

Impact of Compression Only Life Support Workshop on the Basic Life Support Knowledge in Lay People Aged 18-70 Years from Maharashtra.**Hitendra C Mahajan¹, Sunita Sankalecha², Ruchira Wasudeo Khasne³, Nupur Sujay Patil⁴, Sahil Sankalecha⁵, Jeetendra Singh⁶**¹Professor, Department of Anaesthesiology, Parbhani Medical College, Parbhani²Professor and Head, Department of Anaesthesia, GMC & MPGIMER, MUHS, Nashik³consultant and Head, Critical Care Medicine, SMBT Institute of Medical Sciences and Research Centre, Igatpuri, Nashik⁴III MBBS, SMBTMS and RC, Igatpuri, Nashik⁵Intern, SMBT Institute of Medical Sciences and Research Centre, Igatpuri, Nashik⁶Professor and Head, Department of Pharmacology, GMC&MPGIMER, MUHS, Nashik

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Abstract:

Background and Aims: Compression-only life support (COLS) is a part of emergency care for cardiopulmonary resuscitation of cardiac arrest victims by lay persons outside the hospital which is developed by Indian resuscitation council of Indian Society of Anaesthesiologists. Timely provision of basic lifesaving skills such as COLS to cardiac arrest victims on the site positively influences the final outcome. But the overall awareness and training of life saving skills like COLS among lay people is reported to be poor in India. We present this study which assessed current knowledge about COLS and impact of structured COLS workshops among the general adult population of Maharashtra. We also studied association of various socio demographic variables including literacy status on knowledge acquisition and tried to find suitable recommendations.

Methods: Audiovisual demonstration followed by hands-on training of COLS was conducted. All the participants were subjected to pre and post-test before and after the demonstration and hands-on workshop using a pre designed, pre tested questionnaire. Questionnaire contained demographic information and questions on assessment of knowledge of people about COLS. There were 11 questions on various aspects of COLS with a maximum score of 20. Statistical analysis was done by using statistical software SPSS Version 18. Paired 't' test and 'Chi Square' test was used for analysis and p value equal to or less than 0.05 was considered significant.

Results: Among 1249 participants ranging between 18 years to 78 years were divided in different groups as per the gender and educational level. The gender distribution was comparable among different age groups. For all the groups, the mean post-test knowledge score was statistically significantly high as compared to pre-test score, indicating significant improvement in knowledge by attending the COLS workshop. The pre and post test results among both the genders were equal with no statistical difference showing equal grasping power. Whereas the literacy and educational status among the lay people made significant difference.

Conclusions: Regular COLS hands-on workshop teaching to lay people is highly effective in improving basic lifesaving skills. More the literacy/ educational status of the lay person, better is the understanding and execution of COLS knowledge.

Keywords: Compression-only Life Support, Basic Lifesaving Skills, Workshop

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Introduction

Basic life support (BLS) skill is a part of emergency medical care. It is given to the victims of life-threatening illness and injuries until the arrival or provision of well-equipped medical services. In the present lifestyle scenario, cardiac arrest and accidents are increasing in frequency and these two are the most common emergencies with grave prognosis and thus should be dealt with immediately. With simple interventions like BLS skills, many times high mortality rates can be

prevented. [1,2,3,4] In developed countries like the USA, BLS training has been recommended as a compulsory part of curriculum since 1966. [6,7,8] Such practices have recently started in our country. On the other hand, we are having a shortage of medical professionals in India. [5] In India, many studies have been conducted to know and to spread the awareness of medical care amongst the persons linked with the health care delivery system like medical students, nursing staff, paramedical

personnel [9,10,11]. But similar studies are lacking when it comes to lay public who are present on the site and can provide necessary help when they face cardiac arrest victims.

In India, the Indian Resuscitation Council formed by the Indian Society of Anaesthesiologists (ISA) has developed Compression-only life support (COLS), as a practice guideline of cardiopulmonary resuscitation (CPR) for resuscitating cardiac arrest victims outside the hospital by layperson. [4] The aim of the COLS guideline is to provide a step-wise approach in accordance with core links for an optimal outcome. Compression-only CPR is as effective care as conventional CPR for cardiac arrest at home, at work or in public. [4]. To increase awareness and to teach more and more lay people about COLS, it has been included in school curriculum and hands-on workshops are conducted on a regular basis all across India. But the effectiveness of such workshops is not studied scientifically. Hence, we decided to conduct a population-based study to assess the effectiveness of COLS hands-on workshops among the general population and also to provide measures to improve the situation. This study was designed to give preliminary training to lay public about COLS through structured hands-on workshops and to assess the knowledge they gain about COLS through such workshops. The secondary aim was to see the effect of gender and literacy / educational status on knowledge acquisition.

