

**“A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED  
TEACHING PROGRAMME ON KNOWLEDGE REGARDING  
ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF  
NURSES WHO ARE WORKING IN ICU OF VINAYAKA  
MISSION HOSPITAL AT SALEM”.**

By

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Dissertation Submitted to the

**THE TAMILNADU DR MGR MEDICAL UNIVERSITY**

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of the requirements for the degree of

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**in**

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**(Cardio Vascular and Thoracic Nursing)**

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Sakthi Nagar, Bhavani, Erode.**

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This is to certify that the dissertation entitled **“A Study to Assess the Effectiveness of Structured Teaching Programme on Knowledge regarding Arterial Blood Gas Analysis among the Staff nurses who are working in ICU of Vinayaka Mission Hospital at Salem”**. is a bonafide research work done by **D. Thulasimani**, under the guidance of Asst. Prof. **Mr. M. Anand, Msc,(N)** Department of Medical Surgical Nursing.

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## **ENDORSEMENT BY THE RESEARCH GUIDE AND HOD**

This is to certify that the dissertation entitled “**A Study to Assess the Effectiveness of Structure Teaching Programme on Knowledge regarding Arterial Blood Gas Analysis among the Staff nurses who are working in ICU of Vinayaka Mission Hospital at Salem**” is a bonafide research work done by **D. Thulasimani** in partial fulfillment of the requirement for the degree of **Master of Science in Nursing (Medical Surgical Nursing)**.

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3	Letter seeking expert opinion on Validity of the Tool
4	Certificate of Content Validity by the Medical Guide
5	Tool for Data Collection
6	Structured Teaching Programme

## ABBREVIATIONS

M.Sc.,(N)	Master of Science (Nursing)
B.Sc.,	Bachelor of Science
GNM	General Nursing Midwives
DMIPSR	Dharmarathnakara Dr.Mahalingam Institute of Paramedical Sciences and Research
Prof.	Professor
HOD	Head of the Department
Fig	Figure
H <sub>1</sub> , H <sub>2</sub>	Research Hypothesis
ICU	Intensive care unit
n	Total number of samples
No.	Number
p	Probability
r	Reliability
S.D	Standard Deviation
S	Significant
NS	Not Significant
x <sup>2</sup>	Chi-Square Test
%	Percentage
STP	Structured Teaching Programme
ABG	Arterial Blood Gas
H <sup>+</sup>	Hydrogen
P(H)	Hydrogen Ion Concentration
PaO <sub>2</sub>	Partial pressure of Oxygen
PaCo <sub>2</sub>	Partial pressure of Carbon-di-oxide
HCO <sub>3</sub>	Bicarbonate
BE	Base excess

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*Glorious and majestic are his deeds,  
and his righteousness endures forever..*

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## **ABSTRACT**

### **STATEMENT OF THE PROBLEM:**

**“A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME ON KNOWLEDGE REGARDING ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF NURSES WHO ARE WORKING IN ICU OF VINAYAKA MISSION HOSPITAL AT SALEM ”.**

### **OBJECTIVES OF THE STUDY:**

- ❖ To assess the pretest and posttest knowledge of experimental and control group of staff nurses regarding ABG analysis.
- ❖ To compare the pretest and posttest knowledge of experimental and control group regarding ABG analysis.
- ❖ To implement and evaluate the STP regarding ABG analysis
- ❖ To find out the association between the knowledge of experimental and control group with selected demographic variables.

### **METHODS:**

A Quasi experimental research approach with pretest and post test control group design. The study includes sixty staff nurses who were selected by purposive sampling technique. The study was conducted in Vinayaka Mission Hospital at Salem

District. Demographic Data, structured knowledge questionnaire and self report method were used for data collection procedure. The tool was finalized by consulting five experts in the field of medical and nursing. Pilot study was done for its clarity, un ambiguity and feasibility on similar subject. To analyze the experimental data, statistical analysis was used. Demographic data of the staff nurses were presented in graphs. Association of variables was tested by Karl Pearson Chi-Square test.

### **MAJOR FINDINGS OF THE STUDY:**

The findings of the study showed that Over all knowledge of experimental group it shows that the have improved their knowledge from 41.50% to 81.93%. The over all knowledge of control group shows that in pretest they had 40.75% and in post test they had 42.00%, The Overall comparison of pretest and posttest knowledge for experiment group was 16.6% to 32.77%. Hence the posttest group had more knowledge is more than pretest. The Overall comparison of pretest and posttest knowledge for control group was 16.3% and 16.80%, this shows that there is no improvement was found.

The association between demographic variables with knowledge of experimental and control group shows that age and years of experience are significant with posttest knowledge

### **KEY WORDS:**

Arterial Blood Gas, Knowledge, structure teaching programme, staff nurses, Intensive care unit.



# CHAPTER I

## INTRODUCTION

**‘Accident investigation takes the mystery out of working safely’**

**-Marcon group Ltd**

Normal function of body cells depends on regulation of the hydrogen ( $H^+$ ) concentration within very narrow limits. If the  $H^+$  levels exceed these normal limits acid-base imbalances result and are recognised clinically as abnormalities of serum P(H). Because of acid-base imbalances may be caused by disorders of any body system . Their incidence in clinical settings is quite high.

The status of acid-base homeostasis may be monitored clinically through the serial measurement of arterial blood gases (ABGs) among the parameters reported are P(H),  $PaCO_2$  and  $HCO_3$ . These values may be used to determine the presence of type of acid base imbalances and evaluate the level of compensation. These disorders are not clinical diagnosis or diseases in themselves rather, they are clinically syndromes, associated with a wide variety of diseases.

Acidosis refers to any pathological process that causes a relative excess of acid in the body, acidemia is excess acid in the blood. The presence of acidemia does not necessarily confirm the pathological process technically. It is merely a laboratory finding.

The same distinction may be made between the terms alkalosis and alkalemia, alkalosis indicates a primary condition resulting in excess base in body and alkalemia refers more narrowly to elevation of serum pH.

**Brunner (2004) USA** Stated that in 2000 In USA the incidence of post operative respiratory failure rate estimated that 8.66 per 1,000 elective surgery. The Americans have been estimated the incidence of asthma is 10.6 million and 12.7 million COPD now the COPD is sixth leading cause of death and 12<sup>th</sup> leading cause of morbidity at world wide.

**Margie.J. Hanson (2004), New Delhi** Stated that the incidence of acid-base imbalance is high in clinical setting, In general hospital among 110 consecutive admission among that the overall incidence of acid-base imbalances respiratory alkalosis [26 cases] Followed by respiratory acidosis [16] metabolic alkalosis [10] and metabolic acidosis [6] had more than one acid base imbalance concurrently.

**All India Institute of Medical Science (2002) New Delhi** Stated that postoperatively collected data of patient with respiratory failure admitted to medical ICU. In that type II respiratory failure [90.2%] number of patient had previous hospitalization as well as intubations 39% and 18.3% respectively. Almost 55% of the patients had evidence of car pulmonale 67% pneumonia 3.7% was pneumothorax.

**Menzel M. Henze D, (2001) Sweden** stated that management of critically ill patients requires frequent arterial blood gas analysis for assessing the pulmonary situation and adjusting ventilator settings and circulatory therapeutic measures. Continuous arterial blood gas analysis is a real-time monitoring tool, which reliably

detects the onset of adverse pulmonary effects. It gives rapid confirmation of ventilator setting changes and resuscitation and helps to ensure precise adjustment of therapy.

**NHLBI (1999) USA** Stated that In USA death rate of respiratory failure is 3,597 per year, 69 permonth, 9 perweek, In United States estimated that 3,55,000 people are diagnosed annually for pulmonary disorder. Regulating in as many as 24,000 deaths per year. The current death rate 40% for respiratory failure, 90% mortality rate for clients with acute respiratory distress syndrome.

#### **NEED FOR THE STUDY:**

The arterial blood gases is one of the most important investigation for assessment of clinical oxygenation and acid-base status in critically ill patients, it provides us with information about ventilation, oxygenation, and acid-base status.

**[Cardio Thoracic centre Pune (2004)]**

**Valero Marco AV, Martinez Castill C. (2008), Turkey** Stated that They conducted study to staff nurses regarding local anesthesia in arterial puncture nurse's knowledge and attitudes, the aim of study is to examine attitudes and beliefs among nurses and third-year undergraduate nursing student in hospital training regarding the use of local anesthesia when performing arterial puncture and to assess their knowledge and technique, of arterial puncture for arterial blood gas analysis the study findings reported that knowledge of staff nurses and students regarding how to perform arterial blood extraction for blood gas analysis is insufficient and need to be

improved among both nurses and nursing students. So these data should be taken in to consideration when training nurses to perform arterial puncture

**Corbridge.et.al(2008)** Germany they conducted the study to assess the effectiveness of teaching module specific to arterial blood gas interpretation among the staff nurses of health memorial hospital at germany, they found that stff nurses knowledge is increased significantly after viewing the teaching module they concluded that the teaching module is nessay for provind continuing education to nurses.

**Coggon J.M (2008), Newyork** states that Arterial Blood Gas analysis is valuable diagnostic tool as it enables the objective evaluation of a patient's oxygenation, ventilation and acid-base balance. Such information demonstrates how well a patients respiratory and metabolic system are working. Within the current health care climate patients being nursed in all clinical areas are becoming sicker, It is not unusual for a nurse to care for patients who need frequent arterial blood gas tests, so it has become necessary for nurses to interpret the results of these tests. This will enable medical staff to be rapidly alerted to any potential problems and care to be tailored to the exact needs of the patient.

**Dodds (2007)** Nursing time stated that assessment for long-term oxygen therapy are now being undertaken by respiratory nurse specialists. The key skill required is arterial blood gas sampling, This has traditionally been the role for the doctor, however by using an education and training package along with a competency based assessment, nurses can know to perform., this extended role. so sarah dodds and

Graham Williamson describe a competency based education and training programme for nurses to carry out this procedure.

**Allen K (2005)** Nursing Times, stated that arterial blood gas analysis can be complex. However, in many clinical areas the nurse is one of the first to see the results. So they need to know whether immediate actions required, this articles stated that guideline for ABG interpretation is useful to the nurses even when all the complexities are not fully understood.

**Simpson H. (2004)** Nursing Times stated that arterial blood gas analysis has become an essential skill for all healthcare practitioners. It provides important information with regard to adequacy of ventilation, oxygen delivery to the tissues and acid-base balance. If the nurse having proper skill regarding arterial blood gas analysis can able to provide appropriate nursing intervention, and medical consultation.

**Cheng YJ. Kao EL (2003)**, Nursing times, stated that The study find out that whether Arterial Blood Gas (ABG) analysis is helpful for deciding on the best management plan in the study results concluded that ABG data can help the nurse to make the right decision about treatment.

**Coleman NJ (1999)**, Australia nursing Journal stated that information about acid base balance is to be useful, we need to know how to interpret arterial blood gases (ABG) inorder to intervene rapidly when the body is unable to restore a normal acid-base balance in the face of an overwhelming derangement.

**Russell JM (1991), Australia** stated that understanding acid-base disturbances is essential in the care of the critically ill patient. Through systemic evaluation of patient symptoms and arterial blood gas value, patient care can be improved. These formulas can be effective tools for the nurse to use in the care of patients with acid-base imbalances.

**Rabichoud-Ekstrnds (1990)** Journal of cardiovascular nursing stated the acid-base problems can be easily identified by the nurse when a systematic approach is utilized during arterial blood gases interpretation. Understanding acid-base balance assist the nurse in choosing the appropriate intervention, since the nurse in is the primary care giver and is most readily available for the client, early interventions to correct acid-base problems would expedite the client's recovery. so the nurse understood the ABG report and interpretation is very essential skill to provide appropriate intervention.

#### **STATEMENT OF THE PROBLEM:**

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3. To implement and evaluate the STP regarding ABG analysis
4. To findout the association between the knowledge of experimental and control group with selected demographic variables.

## **HYPOTHESIS:**

- H<sub>1</sub>** – There is significant difference between pretest and posttest knowledge of experimental group regarding ABG analysis.
- H<sub>2</sub>** - There is a significant difference between posttest knowledge of experimental and control group.
- H<sub>3</sub>** – There is a significant association between the knowledge of staff nurses with selected demographic variables .

## **ASSUMPTIONS:**

1. The newly appointed staff nurses of ICU in Vinayaka Mission Hospital, Salem are having inadequate knowledge regarding ABG analysis.
2. Structured teaching programme on knowledge of ABG analysis will improve the knowledge of staff nurses.

## **OPERATIONAL DEFINITIONS:**

### **Structured teaching programme:**

It is systematically developed instruction and teaching aids designed from a group of staff nurse to provide information regarding ABG analysis.

### **Knowledge:**

Facts, information, and skills acquired by a person through experience or educator. The theoretical person through experience or educative, the theoretical or practice understanding of a subject.

### **ABG analysis:**

A measurement of oxygen, carbon dioxide, as well as pH 0% the blood that provides a means of assessing the adequacy ventilation (PaCO<sub>2</sub>) oxygenation (PaO<sub>2</sub>).

### **Staff Nurse:**

An experimental nurses less than a charge nurse with specific qualification as GNM or B.Sc, (N).

## **LIMITATIONS**

1. The study is limited to 6 weeks period only.
2. The study is not generalized since it includes only the staff nurses who are working in ICU staff nurses of Vinayaka Mission Hospital, Salem.
3. The study is limited to sixty samples only.
4. The study is used by non standardized tool.



## **CHAPTER- II**

### **REVIEW OF LITERATURE**

#### **INTRODUCTION:**

Review of literature is a key step in research process. Review of literature refers to an extensive and systemic examination of publications relevant to the research project. Nursing research may be considered and continuing process in which knowledge is gained from earlier studies an integral parts of research in general.

According to Polit and Hungler refers to the activities involved in searching for information on a topic and developing a comprehensive picture of the state as knowledge on that topic.

#### **Purposes are to**

- ❖ To determine what is already known about the topic that the researcher wish to study.
- ❖ It helps to build on previous knowledge in the research process
- ❖ A literature source will serve as that basis for the topic
- ❖ It helps the researcher to decide whether to replicate a study or not
- ❖ It is necessary to narrow the problem to be studied.
- ❖ It helps to plan the study methodology
- ❖ It helps to select the research methods and research tools
- ❖ Literature relevant to the present study was presented in the following parts.

## **REVIEW OF LITERATURES DIVIDED IN TO THE FOLLOWING HEADINGS:**

**Section- A → General Information on Arterial Blood Gas analysis**

**Section- B → Review of literature related to knowledge of Arterial Blood Gas analysis.**

### **SECTION- A:**

#### **GENERAL INFORMATION ON ARTERIAL BLOOD GAS ANALYSIS:**

**Vijaya Sekaran L. (2001), Switzerland** Stated that, Arterial blood gas analysis is a important monitoring for treating the critically ill patients. Many serious acid-base disturbances can co-exist without significant clinical manifestations. In children with acute disorders of respiratory system, circulatory system, gastrointestinal system and renal system underlying acid-base disturbances are inevitable. These should be identified at the earliest and attempts made to maintain normal homeostasis till the organ function, recovers, arterial blood gas analysis reveals oxygenation status, adequacy of ventilation and acid-base balance. It plays a significant role in documenting and monitoring respiratory failure, especially during ventilator and oxygen therapy.

**Gooms (2001) Thailand** stated that ABG analysis is a diagnostic tool that allows the objectives evaluation of a patient's oxygenation. Ventilation and acid-base balance

The results from an ABG will indicate how well a patient's respiratory system is working. However, ABG can offer more than just information on the respiratory system they also indicate how well a patients kidneys and other internal organs [The metabolic system] are functioning.

Although all of the data in an ABG analysis can be useful. It is possible to interpret the results accurately without considering all of the values. It is only essential to consider a maximum of six values.

- Hydrogen ion concentration (pH)
- Oxygen saturation (SaO<sub>2</sub>)
- Oxygen concentration (PaO<sub>2</sub>)
- Carbon dioxide concentration (PCO<sub>2</sub>)
- Bicarbonate ion concentration (HCO<sub>3</sub>)
- Base excess (BE)

### **Arterial Blood Gas:**

Arterial Blood gas is typically requested to determine the pH of the blood and the partial pressure of carbon dioxide (PaCO<sub>3</sub>) and (PaO<sub>2</sub>) within it. It is used to assess the effectiveness of gaseous exchange and ventilation, be it spontaneous or mechanical. If the pH becomes deranged, normal cell metabolic status to be assessed, giving an indication of how they are coping with their illness. It would therefore seem logical to request an ABG on any patient who is or has the potential to become critically ill.

**Purpose of ABG analysis:**

- For accurate assessment of acid-base status
- For assessing degree of oxygenation of blood and adequacy of alveolar ventilation
- To know the respiratory function of body.
- For providing immediate intervention for respiratory disorders.

**REVIEW RELATED TO HYDROGEN ION CONCENTRATION (pH):**

The hydrogen ion concentration (pH) provides information on acid-base balance. This relates to how much acid or alkali a patient had in their blood. The pH scale indicates the concentration of hydrogen ions. The normal level of pH is 7.35-7.45. If the pH level decrease less than 7.35-7.45 that is known as Acidemia and the pH the level Increase more than 7.45 that is known as Alkalemia.

