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A pre-experimental study to assess the effectiveness of demonstration method on knowledge and practice regarding CPR among nursing students of selected nursing college of Dehradun

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Abstract
Background: Cardiac arrest is still prevalent in the whole world and is the cause of millions of deaths. We need to decrease the prevalence of it by improving the knowledge and practice of cardiopulmonary resuscitation.
Statement: A pre-experimental study to assess the effectiveness of demonstration method on knowledge and practice regarding CPR among nursing students of selected nursing college of Dehradun.
Method: The 31 samples were selected with the purposive sampling technique and data was collected by using structured questionnaire and checklist during the month of April 2021.
Conceptual framework: In this study we have used the modified conceptual framework based on General System Theory by Karla Ludwig Von Bertalanffy.
Result: Findings revealed that Out of all (87%) subjects belongs to the age group of 18-20 years followed by (13%) belongs to 21- 23 years age group. Majority (84%) subjects were female followed by (16%) male. Maximum (100%) subjects were 12th pass. Majority (96%) subjects had pervious information regarding CPR followed by (4%) did not had previous information regarding CPR. Majority (94%) had curriculum as previous source of information followed by (3%) mass media and (3%) had previously attended seminar. Findings revealed that lowest number 2(7%) of nursing students had good pretest knowledge, followed by 6 (19%) with average and 23 (74%) had below average knowledge regarding CPR, lowest number 0(0%)of nursing students had good pretest level of practice, followed by 6(20%) with average and 25 (80%) had below average practice regarding CPR, highest number 21 (67%) of nursing students had good posttest level of knowledge, followed by 9(30%) with average and 1 (3%) had below average knowledge regarding CPR, lowest number 5 (17%)of nursing students had good posttest level of practice, followed by 19 (62%) with average and 7 (21%) had below average practice regarding CPR.
Conclusion: The study findings revealed that nursing students had average pretest knowledge and practice regarding CPR and it had improved with good level of knowledge and practice in posttest. Association was found to be significant between the knowledge of nursing students regarding CPR with their gender and previous source of information and others were found to be non-significant.

Keywords: CPR, knowledge, practice, nursing students

Introduction
Background of The Study: Human heart is most vital organ of the body which is responsible for continuous supply of oxygenated blood to the all organs, tissues of the body. When there is sudden stoppage of heart and lungs functioning, it is known as cardiopulmonary arrest. Now a day's accidents and cardiac arrest are common cause of death; immediate action, good skills and proper knowledge of cardiopulmonary resuscitation is necessary to save someone's life. Cardiopulmonary resuscitation is a lifesaving technique which is useful in many emergencies that includes cardiac arrest, cardiopulmonary arrest.

CPR stands for
C= Cardio (heart)
P= Pulmonary (lungs)
R= Resuscitation (recover)

CPR is a technique used for the purpose of oxygenation to the lungs, heart, and brain until and unless the appropriate medical treatment can reach and restore the normal cardiopulmonary function. It is a series of steps used to establish artificial ventilation and circulation in the person who is not breathing and has no pulse.

The steps includes
C= Circulation
A= Airway
B= Breathing

If more people know CPR and had a confidence to use it, fewer lives would be lost. Bjork Torunn Ida and Roel Siv [1], Nursing students must be able perform cardiopulmonary resuscitation effectively when they start their career in nursing. Often the nurse arrives first at the scene of cardiac arrest in the hospital. As it is the first few minutes with optimal CPR that are decisive for the patient's chances to survive the arrest, and for further quality of life, the nurse's competency in CPR is crucial. However, the studies shows that the both nurses and physicians skills in CPR is deficient, including that better education in CPR and maintenance of skill is necessary. Simsek Evrim, Yilmaz Atakan [2], Survival after cardiac arrest is directly related to rapid and effective cardiopulmonary resuscitation. To this end current studies is aims to provide rapid intervention by offering basic life support training to those in society who are not interested in health. BLS includes interventions after cardiopulmonary arrest without additional special medications or tool. Villalobos Felipe et al. [3], Out of hospital cardiac arrest is a significant public health problem. In Europe, over 275000 cases of out of hospital deaths are recorded every year. In Spain, it is estimated that 24500 cases of out of hospital deaths occurs yearly, with mortality rate between 79.95% and 84.3%. The mortality is mainly associated with the gap between cardiac arrest and arrival of medical care or emergency services. Eibai Hamed Adel et al. [4] Sudden cardiac arrest is a life threatening condition that known as cardiopulmonary arrest or circulatory arrest. Electrical heart malfunctioning caused by cardiac arrest that induced arrhythmia and disturbed blood flow of the lungs, brain and other body organs. Many recent studies reported that 1 million people died due to cardiac arrest in worldwide. Vandali Vijayaraddi et al. [5], Cardiopulmonary resuscitation is a lifesaving technique for victims of sudden cardiac arrest. Despite advances in resuscitation science, basic life support remain a critical factor in determining outcomes. The American Heart Association recommendation for adult basic life support incorporate the most recently published evidence and served as the basis for education and training for laypeople and healthcare provider who perform cardiopulmonary resuscitation. The guideline have been recommended after discussion among Indian experts and the recommendation for modified to ensure its practical applicability across the country.

