



A study to assess the effectiveness of structured teaching programme on electrocardiogram among 3rd & 4th year B.Sc nursing students in a selected nursing institution

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Abstract

Electrocardiogram is widely used as a diagnostic tool in the cardiovascular system. Electrocardiogram is a simple, non-invasive, safe, fast, low-cost and easy procedure in cardiovascular assessment. The electrocardiogram is a method of recording the electrical activity of the heart. For every electrocardiogram, certain features should be examined systematically viz., heart rate, evaluation of specific waves like P, QRS and T waves, intervals like P-R, R-R and Q-T intervals, segments like P-R and S-T segments and rhythm identification [4].

'P' wave represents atrial depolarization. The abnormality may lie in the absence of P wave or tall P wave. Absent P wave denotes disorders like atrial fibrillation where the P wave is replaced by numerous small irregular fibrillatory waves. In atrial flutter, P wave is replaced by flutter (F) wave. In ventricular tachycardia P waves are difficult to identify as they are buried in wide QRS complex and in Hyper Kalemia, P waves are reduced in amplitude and associated with tall T wave and widened QRS complex.

'QRS complex' denotes ventricular repolarization. The abnormalities which show the cardiac conditions are classified into; low voltage QRS complex in which the voltage of R wave in limb leads is less than 5mm and in precordial leads is less than 10mm. The abnormalities are diagnosed as follows: diffuse myocardial disease, hypothyroidism, pericarditis, obesity, thick chest wall, pulmonary emphysema and pericardial effusion. In wide QRS complex condition the duration is more than 0.04 to 0.08 seconds. The causes of wide QRS complex are; bundle branch block, intraventricular conduction defect by antiarrhythmic drugs, electrolyte imbalance, myocardial disease and Wolff Parkinson and White (WPW) syndrome.

'T' wave denotes the ventricular depolarization. The abnormalities of T wave are: ventricular hypertrophy in which there will be inverted T wave and in hyperkalemia there will be tall 'T' wave.

'Q-T' interval denotes the total duration of ventricular systole. The abnormalities of Q-T interval may be prolonged Q-T interval in which the duration is greater than 0.43 seconds and in shortened Q-T interval, the duration is less than 0.35 seconds.

The abnormalities of 'S-T' segments are classified into S-T segment depression and S-T segment elevation. S-T segment depressions are caused by the following conditions: cardiomyopathy, coronary insufficiency and ventricular hypertrophy. The causes of S-T segment elevation are: coronary artery disease, which includes myocardial infarction, angina and post infarction syndrome, acute pericarditis, and ventricular aneurysm [5].

Keywords: electrocardiogram, teaching programme, nursing institution

Introduction

Cardiovascular diseases are the major diseases that lead to high mortality in all over the world. In 1999, the American Heart Association reported the death rates of cardiovascular diseases, in which 53.6 per cent were from heart attacks, 3.1 per cent were due to hypertension, and 0.7 per cent were from rheumatic heart disease and 27.6 per cent from all other cardiovascular diseases. The current mortality rate of the United States reported that almost 66 million people have some form of cardiovascular diseases and further the mortality rates quoted that one dies with cardiovascular disease in every 32 seconds. The AHA estimates that the cost of nation for managing the cardiovascular disease was around \$88.2 million [1].

Coronary Heart Disease is also a leading cause of morbidity and mortality in developed countries and is emerging as an epidemic in developing countries. It is predicted that there will be an increase of 111 per cent in cardiovascular deaths in India by the year 2020 when compared to the year 1990. This is much higher

than that predicted to any other region both in Asia as well as outside Asia. In India, the prevalence of CHD is much higher in south India when compared to north India.

Nurse educators are responsible for training the nurses to improve the knowledge, skills and confidence to perform nursing care effectively within the coronary care setting [18]. If the nurse educator has knowledge on electrocardiogram, they can guide the students to improve the knowledge regarding electrocardiogram procedure and its interpretation, which will help the students to identify the illness at early when they are posted in cardiology ward and coronary care unit.