**Akguls, (2002) Turkey** Intensive care unit of a Istanbul university hospital staff nurses stated that,. They conducted the study regarding pH change before and after administration of normal saline the study results shows that there is no significant difference was found between pH levels recorded before and after 5 minutes suctioning with saline solution however the increase in pH following suctioning with saline solution was significant.

### **Review related to oxygen saturation (SaO<sub>2</sub>):**

Saturation (SaO<sub>2</sub>) measures how well the haemoglobin in the blood is saturated, the SaO<sub>2</sub> value derived from a blood gas is very similar to the SPO<sub>2</sub> values gained from pulse oximetry. The only difference is that in a blood gas we are measuring the saturation of arterial blood SaO<sub>2</sub> and in pulse oximetry we are measuring the saturation of peripheral capillary blood (SPO<sub>2</sub>) the normal range is 95-100%.

**Seguin P, et al [2000], France** states that The comparison between the pulse oximetry saturation [SPO<sub>2</sub>] with arterial blood gas saturation [SaO<sub>2</sub>] obtained during clinical routine examination, study findings concludes that SaO<sub>2</sub> ranged from 87 to 99% and SPO<sub>2</sub> ranged from 92% to 100%. Based on this result the author concluded that before defining Fio<sub>2</sub> with SpO<sub>2</sub> the materials used daily must be evaluated.

**Hahnel (1991) German,** This study results found that, arterial blood gas results and SaO<sub>2</sub> course differentiated as to procedures with or without preoxygenation as well as on-ventilator and off-ventilator suctioning in that without preoxygenation, most patients did not exhibit threatening drops in SaO<sub>2</sub>, preoxygenation provided an additional safety margin under certain condition (eg) Respiratory distress syndrome.

**Review related to (PaO<sub>2</sub>):**

This is partial pressure of oxygen dissolved within the arterial blood will determine oxygen binding to haemoglobin (SaO<sub>2</sub>). The normal level of PaO<sub>2</sub> is 80-100mmHg. The PaO<sub>2</sub> low level is low to 80/ it indicates hypoxemia.

**Rudiger M, (2005), Germany**, this study explains that PaO<sub>2</sub> are important monitoring parameters in intensive care units. The study survey shows that the use of transcutaneous monitors to measure the PaO<sub>2</sub> remains widespread among German. ICUS, the earlier data suggesting that their use had been abandoned in many ICUS worldwide in addition, we suggest that the current method of monitoring oxygenation may not prevent hypoxemia.

**Review related to PaCO<sub>2</sub>:**

This is the partial pressure of carbon dioxide dissolved within the arterial blood. It is used to assess the effectiveness of ventilation. The normal level for PaCO<sub>2</sub> is 35-45mg. If the normal level is reduced below 35 mm Hg that is known as respiratory alkalosis, the PaO<sub>2</sub> level is Increased than 45 mm Hg that is known as respiratory acidosis.

**Florian Floss (2008), France** the study explained there are three different methods to determine PCO<sub>2</sub> during transport are available, arterial blood gas analysis (PaCO<sub>2</sub>) end-tidal [PetCO<sub>2</sub>] and transcutaneous [PtCCO<sub>2</sub>] measurement.

The study result find that during inter hospital transport PaCO<sub>2</sub> and PtcCO<sub>2</sub> provide the best accuracy when compared with the reference measurement, patients

who either require a tight control of  $\text{PCO}_2$  or endured lengthy transportation could benefit greatly from the combination of expiratory capnography with mobile arterial blood gas analysis or the transcutaneous measurement of  $\text{PCO}_2$ .

### **Review related to $\text{HCO}_3^-$ :**

$\text{HCO}_3^-$  is the chemical formula for bicarbonate, and alkali. It is the main chemical buffer in plasma and alludes the body's metabolic status. It takes in to account bicarbonate produced as a result of respiratory failure the normal  $\text{HCO}_3^-$  is 22-26 meq/L, the  $\text{HCO}_3^-$  is level decreased below 22 meq/L that is known as metabolic acidosis the level is Increased above 26 meq/L that is known as metabolic alkalosis.

**V. Kumar, (2008), New Delhi** Roche diagnostics center conducted the study regarding comparison of measured and calculated Bicarbonate value, the study findings shows that In the majority of instances the  $\text{HCO}_3^-$  concentration calculated from ABG measurements provided a good estimate of the measured venous  $\text{HCO}_3^-$  concentration, the calculated  $\text{HCO}_3^-$  values may provide effective means for detecting systematic errors in either procedures.

### **Review related to Base excess (BE):**

Base excess is a surplus amount of base (alkali) within the blood however, It can be normal to have a small of surplus within the blood. The normal range can be -2 mmol and +2 mmol per litre (or)  $\pm 2.0$  meq/L.

**Paake MJ, White GH (2002)** Express laboratory south path finders medical centre stated that as part of arterial blood gas analysis, base excess is often reported as a measure of non-respiratory acid-base disturbance. Most blood gas analysers offer, the option of calculating either the base excess of the blood sample or the base excess of the extracellular fluid (ECF). We report a case that illustrates that selecting the physiologically appropriate parameter avoids the potential for misinterpretation, of acid-base data, we recommend that the base excess of the ECF is the appropriate metabolic blood gas parameter for clinical use.

## **SECTION – B:**

### **REVIEW OF LITERATURE RELATED TO KNOWLEDGE OF ABG ANALYSIS:**

**Carillo alvareza (2003)** Seejon Cuidadas Intensives, Hospital General university Gregorio Maranon Espana stated that analysis of blood gases and acid-base status is essential skill for monitoring mechanical ventilation, the most commonly used methods, are based on intermittent blood gases, continuous pulse oximeters, and capnography, and less frequently on continuous interarterial gasometry, The most useful parameters for analyzing oxygenation are PaO<sub>2</sub>, hemoglobin saturation, PaO<sub>2</sub> / FiO<sub>2</sub> ratio, oxygenation index, PaCO<sub>2</sub> to evaluate ventilation, and pH and base excess to analyze acid-base status. A method for analyzing the results of blood gases and derivative parameters is recommended to the interpretation of different states of acidosis and alkalosis is discussed.



**Chen CZ, Hsiue TR (2003)**, Department of Internal medicine, college of Medicine National University Tainan, Stated that arterial blood gas analysis knowledge is useful in evaluation of the clinical condition of critically ill patients, however, arterial puncture or insertion an arterial catheter may be used for arterial blood gas analysis, Through this we can evaluate pH, partial pressure of carbon dioxide PaCO<sub>2</sub> and partial pressure of oxygen PaCO<sub>2</sub> and bicarbonate, (HCO<sub>3</sub>) and predict the ABG analogs for patients with acute respiratory failure treated by mechanical ventilation in an intensive care unit.

**Day TK (2002)** Louisville veterinary specially and emergency services USA stated that evaluation of both arterial and central venous blood can be valuable in monitoring the critically ill veterinary patient. The traditional approach, which concentrates on arterial blood gas analysis only, may miss important aspects of oxygen delivery to tissues, especially in patients with poor perfusion, the advances that have resulted in affordable bedside blood gas analyzers have created a clinical situation in which blood gas analysis should be an integral part of critical care monitoring and assessing both the arterial and central venous samples should results in more efficient and higher quality care for critically ill patients.

**Gerontol A (2000)** Institute of Internal Medicine and Geriatrics, University of Siena, Italy stated that arterial blood gas analysis is a first step diagnostic approach in patients with suspected respiratory disorders. Respiratory alkalosis and acidosis were also the metabolic disorders diagnosed in earlier stage through the Arterial Blood gas analysis.

**Shoulders Odom.B.(2000)** Dimens critical care of nursing ,cardiology department USA, stated that the arterial blood gas (ABG) analysis, one of the most common tests ordered provides clinicians with valuable information on a patient's oxygenation and acid-base balance. Interpreting ABG analysis results can be challenging, even for the most experienced practitioners, because it requires knowledge of the physiology and cause and effects relationship of the disturbances. Applying the principles ,and the ABG algorithm described in this article will provide nurses with a systematic way to Interpret uncomplicated arterial blood gas results, including primary, mixed and compensated acid -base disturbances.

**Capovilla J. Miller (2000)** critical care nursing Napa Valley College Napa, California, Stated that In the clinical setting, knowledge of noninvasive blood gas monitoring has become the standard of care over arterial puncture, Technology has provided ways to measure both arterial oxygen ( $\text{PaO}_2$ ) and arterial carbon dioxide ( $\text{PaCO}_2$ ) with the availability of non invasive blood gas monitoring, patient care and comfort is improving and cost saving are being implemented, Overall non-invasive monitoring can aid in the diagnosis of some pulmonary diseases and monitor patient progress.

**Coleman (1999)** Australia nursing journal stated that information about acid-base balance is to be useful, we need to know how to interpret arterial blood gas [ABGs] so we can intervence rapidly when the body is unable to restore a normal acid-base balance in the face of an overwhelming derangement.

**Prause G, (1998)** Pre Clinical Blood Gas Analysis, in German stated that arterial blood gas analysis proved to be helpful in the optimal management out of

hospital cardiac arrest. In emergency patients alternative methods fail to detect severe disturbances of the patients oxygen and / or carbon dioxide status and the acid-base balance management of prehospital. Cardiac arrest could be optimized by the routine use of blood gas analysis.

**Faria SH, (1997)** Journal of vascular Nursing stated, that many clinical nurses find the concept of acid/base balance confusing. The nurse can use the further step approach in ABG interpretation. In addition, the components at ABGs [pH<sub>1</sub> PCO<sub>2</sub> and HCO<sub>3</sub>] are essential, metabolic and respiratory abnormalities [Acidosis and alkalosis] related cause and signs & symptoms. By using this approach, the nurse can analyze the ABG values confidently and make a wise choice about appropriate nursing actions.

**Zimmerman (1996)** critical care clinic's, Baylor college of medicine, USA stated that arterial blood gas (ABG) measurement are one of the most frequently requested laboratory examinations in critically ill patients, ABGs include measurement of pH<sub>1</sub>, PaCO<sub>2</sub> and Oxyhemoglobin saturation these measurements allows for assessment often nature, progression, and severity of metabolism and respiratory disturbances.

**Schizzerman (1994)** American journal of nursing stated that understanding acid-base disturbances is essential skill for the nurse to care of the critically ill patient, through a systematic evaluator of patient symptoms and arterial blood gas value so that the patient care can be improved. These formulas can be effective tools for the nurse to use in the care of patients with acid-base imbalanced.

**Robichaud – (1990)** “Journal of cardiovascular nursing stated that acid-base problems can be easily identified by the nurse when a systematic approach is utilized during arterial blood gas interpretation. By intervening early, many emergency situation can be avoided, since the nurse is the primary care giver, and is most readily available for the client, early interventions to correct acid-base problems would expedite the client’s recovery.

**Shapiro, BA. (1988)**, Critical Care Clinics, Northwestern University Medical College, Illinois, stated that a clinically relevant presentation of interpretation of arterial blood gas measurement in the critically ill patient is presented. Oxygenation deficits are discussed in relation to differentiation of pulmonary, cardiovascular, and metabolic causes gas measurement and interpretation is very essential skill for nurses who are working in ICU.

**Ventriglia WJ. (1986)**, Emergency medical clinic North America stated that blood gas determination provide detailed information regarding cardiopulmonary and metabolic homeostasis in the emergency patient. The rapidly available arterial blood gas (ABG) analysis is useful in the resuscitation of the acutely ill or injured patient.

## CONCEPTUAL FRAME WORK

Conceptualization refers to the process of developing an refining abstract.

**Creasla. J.L. et.al. (1991)** stated that a conceptual model gives a clear picture for logical thinking for systemic observation and interpreting the observed data. The model also gives direction for relevant questions on phenomena and points out solution to practical problems.

A conceptual model frame work deals with the concept of the research problems assembled together to provide certain frame of reference. The frame work helps and guide the researcher to gain in sight in to the problem by explaining the relationship between the facts.

To describe the relationship of concepts in the study, open system mdoel by J.W. Kenny's was used. Open system model serves as a model for reviewing people as interrupting with the environments. Open system model is a set of related definitions, assumptions and prepositions which deals with reality as an integrated hierarchy, system model focuses in each system as a, whole, but, pays particular attention to the interaction of its part or subsystems. A system is a group of elements that interact with one another in order to achieve a goal.

### **The following are the major concepts of the theory:**

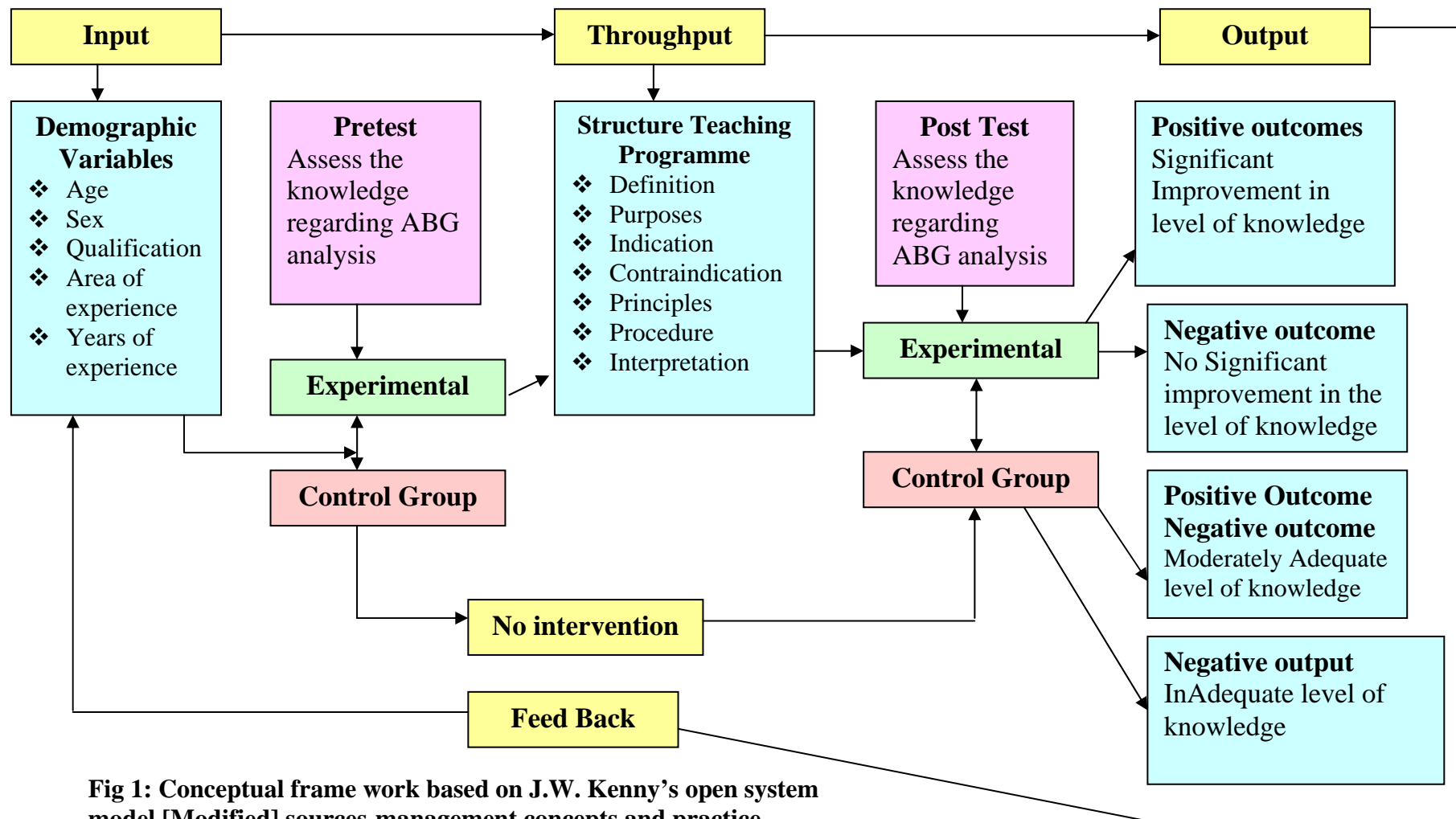
Input is the matter, energy and transformation that enters to be system. In the present study, the input is the characteristics of the staff nurse age, sex, qualification, area of experience, Years of experience.

Throughout is the use of structured questionnaire by structured teaching programme.

Output is the expected outcome that was obtained by assessing the knowledge through structured questionnaire, the output was considered in terms of change in post-test knowledge scores obtained through structured questionnaire.

**Feed Back:**

Difference in pre and post-test scores were observed from the knowledge scores of the samples. In the present study, the feedback was considered as a process of maintaining the effectiveness of structured teaching programme. It was assessed by comparing pre and post-test scores through 't' test. The effectiveness of the structured teaching programme was also tested between the obtained scores of the samples with their demographic variables through chi-square and the effectiveness of structured teaching programme related to the association of knowledge was tested through the 't' value and chi-square.



**Fig 1: Conceptual frame work based on J.W. Kenny's open system model [Modified] sources-management concepts and practice**

## CHAPTER III

### METHODOLOGY

Research methodology is the systematic way to solve the research problem. Pearson (1992) stated that there is no short cut to truth. There is no way to gain knowledge of universe except through the gate way of scientific method. Methodology is one which enables the researcher to project a blue print of the research undertaken.

The research methodology presents the research approach and the research design. The design of the study describes about the setting of the study, population the sample and sampling technique. The data collection technique, content validity and reliability of tools. Pilot study, and methods of data analysis based on the statement.