Need of study
According to American Heart Association, more than 350000 out of hospital cardiac arrest occurred in 2016 and sadly 88% of people who suffered with cardiac arrest outside the hospital died. This data is enough to explain the need of learning CPR knowledge and skills. Brain death occurs within 3 to 5 minutes after the cardiopulmonary arrest. CPR effectively keeps blood flowing and provides oxygenated blood to brain and other vital organs of body, giving the victim better chance for recovery. The main need of CPR study is learn to maintain blood circulation, open airway and provide artificial breathing. It provides basic life support till the medical and advance life support is arrives. Elbaih Hamed Adel et al. [16] The quality of cardiopulmonary resuscitation may be poor in clinical situations especially with lack of resuscitation skills in nurses for BLS. However, contributing factors may be identified as the poor outcomes of cardiac arrest victims. High quality CPR skills have considered impact on mortality. Improvement in skills will improve the live saving chances for the victim. Moothedan Sajitha Sr. Rev. et al. [17] Thecurrentlevel of the knowledge regarding cardiopulmonary resuscitation is not adequate, according to current situations, we should explore the status of curricula for general population and identify the priorities for curricula improvement using importance performance analysis. A pre test post test only research study was conducted among Policeman and they found the inadequate knowledge level. Panday Ms. Manjari et al. [18] Now a days, regarding basic life support, it is known that the presence of a trained rescuer is the main determinant for the survival of victim of cardiopulmonary arrest. We emphasize that training in CPR should be provided conditions for a good development of the psychomotor skills necessary to apply this technique, in addition to transmitting knowledge on the technical procedure. CPR can reduce the mortality rate due to cardiopulmonary arrest. Kose Selmin et al. [19], Nurses are expected to provide effective cardiopulmonary resuscitation to decrease the death rate due to cardiopulmonary arrest. For the effectiveness of cardiopulmonary resuscitation nurses should be well trained and they should have proper knowledge but the previous data about their knowledge is not good so they need an adequate guide for the training and knowledge.

Review of literature
Queensland University, a literature review is an evaluative report of information found in the literature related to selected area of study. The review describes summarization, evaluates and clarifies the study. It gives a theoretical base for the research and helps to determine the nature of research [33]

Review of literature related to demonstration, knowledge, and practice
Sanela Pivac et al. [34] conducted a study on the impact of cardiopulmonary resuscitation (CPR) training on schoolchildren and their CPR knowledge, attitude, towards CPR, and willingness to help others and perform CPR: mixed methods research design. They have used pre- post sampling design on 737 students. The findings shows that the mean age 12.5 and p= 0.001.Saba Laila Aslam et al. [35] conducted a study on cardiopulmonary resuscitation- knowledge and attitude in a tertiary care hospital in Karachi. The study design was cross- sectional research design on 442 healthcare staff participants. The result of study revealed that the overall median knowledge score was found 7 with a maximum score of 12. Majority of the participants had incorrect knowledge regarding the depth of chest compression (18.1% and 11.1% respectively). Zayed HA, Saied SM [36] conducted a cross- sectional study to assess the knowledge concerning basic life support among nursing professionals at Tanta university hospitals. The sample size for the study was 317. The findings shows that the 33.92% nurses had adequate knowledge and the total knowledge score was 10.92±3.73.Okwuikpo Margaret Ihunanya et al. [37] conducted a study on knowledge, attitude and practice of cardiopulmonary resuscitation among nurses in Babcock university teaching hospital in Ilishan-

Remo, ogun state, Nigeria. The study design was the descriptive research. The findings shows that the 74.9% respondents had good knowledge and 65.25 respondents had never practiced the cardiopulmonary resuscitation in their life and everyone had a positive attitude regarding CPR practice and knowledge. Rekha Koranga *et al.* [38] conducted a study to assess the effectiveness of structured teaching program regarding CPR among undergraduate students at selected college of Dehradun, Uttarakhand. The sample size of the study was 61. The result of the study shows that the most of the UG students had poor knowledge (36.06%), only (3.27%) had the good level of the knowledge. Pratibha Agarkar *et al.* [39] conducted an exploratory study to assess the knowledge regarding CPR among students studying in selection physical education colleges of Pune city. The sample size was 100 final year students. The study result revealed that the maximum students are 72% out of 100% were found with average knowledge regarding CPR.