The objectives

- To assess the existing knowledge level of 3rd & 4th Year B.Sc Nursing students on electrocardiogram.
- To assess the effectiveness of Structured Teaching Program on electrocardiogram. year B.Sc Nursing students.

- To find out the relationship between the selected socio-demographic variables of 3rd & 4th with their post test knowledge score on electrocardiogram.

Methodology

The research design adopted for this study was one group pre test post test pre experimental design. Fifty two 3rd & 4th year B.Sc Nursing students were selected by simple random sampling technique and by adopting complete enumeration method. A self-administered questionnaire was used for data collection, which consists of part I and part II.

Part I consists of socio-demographic characteristics of the sample and the general information related to electrocardiogram.

The knowledge items related to electrocardiogram such as electrocardiogram procedures, normal and abnormal electrocardiogram were included in the part II.

The prepared tool and structured teaching programme was validated by 11 medical and surgical nursing experts, 3 cardiologists and 2 general medicine experts. The pilot study was conducted from 02.12.2019 to 01.01.2020 to assess the feasibility and reliability of the tool. The computed co-efficient of correlation value was $r=0.91$ indicated that the tool was highly reliable and valid.

The collected data were analyzed by statistical tests (descriptive and inferential statistics) such as percentage distribution, mean, standard deviation, paired 't' test and chi-square test.

Operational Definition

Effectiveness

Refers to determine the extent to which the structured teaching programme has achieved the desired effect in improving the knowledge regarding electrocardiogram among 3rd & 4th year B.Sc. Nursing students.

Structured Teaching Programme

It refers to systematically organized and developed instruction and teaching aids were designed for the group of 3rd & 4th year B.Sc. Nursing students to enhance their knowledge regarding electrocardiogram.

Electrocardiogram

The electrocardiogram is a sophisticated galvanometer, a sensitive electromagnet which records the electrical activity of the heart whereby the professionals can detect and record changes in the heart by means of alteration in the wave patterns such as P, QRS, T and U waves.

3rd & 4th year B.Sc. Nursing students

Students who are studying in 3rd & 4th year B.Sc. Nursing course.

Variables

A variable is a characteristic or attribute that differs among the persons, objects, events and so forth that are being studied.

Three types of variables were identified in the present study and they were categorized as:

- Independent variables
- Dependent variables
- Extraneous variables

Independent Variables

It is the cause or the variable that is thought to influence the dependent variable. In the present study, structured teaching programme electrocardiogram was the independent variable.

Dependent Variables

It is the effect or the variable that is influenced by the researcher's manipulation (control) of the independent variable. Knowledge level on electrocardiogram was the dependent variable for the present study.

Extraneous Variables

Demographic variables of the sample were considered as extraneous variables *viz.*, age, gender, religion, type of the family and other variables such as experience in the specialty units, exposure in assisting the investigative procedures.

Assumptions

It refers to beliefs that are held to be true but have not necessarily been proven.

- 3rd & 4th year B.sc nursing student may have some knowledge regarding electrocardiogram.
- 3rd & 4th year B.Sc nursing students will extend co-operation in providing factual information.
- The structured teaching programme will improve the knowledge of 3rd & 4th year B.Sc Nursing students on electrocardiogram.
- The responses measured by self-administered questionnaire will represent the actual knowledge level of 3rd & 4th year B.Sc Nursing students.

Delimitations

Restriction of the study imposed by the researcher.

- Who were willing to participate in the study
- 3rd & 4th year B.Sc Nursing students who were studying Final year.

Hypotheses

Based on the objectives and the review of literature, the following research hypotheses were formulated.

H1. There will be significant difference between the pretest and posttest assessment score on electrocardiogram.

H2. There will be significant association between the type of family of 3rd & 4th year B.Sc Nursing students and post test knowledge score on electrocardiogram.

H3. There will be significant association between the experience in the specialty units of 3rd & 4th year B.Sc Nursing students and post test knowledge score on electrocardiogram.