#### **Research approach:**

The research approaches adopted for this research study is an Quantitative approach. It helps to understand the effect of independent variables on the dependent variables. So the above mentioned research approach is suitable for the study.

#### **Research design:**

The research design refers to the researcher's overall plan for obtaining answers to the research questions and for testing the research hypothesis. The research design spells out the strategies that the researcher adopt to develop information that is accurate objective and interpretable.



For this study the research design chosen is quasi experimental design which includes

pre-test, post test control group design. The design was used for assessing the level of knowledge of staff nurses regarding ABG analysis. It will be achieved through the comparison between two groups. The groups are experimental and control group.

**The schematic representation of research design:**

A quasi - experimental design, which include manipulation, control and no randomization.

<b>GROUP</b>	<b>PRE ASSESSMENT</b>	<b>INTERVENTION</b>	<b>POST ASSESSMENT</b>
Experimental	O <sub>1</sub>	X	O <sub>2</sub>
Control	O <sub>1</sub>	-	O <sub>2</sub>

Key: O<sub>1</sub> – Pre assessment

X -- Structured teaching programme

O<sub>2</sub> – Post assessment

## **VARIABLES:**

Variables are the qualities, properties or the characteristics of the person, things or situation that change or vary. The variables mainly include in this study are Independent and Dependent variables. Dependent variables explain the effect of independent variables.

### **I. Independent variables:**

Independent variables is the variable which is not dependent on any other, In this study the independent variable refers to structured teaching programme, on ABG analysis.

### **II. Dependent variables:**

The Dependent variable is the variable that the researcher is interested in understanding explaining or predicting . In this study the dependent variable refers to gain the knowledge of staff nurses towards ABG analysis who are working in selected hospitals at Salem.

## **POPULATION:**

Population refers to the entire aggregation of cases that meets designed criteria. The population of present study was staff nurses who are working in Vinayaka Mission Hospital at Salem District were the population for the study who fullfill the criteria are selected as a sample. Ethical clearance was obtained to conduct the study.

**SAMPLE:**

Sample refers to a subject of a population that is selected to participate in a particular study. It is a portion of the population. Which represents the entire population, Hence the researcher selected sample from staff nurses working in ICU of Vinayaka Mission Hospital, Salem.

**SAMPLE SIZE:**

The sample comprises of 60 staff nurses [30 experimental, 30 control] who met the inclusion criteria and working in ICU of Vinayaka Mission Hospital, Salem.

**SAMPLING TECHNIQUES:**

The investigator selected subjects by Purposive sampling technique.

**SITE AND SETTINGS:****Site:**

Site is the exact physical location where the study was conducted.

❖ Vinayaka Mission Hospital, at Salem

**Setting:**

Setting is the physical location of the site in which data collection takes place.

- ❖ Present study was conducted at selected ICU of Vinayaka Mission Hospital, Salem, Tamilnadu.

**CRITERIA FOR SAMPLE SELECTION:****Inclusion criteria:**

- Staff nurses who are working in ICU of Vinayaka Mission Hospital, Salem.
- Staff nurses who are completed GNM and B.Sc Nursing.
- Staff nurses who are available at the time of study period.

**Exclusion Criteria:**

- Staff nurses who are on night shift.
- Staff nurses who are in leave.
- Staff nurses who are not willing to participate in this study.

**DEVELOPMENT OF DATA COLLECTION INSTRUMENT:**

The instrument selected in the research should be as far as possible the vehicle that would to be best to obtain data for drawing conclusions. Which are pertinent for the study.

The major task of the researcher is to develop instrument that accurately and precisely to measure the variables of interest. Questioning allows the gathering of large sample. Relatively quickly and inexpensively. It avoids interviewer bias, offers, anonymity and the cost effective data collection method, that is self report.

To assess the knowledge of staff nurses a questionnaire was prepared based on objectives of the study by the investigator, after reviewing and considering literature on ABG analysis, based on the opinion of the nursing experts.

#### **Data Collection Instrument:**

Data collection instrument used was

- ❖ Structured questionnaire [Pre-test and Post-test]
  
- ❖ Structured teaching programme

#### **Data collection method:**

- Data collection method was used was Self report method.

#### **Description of data collection instruments:**

The instrument used for data collection was Structured questionnaire which consists of 3 sections.

**Section -1** – Demographic variables of staff nurses

**Section -2** – Structured knowledge questionnaire

- i). Introduction regarding ABG analysis
- ii). Procedure regarding arterial puncture
- iii). Reference range and interpretation

**Section -3** – Structured teaching programme on ABG analysis

**Section 1 – Demographic data:**

It consists of selected demographic variables like age, sex, qualification, area of experience, years of experience that was taken.

**Section 2 : Structured Knowledge questionnaire:**

A questionnaire to assess the level of knowledge of the subjects on ABG analysis.

It consists of 40 items, All the items were multiple choice questions it divided into the areas like basic knowledge regarding ABG analysis.

- Introduction - 5
- Procedure - 16
- Interpretation - 19

### Level of knowledge based on score

<b>LEVEL OF KNOWLEDGE</b>	<b>PERCENTAGE OF SCORE</b>	<b>ACTUAL SCORE</b>
Inadequate	<50%	0 – 20 score
Moderate	51%-75%	21 – 30 score
Adequate	75%-100%	31 -40 score

#### **i). Introduction regarding ABG analysis:**

It consists of 5 Items, All the items were multiple choice questions. A score (1) for the correct answer and a score (0) for the incorrect answer was awarded.

#### **ii). Procedure regarding arterial puncture:**

It contains 16 questions related to procedure regarding Arterial puncture which was multiple choice questions.

For correct answer a score is (1) and Incorrect answer a score is (0).

#### **iii). Reference range and interpretation:**

It consist of 19 Items. All the items were multiple choice questions and score (1) for the correct answer and score (0) for the incorrect answer.

### **Section -3 – Structured teaching programme on ABG analysis**

Teaching programme was titled as structured teaching programme on ABG analysis it was organized to previous headings.

- i) Introduction of ABG analysis
- ii) Definition of ABG analysis
- iii) Purpose of ABG analysis
- iv) Indications for ABG analysis
- v) Contraindications for ABG analysis
- vi) Limitations or principles for ABG analysis
- vii) Article needed for ABG analysis
- viii) Procedure for arterial puncture
- ix) Interpretation of ABG value

p(H), SaO<sub>2</sub>, PaO<sub>2</sub>, PaCo<sub>2</sub>, HCO<sub>3</sub>, BE

#### **Content Validity:**

The content validity of the instrument was assessed by obtaining from five experts in the field of nursing and medicine. The experts suggested specification in languages, recognition and addition to certain items. Appropriate modification were made accordingly after that the tool was finalised.



**Reliability:**

The reliability is the degree of consistency or accuracy with which an instrument measures on attribute that is supposed to measure.

In order to establish reliability of the tool. It was administered to 5 staff nurses those not in sample area, Reliability of the tool was established through test and retest method.

**Pilot study:**

The pilot study is a small preliminary investigation of the same general character as the major study. It is designed to acquaint the researcher with the problems to be corrected in preparation for the large research project and try out the problems for collecting the data. Pilot study was conducted to ensure validity and reliability of the tool and feasibility for giving intervention.

The pilot study was conducted in KMCH hospital, Erode From 1.11.09 to 7.11.09.. After getting formal permission through principal. 6 samples were taken during the pilot study. They were selected by using purposive sampling method. In that 3 sample in experimental group and 3 in control group who fulfilled the selection criteria other than the main study sample area.

A Structured questionnaires was used in pre test, post test to collect data from the staff nurses during pilot study. The study was not feasible because of inadequate sample in this hospital. So the settings were changed.

## **DATA COLLECTION PROCE**

The study was conducted in Vinayaka Mission hospital From 11.11.09 to 30.11.09 after getting written permission was from Vinayaka Mission Hospital, Medical Director and Cardio Thoracic Surgeon, Nursing Superintendent, then the researcher introduced herself & explain about the study and purposes of study to the staff nurses. Researcher select the sample according to the selection criteria by using purposive sampling technique method. Then the researcher introduced herself to the staff nurses and developed a good rapport. The researcher assured the participants for the confidentiality of their response.

A pretest was conducted by the researcher by providing Structured questionnaire to experimental and control group of staff nurses on knowledge on ABG analysis for 15-20 mts. After that researcher distributed structured teaching programme to the experimental group .

After 7 days, the post test was administered to the experimental and control group staff nurses for 15-20 minutes regarding knowledge on ABG analysis using the same questionnaire.

## **PLAN FOR STATISTICAL ANALYSIS**

The data analyzed was based on the objectives of the study using descriptive and inferential statistics.

- ❖ Frequencies and percentages for the analysis of the demographic data.
- ❖ Mean score, percentage and standard deviation for the knowledge score.

- ❖ Paired 't' test and Chi-square used for association between the selected demographic variables of knowledge and practice score.

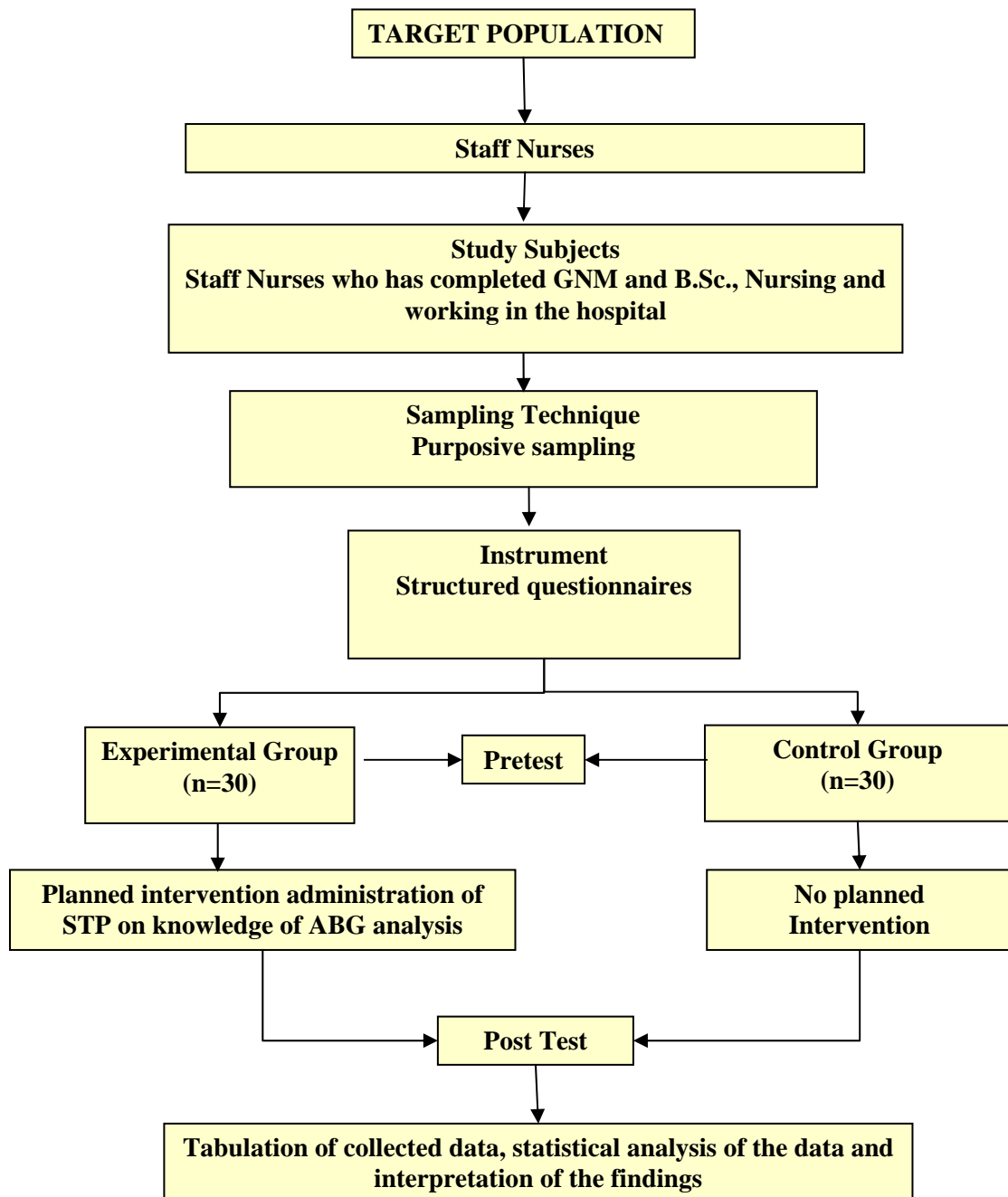
### PLAN FOR DATA ANALYSIS

S.No.	Data Analysis	Methods	Remarks
1.	Descriptive	Mean, Standard deviation percentage	Assess the level of knowledge, regarding ABG analysis
2.	Inferential statistics	paired 't' test  Chi-square test	compare the pretest and posttest knowledge of ABG analysis among the experimental and control group  Analyse the association between knowledge with demographic variables

### ETHICAL CLEARANCE

The proposed study was conducted after the approval of dissertation committee of the college, chief of the hospital and also after the consent from the study participants without violating the human rights.

**Fig. 2: SCHEMATIC REPRESENTATION OF THE STUDY DESIGN**



## CHAPTER- IV

### ANALYSIS AND INTERPRETATION

**Kerlinger (1995) defines** analysis as the categorizing ordering manipulating and summarizing of data to obtain answers to research question. The purpose of analysis is to reduce the data into interpretable form so that relations of research problem can be studied and tested.

This chapter deals with analysis and interpretation of the information collected from 60 staff nurses working in Vinayaka Mission hospital at Salem.

#### **DESCRIPTION OF DATA ANALYSIS:**

The analysis of the data is organized and presented under the following broad headings,

**Section I:** Description of study subjects by demographic characteristics.

**Section II:** Analysis of pre test and posttest knowledge of experimental group of staff nurses regarding ABG analysis.

**Section III:** Analysis of pre test and posttest knowledge of control group of staff nurses regarding ABG analysis.

**Section IV:** Comparison of pretest and posttest knowledge of experimental and control group staff nurses regarding ABG analysis.

**Section V:** Findout the association between the knowledge of experimental and control group with selected demographic variables of staff nurses.

## SECTION I

### FREQUENCY AND PERCENTAGE DISTRIBUTION OF DEMOGRAPHIC CHARACTERISTICS:

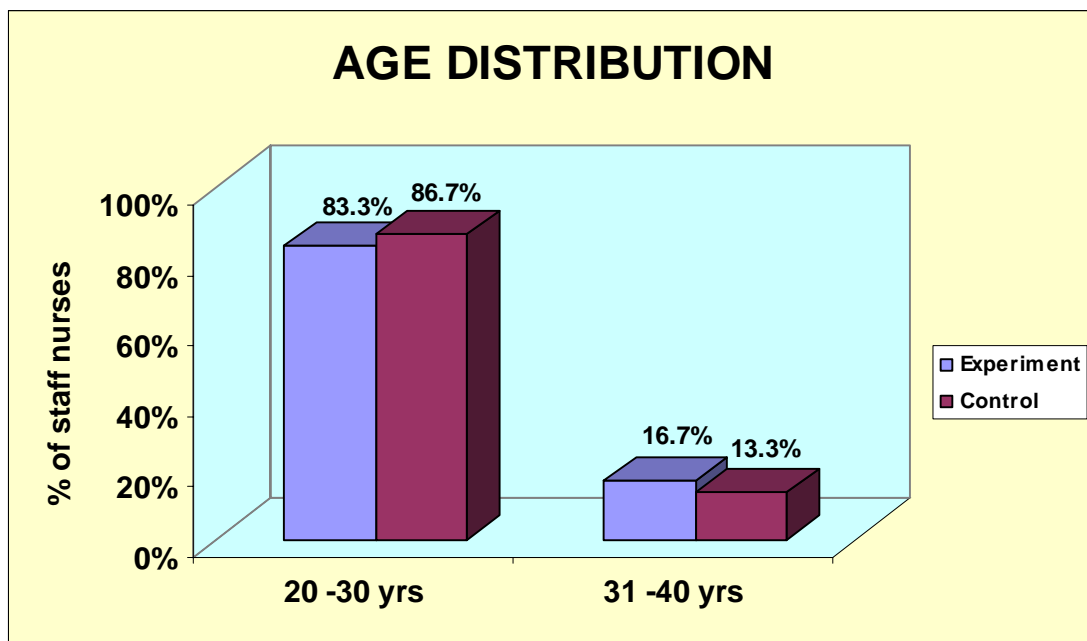
**Table 1: DEMOGRAPHIC PROFILE**

Demographic variables		Group				significance
		Experiment		Control		
		n	%	n	%	
Age	20 -30 yrs	25	83.3%	26	86.7%	$\chi^2=0.13P=0.71$
	31 -40 yrs	5	16.7%	4	13.3%	
Sex	Male	8	26.7%	11	36.7%	$\chi^2=0.69P=0.40$
	Female	22	73.3%	19	63.3%	
Qualification	GNM	26	86.7%	27	90.0%	$\chi^2=0.16P=0.69$
	B.Sc.(N)	4	13.3%	3	10.0%	
Years of Experience	0 -1 yr	10	33.3%	8	26.7%	$\chi^2=0.35P=0.85$
	1 -2yrs	15	50.0%	17	56.7%	
	2 -3yrs	5	16.7%	5	16.7%	
Area of experience	ICU	28	93.3%	30	100.0%	$\chi^2=0.51P=0.47$
	OT	2	6.7%	0	0.0%	

Table no.1 shows the experiment group and control group staff nurses demographic variables, those who have participated for the following study “A study to asses the effectiveness of structured teaching programme on knowledge regarding

arterial blood gas analysis among the staff nurses who are working in ICU of Vinayaka Mission hospital at Salem.”

