African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper   Open Access

STUDENT STROKE CHAMPIONS: A STROKE LITERACY PROGRAM FOR HIGH SCHOOL CHILDREN IN URBAN BANGALORE

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ABSTRACT

Background and Purpose— Early Recognition and access to care of stroke in the community is a global challenge. Multiple studies have demonstrated considerable delay in stroke recognition which in turn pose a barrier to acute stroke treatment. [1] We have developed a simple yet comprehensive stroke education program for high school children to learn stroke recognition and bystander response and educate the parents and family regarding the same.

METHODS— A standard training module of 1 hour based on the "FAST" mnemonic was developed and implemented in 338 high school students of ten schools in urban Bangalore. Both public and private schools we included in the study. In addition to a pre and post-test before and after our training, an evaluation form was given to the students after 3 months. An Assignment given to children to encourage parental interaction and consequent spread of stroke awareness.

RESULTS— The four questions in the pre and post-test dealt with knowledge aspects of stroke, its recognition and bystander response. We found a statistically significant improvement in the correct answers by the students in the posttest after our training (*p< 0.001)* and significant Z values on the Wilcoxon Sign-Rank Test. Data from the evaluation forms 3 months post-training after the training. 42.43 % of the students were able to name atleast two risk factors. Upon asking to name components of "FAST" we found that 37 % of the students were able to name three and 34 % all four components.

CONCLUSIONS— High school children can be educated about stroke risk factors and its recognition using a simple measurable training model and can potentially spread awareness in their own family.

KEYWORDS: Stroke, High school, risk factors, awareness

INTRODUCTION:

70 percent of the strokes in the world occur in low-middle income countries (LMICs) like ours and consequently the burden of disease is greater than the developed world. With increasing life expectancy to over 60 years in our country, we see a dramatic increase in non-communicable diseases including stroke. Stroke is the commonest cause of mortality after coronary artery disease in the world and is our country's fourth leading cause of death.[2]

Lack of immediate care and stroke severity are the causes of fatalities. There are many barriers to patients of stroke receiving appropriate and timely care including lack of awareness and consequently failure to recognize stroke symptoms. This in turn leads to delayed presentations to hospitals and lower rates of thrombolysis in ischemic strokes. In addition to the above in rural settings distance to hospitals is also a key contributor to late presentation to hospitals. In major urban centers, the average time to present to hospital emergency department was 7.66 hours.[1]

In any community, recognition of a stroke plays a larger challenge and 95.5 % of the time relatives or bystanders call for help. Therefore, the authors felt training all members of the community including our youngsters in not just stroke recognition but knowledge of risk factors and its mitigation will go a long way in the fight against stroke.[3]

HeartRescue India (HRI) is an international program working with healthcare and community partners in Bangalore to improve access and quality for acute cardiovascular disease (CVD) care. HRI has engaged multisector stakeholders including government agencies, medical professional societies, local health care providers, community groups, patients, and their families to strengthen acute CVD systems of care. [4] A key aspect of the HRI program is training 8th grade school children in recognizing heart attack, Hands-only CPR and CVD risk factors. Stroke literacy was an important module in this training. [5]

One of the earliest stroke literacy programs called Hip Hop Stroke for Children proved that indeed adult members of the community can be educated by educating the children.[6] Similar studies have shown the "FAST" (Facial weakness, Arm weakness, Speech, and Time) tool to be simple and easy to understand for school children.[7]

Czech Republic spearheaded this with their innovative web-based learning program called the HOBIT campaign which roughly translates in English to one lesson of biology to save a life.[8] Although there is plenty of literature focussed on stroke awareness in adults, few have explored stroke literacy for school children. Introducing a specific stroke literacy module comprising knowledge of risk factors and stroke symptom recognition for school children at a time when most schools mandatorily teach first-aid and CPR could assist in the holistic outlook of these children. Thus, making them effective bystanders in times of emergency.