Timely provision of BLS saves lives of the people in need. But, training in emergency medical services is reported to be poor in India. [9,10,11] There is a shortage of medical professionals in India which can be assessed by present census.[5] Appropriate response in an emergency situation depends upon good knowledge and skills and which further decides the victim's outcome. That makes it important to train more and more laypeople to help cardiac arrest victims by appropriately applying COLS techniques before they reach the hospital or the ambulance with trained paramedics takes over. In the last few years there is a rise in the number of COLS hands on workshops getting conducted all across India to train lay public. We decided to do community-based study to check its effectiveness and find out shortfalls.

We present this study with the primary objectives to study the impact of structured COLS workshops on knowledge gained by the general adult population. And secondary objective to study association of various socio demographic variables and literacy / educational level with acquisition of knowledge about COLS.

Methods

This was an interventional study conducted in Nashik, Satara and Kolhapur districts of Maharashtra state which were randomly selected. The Institutional Ethical Committee approval was taken before starting the study and the study was registered in the Clinical Trials Registry -India (REF/2018/10/022060 (DE). The minimum sample size was calculated as 1046 with the help of findings from a previous interventional study on BLS by taking 5% significance level and 80% power. The participants were included by using consecutive sampling methods over the study duration (At each study site- on an average of two workshops in a month which will have minimum 15 participants, so monthly minimum 30 participants were included). This study included a single site in each selected district. The study was conducted in public places, railway stations, temples, bus stands all across Maharashtra over the period of 6 months.

The prior written informed consent of participants was taken before starting the workshop. Lay people between 18 to 70 years of age of either gender who were willing to participate in hands-on COLS workshops were included in this study. All the participants were subjected to pre-test and post-test of the designed questionnaires.

The workshop was conducted based on the COLS module described by Indian Resuscitation Council of Indian Society of Anaesthesiologists to impart knowledge on BLS to the same group of participants (laypeople)[4]. Participants who could not complete the training as per module and participants who submitted incomplete pre-test or post-test questionnaires were excluded from this research. The socio-demographic information was collected by self-administered questionnaire while pre-test and post-test questionnaires were used to assess the level of basic life support knowledge. (Annexure attached).

'Laypeople' (also laymen or laywomen) is defined as a person who is not qualified in a given profession and/or does not have specific knowledge of a certain subject. *Jeevansanjivani* term is used in this study which generally means 'giving life' or 'panacea'. This term was used for denoting that training in COLS for cardiopulmonary resuscitation will help them in saving the life of a person in an emergency outside the hospital environment.

COLS (Jeevansanjivani) hands-on workshop included 5 to 10 minutes of the audiovisual and hands-on demonstration on mannequin by qualified instructors about identifying the cardiac arrest victim, safe site check, call for help and chest compressions at specific site with specific depth and rate at the count of 1 to 30, as described by IRC COLS module.[4]. After the demonstration,

each participant was made to practice for a minimum of 5 min (Total 60 min duration – single session) on the mannequin. After completion of hands-on training post-test was conducted. At the end of the workshop, written feedbacks from the participants were taken. Certificate of participation was given as an incentive for the workshop to each participant who successfully completed the module.

Data Collection Instrument / Method: Pre-validation was done by 5 to 6 subject experts. A pre designed, pre tested questionnaire was used before and after the workshop as pre and post-test. Questionnaire contained demographic information and questions for assessment of knowledge of people about COLS. There were 11 questions on various aspects of COLS training containing a maximum score of 20. Post validation was conducted after pilot study for assessing the validations of questionnaires.

Statistical analysis was done by using statistical software SPSS (Statistical Package for the Social Sciences) Version 18. Paired 't' test and 'Chi Square' test was used for analysis and p value equal to or less than 0.05 considered significant.

Parts of Module

- Consent, social and demographic information collected
- Pre-test conducted
- Demonstration of BLS activity as per mentioned module (5-10 mins)
- Exact module/Drill - Tapping the shoulder to check response (5-10 seconds) - If no response shout to take the help of people around you and call for ambulance(108) (5-10 seconds) - Do chin lift, head tilt, clear the airway of any vomitus (5 seconds) - Start chest compressions - Sit by the side of the victim on knees - Place both the palms with interlocking fingers on the sternum(chest bone), keep elbows straight - Compress chest 2 inches(5cm) and let recoil - Give 100-120 compressions in a minute - Continue the process yourself or ask the help of the helper to continue the compressions - Do this till the victim responds or medical help arrives.
- After demonstration hands on training for each participant for 5 mins (Total 60 mins duration-single session)
- After completion, post test conducted and written feedback taken
- Certificate of participation given as incentive of workshop.