H4. There will be significant association between the exposure in assisting the investigative procedures of 3rd & 4th year B.Sc Nursing students and post test knowledge score on electrocardiogram.

The symbolic representation of this design as applied to the present study was given below:

Table 1: E O₁, X O₂

E	-	Experimental group
O ₁	-	Pre-test assessment of knowledge on electrocardiogram among 3 rd & 4 th year B.Sc Nursing students
X	-	Treatment structured teaching programme on electrocardiogram
O ₂	-	Posttest assessment of knowledge on electrocardiogram among 3 rd & 4 th year B.Sc Nursing students.

Schematic diagram of research design

Population

A population is a group whose members possess specific attributes that a researcher is interested in studying [53].

The target population is a group of population that the researcher has to study and to whom the study findings will be generalized. Accessible population is the group of population that the researchers find easily [54].

The target population and the accessible population were same for the present study i.e. 3rd & 4th year B.Sc. Nursing students in a selected Nursing Institution.

Sampling Technique

Sampling technique is a process of selecting a portion of the population to obtain data regarding a problem [54].

The purposive sampling technique was considered appropriate to select the study area. Random sampling by complete enumeration method was considered best to select the sample for the study.

A sample consists of a subset of the population selected to participate in the research study [55]. 3rd & 4th year B.Sc Nursing students who were studying were considered as sample.

58 students were studying 3rd & 4th year B.Sc Nursing course. Among them, six students were taken for pilot study and they were not included in the final study.

Criteria for selection of sample

Inclusion Criteria

The Nursing students who were:

- Studying 3rd & 4th year B.Sc. Nursing.
- Available at the time of data collection.
- Willing to participate in the study.

Exclusion Criteria

The Nursing students who were:

- Not studying 3rd & 4th year B.Sc. Nursing.
- Not willing to participate in the study.
- Not available during data collection.
- Included in the pilot study.

Sample Size

Based on the set of criteria, 52 3rd & 4th year B.Sc Nursing students were considered as the sample for the study.

Limitations

A standardized restriction framed for conduct the study. The study was limited to:

- Who were available during data collection
- Who were willing to participate in the study
- Who were studying 3rd & 4th year B.Sc Nursing
- The sample selected for pilot study will not be considered as sample for main study.

Method of Data Collection

Method of data collection includes development of tool, testing of validity and reliability and data collection procedure. The instrument selected in research should be as far as possible the vehicle that would best obtain data for drawing conclusion, which are pertinent for the study [53].

A questionnaire is a self- report instrument and contains questions that respondents are asked to answer in writing [56].

A self-administered questionnaire was selected as a method of data collection for the present study.

Development of Tool

After thorough search of literature, experts’ suggestions and based on the pilot study results, the self-administered questionnaire was developed to assess the effectiveness of structured teaching programme on electrocardiogram among 3rd & 4th year B.Sc. Nursing students.

Description of the tool

The final format of the structured questionnaire was comprised of two parts.

Part I

The socio demographic data consists of information about the 3rd & 4th year B.Sc. Nursing students’ age, gender, religion, type of family and the general information related to exposure and assisted for electrocardiogram procedure during training period.

Part II

It consists of 65 items related to electrocardiogram. These were:

- Electrocardiogram procedure.
- Normal electrocardiogram.
- Abnormalities of electrocardiogram

Scoring

Each question had one or more possible correct responses and each possible correct response was awarded with one score point and wrong answer as zero. The total number of possible correct responses were 69, for the purpose of present study, the score was classified as;

Table 2

Level of knowledge	Percentage	Range of Score
Low	0 – 50	0 – 34
Average	51 – 75	35 – 52
High	Above 75	Above 52

Development of Structured Teaching Programme

The Investigator has prepared structured teaching programme based on the study objectives, experts’ opinion and knowledge level of the Nursing students.