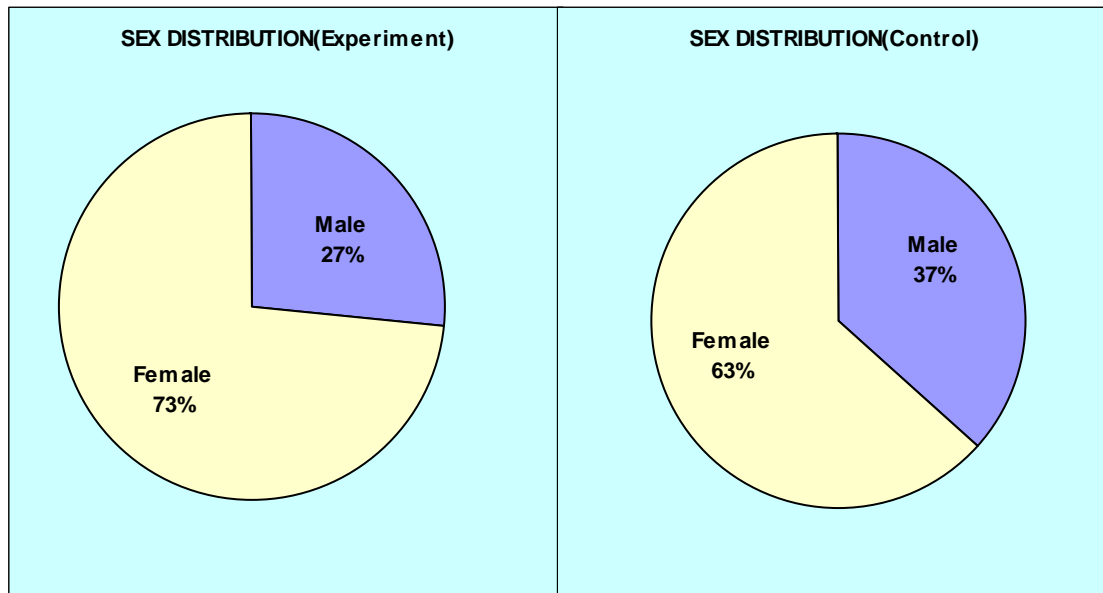
Statistical analysis shows that there is no statistically significant difference between experimental and control group. It means both groups are similar. It was calculated using Pearson chi-square test/Yates corrected chi-square test.



**Fig. 3: Bar diagram showing distribution of age among the experimental and control group of staff nurses.**

According to age group the staff nurses are belongs to 20-30yrs in experimental was 83.3% and in control group was 86.7% and the staff nurses who belongs the age group 31-40 yrs is 16.7% in experimental group and in control group.

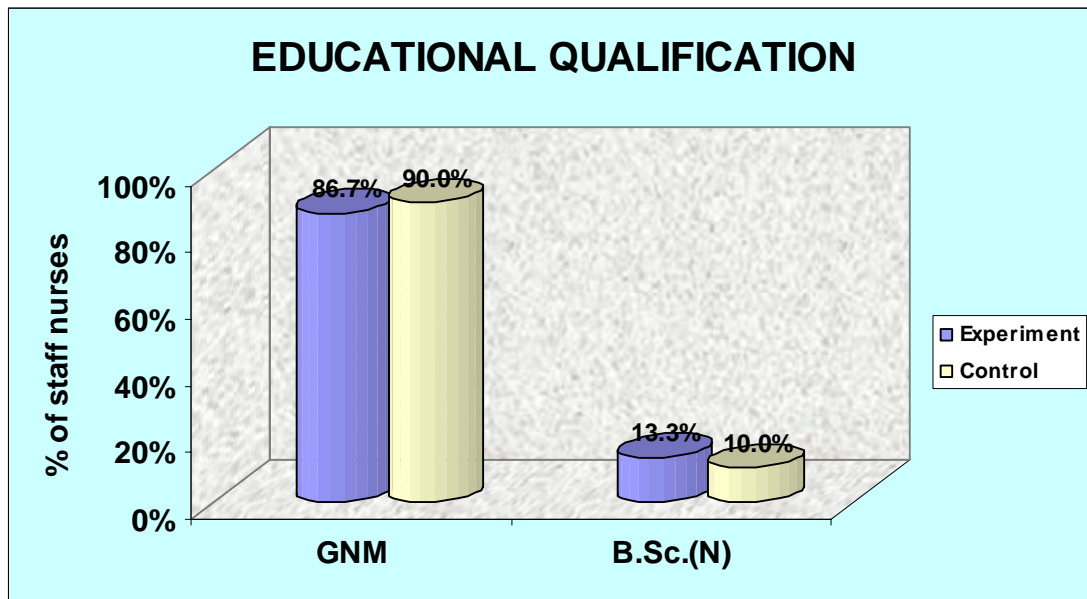
**Fig.4.: Pie diagram showing sex distribution among experimental and control group of staff nurses**



According to sex 73% female and 27% male in experimental and in control group 63% female and 37 % male

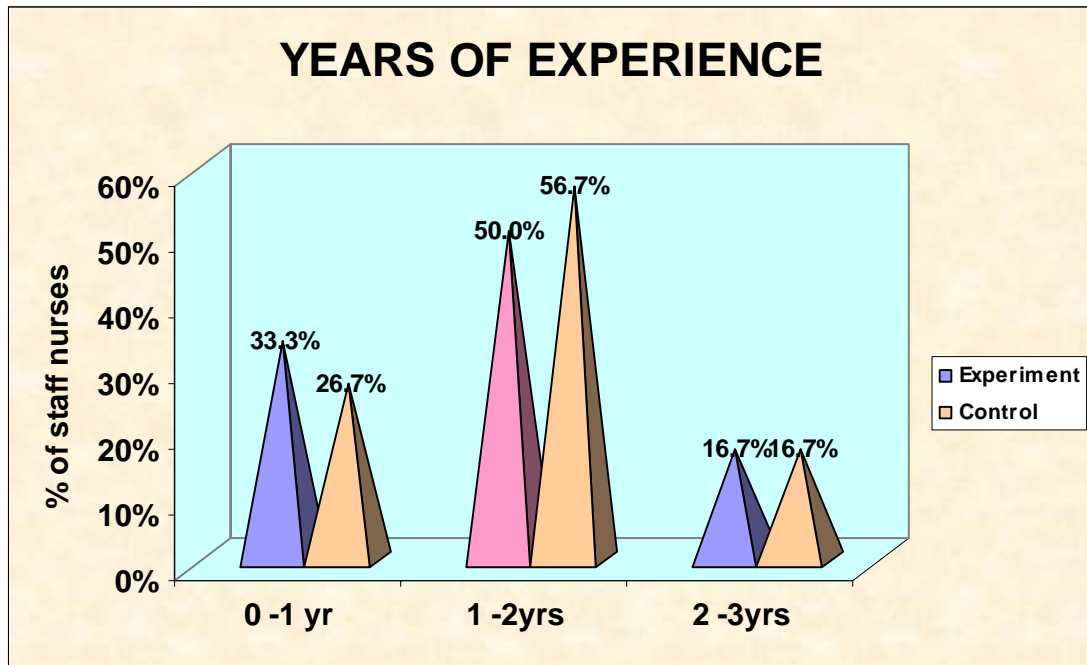


**Fig. 5: Cylindrical diagram showing distribution of educational qualification among the experimental and control group of staff nurses**



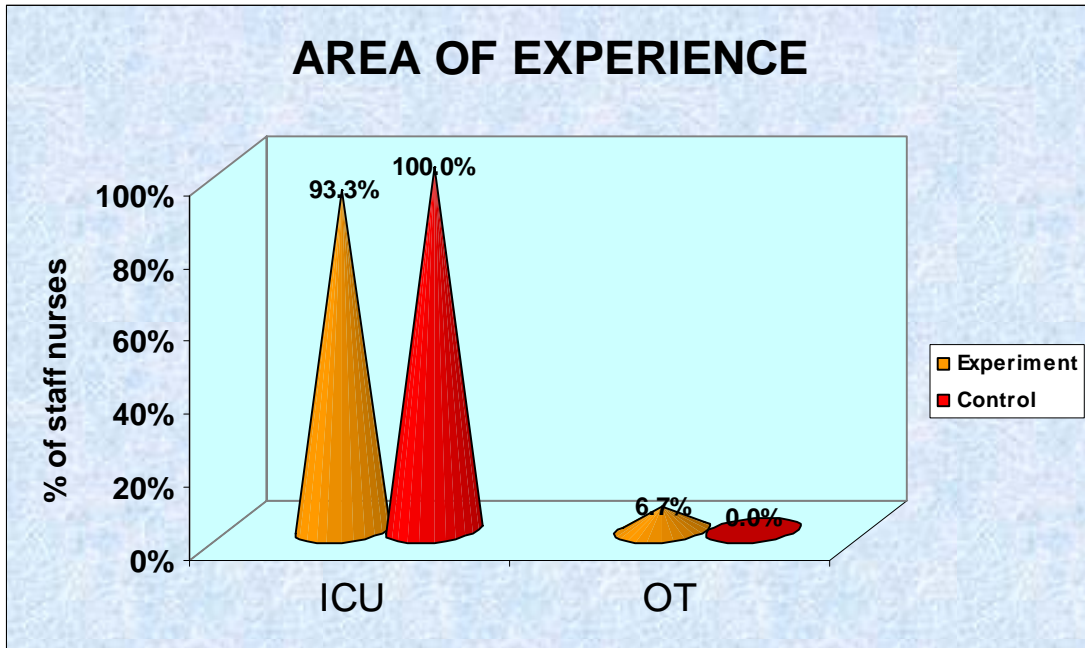
According to educational qualification in experimental group 86.7% GNM and 13.3% Bsc.,(N) and in control group 90% are GNM and 10% Bsc.,(N)

**Fig. 6: Pyramid diagram showing distribution of years of experience among the experimental and control group of staff nurses**



According to years of experience 33.3% are having 0-1 yr and 50.0% are having 1-2 yrs and 16.7% are having 2-3 yrs of experience in experimental group In control group 26.7% are having 0-1yr and 56.7% are having 1-2yrs and 16.7% are having 2-3 yrs of experience.

**Fig. 7: Cone diagram showing distribution of area of experience among the experimental and control group of staff nurses**



According to area of experience in experimental group 93.3% are having experience in ICU, 6.7% are having experience in OT In control group 100% are having experience in ICU none of the members in OT.

## SECTION II

### TO ASSESS THE PRETEST AND POSTTEST KNOWLEDGE OF EXPERIMENTAL GROUP OF STAFF NURSES REGARDING ABG ANALYSIS

**Table 2: ABG ANALYSIS KNOWLEDGE SCORE (Experiment)**

	No. of questions	Min – Max score	Pretest knowledge		Posttest knowledge	
			Mean score	%	Mean score	%
Introduction	5	0 -5	1.93	38.60%	3.87	77.40%
Procedure	16	0 -16	6.83	42.69%	13.07	81.68%
Interpretation	19	0 -19	7.83	41.21%	15.83	83.31%

Table no.2 shows the experimental group staff nurses pretest and posttest knowledge score on each aspects of ABG analysis. In pretest staff nurses scored only poor score but in posttest they scored adequate score on ABG analysis questions.

**Table 3: OVERALL KNOWLEDGE SCORE(Experiment)**

	No. of questions	Min – Max score	Pretest knowledge		posttest knowledge	
			Mean score	%	Mean score	%
Overall mean score	40	0 -40	16.60	41.50%	32.77	81.93%

Table no.3 shows the experimental group staff nurses pretest and posttest overall knowledge score on ABG analysis. In pretest staff nurses scored only poor

score but in posttest they scored adequate score on ABG analysis. Overall knowledge score shows, they improved their knowledge from 41.5% to 81.93%.

**Table 4: LEVEL OF KNOWLEDGE (Experiment)**

<b>Level of knowledge</b>	<b>Pretest</b>	<b>Posttest</b>
Inadequate	27(90.0%)	0(0.0%)
Moderately Adequate	3(10.0%)	6(20.0%)
Adequate	0(0.0%)	24(80.0%)

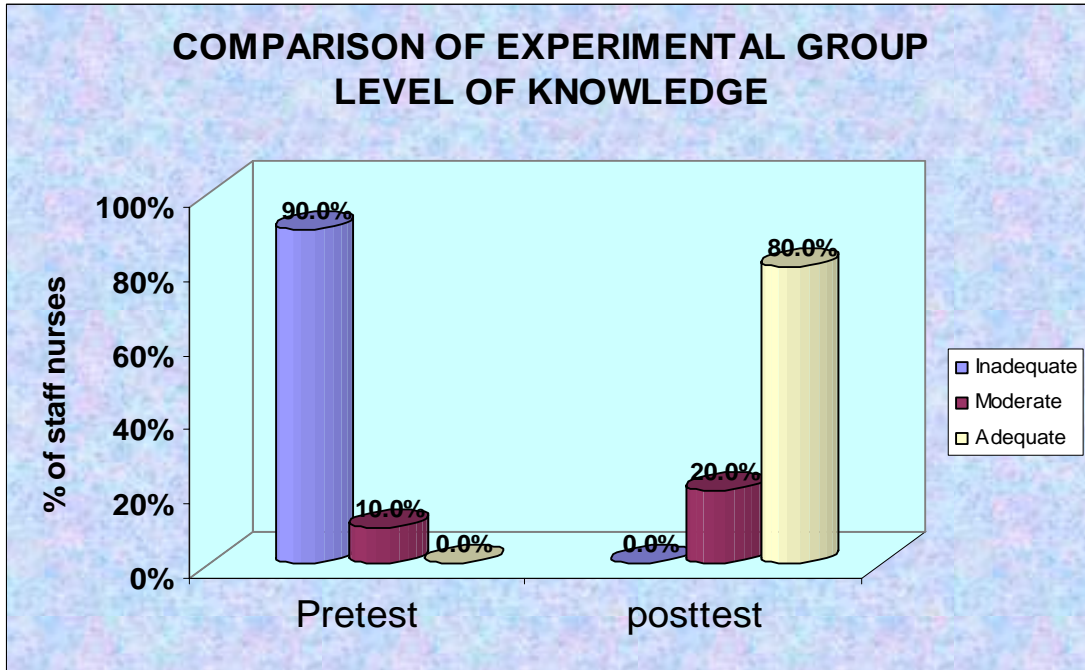
Table no. 4 shows the pretest and posttest overall level of knowledge for experimental group. In pretest 90% of staff nurses are having inadequate knowledge regarding ABG analysis. In posttest none of the staff nurses are having inadequate knowledge regarding ABG analysis.

**Score 0 - 40**

< 50% inadequate knowledge = 0 – 20 score

51 -75% moderately adequate knowledge = 21 – 30 score

76-100% adequate knowledge = 31 -40 score



**Fig. 8: Cylinder diagram showing comparison of experimental group of pretest and post test knowledge regarding ABG analysis**

### SECTION III

#### TO ASSESS THE PRETEST AND POSTTEST KNOWLEDGE OF CONTROL GROUP OF STAFF NURSES REGARDING ABG ANALYSIS

**Table 5: ABG ANALYSIS KNOWLEDGE SCORE(Control)**

	No. of questions	Min – Max score	Pretest knowledge		posttest knowledge	
			Mean score	%	Mean score	%
Introduction	5	0 -5	1.73	34.60%	1.80	36.00%
Procedure	16	0 -16	6.67	41.69%	6.77	42.31%
Interpretation	19	0 -19	7.90	41.57%	8.23	43.31%

Table no.5 shows the control group staff nurses pretest and posttest knowledge score on each aspects of ABG analysis. In pretest, staff nurses scored only poor score and in posttest also they scored poorly on ABG analysis questions.

**Table 6: OVERALL KNOWLEDGE SCORE(Control)**

	No. of questions	Min – Max score	Pretest knowledge		posttest knowledge	
			Mean score	%	Mean score	%
Overall mean score	40	0 -40	16.30	40.75%	16.80	42.00%

Table no.6 shows the control group staff nurses pretest and posttest overall knowledge score on ABG analysis. In pretest staff nurses scored only poor score and in posttest also they scored poorly on ABG analysis. Overall knowledge score shows, they improved their knowledge from 40.75% to 42.00%.