Results

Observation & Results

Age	
N	1249
Mean	33.8 Years
Std. Error of Mean	0.33
Std. Deviation	11.468
Minimum	18 Years
Maximum	78 Years

Mean age of participants was 33.8 ± 11.468 years. Among 1249 participants, minimum age was 18 years and maximum age was 78 years.

Age Groups	Frequency	Percentage
< 20 years	131	10.5
20-40 years	810	64.9
40-60 years	276	22.1
> 60 years	32	2.6
Total	1249	100.0

75.3% (941) participants were of age ≤ 40 years and 24.7% (308) participants were > 40 years old.

Gender	Frequency	Percentage
Female	695	55.6
Male	554	44.4
Total	1249	100.0

Age Groups * Gender			Gender		Total
			Female	Male	
Age Groups	< 20 years	Count	91	40	131
		% within Age Groups	69.5%	30.5%	100.0%
	20-40 years	Count	502	308	810
		% within Age Groups	62.0%	38.0%	100.0%
	40-60 years	Count	93	183	276
		% within Age Groups	33.7%	66.3%	100.0%
	> 60 years	Count	9	23	32
		% within Age Groups	28.1%	71.9%	100.0%
Total		Count	695	554	1249
		% within Age Groups	55.6%	44.4%	100.0%

Chi-square (χ^2) = 86.98, df = 3, P value = < 0.001 (Highly significant)

Above table shows that, gender distribution was comparable among different age groups as the difference found between age groups and gender was not significant statistically. So, sample was homogeneous for age and gender distribution for a given* study population.

Paired 't' test:

Variable	Groups	N	Mean	SD	t	df	P value
Knowledge score	Pre-test	1249	5.4	2.319	-40.6	1248	< 0.001*
	Post-test	1249	8.2	2.003			

* indicates that P value is Highly Significant. The mean post-test knowledge score (8.2 ± 2.003) was high as compared to pre-test score and this difference was highly significant statistically.

Thus, participant's knowledge was significantly improved by attending the COLS-'Jeevan Sanjeevani' workshop.

Question No.	Group	Mean score	N	SD	t	df	P value
1	Pre-test	0.3	1249	0.443	-38.8	1248	< 0.001*
	Post-test	0.8	1249	0.374			
2	Pre-test	0.4	1249	0.493	-32.3	1248	< 0.001*
	Post-test	0.9	1249	0.324			
3	Pre-test	0.3	1249	0.457	-22.6	1248	< 0.001*
	Post-test	0.7	1249	0.477			
4	Pre-test	0.4	1249	0.497	-11.2	1248	< 0.001*
	Post-test	0.6	1249	0.486			
5	Pre-test	0.9	1249	0.319	-9.1	1248	< 0.001*
	Post-test	1.0	1249	0.174			
6	Pre-test	0.4	1249	0.487	-15.1	1248	< 0.001*
	Post-test	0.6	1249	0.482			
7	Pre-test	0.8	1249	0.384	-11.1	1248	< 0.001*
	Post-test	0.9	1249	0.244			
8	Pre-test	0.7	1249	0.470	-6.1	1248	< 0.001*
	Post-test	0.8	1249	0.430			
9	Pre-test	0.3	1249	0.437	-27.1	1248	< 0.001*
	Post-test	0.7	1249	0.470			
10	Pre-test	0.3	1249	0.453	-9.1	1248	< 0.001*
	Post-test	0.4	1249	0.494			
11	Pre-test	0.7	1249	0.472	-15.3	1248	< 0.001*
	Post-test	0.9	1249	0.348			

* Indicates that P value is highly significant. The mean post-test knowledge scores for all questions asked (11 in total) were more as compared to pre-test scores and this difference was significant statistically.

Thus, participant's knowledge was significantly improved in all aspects of the given topic by attending the COLS workshop. The highly significant knowledge gain was seen with question number 1, 2, 3 & 9.