The content of structured teaching programme were as follows:

- Introduction of electrocardiogram
- Conduction system of the heart
- Definition of electrocardiogram
- Types of electrocardiogram
- Purpose of 12- lead electrocardiogram
- Indications of 12 – lead electrocardiogram
- Nurses’ responsibilities in electrocardiogram procedure
- Normal electrocardiogram

- Calculation of the heart rate by using electrocardiogram
- Abnormalities of the waves, intervals and segments.

The visual aids used in the structured teaching programme were:

- Charts for conduction system of the heart indications of electrocardiogram.
- Flash Cards for normal and abnormal ECG waves, intervals and segment.
- Handout for normal deflections, normal criteria for P and Q wave, purposes of electrocardiogram.
- Real Objects (ECG machine and leads) for demonstration of ECG procedure.
- Transparency for definition, types, limb leads, chest leads, nurses' role before ECG procedure and causes of ST segment depression.
- Major findings of the study
- Majority of the students were fallen in the age group of 21-22 years (86.5%) followed by 23-24 years (9.6%) and above 24 years (3.9%).
- Majority of 3rd & 4th year B.Sc Nursing students were females (90.4%) followed by males (9.6%).
- Nearly three fourth of 3rd & 4th year B.Sc Nursing students were Hindus (28.9%) and Christians (71.1%)
- Majority of the sample belongs to nuclear family (82.7%) followed by joint family (15.4%) and extended family (1.9%).
- Nearly two third of 3rd & 4th year B.Sc Nursing students had Intensive Coronary Care Unit experience (63.5%) and 36.5 per cent had Intensive Care Unit experience.
- Three fourth of 3rd & 4th year B.Sc Nursing students were assisted electrocardiogram procedure (75%) less than one fourth of the sample were assisted echocardiogram (23.1%) and very negligible percentage of the sample were assisted for exercise tread mill test (1.9%).
- In pre test, majority of 3rd & 4th year B.Sc Nursing students possessed low knowledge (90.4%) and average knowledge (9.6%), whereas after implementation of structured teaching programme i.e. in post test, majority of the sample had high knowledge (88.5%) followed by average knowledge (11.5%).
- In pre test, the mean score was 32.17 (SD=4.37) and in post test the mean score was 57.6 (SD=4.18), it indicated that the 3rd & 4th year B.Sc Nursing students' knowledge on electrocardiogram was improved.
- Paired 't' test value was 45.64 indicated that, the structured teaching programme was effective in enhancing the knowledge on electrocardiogram among 3rd & 4th year B.Sc Nursing students.
- The chi-square value computed between the selected variables such as age, experience in specialty units, exposure in assisting investigative procedure with their post test knowledge score on electrocardiogram showed significant relationship.
- Significant relationship was not observed between the post test knowledge score on electrocardiogram with the variables like religion and type of family.

Results

Among 52 third & fourth year B.Sc Nursing students, majority of 3rd & 4th year B.Sc Nursing students were belonged to the age

group of 21-22 years (86.5%) and 90.4 per cent of 3rd & 4th year B.Sc Nursing students were females. Nearly three fourth of 3rd & 4th year B.Sc Nursing students were Hindu (71.1%). Nuclear family type was observed more among 3rd & 4th year B.Sc Nursing students' families (82.7%). Nearly two third of 3rd & 4th year B.Sc Nursing students were posted in Intensive Coronary Care Unit (63.5%) and three fourth of sample were assisted for electrocardiogram procedure (75%).

In pre test, majority of 3rd & 4th year B.Sc Nursing students had low knowledge (90.4%) and very minimal percentage of sample had average knowledge (9.6%) whereas in post test, majority of 3rd & 4th year B.Sc Nursing students had high knowledge (88.5%) and 11.5 per cent of Final year B.Sc Nursing students had average knowledge.

In Pre test, the 3rd & 4th year B.Sc Nursing students had a mean of 32.17; S.D=4.37 and the post test assessment mean was 57.6; S.D=4.18 with paired 't' value of 45.64. This result indicated that the structured teaching programme was effective in enhancing the knowledge on electrocardiogram among Final year B.Sc Nursing students.