We therefore felt a paradigm shift is needed in stroke education for the community where instead on educating the adults we focus on young minds who we believe are likely to spread the awareness whilst being aware themselves. We envision grooming the young children to be stroke champions, to train other members of the community.

METHODOLOGY

Our study was conducted in the academic year of 2018-19 after approval from the institutional ethical review board. In total, 530 students were enrolled from 10 urban schools (Government and Private Schools) in Bangalore in the entire 10-module program. However, owing to absenteeism 338 students were included in the study and underwent the stroke module implementation.

The purpose of this module is for the student to learn about and recognize symptoms of stroke. The entire module takes 1 hour of classroom time and was implemented on the campuses of each of the ten participant schools by the authors along with emergency medicine nurses and science teachers of the school. The training encompassed a pre and post-test comprising 4 multiple-choice questions that addressed the key knowledge elements and were the following:

1) What is a stroke?
2) What is / are the risk factors for stroke?
3) Symptoms of stroke are_____
4) What will you do when you identify a person who could be having a Stroke?

The trainers subsequently in an interactive session discussed with the students what a stroke is, the risk factors of stroke, and its prevention. The students were trained to identify stroke using the American Stroke Association recommended "FAST" tool. The knowledge was delivered using live dramatization from the trainers with the help of the science class teacher. The students thereafter completed the post-test of the same questions. To trigger a conversation between the students and their parents regarding the stroke risk factors and their recognition, a handout (Figure 1) was given to them to teach their parents and in addition, an assignment was given to all students to ask their parents if anyone in their family has had a stroke. If they did, write about how it happened and what medical treatment was given. To assess retention of knowledge, a 3-question evaluation form was administered to the students with the help of the school science teacher 3 months after the training in each of the schools separately. We focussed the evaluation on the key learning outcomes desired. The questions were

1) Which part of the body does stroke affect?
2) Name the risk factors for stroke
3) Name components of "FAST"

Figure 1: FAST Handout

RESULTS

A total of 338 8th grade students from 10 public and private schools of Bangalore were included in the study and paired analysis of the pre and post-test data was done. The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft Word and Excel were used to generate graphs, tables, etc**.** Descriptive and inferential statistical analysis has been carried out and results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at a 5 % level of significance. We analyzed the data using The Wilcoxon signed rank sum test. [9-12] Upon analysis of the pre and post-test data, we found that when students were asked what a stroke is 49 (14.5 %) answered correctly prior to the training and although 37 students (10.9 %) did not attempt to answer in the post-test, 302 (89.1%) students answered correctly post-training (Table 1) which is a statistically significant improvement $(Z=-13.548, p< 0.001)$. When asked about risk factors of stroke prior to training (Table 2), 96 (28.3%) students answered correctly which improved to 301(88.8%) answering correctly after our training which is a statistically significant improvement $(Z=-12.978, p< 0.001)$. We saw similar trends in improvement $(Z=-7.879, p< 0.001)$ when asked about stroke symptoms where a fair number of children (Table 3) i.e., 132 (38.9%) had the knowledge and answered correctly in pre-test. Subsequently, we noted an improvement to 301(88.8%) students answering correctly. Lastly, Students when asked a question which dealt with bystander response (Table 4), a reassuring 188 (55.5 %) of the students answered correctly prior to training which improved to 299 (88.2 %) students who answered correctly post training which is a statistically significant improvement $(Z=-10.518, p< 0.001)$.

What is a stroke?	PRE-TEST	POST-TEST	% Difference
0	1(0.3%)	37(10.9%)	10.6%
1	179(52.8%)	0(0%)	-52.8%
2	36(10.6%)	0(0%)	-10.6%
3	74(21.8%)	0(0%)	-21.8%
4	49(14.5%)	302(89.1%)	74.6%
Total	339(100%)	339(100%)	-

Table 1: Question 1-Frequency distribution of pre and post-test answers

| What is / are the risk factors for stroke?	PRE-TEST	POST-TEST	% Difference
0	1(0.3%)	0(0%)	0.3%
1	58(17.1%)	0(0%)	-17.1%
2	51(15%)	0(0%)	-15.0%
3	133(39.2%)	38(11.2%)	-28.0%
4	96(28.3%)	301(88.8%)	60.5%

| Total | 339(100%) | 339(100%) | - |

Table 2: Question 2-Frequency distribution of pre and post-test answers

Symptoms of stroke are	PRE-TEST	POST-TEST	% Difference
0	0(0%)	0(0%)	0.0%
1	94(27.7%)	54(15.9%)	-11.8%
2	56(16.5%)	0(0%)	-16.6%
3	57(16.8%)	0(0%)	-16.8%
4	132(38.9%)	285(84.1%)	45.2%
Total	339(100%)	339(100%)	-

*Table 3: Question 3-Frequency distribution of pre and post-test answers*

What will you do when you identify a person who could be having a Stroke?	PRE-TEST	POST-TEST	% Difference
0	0(0%)	0(0%)	0.0%
1	37(10.9%)	0(0%)	-10.9%
2	99(29.2%)	0(0%)	-29.2%
3	188(55.5%)	299(88.2%)	32.7%
4	15(4.4%)	40(11.8%)	7.4%
Total	339(100%)	339(100%)	-

*Table 4: Question 4-Frequency distribution of pre and post-test answers*
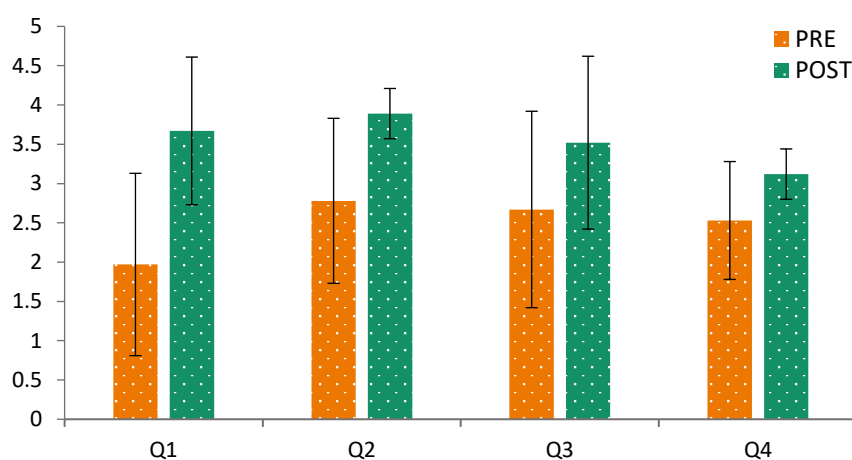
Figure 2: Comparison of effectiveness of school-based Stroke literacy program at pre and post-test

When we analysed the data from the evaluation forms given to the students 3 months after the training. It was quite reassuring to us as far as knowledge retention was concerned. All 338 students answered "Brain" when asked which part of the body the stroke affects. Thereafter, when asked to name risk factors for stroke, 42.43 % of the students were able to name two, and 28 % of the students had three risk factors (figure 3).

*Figure 3: Knowledge of stroke risk factors at 3 months*
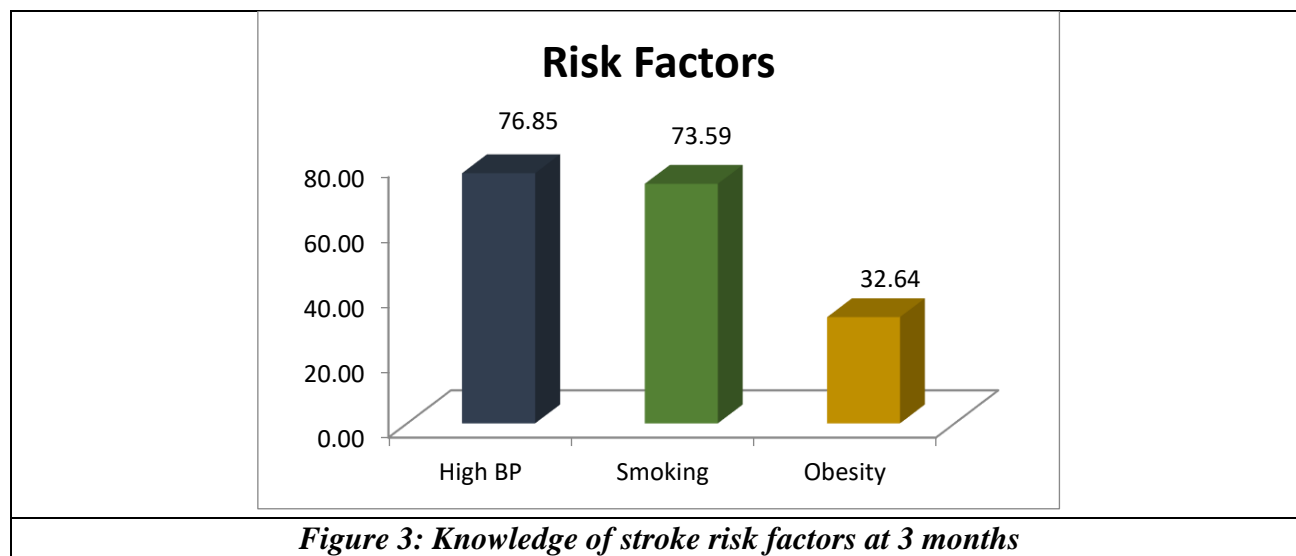
76.5 % of the children named High blood pressure followed by 73.59 % of the students mentioning stroke and 33 % of the students mentioned obesity. 42.43 % of the students were able to name two and 28 % of the students three risk factors. Upon asking to name components of "FAST" we found that 37 % of the students were able to name three and 34 % all four components of "FAST" (figure 4).

Figure 4: Knowledge of "FAST" components at 3 months
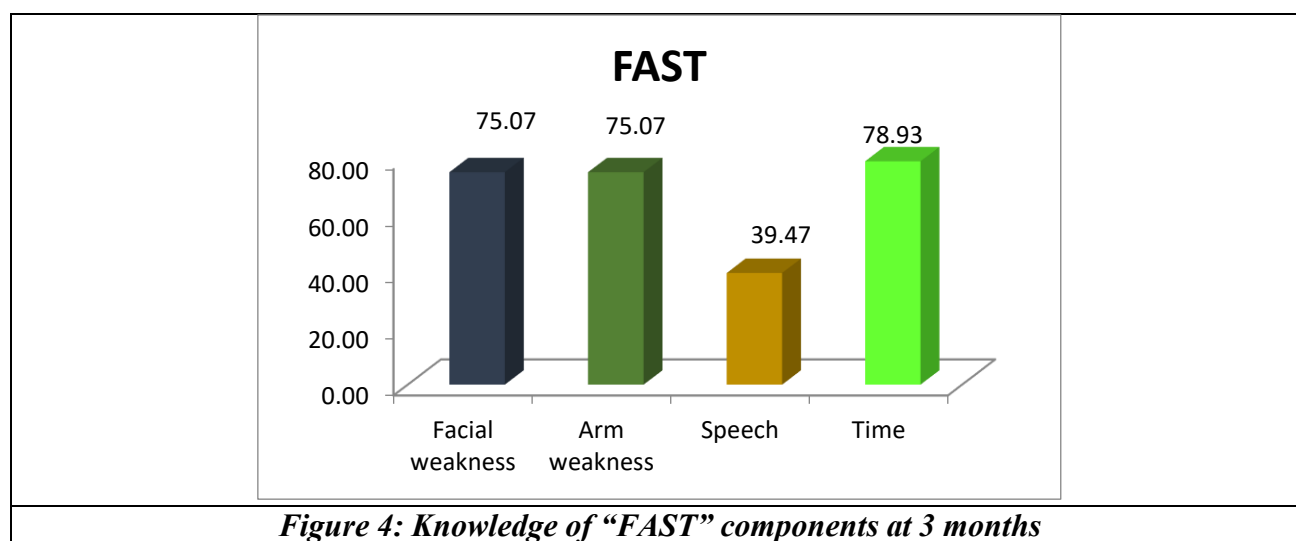
In summary, the Wilcoxon Sign-Rank Test indicated that median post-test ranks were higher for the answers by the students than the pre-test ranks for all questions (Table 5).

Variables	PRE	POST	Difference	95% Confidence Interval of the Difference		Z Value	P Value
				Lower	**Upper**		
Q1	1.97±1.16	3.67±0.94	-1.699	-1.856	-1.543	-13.548	<0.001**
Q2	2.78±1.05	3.89±0.32	-1.106	-1.225	-0.987	-12.978	<0.001*
Q3	2.67±1.25	3.52±1.1	-0.853	-1.030	-0.675	-7.879	<0.001*
Q4	2.53±0.75	3.12±0.32	-0.584	-0.673	-0.495	-10.518	<0.001*
Table 5: Comparison of effectiveness of school-based Stroke literacy program at pre and post-test							

Figure 2: Comparison of effectiveness of school-based Stroke literacy program at pre and post-test
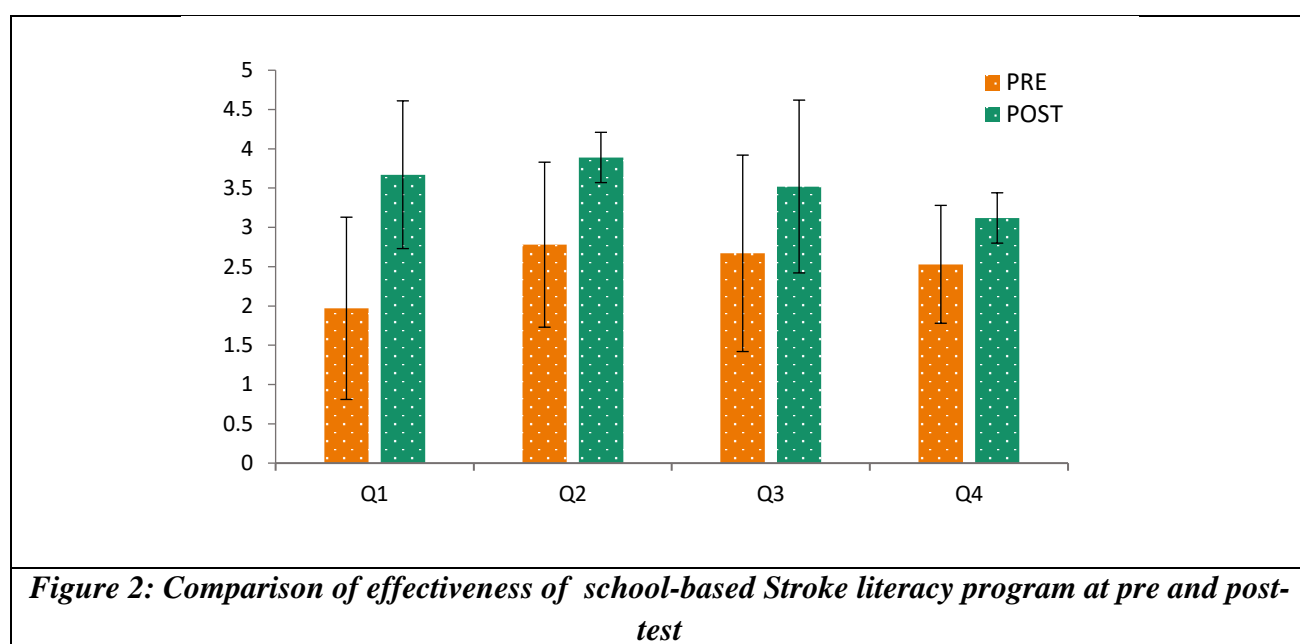
DISCUSSION:

Ultimately in our study, our overarching goal is to elevate the overall awareness of the community regarding stroke risk factors, recognition, and appropriate response. The impact is two-pronged. It is obvious that the children themselves will be effective bystanders when faced with a family member having a stroke. Secondly, we hypothesize that high school children are more likely to communicate the knowledge regarding stroke and its risk factors to all members of the family. In our study we observed across all aspects relevant to stroke, there was significant improvement of posttest scores and thereafter satisfactory results on the evaluation forms after three months. We demonstrated that high school children are fully capable of understanding and assimilating knowledge aspects of stroke risk factors, recognition, and response with satisfactory retention at 3 months after training.

One of the landmark studies in this domain was conducted by Olajide Williams and colleagues which aimed to achieve stroke awareness in adults by engaging high school children was conducted in Harlem, New York, USA. That part of USA had high incidence of stroke but delayed presentations to hospitals as is seen in our country. The authors used a school-based intervention which was creatively tailored with videos and songs and children and parents both were evaluated for improvement after a

baseline assessment and at 3 months post-intervention. They were able to conclude that children can be effective conduits for stroke literacy.[6]

In a study like ours by Khan et al, the authors aimed to improve stroke awareness including its treatment through a brief educational intervention in high school and college students. They determined that in areas of stroke risk factors, symptoms, and treatment modality significant improvement was achieved by a brief training. In our study, our focus was similar in all aspects except we insisted on the FAST mnemonic and we ensured parental engagement by way of an assignment. We also attempted to evaluate retention at 3 months post-training and received satisfactory results. [13]

In a study by Jennifer et al, with her colleagues attempted to improve stroke awareness especially recognition using the "FAST" tool among the elderly at senior care centers by engaging nurses. They concluded that the FAST tool is simple yet effective and they were able to significantly increase awareness. As hypothesized by us FAST is proven to be simple yet effective for community-based education and therefore we used the same in our study. [14] It is interesting to note that a lot of the research in this area was done in Japan. Of note, Amano T et al implemented a stroke education program based on "FAST" in 3 high schools, and knowledge was assessed at baseline, post-intervention, and after 3 months in students like our study. They also went on to assess knowledge of the "FAST" tool at 3 months among parents. They concluded that the "FAST" message is effective in educating children and their parents. [7]

Another study of note is one of the large studies from Japan by Matsuzono K et al, where they investigated the impact of stroke education in 1127 high school students much like our study. Like our study they assessed the students at baseline evaluated them for improvement after training and encouraged students to go back and talk to their parents about their learning. It is interesting to note the use of a traditional comic series to deliver the same. This study in addition to the "Hip-hop stroke" study mentioned earlier again reiterates the need for unique teaching methodologies to be adopted. We took cognizance of the same and used dramatization to favour learning of stroke symptoms and its recognition. [15]

Like our study, Tomari S et al, too implemented a stroke education program much like the authors above but they differed in their methodology by engaging emergency medicine technicians from the regional fire centre to deliver the awareness. They nonetheless found that the stroke education delivered to the children and parents were significant and effective. [16]

In our study, the stroke education was conducted by health care personnel actively working in the emergency department, we feel this has a positive impact in brining context and, they trainers can speak from experience on the need for early recognition. Although our model works effectively to enhance knowledge of students and ensures retention, our limitation was we did not quantify the parental engagement by the students.

CONCLUSION

Stroke is a major public health concern in our country. Although efforts to improve access to care is being done at a rapid pace however, community awareness is less than desired. While we strive to educate the adult members of our society on stroke risk factors and its recognition, we strongly recommend focussing our efforts in educating and empowering our school children with this knowledge. In our study we have proposed and demonstrated a financially and logistically feasible model which can be scaled state and nation-wide in schools. Schools have an incredible potential to serve as a platform for a myriad of public health interventions. We envision school children as stroke champions working towards creating stroke awareness in the society.

Dr. Aruna C Ramesh / Afr.J.Bio.Sc. 6(9) (2024)

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