Paired Samples Correlations	N	Correlation	Sig.
Pre Q1 & Post Q1	1249	0.2	< 0.001*
Pre Q2 & Post Q2	1249	0.3	< 0.001*
Pre Q3 & Post Q3	1249	0.3	< 0.001*
Pre Q4 & Post Q4	1249	0.4	< 0.001*
Pre Q5 & Post Q5	1249	0.3	< 0.001*
Pre Q6 & Post Q6	1249	0.3	< 0.001*
Pre Q7 & Post Q7	1249	0.4	< 0.001*
Pre Q8 & Post Q8	1249	0.4	< 0.001*
Pre Q9 & Post Q9	1248	0.3	< 0.001*
Pre Q10 & Post Q10	1249	0.4	< 0.001*
Pre Q11 & Post Q11	1249	0.4	< 0.001*

Independent samples (Unpaired) 't' test:

Score	Gender	N	Mean	SD	t	df	P value
Pre-Test	Male	554	5.27	2.360	-1.65	1247	0.100
	Female	695	5.49	2.282			
Post-Test	Male	554	8.44	1.809	3.38	1247	0.001*
	Female	695	8.05	2.130			

* indicates that P value is significant. The mean pre-test score was comparable with respect to gender among the participants of the workshop. But the mean post-test score was high in male participants as compared to female participants of the workshop and this difference was significant statistically. Male participants showed more improvement in the knowledge gained by attending the workshop.

Paired 't' test:

Gender	Score	N	Mean	SD	t	df	P value
Female	Pre Test	695	5.49	2.282	-28.1	694	< 0.001*
	Post Test	695	8.05	2.130			
Male	Pre Test	554	5.27	2.360	-29.8	553	< 0.001*
	Post Test	554	8.44	1.809			

* indicates that P value is highly significant.

One-way ANOVA test:

Score Vs Age groups	N	Mean	SD	F	df	P value	
Pre-Test	< 20 years	131	5.37	2.013	1.09	3	0.353
	20-40 years	810	5.46	2.384			
	40-60 years	276	5.26	2.246			
	> 60 years	32	4.84	2.411			
	Total	1249	5.39	2.319			
Post-Test	< 20 years	131	8.25	2.080	1.06	3	0.366
	20-40 years	810	8.28	2.014			
	40-60 years	276	8.11	1.939			
	> 60 years	32	7.78	1.913			
	Total	1249	8.22	2.003			

* indicates that P value is Significant.

Occupation	N	Mean	SD	F	df	P value	
Pre-Test Score	Post-Graduate	319	6.0	2.835	45.4	2	< 0.001*
	Graduate	189	6.3	2.016			
	< 10th Grade	741	4.9	1.991			
	Total	1249	5.4	2.319			
Post-Test Score	Post-Graduate	319	9.0	1.423	67.6	2	< 0.001*
	Graduate	189	8.9	1.369			
	< 10th Grade	741	7.7	2.181			
	Total	1249	8.2	2.003			

* Indicates that P value is Highly Significant.

Post Hoc Tests- Bonferroni

Dependent Variable	(I) Occupational Groups	(J) Occupational Groups	Mean Difference (I-J)	SE	Sig.
Pre-Test Score	Post-Graduate	Graduate	-0.268	0.206	0.579
		< 10th Grade	1.118*	0.150	< 0.001
	Graduate	< 10th Grade	1.386*	0.183	< 0.001
Post-Test Score	Post-Graduate	Graduate	0.120	0.175	1.000
		< 10th Grade	1.318*	0.127	< 0.001
	Graduate	< 10th Grade	1.198*	0.155	< 0.001

* The mean difference is significant at the 0.05 level.

Paired 't' test:

Occupation	Score	N	Mean	SD	t	df	P value
Post-Graduate	Pre-Test	319	6.0	2.835	-19.3	318	< 0.001*
	Post-Test	319	9.0	1.423			
Graduate	Pre-Test	189	6.3	2.016	-17.5	188	< 0.001*
	Post-Test	189	8.9	1.369			
< 10th Grade	Pre-Test	741	4.9	1.991	-31.7	740	< 0.001*
	Post-Test	741	7.7	2.181			

* indicates that P value is highly significant

Discussion

COLS is a well-established skill for resuscitation of cardiac arrest victims outside hospital by lay public [1, 13]. Indian Resuscitation Council developed COLS and first time recommended in 2017. [4]. Because of a structured program designed by Indian Resuscitation Council the teaching of COLS is uniform all across the nation. But the attending delegates are different depending upon their gender, language, literacy status and educational qualifications. There are chances that these differences among the attending delegates will affect the understanding, skill acquisition and adaptability of training delivered in the hands-on workshop of COLS. We studied the same and came out with certain conclusions.