**Table 7: LEVEL OF KNOWLEDGE (Control)**

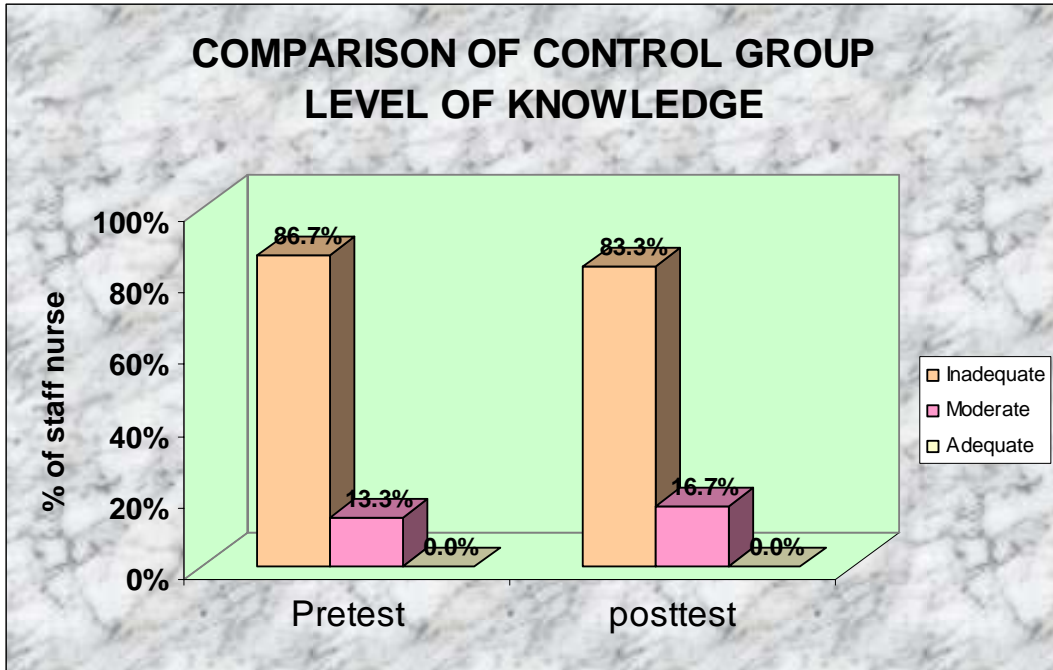
<b>Level of knowledge</b>	<b>Pretest</b>	<b>Posttest</b>
Inadequate	26(86.7%)	25(83.3%)
Moderately Adequate	4(13.3%)	5(16.7%)
Adequate	0(0.0%)	0(0.0%)

Table no 7 shows the pretest and posttest overall level of knowledge for control group . In pretest 86.7% of staff nurses are having inadequate knowledge regarding ABG analysis. In posttest also 83.3% of the staff nurses are having inadequate knowledge regarding ABG analysis.

**Score 0 - 40**

- < 50% inadequate knowledge = 0 – 20 score
- 51 -75% moderately adequate knowledge = 21 – 30 score
- 76-100% adequate knowledge = 31 -40 score





**Fig. 9: Bar diagram showing comparison of control group of pretest and post test knowledge regarding ABG analysis**

## SECTION IV

### TO COMPARE THE PRETEST AND POSTTEST KNOWLEDGE OF EXPERIMENTAL AND CONTROL GROUP REGARDING ABG ANALYSIS.

**TABLE 8**

#### COMPARISON OF PRETEST & POSTTEST ABG ANALYSIS KNOWLEDGE SCORE (EXPERIMENT)

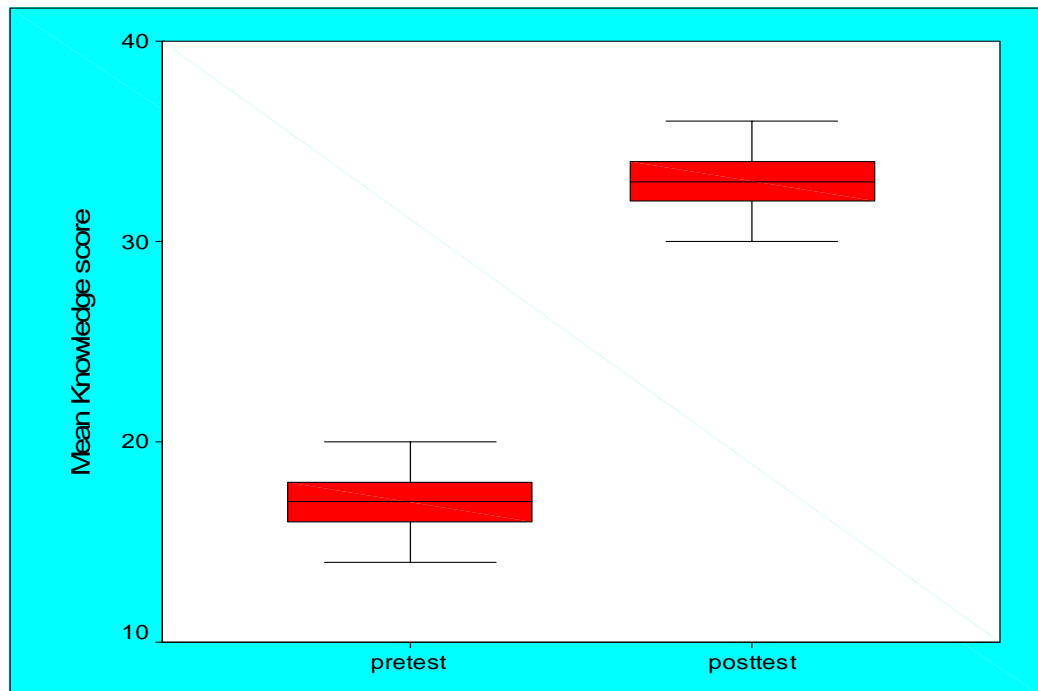
Knowledge	Pretest knowledge		Posttest knowledge		Student's paired t-test
	Mean	SD	Mean	SD	
Introduction	1.93	0.87	3.87	0.73	t=13.49 P=0.001 significant
Procedure	6.83	1.58	13.07	1.14	t=16.97 P=0.001 significant
Interpretation	7.83	0.95	15.83	1.32	t =33.37 P=0.001 significant

Table no 8 Compares the pre and posttest knowledge score. It shows there is a significant difference between pretest and posttest score of staff nurses knowledge on all aspects of ABG analysis. It was analysed using student's paired t-test.

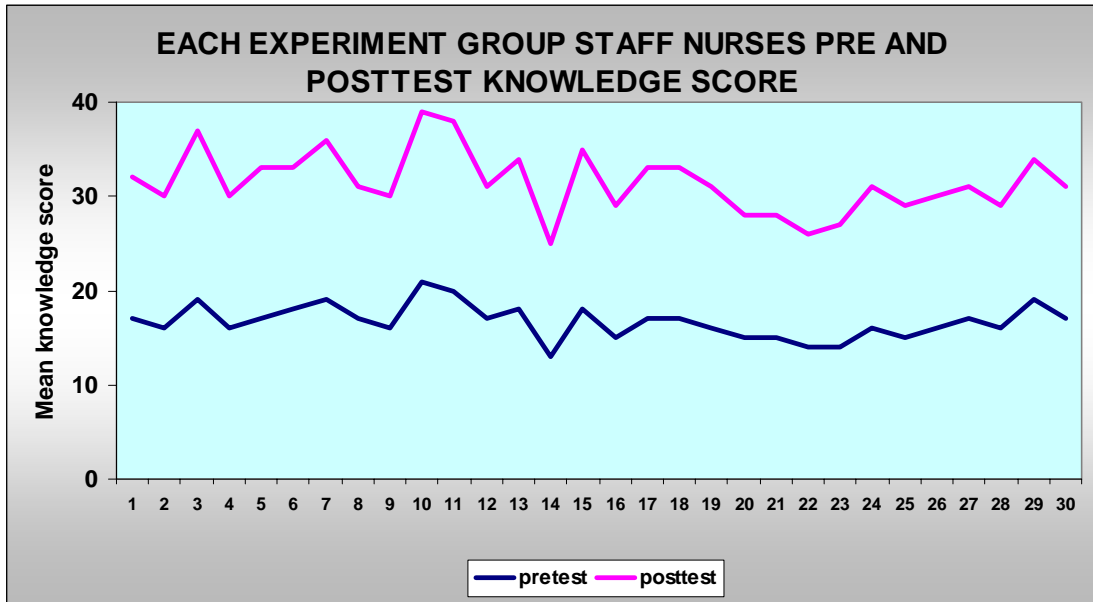
**Table 9: COMPARISON OF OVERALL KNOWLEDGE SCORE (Experiment)**

	No. of staff nurses	Pretest Mean±SD	Posttest Mean±SD	Student paired t-test
Overall Knowledge Score	30	16.60± 1.98	32.77 ± 1.79	t=31.43 P=0.001 significant

Table no 9 shows the comparison of overall knowledge score. On an average staff nurses are improved their knowledge from 16.6 to 32.77 on ABG analysis. Or we can say , in pretest they are able to answer only 17 questions, in posttest they are able to answer upto 33 questions. This improvement is statistically significant. it was analysed using student 's paired t-test.



**Fig 10: Box Plot compares the experimental group staff nurses pretest and posttest knowledge score on ABG analysis**



**Fig 11: Line diagram compares the experimental group of staff nurses pretest and posttest knowledge score on ABG analysis**

**TABLE 10****COMPARISON OF PRETEST & POSTTEST ABG ANALYSIS  
KNOWLEDGE SCORE(Control group)**

<b>Knowledge</b>	<b>Pretest knowledge</b>		<b>Posttest knowledge</b>		<b>Student's paired t-test</b>
	<b>Mean</b>	<b>SD</b>	<b>Mean</b>	<b>SD</b>	
Introduction	1.73	0.78	1.80	0.76	t=1.43 P=0.61 not significant
Procedure	6.67	1.54	6.77	1.72	t=1.00 P=0.32 not significant
Interpretation	7.90	2.16	8.23	1.79	t =1.87 P=0.06 not significant

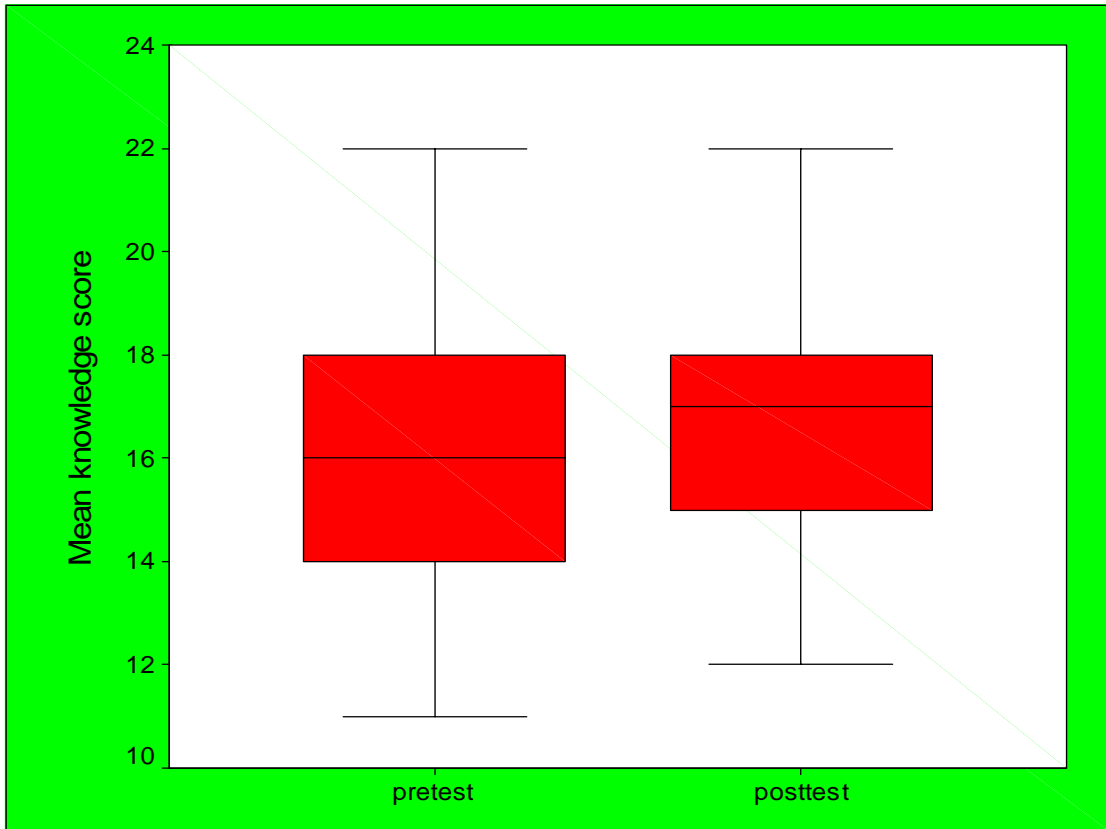
Table no 10 Compares the pre and posttest knowledge score. It shows there is no significant difference between pretest and posttest score of staff nurses knowledge on all aspects of ABG analysis. It was analysed using student 's paired t-test.

**Table 11: COMPARISON OF OVERALL KNOWLEDGE SCORE**

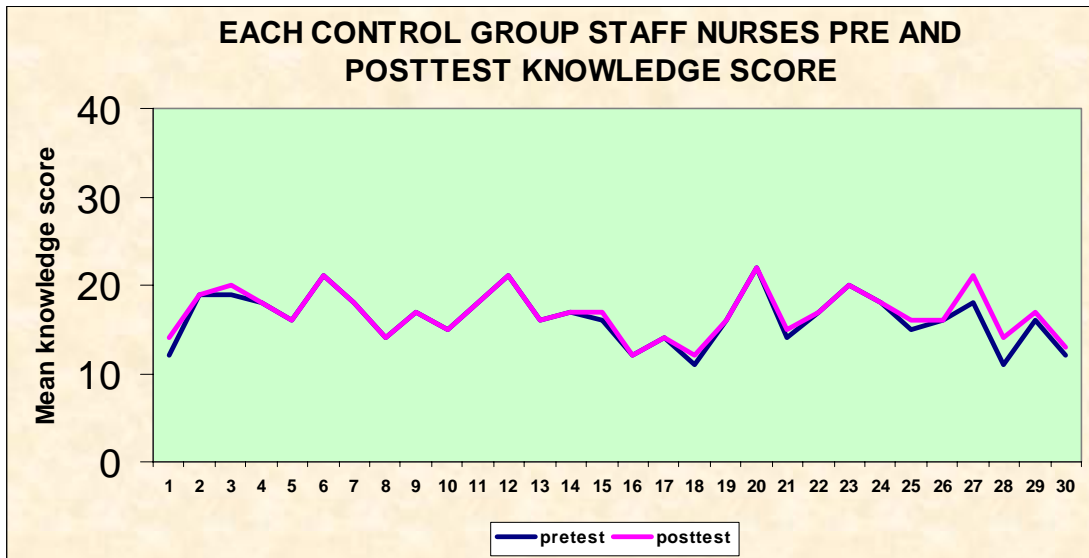
**(Control group)**

	<b>No. of staff nurses</b>	<b>Pretest Mean±SD</b>	<b>Posttest Mean±SD</b>	<b>Student paired t-test</b>
Overall Knowledge Score	30	16.30 ± 2.95	16.80 ± 2.71	t=1.91 P=0.06 significant

Table no 11 shows the control group comparison of overall knowledge score. On an average staff nurses are improved their knowledge from 16.3 to 16.80 on ABG analysis. Or we can say , in pretest they are able to answer only 16 questions, in posttest they are able to answer upto 17 questions. This improvement is not statistically significant. it was analysed using student 's paired t-test.



**Fig 12: Box Plot compares the control group staff nurses pretest and posttest knowledge score on ABG analysis**



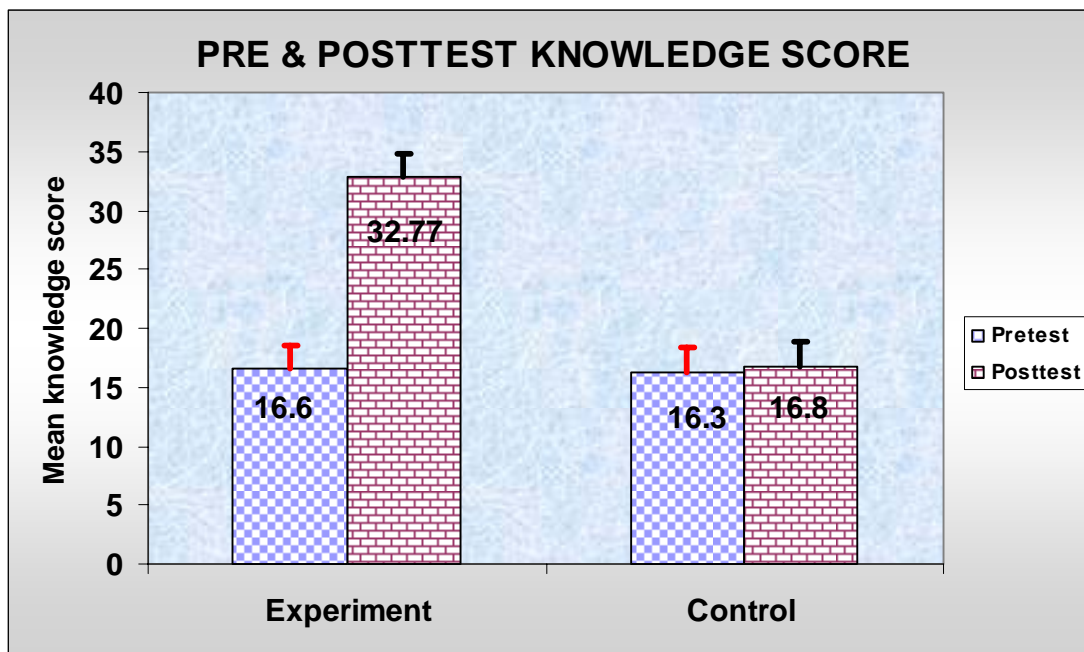
**Fig 13: Line diagram compares the control group staff nurses pretest and posttest knowledge score on ABG analysis**

**Table 12: COMPARISON OF EXPERIMENT & CONTROL GROUP**

### OVERALL KNOWLEDGE SCORE

Knowledge	Experiment group		Control group		Student's Independent t-test
	Mean	SD	Mean	SD	
Pretest	16.60	1.98	16.30	2.95	t=0.46 P=0.64 not significant
Posttest	32.77	1.79	16.80	2.71	t=26.91 P=0.001 significant

Table No 12 shows, Comparison of experiment and control group knowledge score, it was analysed using student 's independent t-test. In pretest there is no significant difference between experiment and control group, but after STP it is observed significant difference between experiment and control



**Fig 14: Bar diagram showing comparison of pretest and posttest knowledge score among the experimental and control group staff nurses regarding ABG analysis**

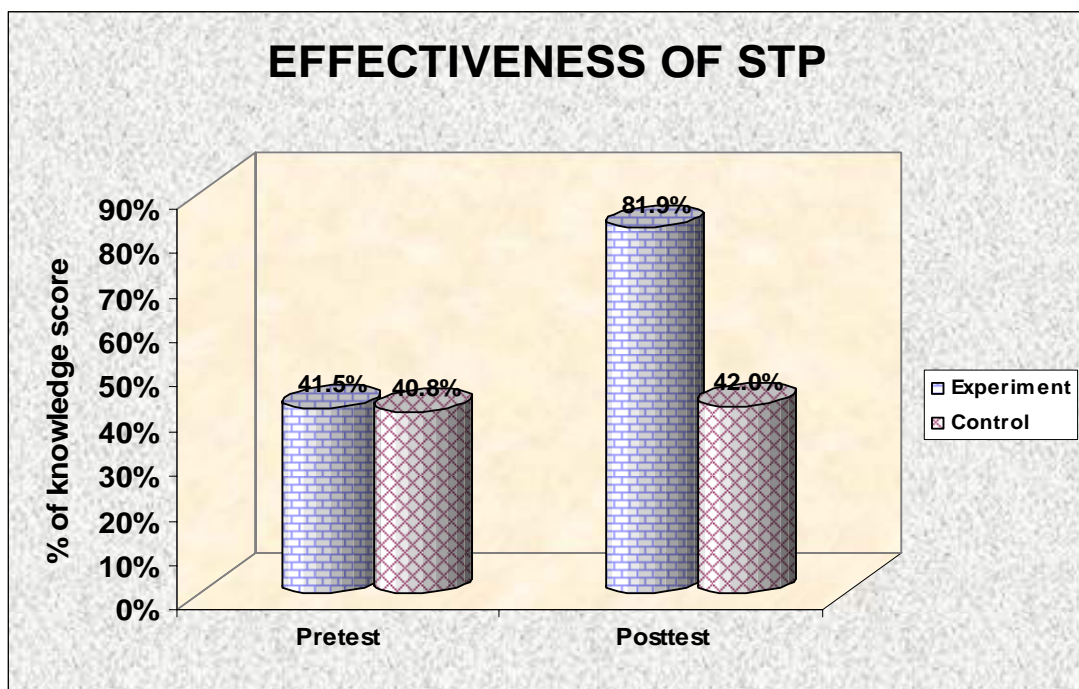
**TABLE 13**



## EFFECTIVENESS OF STRUCTURED TEACHING PROGRAMME

		Pretest	Posttest	% of Difference	Net Benefit
Knowledge	Experiment	41.50%	81.93%	40.33%	39.08%
	Control	40.75%	42.00%	1.25%	

Table no 13 shows the effectiveness of the STP Considering the overall score, Staff nurses gained 39 percent more knowledge on ABG analysis, after the administration of STP this 39 percent of knowledge gain is the net benefit of this study, which indicates the effectiveness of STP.



**Fig 15: Cylinder diagram showing effectiveness of structured teaching program among pretest and posttest of experimental and control group of staff nurses regarding ABG analysis.**

## SECTION V

**FIND OUT THE ASSOCIATION BETWEEN THE KNOWLEDGE OF EXPERIMENTAL AND CONTROL GROUP WITH SELECTED DEMOGRAPHIC VARIABLES**

**TABLE 14**

**ASSOCIATION BETWEEN PRETEST LEVEL OF KNOWLEDGE AND THEIR DEMOGRAPHIC VARIABLES( Experiment)**

		Pretest				Total	Chi square test/ Yates corrected chi square test
		Inadequate		Moderate			
		n	%	n	%		
Age	20-30 yrs	24	96.0%	1	4.0%	25	$\chi^2=2.66P=0.10$ Not significant
	31-40 yrs	3	60.0%	2	40.0%	5	
Sex	Male	8	100.0%	0	0	8	$\chi^2=0.17P=0.68$ Not significant
	Female	19	86.4%	3	13.6%	22	
Qualification	GNM	24	92.3%	2	7.7%	26	$\chi^2=0.03P=0.85$ Not significant
	B.Sc.(N)	3	75.0%	1	25.0%	4	
Years of Experience	0 -1 yr	9	90.0%	1	10.0%	10	$\chi^2=1.15P=0.28$ Not significant
	1 -2yrs	15	100.0%			15	
	2 -3yrs	3	60.0%	2	40.0%	5	
Area of experience	ICU	26	92.9%	2	7.1%	28	$\chi^2=0.53P=0.46$ Not significant
	OT	1	50.0%	1	50.0%	2	

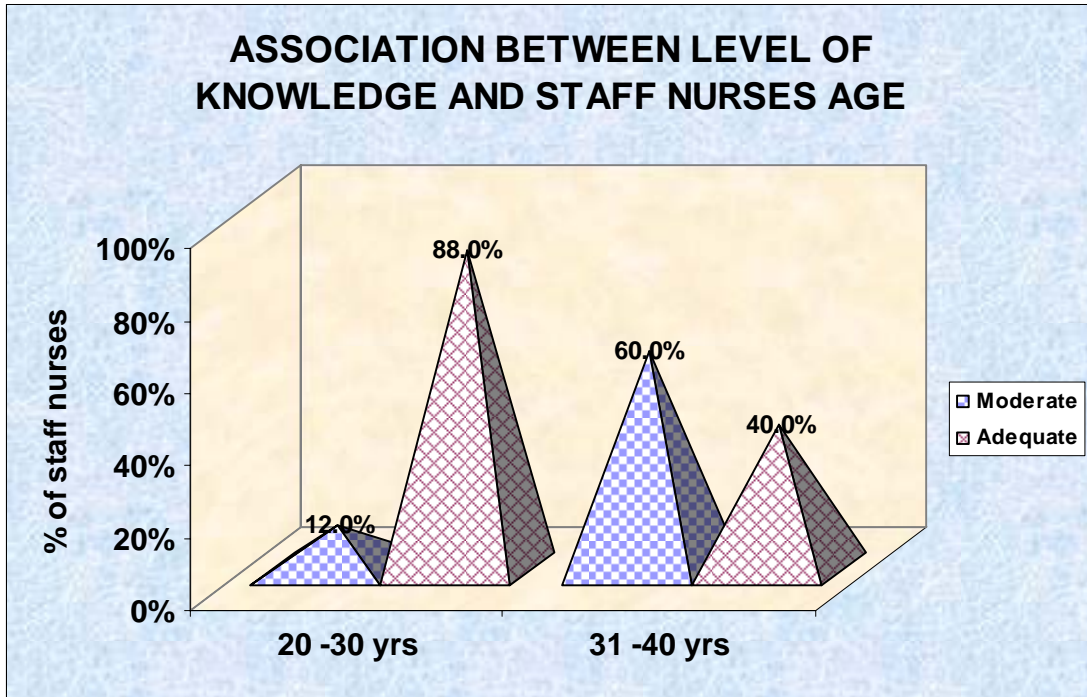
Table no 14 shows the association between socio-demographic variables and the pretest level of knowledge among experimental group of staff nurses. None of the demographic variables are significantly associated with their knowledge score. It was calculated using Pearson chi square test/Yates corrected chi square test.

**TABLE 15**

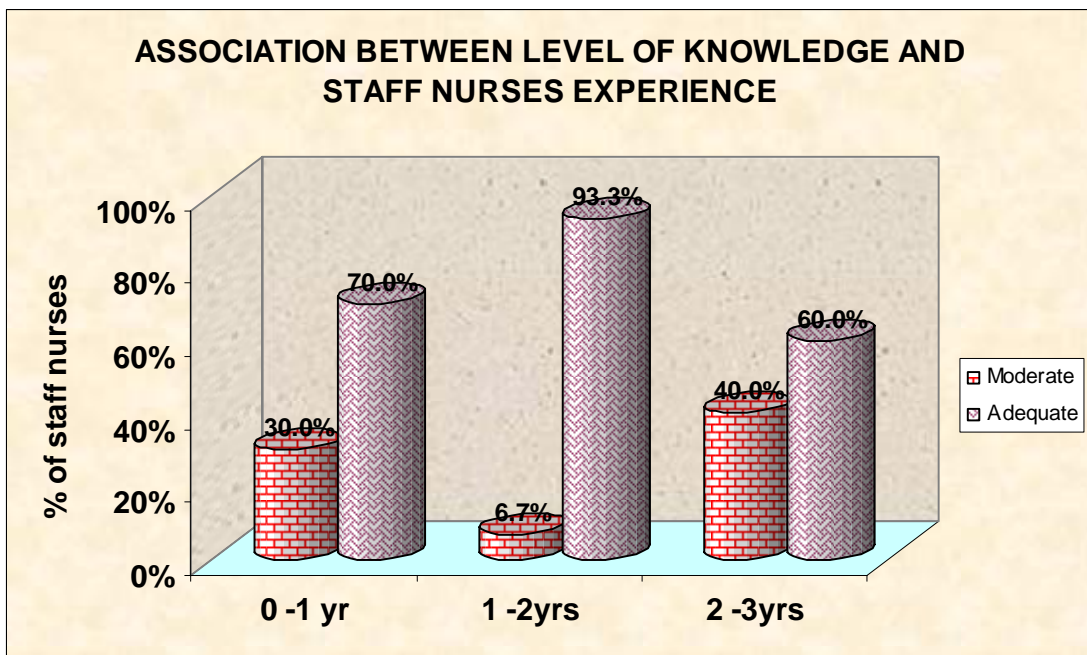
**ASSOCIATION BETWEEN POSTTEST LEVEL OF KNOWLEDGE AND THEIR DEMOGRAPHIC VARIABLES (Experiment)**

		Posttest				Total	Chi square test/ Yates corrected chi square test
		Moderate		Adequate			
		n	%	n	%		
Age	20-30 yrs	3	12.0%	22	88.0%	25	$\chi^2=6.00P=0.01$ <b>significant</b>
	31-40 yrs	3	60.0%	2	40.0%	5	
Sex	Male	3	37.5%	5	62.5%	8	$\chi^2=0.86P=0.35$ Not significant
	Female	3	13.6%	19	86.4%	22	
Qualification	GNM	5	19.2%	21	80.8%	26	$\chi^2=0.07P=0.78$ Not significant
	B.Sc.(N)	1	25.0%	3	75.0%	4	
Years of Experience	0 -1 yr	3	30.0%	7	70.0%	10	$\chi^2=8.54P=0.01$ <b>significant</b>
	1 -2yrs	1	6.7%	14	93.3%	15	
	2 -3yrs	2	40.0%	3	60.0%	5	
Area of experience	ICU	5	17.9%	23	82.1%	28	$\chi^2=1.20P=0.27$ Not significant
	OT	1	50.0%	1	50.0%	2	

Table no 15 shows the association between socio-demographic variables and the posttest level of knowledge among experimental group staff nurses. Age of staff nurses and their experience are significantly associated with their knowledge score. It was calculated using Pearson chi square test/Yates corrected chi square test.



**Fig 16: Pyramid diagram shows the. Association between posttest level of knowledge and staff nurses age**



**Fig 17: Cylinder diagram shows the association between posttest the level of knowledge with their experience.**

**TABLE 16**

**ASSOCIATION BETWEEN PRETEST LEVEL OF KNOWLEDGE AND  
THEIR DEMOGRAPHIC VARIABLES (Control)**

		Pretest				Total	Chi square test/ Yates corrected chi square test
		Inadequate		Moderate			
		n	%	n	%		
Age	20 -30 yrs	23	88.5%	3	11.5%	26	$\chi^2=0.54P=0.46$
	31 -40 yrs	3	75.0%	1	25.0%	4	Not significant
Sex	Male	10	90.9%	1	9.1%	11	$\chi^2=0.27P=0.60$
	Female	16	84.2%	3	15.8%	19	Not significant
Qualification	GNM	24	88.9%	3	11.1%	27	$\chi^2=1.15P=0.28$
	B.Sc.(N)	2	66.7%	1	33.3%	3	Not significant
Years of Experience	0 -1 yr	7	87.5%	1	12.5%	8	$\chi^2=0.23P=0.89$ Not significant
	1 -2yrs	15	88.2%	2	11.8%	17	
	2 -3yrs	4	80.0%	1	20.0%	5	
Area of experience	ICU	26	86.7%	4	13.3%	30	$\chi^2=0.00P=1.00$ Not significant

Table no 16 shows the association between socio-demographic variables and the pretest level of knowledge among control group staff nurses. None of the demographic variables are significantly associated with their knowledge score. It was calculated using Pearson chi square test/Yates corrected chi square test.

**TABLE 17**

**ASSOCIATION BETWEEN POSTTEST LEVEL OF KNOWLEDGE AND THEIR DEMOGRAPHIC VARIABLES( Control)**

		Posttest				Total	Chi square test /Yates corrected chi square test
		Inadequate		Moderate			
		n	%	n	%		
Age	20 -30 yrs	23	88.5%	3	11.5%	26	$\chi^2=0.23P=0.63$
	31 -40 yrs	3	75.0%	1	25.0%	4	Not significant
Sex	Male	10	90.9%	1	9.1%	11	$\chi^2=0.72P=0.39$
	Female	16	84.2%	3	15.8%	19	Not significant
Qualification	GNM	24	88.9%	3	11.1%	27	$\chi^2=2.66P=0.10$
	B.Sc.(N)	2	66.7%	1	33.3%	3	Not significant
Years of Experience	0 -1 yr	7	87.5%	1	12.5%	8	$\chi^2=2.35P=0.31$ Not significant
	1 -2yrs	15	88.2%	2	11.8%	17	
	2 -3yrs	4	80.0%	1	20.0%	5	
Area of experience	ICU	26	86.7%	4	13.3%	30	$\chi^2=0.00P=1.00$ Not significant

Table no 17 shows the association between socio-demographic variables and the posttest level of knowledge among control group staff nurses. None of the demographic variables are significantly associated with their knowledge score. It was calculated using Pearson chi square test/Yates corrected chi square test.

## CHAPTER V

### DISCUSSION

This chapter discusses the main findings of the research study and reviews that in relation to the findings from the results of the present study regarding knowledge on ABG analysis among staff nurses.

The total sample collected were 60, who were staff nurses. The study shows the effectiveness of structured teaching programme on ABG analysis in pretest and post test among staff nurses. The demographic variables were age, sex, qualification, marital status, No of years of experience, experience in area, income per month, religion and type of the family.

**The first objective was to assess the pretest and posttest knowledge of experimental and control group of staff nurses regarding ABG analysis**

In Overall knowledge of experimental group shows, they improved their knowledge from 41.50% to 81.93%. In pretest 0.0% of staff nurses had adequate knowledge and in post test 8.0% of staff nurse had adequate knowledge regarding ABG analysis. In over all knowledge of control group shows in pretest they had 40.75% and in posttest they had 42.00% of knowledge regarding ABG analysis among staff nurses. In pretest knowledge of control group 0.0% had adequate knowledge and in post test 0.0% had adequate knowledge and in post test 0.0% had adequate knowledge regarding ABG analysis.

**The second objective was to compare the pretest and posttest knowledge of experimental and control group regarding ABG analysis**

The overall comparison of pretest and posttest knowledge of experimental group was 16.6 to 32.77, post test group had more knowledge than pre test. The overall comparison of pretest and posttest knowledge for control group was 16.3 and 16.80. This shows that this improvement is not statistically significant.

**The third objective was to implement and evaluate the effectiveness of structured teaching programme regarding ABG analysis**

The findings of effectiveness of structured teaching programme is improved from 41.50% knowledge to 81.93% knowledge in experimental group the net benefit of structured teaching programme is 39.08% among experiment and control group.

**The fourth objective was to find out the association between the knowledge of experimental and control group with selected demographic variables**

Age and years of experience are significant with post test knowledge more age and more years of experience staff nurses had more adequate knowledge in post test in experimental group. None of the demographic variables were significant with the level of knowledge in pretest and posttest of control group.



## **CHAPTER VI**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **SUMMARY**

This chapter represents a brief summary of the study conclusions and implications for nursing and recommendations.

The conceptual frame work adopted for this study was J.W. Kenny's model, the purposive sampling was used for selecting the sample. In this study review of literature was general information on ABG analysis and this studies related to knowledge of ABG analysis.

Descriptive statistics (frequency, percentage, mean and standard deviation, inferential statistics Chi-Square was used to analyse the data and to test the hypothesis.

The primary aim of the study was to identify the level of knowledge regarding arterial blood gas analysis after administration of structured teaching programme in the experimental group and find the association between knowledge of staff nurses and demographic variables of staff nurses.

#### **OBJECTIVES OF THE STUDY:**

- ❖ To assess the pretest and posttest knowledge of experimental and control group of staff nurses regarding arterial blood gas analysis.

- ❖ To compare the pretest and posttest knowledge of experimental and control group regarding arterial blood gas analysis.
- ❖ To implement and evaluate the Structured teaching programme regarding ABG analysis.
- ❖ To find out the association between the knowledge of experimental and control group with selected demographic variables.

**Major findings of the study:**

- ❖ The findings of the study showed that Overall knowledge of experimental group shows, They have improved their knowledge from 41.50% to 81.93%.
- ❖ The over all knowledge of control group shows that in pretest they had 40.75% and in post test they had 42.00%.
- ❖ The overall comparison of pretest and posttest knowledge for experiment group was 16.6% to 32.77% .Posttest group had more knowledge than pretest.
- ❖ The Overall comparison of pretest and posttest knowledge for control group was 16.3% and 16.80%, this shows that there is no improvement was found.
- ❖ The findings of effectiveness of structured teaching programme is improved from 41.50% knowledge to 81.93% knowledge in experimental group the net benefit of structured teaching programme is 39.08% among experimental and control group.

- ❖ The association between demographic variables with knowledge of experimental and control group shows that age and years of experience are significant with posttest knowledge more age and more years of experience staffs are having more adequate knowledge in posttest in experimental group. None of the demographic variables are significant with the level of knowledge in pretest and posttest of control group. The demographic data with regard to age group 20-30 years was 83.3% in experimental group and 16.7% in control group.

## **CONCLUSION**

From the findings of the present study it was concluded that the level of knowledge regarding arterial blood gas analysis among the staff nurses was inadequate among experimental group and control group during pretest assessment. However, the findings of post test in the experiment group, the level of knowledge has improved and the score has indicated an adequate level of knowledge among staff nurses. The improvement in the level of knowledge is due to the administration of the structured teaching programme. Therefore the knowledge of the staff nurses can be further be improved by an going teaching and in service education.

## **NURSING IMPLICATION**

The findings of the study have implications related to nursing administration. Nursing practice, Nursing Research and Nursing Education regarding the increase in level of knowledge related to arterial blood gas analysis among staff nurses.

## **Nursing Education**

Arterial Blood Gas analysis is one of the important topics which can be included in the curriculum, so that the students will be able to learn about the patient care from the basic level itself. The curriculum can be planned from the basic level.

## **Nursing Administration**

The nurses as an administrator can explain to the staff nurses to follow the proper Arterial Blood Gas analysis and interpretation while giving care to the patient. Administrator should conduct the nursing health education among the staff nurses. She (or) he can motivate the staff nurses to follow Arterial Blood Gas analysis and interpretation.

## **Nursing Practice**

Nursing practice can be rendered in terms of arterial puncture Arterial Blood Gas analysis and interpretation in such a way so that the nurse will be able to give care to the patient and be able to take care of her or his health and prevent injury. Emphasis should be given in giving good nursing care.

## **Nursing Research**

Nursing Research helps to broaden the scope of nursing. Based on the results further recommendations can be made. Further studies can be done to find out the effectiveness of various nursing practice.

## **SUGGESTIONS**

- 1) In service education can be planned to the staff nurses regarding Arterial Blood Gas analysis.
- 2) Periodical evaluation should be done by the ward incharge to ensure staff nurses knowledge.
- 3) Student nurses should be supervised while taking blood for ABG analysis.

## **RECOMMENDATION**

1. This study can be done as comparative study with different ward staff nurses.
2. A similar study can be done on larges sample to draw more definitive conclusions.
3. A study can be conducted among nursing student.
4. A study can be done among senior nurses regarding Arterial Blood Gas interpretation.
5. A study can be conducted using various method of teaching to determine the most effective method of teaching example – self instructional module, demonstration video assist teaching.

## **CHAPTER – VII**

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## ANNEXURE II

### LETTER SEEKING PERMISSION TO CONDUCT STUDY

From


Ms.Thulasimani.D. M.Sc. (N) II Year,  
(Specialty – Medical Surgical Nursing),  
Dr. Mahalingam College of Nursing,  
Sakthi Nagar (Po),  
Bhavani (TK), Erode (DT),  
Tamilnadu.

To

THE MEDICAL DIRECTOR,  
VINAYAKA MISSION HIGH-TECH HOSPITAL,  
SALEM.

Through:

The Principal,  
Dr. Mahalingam College of Nursing,  
Sakthi Nagar (Po),  
Bhavani (TK), Erode (DT).  
Tamilnadu

  
PRINCIPAL,  
COLLEGE OF NURSING  
Jharmarathnakara Dr. Mahalingam Institute  
of Paramedical Sciences and Research,  
(Sri Adichunchanagiri Shikshana Trust)

Respected Sir / Madam,

SUB: Permission to conduct study - Reg.

I am II year M.Sc., Nursing student of Dr. Mahalingam College of Nursing, Sakthi Nagar. As a partial fulfillment of Master of Science in Nursing, I have undertaken the following research study, which has to be submitted to The Tamilnadu Dr.M.G.R. Medical University, Chennai.

#### RESEARCH STUDY :

“A Study To Assess The Effectiveness Of Structured Teaching Program On Knowledge Regarding Arterial Blood Gas Analysis Among The Staff Nurses Who Are Working In ICU Of VINAYAKA MISSION HOSPITAL, at SALEM.

.. 2 ..

I kindly request you to permit me to do reliability of the prepared tool to Assess The Effectiveness Of Structured Teaching Program On Knowledge Regarding Arterial Blood Gas Analysis Among The Staff Nurses Who Are Working In ICU Of VINAYAKA MISSION At SALEM with effect from 11.11.2009 to ---- 30.11.2009

I kindly request you to permit me to conduct the proposed study and provide necessary facilities. Please do the needful.

Thanking you,

Date :

Place : SALEM

Yours Sincerely,

*D. Thulasi*

(Thulasimani.D)

*Permit and  
program done.*

*Dr. K*

**Dr. K. Ezhil Venkhan**  
Medical Director  
Vinayaka Mission Hospital  
Sankari Main Road (NH-47),  
Veerapandi (P.O.), Salem - 636 208

# ANNEXURE I



**SRI ADICHUNCHANAGIRI SHIKSHANA TRUST®**  
**COLLEGE OF NURSING**

Phone : 04256-247321

**DHARMARATHNAKARA Dr. MAHALINGAM INSTITUTE OF PARAMEDICAL SCIENCES & RESEARCH**  
(Kannada Linguistic Minority Institution)  
**Sakthinar - 638 315. Bhavani Taluk, Erode District, Tamilnadu.**

Ref. No. :

Date .....

To  
Dr. C. RAGUNATH, M.D. I.D.C.C.M.  
Consultant, Physician & Intensivist  
KMCH Speciality Hospital  
Erode,

Dear Sir / Madam,

**SUB:** Dharmarathnakara Dr. Mahalingam Institute of Paramedical Sciences & Research, Sakthi Nagar – Permission to conduct study – Ms. D. Thulasimani – Reg.

In anticipation to the above subject and as per the curricular requirement, I kindly request you to grant permission to Ms. D. Thulasimani M.Sc., (N) II year Post graduate student to conduct Pilot study at your esteemed institution / Hospital.

Kindly oblige and grant her to undergo her study.

Thanking you,

Yours Faithfully,

(Prof. Mrs. R. Vasanthi)  
Principal

PRINCIPAL,  
COLLEGE OF NURSING

Dharmarathnakara Dr. Mahalingam Institute  
of Paramedical Sciences and Research,  
(Sri Adichunchanagiri Shikshana Trust)

Permitted  
Dr. C. RAGUNATH, M.D., I.D.C.C.M.,  
Consultant Physician & Intensivist  
Reg. No : 73931  
KMCH Speciality Hospital,  
Palaniappa Street, Erode - 638 009, India.

Head Office : Sri Adichunchanagiri Shikshana Trust®, Sri Adichunchanagiri Kshethra. PIN : 571 811.  
Nagamangala Taluk, Mandya Dist., Karnataka. Phone : 08234 - 287333, 287444

## ANNEXURE III



**SRI ADICHUNCHANAGIRI SHIKSHANA TRUST®**

Phone : 04256-247321

### **COLLEGE OF NURSING**

**DHARMARATHNAKARA Dr. MAHALINGAM INSTITUTE OF PARAMEDICAL SCIENCES & RESEARCH**

(Kannada Linguistic Minority Institution)

**Sakthinagar - 638 315. Bhavani Taluk, Erode District, Tamilnadu.**

Ref. No. :

Date .....

#### LETTER SEEKING EXPERT OPINION ON CONTENT VALIDITY

From

Ms. D.Thulasimani M.Sc., (N) II Year  
(Speciality - Medical and Surgical Nursing),  
Dr.Mahalingam College of Nursing,  
Sakthi Nagar (Po),  
Bhavani (TK), Erode (DT),  
Tamilnadu.

To

Through,

The Principal,  
Dr.Mahalingam College of Nursing,  
Sakthi Nagar (Po),  
Bhavani (TK), Erode (DT).

PRINCIPAL,  
COLLEGE OF NURSING  
Dharmarathnakara Dr.Mahalingam Institute  
of Paramedical Sciences and Research,  
(Sri Adichunchanagiri Shikshana Trust)

Respected Sir / Madam,

SUB: Request for the validation of the tool.

I am II year M.Sc., Nursing student of Dr.Mahalingam College of Nursing, Sakthi Nagar. As a partial fulfillment of Master of Science in Nursing, I have undertaken the following research study, which has to be submitted to The Tamilnadu Dr.M.G.R.Medical University, Chennai.

#### **RESEARCH STUDY:**

“ A study to assess the effectiveness of structure teaching programme on knowledge regarding arterial blood gas analysis among the staff nurses who are working in ICU of selected hospitals at Madurai ” .

Head Office : Sri Adichunchanagiri Shikshana Trust®, Sri Adichunchanagiri Kshethra. PIN : 571 811.  
Nagamangala Taluk, Mandya Dist., Karnataka. Phone : 08234 - 287333, 287444



## ANNEXURE IV

# CONTENT VALIDITY CERTIFICATE

This is to certify that the student Ms. D. Thulasimani is studying in Final M.Sc., (N) Post graduate Degree course of Dharmarathnakara Dr. Mahalingam Institute of Paramedical sciences and Research, Sakthi Nagar.

Topic Entitled:

**“A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURE TEACHING PROGRAMME ON KNOWLEDGE REGARDING ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF NURSES WHO ARE WORKING IN ICU OF VINAYAKA MISSION HOSPITAL AT SALEM”.**

His content for the study is validated and was found reliable.

Date :

Place :

Signature of guide with seal

**PRINCIPAL**  
**BRESAKTHIMAYEIL INSTITUTE OF**  
**NURSING AND RESEARCH**  
**KOMARAPALAYAM - 638 183.**

## **CONTENT VALIDITY CERTIFICATE**

This is to certify that the student Ms. D. Thulasimani is studying in Final M.Sc., (N) Post graduate Degree course of Dharmarathnakara Dr. Mahalingam Institute of Paramedical sciences and Research, Sakthi Nagar.

Topic Entitled:

**“A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURE TEACHING PROGRAMME ON KNOWLEDGE REGARDING ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF NURSES WHO ARE WORKING IN ICU OF VINAYAKA MISSION HOSPITAL AT SALEM”.**

His content for the study is validated and was found reliable.

Date :

Place :



**Signature of guide with seal**

**K. S. PUSHPALATHA**  
M.Sc.(N) M.B.A..M A .  
**LECTURER**

## **CONTENT VALIDITY CERTIFICATE**

This is to certify that the student Ms. D. Thulasimani is studying in Final M.Sc., (N) Post graduate Degree course of Dharmarathnakara Dr. Mahalingam Institute of Paramedical sciences and Research, Sakthi Nagar.


Topic Entitled:

**“A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURE TEACHING PROGRAMME ON KNOWLEDGE REGARDING ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF NURSES WHO ARE WORKING IN ICU OF VINAYAKA MISSION HOSPITAL AT SALEM”.**

His content for the study is validated and was found reliable.

Date :

Place :

  
Rev. Susan Thomas  
Expert  
Signature of guide with seal  
Assol. Professor.  
Little Flower College of Nursing  
Angamaly.

## **CONTENT VALIDITY CERTIFICATE**

This is to certify that the student Ms. D. Thulasimani is studying in Final M.Sc., (N) Post graduate Degree course of Dharmarathnakara Dr. Mahalingam Institute of Paramedical sciences and Research, Sakthi Nagar.

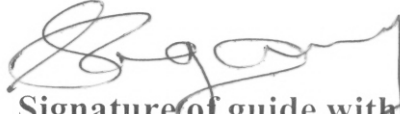
Topic Entitled:

**“A STUDY TO ASSESS THE EFFECTIVENESS OF STRUCTURE TEACHING PROGRAMME ON KNOWLEDGE REGARDING ARTERIAL BLOOD GAS ANALYSIS AMONG THE STAFF NURSES WHO ARE WORKING IN ICU OF VINAYAKA MISSION HOSPITAL AT SALEM”.**

His content for the study is validated and was found reliable.

Date :

Place :

  
Signature of guide with seal  
**Dr. C. RAGUNATH. MD., I.D.C.C.M.,**  
Consultant Physician & Intensivist  
Reg. No : 73931  
KMCH Speciality Hospital,  
15, Palaniappa Street, Erode - 630 009. India.

## ANNEXURE V

### DEMOGRAPHIC DATA:

1. Sex of individual
  - a. male
  - b. female
2. Age
  - a. 20-30 Years
  - b. 31-40 Years
  - c. 41-50 Years
  - d. 51-60 Years
3. Qualification
  - a. gnm
  - b. b.sc., Nursing
4. No. of years of experience
  - a. 0 Year – 1 Year
  - b. 2 Years – 3 Years
  - c. 3 Years – 4 Years
  - d. Above 4 years
5. Area of experience
  - a. icu
  - b. ot
  - c. general wards
  - d. others

### QUESTIONNAIRES RELATED TO KNOWLEDGE:

#### INTRODUCTION:

1. ABG analysis is performed through the
  - a. arterial blood
  - b. venous blood
  - c. capillary blood
  - d. blood from shunt
2. The ABG analysis is used to determine the following
  - a. pH of blood
  - b. pao<sub>2</sub>

- c. paco<sub>2</sub>
  - d. all the above
3. ABG analysis can be performed by EXCEPT
- a. phlebotomist
  - b. radiologist
  - c. nurse
  - d. respiratory therapist
4. ABG analysis is a
- a. diagnostic procedure
  - b. treatment procedure
  - c. surgical procedure
  - d. none of the above
5. ABG analysis should be performed at
- a. before the meals
  - b. after the meals
  - c. morning time only
  - d. at any time

**PROCEDURE:**

6. Before taking blood check the patient's
- a. oxygen concentration
  - b. temperature
  - c. puncture site
  - d. all the above
7. If the radial artery is selected perform the
- a. allen test
  - b. culture sensitivity test
  - c. exercise
  - d. physical examination
8. ABG analysis required for the patient with following condition EXCEPT
- a. critically ill patient
  - b. asthma
  - c. severe respiratory distress
  - d. bleeding disorder

9. Contra indication for arterial puncture EXCEPT
- critically ill
  - anti-coagulation therapy
  - haemophilia
  - low platelet count
10. Arterial puncture should be performed in the following site EXCEPT
- radial artery
  - femoral artery
  - brachial artery
  - shunt
11. Before taking ABG the patient body temperature should be
- 35°C
  - 39°C
  - 37°C
  - 30°C
12. The syringe is pre-pack with small amount of
- normal saline
  - heparin
  - benetic solution
  - insulin
13. The use of heparin is to prevent
- coagulation
  - evaporation
  - contamination
  - dilution
14. The dose of heparin is
- 0.5 to 1.0 ml
  - 1.0 ml to 1.5 ml
  - 1.5 ml to 2.0 ml
  - 2.0 ml to 2.5 ml
15. The needle should inserted in to artery at
- 10° – 20°
  - 20° – 30°
  - 30° – 40°

- d.  $40^{\circ} - 50^{\circ}$
16. After taking blood from artery apply pressure on the puncture site for
- a. 1-2 minutes
  - b. 2-5 minutes
  - c. 5-10 minutes
  - d. Above 10 minutes
17. The blood samples should be held at the room temperature of
- a.  $30^{\circ} - 40^{\circ}$
  - b.  $40^{\circ} - 50^{\circ}$
  - c.  $50^{\circ} - 60^{\circ}$
  - d. Above  $60^{\circ}$
18. ABG analysis performed within
- a. 10 Minutes
  - b. 20 Minutes
  - c. 30 Minutes
  - d. 40 Minutes
19. If the blood samples are not kept at room temperature then it should be kept in
- a. warmer
  - b. ice
  - c. contribute
  - d. none of the above
20. Iced samples should be analysed within
- a. 3 Hours
  - b. 2 Hours
  - c. 1 Hour
  - d. 30 Minutes
21. The complication of arterial puncture
- a. haematoma
  - b. arteriospasm
  - c. haemorrhage
  - d. all the above

**REFERENCE RANGES AND INTERPRETATION:**

22. The blood pH gives information about
- a. hydrogen ion concentration



- b.  $O_2$  concentration
  - c.  $CO_2$  concentration
  - d.  $HCO_3$  Concentration
23. The normal blood pH level
- a.  $< 7.35$
  - b.  $> 7.45$
  - c.  $7.35 - 7.45$
  - d.  $> 8.0$
24. The blood pH value more than 7.45 It indicates
- a. acidemia
  - b. alkalemia
  - c. hypoxemia
  - d. metabolic acidosis
25. The blood pH value decrease less than 7.35 It indicates
- a. acidemia
  - b. alkalemia
  - c. hypoxemia
  - d. metabolic alkalosis
26. The blood  $PaO_2$  alone is used to determine about
- a. acid- base balance
  - b.  $paco_2$
  - c. oxygenation
  - d. ph of blood
27. The normal level of blood  $PaO_2$
- a. 50-60 mm Hg
  - b. 60-70 mm Hg
  - c. 70-80 mm Hg
  - d. 80-100 mm Hg
28. The low  $PaO_2$  level in blood that indicates
- a. alkalemia
  - b. atoxia
  - c. hyoxemic
  - d. academia

29. If the blood PaO<sub>2</sub> less than to mm Hg need
- oxygen therapy
  - nutritional therapy
  - exercise
  - none of the above
30. The normal SaO<sub>2</sub> level
- 80-90%
  - 90-100%
  - 70-80%
  - 60-70%
31. The blood PaCO<sub>2</sub> provide information about the working condition of
- respiratory system
  - gi system
  - immunologic system
  - muskuloskeletal system
32. PaCO<sub>2</sub> is often called
- metabolic parameter
  - respiratory parameter
  - glucometer
  - vital parameter
33. High PaCO<sub>2</sub> is often called
- acidemia
  - alkalemia
  - respiratory alkalosis
  - respiratory acidosis
34. Low PaCO<sub>2</sub> Indicated
- respiratory alkalosis
  - respiratory acidosis
  - acidemia
  - alkalomia
35. The HCO<sub>3</sub> ion provides the information about
- metabolic status
  - acidosis
  - hydroin ion concentration

- d.  $\text{O}_2$  saturation
36. The normal level of  $\text{HCO}_3^-$
- a. 10-14 Meq/L
  - b. 14-18 Meq/L
  - c. 18-22 Meq/L
  - d. 22-26 Meq/L
37. The  $\text{HCO}_3^-$  level is Higher than 26 mg that indicated the patient is
- a. alkalotic
  - b. acidic
  - c. healthy
  - d. none of the above
38. The  $\text{HCO}_3^-$  level is lower than 22 Meq/L that indicate, the patient is
- a. healthy
  - b. acidic
  - c. alkalotic
  - d. keto acidosis
39. The Base excess is a amount of
- a. alkali in the blood
  - b. oxygen in the blood
  - c. acid in the blood
  - d. rbc's count
40. Normal base excess range
- a.  $\pm 4$  mmol
  - b.  $\pm 2$  mmol
  - c.  $\pm 3$  mmol
  - d.  $\pm 1$  mmol

## LIST OF EXPERTS

1. Mrs. K.S. Pushpalatha, M.Sc. (N), Ph.D.,  
Lecturer,  
Shanmuga College of Nursing,  
Salem.
2. Mrs. Jamuna, M.Sc., (N),  
Principal,  
Sakthimayeil Institute of Nursing & Research  
Komarapalayam – 638 183.
3. Mrs. Renu Susan Thomas, M.Sc.,(N),  
Asst. Professor,  
Little Flower college of Nursing,  
Angamaly.
4. Dr. C. Rangunath, M.D., I.D.C.C.M,  
Consultant Physician and Intensivist  
Reg. No.: 73931,  
KMCH Speciality Hospital,  
Erode.





Structured Teaching Programme on  
“ABG ANALYSIS”

NAME OF THE TOPIC : ABG ANALYSIS

DURATION : 45 Min

VENUE : ICU / ICTU

METHOD OF TEACHING : Lecture cum Discussion

TEACHING AIDS : Chart, LCD

PREVIOUS KNOWLEDGE OF THE GROUP : Staff has completed GNM course or B.Sc.,  
Nursing course and they have little knowledge  
regarding ABG analysis.

## **GENERAL OBJECTIVE**

At the end of the structure teaching programme the staff nurses will have increased knowledge regarding ABG analysis.

## **SPECIFIC OBJECTIVE:**

### **Staff nurses are able to**

- define ABG analysis
- listout the purpose of ABG analysis
- listout the indication and contraindications
- explain about the principles for arterial puncture and ABG analysis
- listout the articles need for the procedure
- describe the procedure or demonstrate the procedure
- explain about ABG value interpretation



S. No	Time	specific Objective	Content	Method of Teaching	Learning activity	A.V. Aids	Evaluation
1	3 Mins	Introduce the topic	<p><b>INTRODUCTION:</b></p> <p>Arterial blood gas analysis is valuable as a diagnostic tool as it enables objective evaluation of a patient's oxygenation, ventilation and acid - base balance, such information demonstrates how well a patient's respiratory and metabolic system are working. It is clear that such information has the potential to be invaluable in the treatment of a wide range of patients.</p>	Lecture cum discussion	Listening and answering	Oral	Get the topic from the staff nurses
2	3 Mins	Staff nurses are able to define ABG	<p><b>DEFINITION:</b></p> <p><b>ABG:</b></p> <p>Arterial blood gases refer to any element or compound that is a gas under ordinary conditions and that is dissolved to some extent in blood.</p> <p><b>ABG sampling:</b></p> <p>ABG Sampling is a minimal invasive procedure where arterial puncture is done to collect arterial blood sample. From a peripheral artery (Radial, Brachial, Femoral, or dorsal is pedis via a single percutaneous needle puncture or from an indwelling arterial cannula (or) catheter for multiple samples</p> <p>ABG analysis:</p> <p>An ABG analysis is typically requested to determine the PH of the blood and partial pressure of oxygen (PaO<sub>2</sub>) partial pressure of carbon dioxide (PaCO<sub>2</sub>) and HCO<sub>3</sub> and Base excess and saturation.</p>	Lecture cum discussion	Listening and answering	LCD	Define ABG?

3	5 Mins	List out the purposes of ABG analysis	<p><b>PURPOSES:</b></p> <ul style="list-style-type: none"> <li>➤ Provides a blood specimen for direct measurement of partial pressure of carbon dioxide (PaCO<sub>2</sub>) and (PaO<sub>2</sub>) <ul style="list-style-type: none"> <li>i. Hydrogen ion activity (PH)</li> <li>ii. Total haemoglobin (Hb)</li> <li>iii. Bicarbonate level (HCO<sub>3</sub>)</li> <li>iv. Base excess</li> </ul> </li> <li>➤ Though ABG analysis can identify the respiratory and metabolic conditions of the patient</li> <li>➤ For accurate assessment of acid – base status</li> <li>➤ For assessing degree of oxygenation of blood and adequacy of alveolar ventilation</li> <li>➤ For starting continuous arterial blood pressure monitoring in an emergency</li> </ul>	Lecture cum discussion	Listening and answering	Hand-out	What are the purpose of ABG analysis?
4	5 Mins	List out the indications ABG analysis	<p><b>Indications:</b></p> <ul style="list-style-type: none"> <li>➤ The need to evaluate the adequacy of ventilatory (PaCO<sub>2</sub>) acid – base )PH and Pa CO<sub>2</sub>) status oxygenation (PaO<sub>2</sub> &amp; SaO<sub>2</sub>) status, and the oxygen – carrying capacity of blood (PaO<sub>2</sub>, HbO<sub>2</sub>) Hb total, and dgs haemoglobins)</li> <li>➤ The need to quantitate the patient’s response to therapeutic intervention and /or diagnostic evaluation (eg. Oxygen therapy, exercise testing)</li> <li>➤ The need to monitor severity and progression of a documented disease process.</li> </ul>	Lecture cum discussion	Listening and answering	Hand-out	What are the indications ABG analysis?

5	10 Mins	List out the contra indications ABG analysis	<p><b>CONTRA INDICATIONS:</b></p> <ul style="list-style-type: none"> <li>➤ Negative results of a modified allen test (collateral circulation test ) are indicative of inadequate blood supply to the hand and suggest the need to select another extremity as the sute for puncture.</li> <li>➤ Arterical puncture should not be performed through a lesion or through or distal to a surgical shunt (eg. As in a dialysis patient.). If there is evidence of infection or peripheral vascular disease involving the selected lamb. An alternate site should be selected.</li> <li>➤ Agreement is lacking regarding the puncture sites associated with a lesser likelihood of complications however, because of the need for monitoring the femoral puncture site for an extended period, femoral punctures should not be performed outside theharspiral</li> <li>➤ A coagulopathy or mediam to – high – doses anticoagulation therapy (eg. Heparin, or coumadir, streptokinase, and tissue plasminagen activator but not necessarily aspirin) may be a relative contra indiciation. for arterial puncture.</li> </ul>	Lecture cum discussion	Listening and answering	Black Board	What are the contra indications ABG analysis?
6	15 Mins	Explain about principles and methods during ABG analysis	<p><b>LIMITATIONS OF METHOD / VALIDATION OF RESULTS:</b></p> <ul style="list-style-type: none"> <li>➤ Artery may be inaccessible due to periarterial tissue [overlying muscle, connective tissue].</li> <li>➤ Arterial blood specimen withdrawn from the body only reflect the physiologic condition at the moment of sampling [Eg. Pain from the puncture itself may lead to hyperventilation with consequent.</li> <li>➤ Changes in values.</li> <li>➤ Specimens drawn at peak exercise best reflect response to</li> </ul>	Lecturer cum discussion	Listening and answering	Hand-out	What are the principles and methods during ABG analysis?

			<p>exercise however, specimens drawn within 15 seconds or less of termination of exercise.</p> <ul style="list-style-type: none"> <li>➤ Specimens from mechanically ventilated patients with minimal pulmonary pathology adequately reflect the effects of oxygen concentration change 10 minutes after the change.</li> <li>➤ In spontaneously breathing patients at least 20-30 minutes should elapse following oxygen concentration</li> <li>➤ Specimens held at room temperature must e analyzed within co-minutes of drawing iced samples should be analyzed within 1 hour</li> <li>➤ Some dual – purpose electrolyte /blood gas analyzer stipulate immediate analysis without chilling because q2 possible elevation in potassium from chilling</li> <li>➤ Sample must be obtained an aerobically and anticoagulated with immediate expulsion of air pubbles.</li> <li>➤ Sample should be immediately chillie or analyzed within 10 - 15minutes if left at room temperature</li> <li>➤ If liquid heparin (sodium or lithium 1,000 units / mc at blood ) is used excess heparin ( all except that filling the dead space of the syringe and needle) Should be expelled and a blood sample of 2 – 4 ml be drawn</li> <li>➤ If lyophilized is used, the minimum value drawn depends on the design of the analyzers and the need for other assays</li> </ul>				
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7	10 Mins	List out the articles needed for ABG analysis	<b>ARTICLES:</b> <ul style="list-style-type: none"> <li>➤ 1 ml 2 ml disposable syringe</li> <li>➤ Disposable needle size 20 gauge</li> <li>➤ Lear –Lock for syringe</li> <li>➤ Heparin 1: 1000</li> <li>➤ Alcohol swab</li> <li>➤ Crushed ice in specimen bag</li> <li>➤ Disposable gloves and disposable probes</li> <li>➤ Arterial catheter for continued pressure monitoring</li> <li>➤ Waterproof pad</li> </ul>	Lecture cum discussion	Listening and answering		What are the articles needed for ABG analysis?
8	15 Mins	Explain the procedure for ABG analysis	<b>PROCEDURE:</b> <ul style="list-style-type: none"> <li>➤ Identify patient by asking name</li> <li>➤ Record patients inspired oxygen concentration</li> <li>➤ Check the patient temperature</li> <li>➤ Heparinize the 2ml syringe(withdraw heparin in to syringe to wet the plunger and fill dead space in the needle – Hold syringe in an upright position and expel excess heparin and air bubbles)</li> <li>➤ Wash hands, and don gloves</li> <li>➤ Palpate the radial, brachial or femoral artery</li> <li>➤ If radial artery is selected for puncture, perform the allen test <ul style="list-style-type: none"> <li>a) obliterate the radial and ulnar pulses simultaneously by pressing on both blood vessels at the wrist</li> <li>b) Ask patient to clench and unclench fist until blanching of skin occurs</li> <li>c) Release pressure on ulnar artery (while still compressing radial artery ) watch for return of skin color within 15 seconds</li> </ul> </li> </ul> <p>Note: If the ulnar artery does not have sufficient blood supply to perfuse entire hand the radial artery should not be used</p>	Lecture cum discussion	Listening and answering	Black Board	How to perform ABG analysis?

			<p>d) Obliterate the radial and ulnar pulses simultaneously at the wrist</p> <p>e) Elevate patient's hand above heart and squeeze or compress hand until blanching occurs</p> <p>f) Place waterproof pad under forearms</p> <ul style="list-style-type: none"> <li>➤ The needle is at 45 – 60 degree angle to the skin surface and is advanced in to artery</li> <li>➤ Once the artery is punctured, arterial pressure will push up the piston of the syringe and a pulsating flow of blood will fill the syringe</li> <li>➤ After blood is obtained withdraw needle and apply firm pressure over the puncture site with a dry sponge for 2 – 5 minutes</li> <li>➤ Remove air bubbles from syringe and needle, insert needle in to the rubber stopper placed on the flat surface. Do not hold the rubber stopper.</li> <li>➤ Maintain firm pressure on the puncture site 5 minutes if the patient is on anticoagulant therapy apply direct pressure over puncture site for 10 – 15 minutes and then apply a firm pressure dressing</li> <li>➤ For patients requiring serial monitoring of arterial blood, an arterial catheter is attached to the radial or femoral artery</li> <li>➤ Send labeled, iced specimen to the laboratory immediately with dully filled request.</li> <li>➤ Palpate the pulse (Distal to the puncture), inspect the puncture site and assess for reduced temperature, cold numbers</li> </ul>				
9	15 Mts	Explain about interpretation of ABG analysis	<p><b>INTERPRETATION:</b></p> <p><b>Hydrogen ion concentration (PH):</b></p> <p>The hydrogen ion concentration (HP) provides information</p>	Lecture cum	Listening and	Hand-out	How we can interpretate

		<p>on acid – base balance. This relates to how much acid or alkali a patient has in their blood. The PH Scale indicates the concentration of hydrogen ions. The normal level of PH is 7.35 – 7.45. If the PH level decreases less than 7.35 – 7.45 that indicates Acidemia and if the PH level increases more than 7.45 that indicates Alkalemia.</p> <p><b>OXYGEN SATURATION (SaO2):</b>  Saturation (SaO2) measures how well the hemoglobin in the blood is saturated, the SaO2 value derived from a blood gas is very similar to the SpO2 values gained from pulse oximetry. The only difference is that in a blood gas we are measuring the saturation of arterial blood SaO2 and in pulse oximetry we are measuring the saturation of peripheral capillary blood (SpO2) the normal range is 95 – 100%.</p> <p><b>PaO2:</b>  This is the partial pressure of oxygen dissolved within the arterial blood. It will determine oxygen binding to hemoglobin (SaO2) the normal level of PaO2 is so -100 mm Hg.  It is of vital importance but is not used in determining patient acid base status.  The normal range for a healthy person is approximately 80 to 100 mm Hg. A PaO2 level less than 80 mm Hg indicates hypoxemia.</p> <p><b>PaCO2:</b>  This is the partial pressure of carbon dioxide dissolved within the arterial blood. It is used to assess the effectiveness of ventilation, the normal level for PaCO2 is 35 – 45 mm Hg. If the normal level is reduced below 35 mm Hg that is known as respiratory alkalosis. If the PaCO2 level is increased above 45 mm Hg that is known as respiratory acidosis.</p>	discussion	answering		ABG result?
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			<p><b>HCO3:</b> Hco3 is the chemical for bicarbonate, and alkali, it is the main chemical buffer in plasma and alludes the body metabolic status. It takes in to account bicarbonate produced as normal HCO3 is 22 – 26meqlr, the HCO3 is level decreased below 22meqlc that is known as metabolic acidosis the level is increased above 26meqlr that is known as metabolic alkalosis.</p> <p><b>Base Excess (BE):</b> Base excess is a surpluss amount of base (alkali) within the blood however, it can be normal to have a small of surpluss within the blood. The normal range can be -2mmol to +2mmol /l or + 2.0 meqlc</p>				
			<p><b>Summary:</b> It would therefore seem logical to request an ABG on any patients who is or has the patients to become critically ill. This includes patients in critical care areas and these on wards who ‘trigger’ early – warning scoring systems.</p>				
			<p><b>Conclusion</b> So for we discussed about what is ABG analysis, Indication, Contra indication &amp; principles &amp;articles for ABG analyses, procedure and after care &amp; interpret ate the result.</p>				
			<p><b>BIBILIOGRAPHY:</b></p> <ul style="list-style-type: none"> <li>❖ Brunner, [2006], “<b>TEXT BOOK OF MEDICAL SURGICAL NURSING</b>”, 10<sup>th</sup> edition, published by William Lippincott – New Delhi, Pg No. 623 – 625</li> <li>❖ Joyce m block, [2008], “<b>Text Book Of Medical Surgical Nursing</b>”, 7<sup>th</sup> edition, Volume – I, published by Eleiver publication, Missouri, Pg. No. 603 -605</li> <li>❖ Lippincott, [2006], “<b>Manual Of Nursing Practice</b>”, 7<sup>th</sup></li> </ul>				



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