Objectives
▪ To assess the effectiveness of demonstration method on CPR.
▪ To assess pretest level of knowledge regarding CPR among nursing students in selected nursing college of Dehradun.
▪ To assess pretest level of practice regarding CPR among nursing students in selected nursing college of Dehradun.
▪ To assess post test level of knowledge regarding CPR among nursing students of selected nursing college of Dehradun.
▪ To assess post test level of practice regarding CPR among nursing students of selected nursing college of Dehradun.
▪ To find out association between pre test level of knowledge regarding CPR with selected demographic variables.
▪ To find out association between pre test level of practice regarding CPR with selected demographic variables.
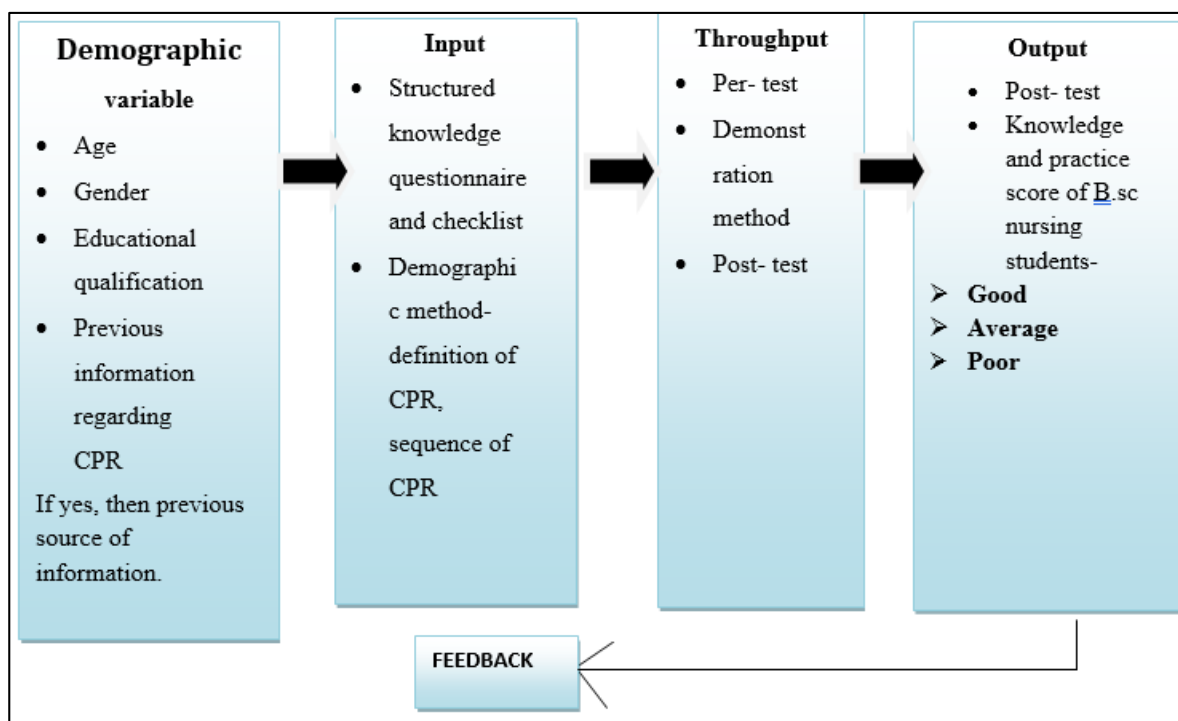
Conceptual Frame Work

Fig 1: Modified conceptual framework based on General System Theory by Karla Ludwig

Material and Method
To accomplish the desired objectives quantitative research approach and experimental (one group pre- test and post- test) research design was used. Demographic variables for the study was Age, Gender, Educational qualification, Previous information, Source of information.31 nursing students who were able to read and write English and studying in the Narayan Swami College of Nursing, Dehradun were selected using purposive sampling technique. The reliability of the self- structured knowledge questionnaire was (0.81) and checklist (0.85). Data for the study were collected using self – structured knowledge questionnaire (consisting 18 questions) and checklist (consisting 18 points) regarding CPR, in the month of April 2021(pre- test) and after 10 days in the month of April 2021(post- test) was conducted. The analysis of the data was done in accordance with the objectives of the study, by using descriptive and inferential statistics such as mean and mean percentage and chi square.