The knowledge gained by the participants being the primary objective of the study, was tested using questionnaires consisted of 11 questions. The test was conducted as a pre-test before the hands-on workshop and as a post-test after the workshop using the same questionnaires. The mean post-test knowledge score (8.2 ± 2.003) was high as compared to pre-test score and this difference was highly significant statistically. This shows that COLS hands-on workshops are playing a significant role in making people knowledgeable regarding important lifesaving skills that need to be provided to cardiac arrest victims by bystanders outside hospital. Thus, participant's knowledge was significantly improved by attending the COLS- 'Jeevan Sanjeevani' workshop.

To verify the secondary objective of the study, all the participants were divided into post-graduate, graduate and below 10th grade as per their educational qualification. Knowledge gained by

participants is classified according to their educational category. All the participants showed statistically significant ($p < 0.001$) knowledge gained after the COLS hands-on workshop. The knowledge gained by post-graduate and graduates were better and comparable ($P > 0.001$), whereas the knowledge gained by those below 10th was significantly low when it was compared with post-graduates and graduates ($P < 0.001$). This strongly suggests the importance of educational qualifications for gaining knowledge and improving overall educational level and literacy rate will definitely lead to improved COLS knowledge and skills by an individual. So, in order to increase the awareness and knowledge about life saving skills like COLS among the society, it is equally important to improve the literacy and educational status of the society.

Among 1249 participants, minimum age was 18 years and maximum age was 78 years. Maximum participants (64.9 %) were between the age of 20 to 40 years with mean age of 33.8 ± 11.468 years. 75.3% (941) participants were of age ≤ 40 years and 24.7% (308) participants were > 40 years old. There were 55.6 % female participants against the 44.4 % male but the gender distribution was comparable among different age groups as the difference found between age groups and gender was not significant statistically. So, sample was homogeneous for age and gender distribution for a given study population.

As far as gender distribution is concerned, though it was evenly distributed, male showed marginally better grasping power as compared to females which was proved by post-test results. The mean pre-test score was comparable with respect to gender among the participants of the workshop. But

the mean post-test score was high in male participants as compared to female participants of the workshop and this difference was significant statistically. Male participants showed more improvement in the knowledge gained by attending the workshop. [12] This may be due to shyness, performance anxiety and comparatively less educational level seen among the females. Proper counseling and explanation regarding the importance of their role in saving the cardiac arrest victims, who can be their own relatives, especially at home, can encourage females to learn this skill full hearted. As far as age is concerned, all age groups showed significant gain in knowledge due to COLS hands-on workshops. This was proved by better post-test results as compared to pre-test results. The knowledge gained among various age groups were comparable with no specific age groups showing better performance over others. [13]

The aim of Indian Resuscitation Council is to make every citizen a lifesaver by making them trained in COLS Knowledge. Almost all the cardiac arrests outside hospital are witnessed by lay people who can be relatives or bystanders. They are the first responders and if they have knowledge of COLS skills, they will be in the best position to offer them to the victims till the paramedics arrive on site or the victim is shifted to hospital making a significant difference in their overall outcome and survival rate. From our study we can very well confirm that conducting frequent and regular COLS hands-on workshops for lay people is the important step in making them trained in these simple but very important lifesaving skills. This is also proved by an online survey done by Kerketta et.al and Jarwani et.al. [14 15] Our study has also shown that any adult with a reasonable academic background is capable of learning these skills though the level of skill acquisition is better in those with higher education. So, it is equally important to increase the overall educational level of the society at a larger level. At the same time, considering the existence of illiterate people, especially in rural areas, it is important to come up with the material and methods of imparting COLS Knowledge and skills to them using pictorial and audiovisual aids. Because non communicable diseases have penetrated the rural parts of the nation making people vulnerable for cardiac arrest and the cardiac arrest victims from such areas being away from medical facilities are more in need of on-site help.

Though we could study the effectiveness of COLS hands-on workshop on knowledge delivery and training of people from various background with good outcome, we could not keep the follow up and try to know the retained knowledge after a gap of a month or more. Our participants being randomly picked up from the public places, it was difficult to

trace them for subsequent knowledge testing which we consider as a limitation of our study. We suggest and wish to conduct a similar study on the people who can be re-approached after a certain time to assess the retained knowledge and find out the necessity and frequency of refreshing the knowledge by making them attend another COLS hands-on workshop.

Conclusion – Hands-on COLS workshop is highly effective in improving basic lifesaving skills of lay people. More the literacy/ educational level of the lay person, better is the understanding, acquisition and execution of COLS knowledge.

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