Significant association was found between the post test knowledge score on electrocardiogram with age ($X^2=38.502$) experience in specialty units ($X^2=11.7988$) and exposure in assisting the investigative procedures ($X^2=23.709$) at 5% level of significance.

Significant relationship was not observed found between the post test knowledge score on electrocardiogram with other socio demographic variables such as religion and type of family.

Conclusion

Majority of 3rd & 4th year B.Sc Nursing students had high knowledge on electrocardiogram in post test. As they are the future nurses, the knowledge of electrocardiogram will help them to provide better quality care by investigating various cardiac ailments in time and referring them to the appropriate health care agencies.

Implications and Recommendation) N

Implications

The findings of the study have several implications for nursing education, nursing practice, nursing administration and nursing research. The implications, which have been made in the present study were very essential to the nurse practitioners, nurse educators and nurse administrators.

Nursing Education

Nursing education was aimed at preparing nurses who will be able to plan and provide comprehensive care to individuals and families after the completion of educational programme⁵⁸.

- Nurse educators can teach the nursing students to acquire in-depth of knowledge and skills related to electrocardiogram.
- Nurse educators can motivate and insist the nursing students to conduct seminars on investigative procedures such as electrocardiogram.
- Nurse educators can emphasize the nursing students to prepare audio visual aids, manual and guide to interpret electrocardiogram and its findings.
- Nurse educators can provide adequate facilities for each student to acquire efficiency in the skills related to cardiac

nursing, where the students can correlate theory related to investigative procedures such as electrocardiogram with their practice.

Nursing Practice

As Nursing is a practice professional discipline, nurse must have the necessary knowledge, skills and attitudes which are essential for professional nursing practice^[58].

Nurses has to:

- Conduct clinical teaching programme on electrocardiogram.
- Participate in in-service education training programme on electrocardiogram.
- Follows the hospital protocols in electrocardiogram procedure.
- Skilled enough to identify the abnormal electrocardiogram.
- Informs the physician or higher authority in case of identification of abnormal electrocardiogram.
- Nurses who are equipped with updated knowledge on electrocardiogram are better persons to impart appropriate knowledge to the cardiac clients which will help in preventing the cardiac deaths and to modify their life pattern.
- Nurses can instruct the student nurses, the role of nurse during investigative procedures and should provide an opportunity for student nurses to assist the various investigative procedures in all clinical care settings.
- The knowledge of investigative procedures and its interpretation will help the community health nurse to prevent complications, to promote qualitative living if needed instruct for modification of life style or referring the case for appropriate agencies.

Nursing Research

- A similar study can be conducted with large sample covering the entire Final year GNM students.
- A study on abnormalities of electrocardiogram may be carried out by administering electrocardiogram papers.
- A study on nurses' role in electrocardiogram procedure can be conducted.
- A study on other investigative procedures like Defibrillator, Echocardiogram, Mechanical Ventilator etc., can be done among the nursing students or among the staff nurses.

Nursing administration

- Nurse administrator can organize the workshops on electrocardiogram for the nursing students.
- Nurse administrator can organize the staff development programme for nurses to update their knowledge on advanced technologies of electrocardiogram.
- The health care providers are the key personnel in imparting education to the clients. There is a need for in-service education programme for health care providers on electrocardiogram for preparing them to function effectively as effective counselors for clients.

Recommendations

Based on the findings, the following recommendations are proposed for future researchers.

- A similar study can be carried out at varied clinical settings among staff nurses.

- A descriptive study can be conducted among the nursing personnel.
- A comparative study may be conducted to assess the learning needs of nursing students on electrocardiogram.
- A similar study can be replicated with experimental and control group.
- A comparative study can be carried out between varied professional categories.
- A comparative study may be undertaken among graduate and diploma nurses.
- A comparative study between two teaching methods may be conducted to evaluate the teaching strategy such as web based teaching method and lecture method on electrocardiogram or by administering instructional module on electrocardiogram and by lecture method.

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