Cardiopulmonary Resuscitation Checklist [60]

S. No.	Assessment And Activation	Done	Not Done
1	Scene safety		
2	Checks responsiveness		
3	Shout for help		
4	Activate emergency response system (108)		
5	look for normal /absence of breathing		
6	Checks the carotid pulse (not more than 10 seconds)		
	Adult Chest Compression/ Circulation		
7	Hand placement on xiphoid process		
8	30 compression in no less than 15 and no more than 18 seconds		
9	Compresses at least 2-2.5 (3-5cm.)		
10	Complete recoil time after each compression		
	Open Airway		
11	Head tilt chin lift maneuver in non-traumatic patient		
12	Jaw thrust maneuver in traumatic (head or neck injury) patient		
	Adult Breaths		
13	Gives 2breaths with a barrier device/AMBU bag		
14	Each breath given over 1 second		
15	Visible chest rise with each breath		
16	Complete recoil time after each breath		
17	Resume compressions in less than 10 seconds		
18	Termination		

Result

Table 1: Frequency and percentage distribution of demographic variables of nursing students of selected nursing college of Dehradun.

N=31

S. No.	Demographic Variable	Frequency	Percentage%
1.	**Age (in years)**		
a	18-20	27	87
b	21-23	4	13
c	24-26	0	0
d	Above 26	0	0
2.	**Gender**		
a	Male	5	16
b	Female	26	84
3.	**Educational qualification**		
a	12th pass	31	100
b	Graduate	0	0
c	Post graduate	0	0
4.	**Previous information regarding CPR**		
a	Yes	30	96
b	No	1	4
5.	**If yes, then previous source of information**		
a	Mass media	1	3
b	Curriculum	29	94
c	Previously attended seminar	1	3

Table 2: Mean and standard deviation of level of knowledge regarding CPR. Knowledge score:

N =31

Domains	Mean	Mean percentage	Standard deviation
Pretest	8.80	28.38%	2.72
Posttest	13.19	42.55%	2.19

Table 3: Mean and standard deviation of level of practice regarding CPR. Practice score:

N =31

Domains	Mean	Mean percentage	Standard deviation
Pretest	5.16	16.64%	2.8
Posttest	10.87	35.06%	1.58

Table 4: Frequency and percentage distribution of level of pretest knowledge regarding CPR among nursing students in selected nursing college of Dehradun. Knowledge score:

N =31

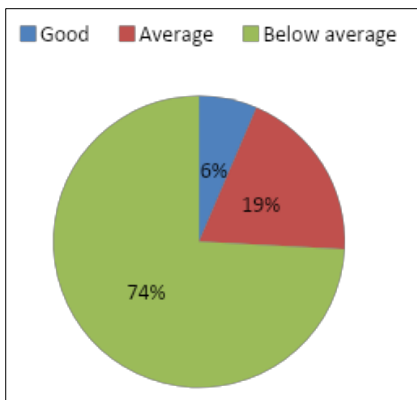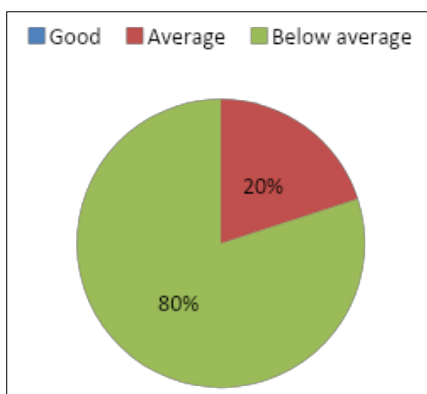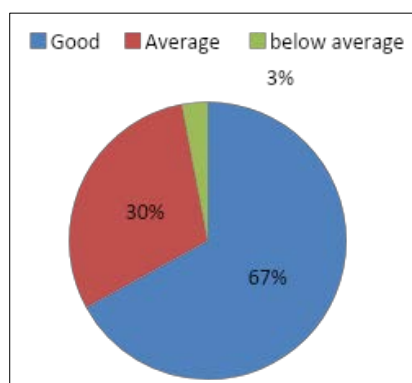| Level of knowledge	Score	Frequency	Percentage
Good	13-18	2	7%
Average	10-12	6	19%
Below Average	0-9	23	74%

Fig 2: Percentage distribution of overall pretest level of knowledge ofnursing students regarding CPR

Table 5: Frequency andpercentage distribution of level of pretest practice regarding CPR among nursing students in selected nursing college of Dehradun.Practice score:

N=31

Level Of Practice	Score	Frequency	Percentage
Good	13-18	0	0%
Average	10-12	6	20%
Below Average	0-9	25	80%

Fig 3: Percentage distribution of overall pretest level of practice of nursing students regarding CPR

Table 6: Frequency and percentage distribution of level of posttest knowledge regarding CPR among nursing students in selected nursing college of Dehradun. Knowledge score:

N =31

Level Of Knowledge	Score	Frequency	Percentage
Good	13-18	21	67%
Average	10-12	9	30%
Below Average	0-9	1	3%

Fig 4: Percentage distribution of overall posttest level of knowledge of nursing students regarding CPR

Table 7: Frequency and percentage distribution of level of posttest practice regarding CPR among nursing students in selected nursing college of Dehradun. Practice score:

N =31

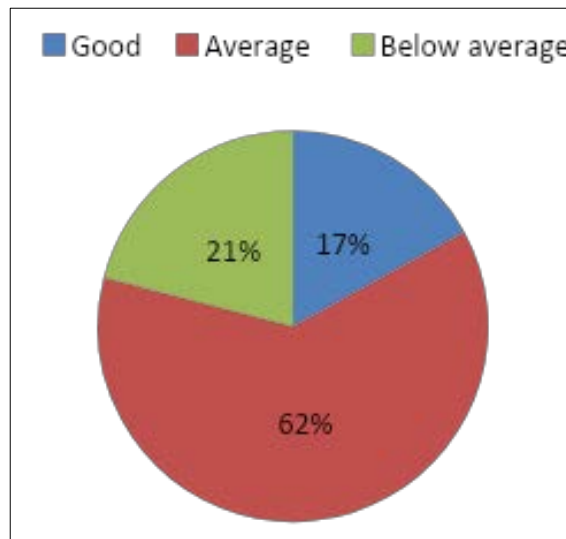| Level Of Practice	Score	Frequency	Percentage
Good	13-18	5	17%
Average	10-12	19	62%
Below Average	0-9	7	21%

Fig 5: Percentage distribution of overall Level of posttest practice of nursing students regarding CPR

Table 8: Effectiveness of Demonstration Method on Nursing Students Knowledge Regarding Cpr. Knowledge score:

N=31

Domains	Mean	Mean percentage	Standard deviation	T value	Df
Pretest	8.80	28.38%	2.72	11.7	30
Posttest	13.19	42.55%	2.19		
Difference	4.39	14.17%	0.53		

Table 9: Effectiveness of Demonstration Method on Nursing Students Practice Regarding CPR**.** Practice score:

N =31

Domains	Mean	Mean percentage	Standard deviation	T value	Df
Pretest	5.16	16.64%	2.8	15.37	30
Posttest	10.87	35.06%	1.58		
Difference	5.71	18.42%	1.22		

Table 10: Association between Pretest Level of Knowledge Regarding Cpr With Selected Demographic Variables Using Chi Square(X^2).

N=31

Variables	X^2
Age	11.09
Gender	14.71
Educational qualification	1.0
Previous information	7.18
Source of information	18.12

P=0.01

There is a significant association between knowledge and gender, knowledge and previous source of information and there was no significant association between knowledge and age, knowledge and educational qualification, and previous information.

Table 11: Association between pretest Level of practice regarding CPR with Selected Demographic Variables Using Chi Square(X^2).

N=31

Variables	X^2
Age	8.57
Gender	1.0
Educational qualification	1.0
Previous information	11.65
Source of information	30.79

P=0.01

There was a significant association between practice and previous information, practice and previous source of information and no any significant association between practice and age, practice and gender, practice and educational qualification.

Discussion
In this section the investigators interpretively discussed the results of the study. The result and discussion of the study are the research opportunity to examine the logic of the theoretical framework, the method, and the analysis.
The findings of the study had been discussed in accordance with the objectives of the research and literature reviewed. The knowledge of nursing students was assessed regarding CPR in relation with age (in years), gender, educational qualification, previous information. The practice of nursing students was assessed regarding CPR in relation with age (in years), gender, educational qualification, previous information.

The first objective of the study was to assess the effectiveness of demonstration method on CPR among the nursing students: The findings of the study revealed that the mean score of the pretest level of knowledge was 8.80 (28.38%) and the posttest was 13.19 (42.55%) with the significant difference of 4.39 (14.17%),the pretest standard deviation for knowledge was 2.72 and the posttest standard deviation was 2.19 with the significant difference of 0.53, the T value of the level of knowledge was 11.7.The findings of the study revealed that the mean score of the pretest level of practice was 5.16 (16.64%) and the posttest was 10.87 (35.06%) with the significant difference of 5.71(18.427%), the pretest standard deviation for practice was 2.8 and the posttest standard deviation was 1.58 with the significant difference of 1.22, the T value of the level of practice was 15.37.
The findings of the study was similar to the study conducted by Afolabi M. Owojuyigbe, *et al*, on impact of basic life support training on the knowledge of basic life support in a group of Nigerian dental students. The 68 dental students were selected for the study. Findings of study shows that the pre- test score was 4.7 ($\pm$1.47) and there is an improvement in the knowledge of respondents with 88.2% of them having post- test score of $\geq$7.

The second objective of the study was to assess the pretest level of practice regarding CPR among nursing students: The findings of study revealed that the (0%) had good practice, (20%) had average and (80%) had below average pretest practice level regarding CPR.
The findings of the study was similar to the study conducted by Chetan Kumar Bhumi Reddy, to assess the effectiveness of video assisted program on CPR among nursing students of Indira Gandhi school and college of nursing, Amethi, UP. The result of the study revealed that the 35% of participants had inadequate knowledge during pre- test and it improved with 85% after the post- test.

The third objective of the study was to assess the posttest level of knowledge regarding CPR among nursing students: The findings of the study revealed that the (67%) had good knowledge, (30%) had average knowledge and (3%) had below average posttest level of knowledge regarding CPR.
The findings of the study was similar to the study conducted by Dorothy Joseph Ed Offiong, Alberta D Nsemo, on knowledge and practice of cardiopulmonary resuscitation among public health nurse practitioners in Calabar metropolis of cross river state, Nigeria. They have used knowledge questionnaire on 57 respondents. The findings shows that the 57% of participants had poor knowledge and also have a poor practice regarding CPR.

The fourth objective of the study is to assess the posttest level of practice regarding CPR among nursing students: The findings of the study revealed that the (17%) had good knowledge, (62%) had average and (21%) had below average posttest level of practice regarding CPR.
The findings of the study was similar to the study done by Swati Sharma, *et al*, to assess the effectiveness of training program on knowledge and practice regarding BLS based on 2015 AHA guidelines among student nurses in a selected college of nursing, in Delhi, India. The findings of study revealed that the pre-test knowledge score of controlled group was 6.6 and experimental group was 6.25 with a difference of 0.25. The post-test knowledge score was (23) of experimental group 16.75 and 6.9 of control group.

The fifth objective of the study was to assess the pretest level of knowledge regarding CPR among nursing students: The findings of the study revealed that the among 31 nursing students (7%) had good knowledge, (19%) had average knowledge and (74%) had below average pretest level of knowledge regarding CPR.
The findings of the study was similar to the study done by Okwuikpo Margaret Ihunanya, *et al*, on knowledge, attitude and practice of cardiopulmonary resuscitation among nurses in Babcock university teaching hospital in Ilishan-Remo, ogun state, Nigeria. The study design was the descriptive research. The findings shows that the 74.9% respondents had good knowledge and 65.25 respondents had never practiced the cardiopulmonary resuscitation in their life and everyone had a positive attitude regarding CPR practice and knowledge.

The sixth objective of the study is to find out association between pretest level of knowledge regarding CPR with selected demographic variables: The findings of the study revealed that the gender and if yes, then previous source of information had the statistically significant association with pretest level of knowledge and age, educational qualification and previous information had the non- significant association with the pretest level of knowledge regarding CPR.
The findings of the study was similar to the study done by Sahithi Reddy, *et al*, on awareness of basic life support among staff and students in a dental school. The 22 questions were used to assess the awareness of the 338 respondents. The

findings of the study shows that the age and educational qualification had the non- significant association with the level of knowledge regarding CPR.

The seventh objective of the study is to find out association between pretest level of practice regarding CPR with selected demographic variables: The findings revealed that the previous information and if yes, then previous source of information had the statistically significant association with pretest level of practice and age, gender, educational qualification had the non- significant association with the practice regarding CPR.

The findings of the study was similar to the study conducted byWedajo Tsegaye, *et al.* on general practice knowledge, attitude and practice of cardiopulmonary resuscitation and associated factors in Ethiopian university medical students. The study design was cross- sectional and the sample size for study was 243. The findings of study revealed that the previous source of information had the significant association with the level of the practice and age, gender had the non- significant association with the level of practice regarding CPR.

Conclusion
The study findings revealed that nursing students had average pretest knowledge regarding CPR and it had improved with good level of knowledge in posttest. Association was found to be significant between the knowledge of nursing students regarding CPR with their gender and previous source of information and others were found to be non- significant.

Recommendation
Based on the study following recommendation were made:-
- The study can be implicated on a large sample to validate and generalize its findings.
- Similar studies can be conducted in different settings like State level and National level.
- It can be conducted in community settings.
- The study also can be recommended for the general population.

Narayan Swami College of nursing demonstration of cardiopulmonary resuscitation
Presented BY: Group-C
Introduction: Cardiopulmonary resuscitation is a lifesaving technique useful in many emergencies including cardiopulmonary arrest.

Definition: "Cardiopulmonary resuscitation- is a process to provide blood flow to vital organs and till effective circulation can be re established". (AHA)
Cardiopulmonary arrest sudden unexpected loss of heart function, breathing and consciousness.

Procedure 1: Assess victim and activate emergency response system within a maximum of 30 seconds. After determining that the scene is safe
Checks for responsiveness by tapping on shoulder and shouting (Are you ok?).
Shout for help/ activate emergency response system.
Check for no breathing or no normal breathing (only gasping)- check from the head to the chest for a minimum of 5 seconds and no more than 10 seconds.
Check carotid pulse- can be done simultaneously with check for breathing or check for a minimum of 5 seconds and no more than 10 seconds.

2. Performs high quality chest compressions (initiate after recognition of cardiac arrest)
Correct hand placement- lower half of sternum/ Xiphoid process.
2- Handed (second hand on the top of the first or grasping the wrist of the first hand).
Compression rate of 100 to 120/minute.
Deliver 30 compressions in 15 to 18 seconds.
Compression depth and recoil- at least 2 to 2.5 inches (5cm) and avoid compressions more than 6 cm.
Complete chest recoil after each compression.
Minimizes interruptions in compressions.

3. Provides 2 breaths by using a barrier device/AMBU bag
Open airway adequately- uses a head tilt- chin lift maneuver (non- traumatic patients) or jaw thrust maneuver (head or neck injury).
Delivers 2 effective breaths.
Delivers each breath over 1 second.
Delivers breaths that produce visible chest rise.
Avoids excessive ventilation.
Resumes chest compressions in less than 10 seconds.

4. Performs same steps for chest compressions and breaths for cycle 2
5. Termination: Patient is able to breath by his/ her own.
Heart functioning reassumed. Patient is dead.

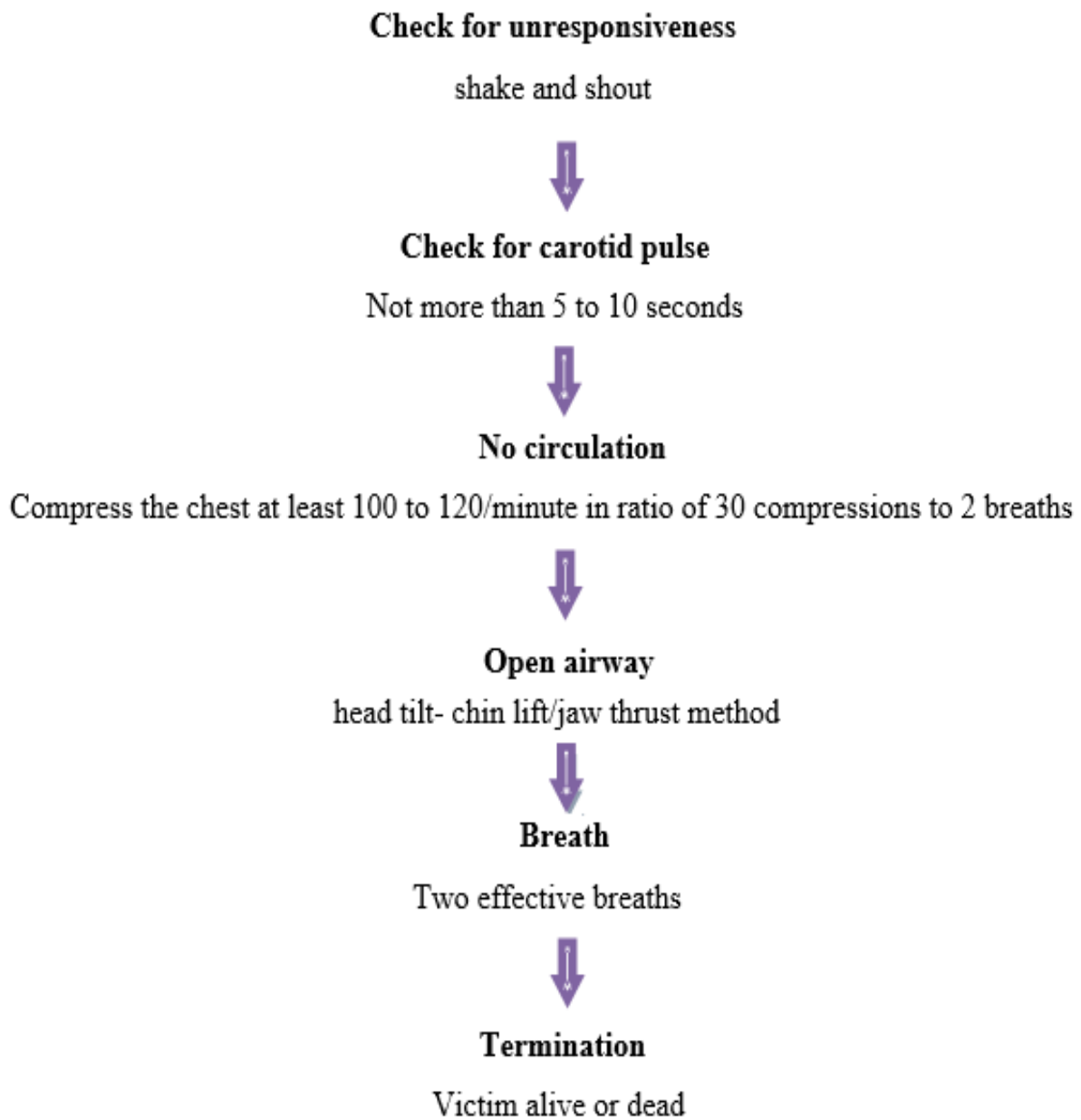**Algorithm for cardiopulmonary resuscitation**

Check for unresponsiveness

shake and shout

⬇

Check for carotid pulse

Not more than 5 to 10 seconds

⬇

No circulation

Compress the chest at least 100 to 120/minute in ratio of 30 compressions to 2 breaths

⬇

Open airway

head tilt- chin lift/jaw thrust method

⬇

Breath

Two effective breaths

⬇

Termination

Victim alive or dead

| Activation of Emergency Response | High-Quality CPR | Defibrillation | Advanced Resuscitation | Post-Cardiac Arrest Care |

Fig 6: Algorithm for cardiopulmonary resuscitation

Photographs
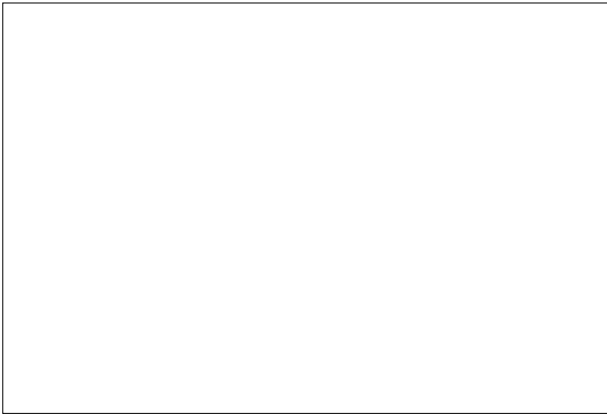
Fig 7: Pre-test demonstration (1)

Fig 8: Pre-test demonstration (2)

Fig 9: Manipulation (Education on CPR skill)
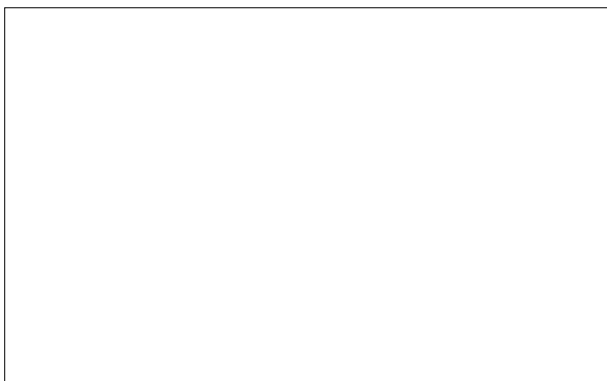
Fig 10: Post-test assessment

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