A STUDY TO ASSESS THE EFFECTIVENESS OF COLD APPLICATION IN REDUCING PAIN DURING CHEST DRAIN REMOVAL AMONG PATIENTS FOLLOWING CORONARY ARTERY BYPASS GRAFT SURGERY (CABG) IN SELECTED HOSPITAL

BY
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A dissertation submitted to

THE TAMILNADU DR. MGR MEDICAL UNIVERSITY, CHENNAI

In the partial fulfilment of the requirement for the award of the degree of

MASTER OF SCIENCE IN MEDICAL SURGICAL NURSING

OCTOBER 2017

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“Whoever humbles will be exalted”

This work is dedicated to
my dearest family, teachers and wishers
who had moulded me.

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RESEARCH ABSTRACT / SYNOPSIS

1. INTRODUCTION

All post operative Coronary Artery Bypass Graft (CABG) patients will have at least one chest drain. Chest drain removal is one of the painful procedures that CABG patients reported to remember from the hospital stay. Though pharmaceutical therapy alleviates pain it is not effective in management of acute pain due to Chest Drain Removal (CDR). Cold application has thought to be effective in pain management, a study is undertaken to assess the effectiveness of cold application in reducing pain due to CDR.

2. AIMS & OBJECTIVES

1) To assess pre test and post test level of pain with chest drain among CABG patients in experimental and control groups

2) To establish the effectiveness of cold application in reducing pain due to CDR among CABG patients in experimental and control groups

3) To compare pre and post test level of pain among CABG patients in experimental and control groups

4) To ascertain the association between the effectiveness of cold application in reducing pain among CABG patients with selected demographic variables

3. RESEARCH METHODOLOGY

Design: Quantitative research, Quasi experimental pre-test and post-test with experimental and control group.

Setting: Super-speciality hospital

Participants: 60 post operative CABG patients with at least 1 chest drain and ready to remove the drain.

Intervention: Cold application with 6 ice cubes applied over the 5 cm circumference of the tube for 15 minutes prior to CDR.

Main outcome measures: Quantification of Pain and its quality using VAS and adapted McHill questionnaire.

Results: VAS and McHill score were significantly low in experimental group compared to the control group at $P < 0.05$. There is no significant association ($P > 0.05$) of any demographical variables to pain among CABG patients.

Conclusion: Cold application is effective, simple and easy to use to alleviate the pain due to CDR among CABG patients. No adverse incidents are reported throughout the study.

Key words: Pain, CDR, Cold application, CABG

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Introduction

CHAPTER – I
INTRODUCTION

Cardiac disease is number one killer in both India and in world. Almost nearly 30% of all death in the last year is cardiac related deaths. Coronary Artery Bypass Surgery (CABG) is proved to be effective and efficient in the treatment of blocked arteries. CABG is a complex open heart surgical intervention to improve blood flow to the heart using harvested veins or artery as a bypass conduit. CABG is performed by highly skilled cardiac surgeon along with multidisciplinary team. CABG is commonly known as “bypass or open heart surgery”.

Chest drains are inserted intra-operatively during CABG to maintain the haemodynamic stability and cardiopulmonary function. Chest drains are inserted in either pleural, pericardial and mediastinal cavity which facilitates to drain air, blood and other fluids collected post-operatively. In addition, chest drain prevents any further pleural effusion, pneumothorax and haemothorax. Preventing these accumulations will avoid serious post operative complications. All post-operative CABG patients will have at least one chest drain, it is estimated that on average 60% of patient have 3 or more drains post operatively.

Chest drains are usually removed within 24 to 48 hours post-operatively. Almost 80% of chest drains are removed within 48 hours, however there are occasion where chest drain are kept longer until the excess air, blood or fluids are drained fully and no more active drain is present. Chest drains are foreign body to the human body, as a normal inflammatory response chest drains tends to adheres to the surrounding tissues. Therefore removing chest drains by separating the adjoining tissues if any is normally painful to the patients. Many studies suggested that Chest Drain Removal (CDR) is one of the painful events that post-

operative patients experience and remembers during the perioperative period.

Pain is caused due to damage to intercostal nerves at the incision site, irritation and incitation of pleura during catheter placement and removal. Moderate to severe pain has been reported due to the CDR in various studies. Pain control during CDR is not very well managed; reactive analgesic administration is a common practice. It is complex to assess and treat pain. Pain is “what person says it is, and exists whenever the experiencing person says so.

Cold application is a cutaneous stimulation technique which is well explained in Gate control theory by Melzac (1965). According to the Gate control theory, impulse stimulate A-fibres is the impulse transmission in thick fibres. Stimulated thick fibres selectively blocks conduction in the thin fibres by closing a gate consisting of specific nerve cells in dorsal horn of spinal cord. Cold application stimulates the A-fibres thereby blocking the pain which is transmitted by thin fibres.

Cold application has been proved to be effective in reducing pain in other post-operative settings. It is shown that cold application slows the tissue metabolism and also has vasoconstrictor and analgesics effects. Cold application is been used to treat pain for more than a century now and its effective in reducing the pain. Other significant factors are it is easy to use, cost effective and readily available.

BACKGROUND OF THE STUDY

Chest drains are inserted during CABG to drain air and fluid out from the chest cavity. Chest drains will be removed when the drainage amount is minimal. Chest drain removal (CDR) is described as a painful experience by the patients. Chest drain tube adheres to the endothelium of the pleural cavity. During CDR adhesion gets detach from adhesion causing sharp pain to the patients.

In order to help in relieving the pain suffered by these patients during CTR, traditional pharmacological method such as acetaminophen and morphine are prescribed to the patients by providing anti-inflammatory effect and directly acting on central nervous system respectively, however the timing of this intervention is always a challenge. For non-pharmacological method, cold application was considered to be applied to patients to reduce their pain. Studies have shown that cold application could reduce the pain impulse transmission velocity and block the pain signal transmission from the periphery pain receptors to the spinal cord. However, the evidence of the effect of cold application before CTR to reduce procedural pain in CTS patients is unclear.

NEED FOR THE STUDY

Approximately more than 100,000 per year CABG performed all over the world. All CABG patients at least have one chest drain post operatively. Most patients reported moderate to severe pain during CDR. Complications such as reduced chest expansion, tachycardia and myocardial infarction may be caused if pain are untreated, especially for the CABG patients. It is vital to have an accurate pain assessment, charting and management to the pain complain by the patients.

Pain is what the person experience which is difficult to explain or describe. This makes it more difficult for others to assess and treat. Cold application as a cutaneous stimulation technique is an effective non-pharmacological intervention for pain management. Cold application is being considered as an alternative non pharmacological therapy. Various studies show that cold application reduces pain and alleviate the need for analgesics in orthopaedic and gynaecologic surgical patients. Cold application does not introduce harmful chemical substances to the body and do not have any adverse effects to the patients. Cold application is

simple and easy to be applied. Lastly, ice bags are low cost which decreases the cost in applying cold application to the patients.

Even though cold application has been used in reducing surgical pain; the effectiveness of cold application in reducing pain during CDR is not clear.

This study will provide the information about the effectiveness of cold application n reducing pain due to CDR.

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of cold application in reducing pain during chest drain removal (CDR) among patients following coronary artery bypass graft surgery (CABG) in selected hospital.

OBJECTIVES

1) To assess pre test and post level of pain with chest drain among CABG patients in experimental and control groups

2) To establish the effectiveness of cold application in reducing pain due to CDR among CABG patients in experimental and control groups

3) To compare pre and post test level of pain among CABG patients in experimental and control groups

4) To ascertain the association between the effectiveness of cold application in reducing pain among CABG patients with selected demographic variables

OPERATIONAL DEFINITIONS

Effectiveness is the ability and extent of cold application to reduce pain due to CDR.

Cold application is an intervention to stimulate the skin and underlying tissue with cold to reduce pain due to CDR.

Pain is an unpleasant sensory and emotional experience associated with CDR.

Chest Drain is a flexible tube that is placed through the chest wall and into the chest (pleural, pericardial or mediastinal) to drain the accumulation of excessive air, fluid and blood post operatively.

CABG is a type of surgery that improves blood flow to the heart using harvested veins or artery as a bypass conduit.

ASSUMPTIONS

1) CDR will cause pain to the patients

2) Level of pain is a continuum

3) Cold application will reduce the pain due to CDR

HYPOTHESIS

H1 – There will be reduction in level of pain due to CDR among CABG patients after cold application

H2 – There will be significant difference of level of pain between experimental and control group

LIMITATIONS OF THE STUDY

- Cold application accuracy is based on duration of application
- CDR are carried out by various health care professionals
- Only CABG patients who are haemo-dynamically stable were included in the study

PROJECTED OUTCOME

This study will determine the effectiveness of cold compression in reducing pain due to CDR among CABG patients which will inform the guidelines for pain management during CDR.

HUMAN RIGHTS PROTECTION

- ❖ Formal permission were requested and obtained from the relevant authorities
- ❖ Informed consent obtained from all participants
- ❖ All collected data is confidential and will be used only for this research purpose

CONCEPTUAL FRAME WORK BASED ON BIOPSYCHOSOCIAL PAIN MODEL BASED ON GATE CONTROL THEORY

Gate control theory of pain is the basis for this conceptual framework. Earlier biopsychosocial model have been developed to understand the chronic pain. Nursing research involves a systematic research for knowledge relating to the nursing profession. Theory is an abstract of that has been proved to of phenomena.

A framework is a conceptual under pinning of the study. Not every study is based on a theory of conceptual model, but every study has a framework. In this study Gate control theory forms the basis of the framework to explain the study theoretically.

Conceptual framework represents easier of organising specific needs of the phenomena than theories. Conceptual framework details with abstraction that are assembled by virtue of their relevance to a common theme and provides clear description of the variables suggesting ways or methods to conduct the study and guiding the interpretation, evaluation and integration of significant findings.

This study aimed at assessing the effectiveness of cold application on pain due to CDR.

Melzac (1965 explains Gate control theory of pain in which a mechanism acts like a gate that inhibits are facilitates transmission of the stimuli from the body to the brain in respect to the diameters of the stimulated fibres. According to this pain is induced by the stimuli and depending upon the size of the fibre being thick and thin; thin fibre will mask the thick fibres when stimulated. Pain is transmitted by thick fibres whereas touch and sensation are transfer by thin fibres.

However this theory has not accounted for the other variables such as sociocultural aspects of the pain and psychological aspects such as previous experience with pain and coping strategies. Therefore this conceptual model will include psychosocial, biological and pain perception of CABG patients in CDR.

The model focuses on following three areas;

1) Biopsychosocial aspect

2) Gate control for transmission

3) Pain perception

1. Biopsychosocial aspects

Psychosocial aspects include psychological, cultural and social exposure. Influence of ethnicity, family system and cultural beliefs and practices are part of sociocultural aspects. Factors such as anxiety, coping mechanism, depression and social learning are core component of the different aspects in psychological part. Biological aspects are complex to explain and understand many variables such as tissue damage, features of the stimuli, genetic composition and endogenous

pain mechanism will interfere how the pain is being perceived. All these aspects will have effects on the pain.

2. Gate control for transmission

Stimuli are mainly transmitted through two types of fibre namely thick and thin fibres. Thick transmits pain and thin fibre is effective for senses such as touch and cold. With the thin fibres where the cold application works will significantly mask the thick fibre of pain transmission thereby reducing the pain perception due to CDR.

3. Pain perception

Pain is subjective and individualistic, it is complex and describing the pain can be difficult. Numerous factors from biological, social, cultural, psychological aspects will interfere with the pain perception. For acute pain even though other aspects are important for modification of perception, biological aspects in terms of gate control phenomenon is key. Using cold application will stimulate the thin fibres so that it can mask the thick fibre and also the conceived pain.

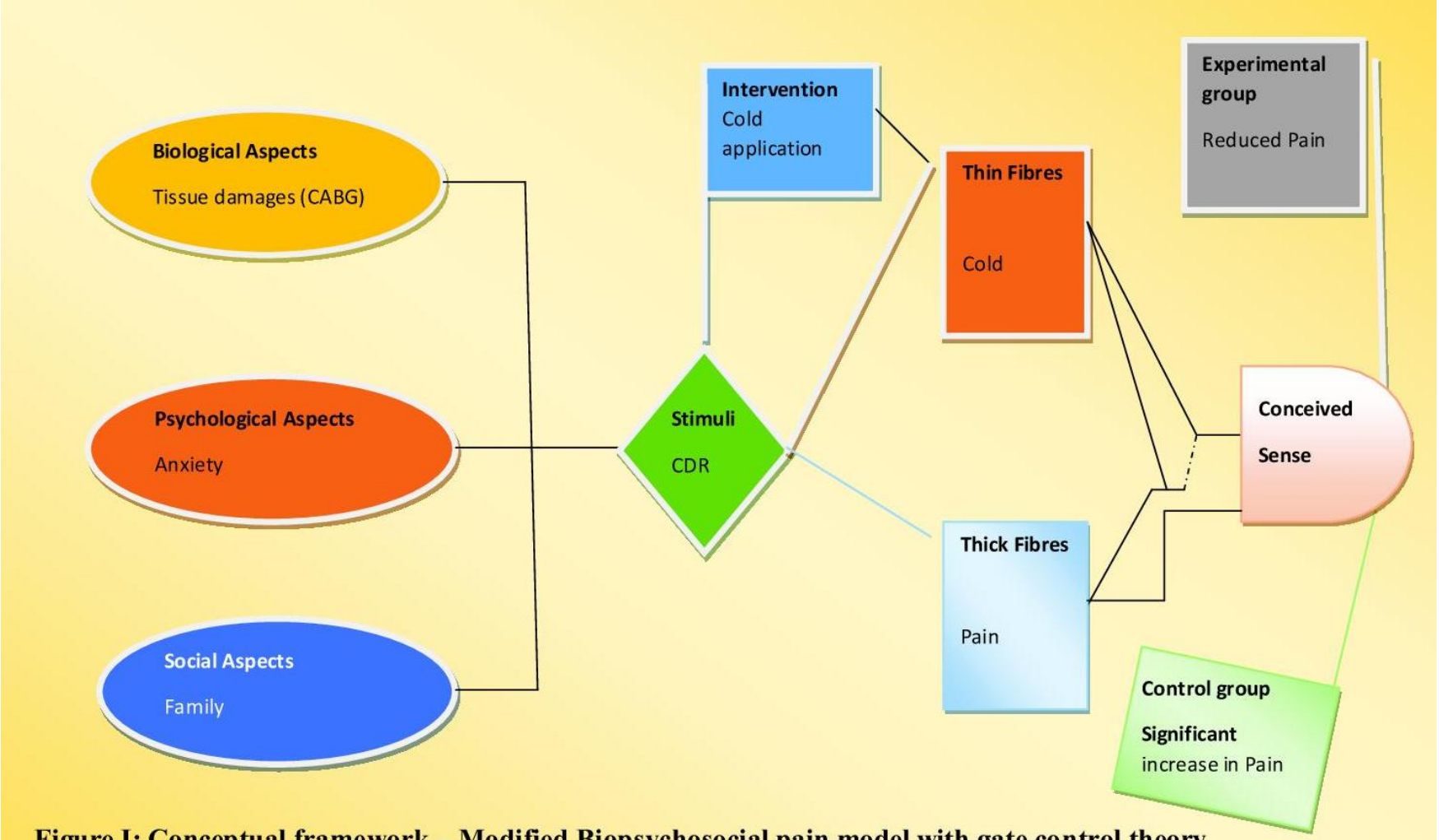

Figure I: Conceptual framework – Modified Biopsychosocial pain model with gate control theory

Review of Literature

CHAPTER – II
REVIEW OF LITERATURE

Literature review is a critical report of academic literature related to the selected area of study which will describe, summarise, evaluate and clarify the literature. This will provide a theoretical base for the research and determine the nature of your research.

Review of literature include

1) Literature related to pain management during CDR

2) Literature related to cold application in reducing pain

1. Literature related to pain management during CDR

Puntillo and Ley (2004) in a study "**Appropriately timed analgesics control pain due to chest drain removal**". Four interventions were tested in 74 patients in a randomized, double-blind study: (1) 4 mg intravenous morphine and procedural information; (2) 30 mg intravenous ketorolac and procedural information; (3) 4 mg intravenous morphine plus procedural and sensory information; and (4) 30 mg intravenous ketorolac plus procedural and sensory information. Analgesics were administered to correspond to peak effect, and scripted information was provided. Pain intensity and pain distress were measured before analgesic administration, immediately after chest tube removal, and 20 minutes later Pain quality was measured immediately after chest tube removal. Level of sedation was measured before and 20 minutes after chest tube removal. Repeated-measures analyses of variance were used to test differences among groups over time. Procedural pain intensity (mean 3.26, SD 3.00) and pain distress (mean 2.98, SD 3.18) scores for all were low. Patients remained alert, regardless of which analgesic was administered. If used correctly, either an opioid (morphine) or a nonsteroidal anti-inflammatory (ketorolac)

can substantially reduce pain during chest tube removal without causing adverse sedative effects

Demir and Korshid (2010), conducted a study "**The effect of cold application in combination with standard analgesic administration on pain and anxiety during chest drain removal: single blinded, randomised, double controlled study**" Ninety patients aged 18-74 years, hospitalized in the intensive care unit (ICU), who had a chest tube for a duration of at least 24 hours were used for this convenience sample. The application of cold, placebo, or control therapies was randomized into three different groups. Sixty minutes before CTR was scheduled, an ICU nurse administered 10mg/kg paracetamol intravenously to all study subjects. Cold and warm packs covered with gauze dressing were applied to the area surrounding the chest tubes for 20 minutes. Pain intensity, pain quality and situational anxiety for CTR were measured. Variance analysis and the latent growth model were used in the analysis of the data. Patients in the cold group had significantly lower pain intensity than the placebo group. The perception of pain intensity measured by visual analog scores of patients in the cold group showed the least variation. There was no statistically significant difference in McGill Melzac Pain Questionnaire scores or in change of anxiety level between the three groups. The application of cold prolonged the length of time until analgesics were needed after CTR. Results showed that cold application reduced patients' intensity of pain due to CTR but did not affect anxiety levels or the type of pain. Cold application is recommended as a pain-relieving technique during CTR.

Joshi Et al (2007) conducted a study "**Comparison of analgesic efficacy of fentanyl and sufentanil for chest tube removal after cardiac surgery**" One hundred and forty one adult patients undergoing cardiac surgery were recruited in a prospective, randomized, double blind, placebo controlled study. Patients were randomized to receive

either 2 microg/Kg fentanyl IV or 0.2 microg/Kg sufentanil IV or 2 ml isotonic normal saline, 10 min before removing chest tubes. Pain intensity was assessed by measuring visual analog scale pain score 10 minutes before removing chest tubes and 5 min and 20 min after removing chest tubes. Level of sedation, heart rate, arterial pressure, oxygen saturation, and respiratory rate were recorded by a blinded observer at the same time intervals. Mean pain intensity scores 10 minutes before removal of chest tubes in fentanyl, sufentanil and control groups were 23.88+/-5.2, 25.10+/-5.39 and 23.64+/-6.10 respectively. The pain scores 5 minutes after chest tube removal were reduced to 20.11+/-6.9 ($p<0.05$) in the fentanyl group and 13.60+/-6.60 ($p<0.05$) in the sufentanil group, whereas in control group pain scores increased to 27.97+/-8.39 ($p<O.05$). The pain scores in sufentanil group were significantly lower compared with fentanyl or control group. Sedation scores remained low in all groups and patients remained alert and none of the patients showed any adverse effects of opioids. Heart rate, arterial pressure and respiratory rate had least variations in sufentanil group than fentanyl or control group.

Frieshnar Et al (2007) conducted a study "**Comparison of two pain-management strategies during chest tube removal: relaxation exercise with opioids and opioids alone**" A 10-cm vertical Visual Analog Scale was used to measure pain at three points: before CTR, immediately after CTR, and 15 minutes after CTR. The experimental group received slow breathing relaxation exercises in addition to the usual opioid doses administered. Data were analyzed using analysis of variance, and multivariate analysis of covariance yielded a significant difference in pain ratings immediately after CTR and 15 minutes after CTR for the group receiving relaxation exercise as an adjunct to opioid analgesic. This study supports the use of a slow deep-breathing relaxation exercise as an adjunct to the use of opioids for pain

management during CTR among patients who have undergone coronary bypass surgery.

Houston and Jesurum (1999) conducted a study on "**The quick relaxation technique: effect on pain associated with chest tube removal**". The quick relaxation technique (QRT) was used on 24 primary aorta-coronary bypass surgical patients. Subjects rated their pain on the visual analog scale immediately following CTR and 30 minutes later. Results indicated that men > or = 70 years of age who received QRT in conjunction with analgesics reported less than half the amount of pain experienced by those who did not receive QRT. In comparison, women 70 years old or older reported much higher pain intensity scores when QRT was used. Preliminary results suggest that for most patients, the combination of analgesics and relaxation exercises is not more effective in decreasing pain during CTR than when analgesics are administered without relaxation exercises.

Carson Et al (1994) studied "**Managing pain during mediastinal chest tube removal**". Before chest tube removal, subjects were medicated with either: (1) intravenous morphine sulfate (morphine), (2) intravenous morphine and subfascial angiocatheter lidocaine hydrochloride (lidocaine), (3) intravenous morphine and subfascial angiocatheter normal saline solution, or (4) subfascial angiocatheter lidocaine.Mean pain rating scores for groups 1, 2, 3, and 4 were 43.7 40.9, 36.4, and 38.1, respectively. Analysis of variance showed no significant difference between scores ($p = 0.8948$). The percentage of comments rated as "not bad at all" or "not bad" for groups 1, 2, 3, and 4 were 56%, 83%, 47% and 75%, respectively. Chi-square analysis showed a significant difference between ratings ($p < 0.01$).Blind ratings of subjects' descriptions of sensations suggest subfascial lidocaine may be useful in reducing discomfort during chest tube removal.

Puntillo (1996) "**Effects of interpleural bupivacaine on pleural chest tube removal pain: a randomized controlled trial**". A randomized, double-blind, placebo-controlled trial was used, with a repeated measures design. Pain intensity and distress were measured before, immediately after and 1 hour after chest tube removal. Pain sensations and affect were evaluated immediately after chest tube removal. The experimental group (n = 21) received bupivacaine and the control group (n = 20) received normal saline. In both group's pain intensity and distress scores were significantly higher at the time of chest tube removal than immediately before or 1 hour after. No significant differences in pain intensity, distress, sensation, or affect scores were found between the two treatment groups. The 13 patients who received intramuscular ketorolac an average of 3.5 hours before the procedure, independent of the study design, had significantly lower pain intensity scores at the time of chest tube removal than the 26 who did not.

Sauls (2004) studied "**The use of ice for pain associated with chest tube removal**" Every year more than 300,000 patients undergo cardiothoracic surgery, requiring placement of at least one chest tube. Removal of these chest tubes has been described as one of the worst intensive care unit experiences for these patients. Pain associated with chest tube removal (CTR) has been poorly controlled in many surgical patients. The purpose of this experimental study was to ascertain if the application of ice would decrease pain before, during, and after chest tube removal. Fifty post cardiac surgery patients were randomly assigned to two groups. The experimental group received ice therapy before CTR, whereas control subjects received a placebo. Pain intensity and pain distress were measured on a 0-10 numeric rating scale, and pain quality was measured using the McGill Pain Questionnaire-Short Form (MPQ-SF). Differences in pain intensity and pain distress between

the experimental and control groups were not significant. A significant change in pain over time was noted in both groups, with pain intensity and distress being most severe during actual chest tube removal. Additionally, patients who received preprocedural pain medication did not differ in their levels of pain intensity or distress. Both groups used all the quality descriptors on the MPQ-SF for the sensory and affective components of pain, with cramping and gnawing as the most frequently chosen words. Continued research with larger samples is encouraged to further evaluate ice and other interventions that can be used to manage pain associated with CTR. These data demonstrate that chest tube removal pain is of moderate to severe intensity and that pleural chest tube injections of bupivacaine were not effective in decreasing chest tube removal pain. However, the decrease in pain associated with the administration of ketorolac warrants future study.

Cheng and Hsieh (2015) "**The effectiveness of a cold application for pain associated with chest tube removal: a systematic review**" Only randomized controlled trials (RCTs) that evaluated the efficacy of cold application in patients before CTR were included in analysis. Study quality was assessed using the Modified Jadad scale. Five RCTs that enrolled a total of 426 patients were included in the analysis. The mean age of participants ranged from 48.7 (SD = 16.5) to 60.2 (SD = 6.2) years. Ice packs were most widely used and applied to an area approximately 5-15 cm in diameter, with the chest tube entry point at the centre. The findings of the effectiveness of the cold application were inconsistent among the studies. The researchers terminated the cold application when patients' skin temperature reached 13°C or after 20 min, which showed that the cold application immediately reduced the pain associated with CTR. It was also observed that the cold application prolonged the duration of time between the CTR and the administration of analgesics. Additionally, two studies in

which analgesics were administered to participants 60 min before CTR showed that cold application in combination with analgesics administration reduced patient pain due to the enhancement affects of CTR, which obtained results that were better than analgesics administration alone. The results of this study may be used as a reference for reducing pain associated with CTR in clinical practice. However, further studies with larger sample sizes are required to support these results.

Bruce (2006) "**Chest drain removal pain and its management: a literature review**" Fourteen studies were reviewed, including five descriptive studies; three studies of non-pharmacological interventions; and six randomized controlled trials of morphine, local anaesthetics and Entonox. The search revealed only two paediatric studies. Many of the studies had design limitations or were poorly reported. The majority of studies indicated that patients experienced moderate to severe pain during chest drain removal, even when morphine or local anaesthetics were given. Morphine alone does not provide satisfactory analgesia for chest drain removal pain. Non-steroidal anti-inflammatory drugs, local anaesthetics and inhalation agents may have a role to play in providing more effective analgesia for this procedure. Analgesic protocols for the management of painful procedures such as chest drain removal are unsatisfactory and practice in this area should be revised. More research is needed to determine the efficacy of drugs other than morphine, particularly Entonox and to investigate multi-modal techniques of management further.

2. Literature related to cold application in reducing pain

Saeki (2004) in a study "**Effect of local application of cold or heat for relief of pricking pain**" Electrical stimulation was applied to the ante brachium or brachium of subjects as an artificial pricking pain, and skin blood flow (BF) and skin conductance level (SCL) at the

fingertip were measured. Application of cold to the stimulation site using an ice-water pack reduced BF and SCL responses and pain sensation where as application of heat using a hot water bottle caused an increase in pain sensation and increased BF and SCL responses. As a result it is suggested that cold application provides relief of pricking pain sensation and reduces autonomic responses.

Wares and Raiser (2003) in their experimental study namely "**Ice massage for the reduction of labour pain**". Ice massage is applied to LI4 which is located on the medial midpoint of the first metacarpal, within 3 to 4 mm of the web of skin between the thumb and forefinger. Pain reduction mean on the VAS of 28.22 mm on the left hand and 11.93 mm on the right hand was noted. Results confirmed ice massage is safe, non-invasive, non-pharmacological method of reducing labour pain.

Melzack Et al (1998) in an experimental study "**Relief of dental pain by ice massage on hand**". Patients suffering from acute dental pain were treated with ice massage in L14 which is located between the thumb and index finger of the hand on the same side as the painful region. Ice massage reduces the intensity of the dental pain by 50% or more in most patients. Ice massage is a simple method for the non pharmacological intervention to reduce pain in dental clinics.

Saibita Et al (2008) in an experimental study "**Effect of cryotherapy on arteriovenous fistula puncture-related pain in haemodialysis patients**". The pain scores were significant ($P = 0.001$), reduced within the experimental group with the application of cryotherapy. This study highlights the need for adopting alternative therapies such as cryotherapy for effective pain management in hospital settings.

Ertug and Ulker (2012) conducted a study "**The effect of cold application on due to chest tube removal**". The Visual Analogue Scale score was measured immediately after the chest tube removal in the experimental group was 3·85, compared with 5·60 in the control group. There were significant differences on pain with cold application between the two groups prior and after the intervention. Age, gender, the number of days the chest tube was inserted and the chest tube insertion indication had no effect on the pain owing to chest tube removal.

Research Methodology

CHAPTER – III
RESEARCH METHODOLOGY

Methodology adopted for the research work is detailed in this chapter. This will provides important details and eliminate negative research work and makes the study progressive towards its objectives. This systematic methodology includes the steps, procedures and strategies in gathering and analysis of data in the research investigation.

RESEARCH DESIGN / RESEARCH APPROACH

The research design is "a systematic process for research overall plan for obtaining answer to the research objectives using the research strategies adopted for developing information that is accurate, objective and interpretable". The research design provides a working frame work and guides the researcher to achieve the intended goal.

In this study, the quasi experimental design is used along with quantitative approach.

Experimental Group	Pre test	i	Post test
Control Group	Pre Test	r	Post Test

i = cold application before CDR

r = Routine CDR

COLD APPLICATION INTERVENTION BEFORE CDR

1) Explain and obtain consent for cold application for CDR

2) Prepare 6 ice cubes in the clean gloves

3) Remove the dressing around the chest drain and place a sterile gauze

4) