF which may cause the inception of the disease.[10,11] As the onset of atherosclerosis is evident in the later stages of any individual and management of various factors can help in controlling the diseases upon early diagnosis, a better understanding about CVD and associated factors in school-aged children is crucial for preventing this disease at an early stage .[4,12] Hence, the current study was carried out for assessing the insights and apprehensions regarding CVD RF, HA, and stroke among school students to promote timely incorporation of desirable health conduct .

There is presently very little data on apprehensions regarding cardiovascular diseases among school aged children. A study done by Ray et al reported CVD awareness levels to be was only 41% among high school children as assessed by a survey questionnaire and showed modest improvement with the use of a single, simplistic, inexpensive educational intervention, which is less than the present research.[4]

Using a classroom-based approach, Harrel et al showed that there was remarkable enhancement regarding apprehensions about CVD and associated RF (7.9%) along with scoring of physical activity score (3.7%) amongst students studying in elementary school in case of intervention being inclusion of 8 weeks exercise program in addition to nutrition and smoking classes.[13] The group of students under intervention showed decreased levels of total cholesterol, bodily fat, blood pressure as well as increased aerobic capacities in comparison with the control students .[13] In comparison, the current study found notable advancements in high school children's CVD awareness with a lecture-cum-workshop educational intervention. However, exercise interventions and physical parameter recording were not performed in the present research.

Killen and colleagues have shown the importance of imparting the viability of CVD risk-reduction education in school-based viewpoint .[14] The students of the intervention group implemented the regular exercise program following a risk reduction training of 20 sessions as compared to the control students. Also, smokers present in the intervention group had a higher tendency of quitting smoking compared with the control group.[14] While the current study limited its focus on lecture-workshop intervention, significant improvements were noted in students' awareness.

Another prospective, randomized, controlled, multiethnic school-based intervention study in USA, the KIDS (Kids Identifying and Defeating Stroke) Program, found that educational intervention was successful in improving students' stroke symptom and treatment knowledge together with their intention of calling emergency services after going through a stroke in comparison with the control group ($p<0.001$), thus reducing delayed period of hospital arrival.[15]Similar efforts were made in the present research to inculcate within school students, the acumen to recognize and report stroke signs. Widespread amalgamation of such courses in

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school curriculum is needed to mitigate CVD risk effectively and efficiently for the future generation.

Hence, the current study noted significant gain in students' insights and apprehensions regarding CVD RF, HA, and stroke with the current interventions. This could provide a simple educational means to achieving adolescent cardiovascular health consciousness and responsiveness. Effective curriculum incorporation of such behavior-modifying practices could provide different avenues for students for validation of affirmative health propagating beliefs and intentions and intentions. The study has its limitations like including a smaller, geographically limited sample, simple intervention not using mixed methods, and lack of detailed assessment design such as behavior change evaluation. Future research should be performed on a larger population for assessing the efficacy of such interventions. Use of a larger population would also help in gaining insights regarding interpretation at subgroup levels based on risk level, gender, socioeconomic status. Further direction is required to develop effective instructional strategies to achieve health related goals and behavioral outcomes. It is also necessary to generate positive perceptions about protective behaviors and to remove negative perceptions about risk behaviors right from the beginning.

CONCLUSION

School-based intervention program was associated with remarkable enhancements regarding insights and apprehensions of the students regarding CVD RF, HA, and stroke.

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LEGENDS

Table-1: Gender distribution of participants from each school
Table-2: Descriptive statistics of scores in each domain
Table-3: Comparative distributionof pre-test and post-test scores in each domain
Table-4: Statistical analysis of schools based on syllabus, language medium and sector

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Table-1: Gender distribution of participants from each school

School No.	No. of girls	No. of Boys	Total
1	14 (50%)	14 (50%)	28
2	31 (53.7%)	27 (46.3%)	58
3	3 (23%)	10 (77%)	13
4	13 (27%)	35 (73%)	48
5	14 (45%)	17 (55%)	31
6	15 (46%)	17 (54%)	32
7	13 (31%)	29 (69%)	42
8	52 (48%)	56 (52%)	108
9	17 (50%)	17 (50%)	34
10	30 (41%)	43 (59%)	73
Total	**202 (43%)**	**265 (57%)**	**467**

Table-2: Descriptive statistics of scores in each domain

Domain	Pre-test score	Post-test score				Total
		Poor	Average	Good	Excellent	
Cardio-vascular disease risk factors	Poor	5 (6.7%)	13 (17.3%)	23 (30.7%)	34 (45.3%)	75
	Average	2 (2.3%)	14 (16.3%)	28 (32.6%)	42 (48.8%)	86
	Good	6 (6.1%)	10 (10.2%)	26 (26.5%)	56 (57.1%)	98
	Excellent	1 (0.6%)	9 (5.4%)	7 (4.2%)	149 (89.8%)	166
	Total	*14 (3.3%)*	*46 (10.8%)*	*84 (19.8%)*	*281 (66.1%)*	*425*
Heart attack	Poor	19 (22.4%)	22 (25.9%)	30 (35.3%)	14 (16.5%)	85
	Average	8 (6.9%)	38 (32.8%)	48 (41.4%)	22 (19%)	116
	Good	1 (1%)	11 (11.5%)	38 (39.6%)	46 (47.9%)	96
	Excellent	0 (0%)	2 (4%)	10 (20%)	38 (76%)	50
	Total	*28 (8.1%)*	*73 (21%)*	*120 (36.3%)*	*120 (34.6%)*	*347*
Stroke	Poor	77 (39.7%)	41 (21.1%)	51 (26.3%)	25 (12.9%)	194
	Average	11 (12.1%)	20 (22%)	36 (39.6%)	24 (26.4%)	91
	Good	2 (3.8%)	5 (9.4%)	24 (45.3%)	22 (41.5%)	53
	Excellent	0 (0%)	1 (11.1%)	4 (44.4%)	4 (44.4%)	9
	Total	*90 (25.9%)*	*67 (19.3%)*	*115 (33.1%)*	*75 (21.6%)*	*347*

Table-3: Comparative distribution of pre-test and post-test scores in each domain

Domain	Score category	Pre-test	Post-test	p-value
Cardio-vascular	Poor	75 (17.6%)	14 (3.3%)	<0.001

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disease risk factors (n=425)	Average	86 (20.2%)	46 (10.8%)	
	Good	98 (23.1%)	84 (19.8%)	
	Excellent	166 (39.1%)	281 (66.1%)	
Heart attack (n=347)	Poor	85 (24.5%)	28 (8.1%)	<0.001
	Average	116 (33.4%)	73 (21%)	
	Good	96 (27.7%)	126 (36.3%)	
	Excellent	50 (14.4%)	120 (34.6%)	
Stroke (n=347)	Poor	194 (55.9%)	90 (25.9%)	<0.001
	Average	91 (26.2%)	67 (19.3%)	
	Good	53 (15.3%)	115 (33.1%)	
	Excellent	9 (2.6%)	75 (21.6%)	

Table-4: Statistical analysis of schools based on syllabus, language medium and sector

Variable		**Domain**					
		Cardio-vascular disease risk factors (n=425)		**Heart attack (n=347)**		**Stroke (n=347)**	
		Pre-test	**Post-test**	**Pre-test**	**Post-test**	**Pre-test**	**Post-test**
Syllabus	CBSE	71%	76%	72%	84%	45%	68%
	State	57%	71%	46%	67%	29%	56%
Language medium	English	61%	79%	59%	75%	35%	61%
	Kannada	47%	57%	42%	64%	35%	62%
Sector	Private	61%	79%	59%	75%	35%	61%
	Government-aided	47%	57%	42%	64%	35%	62%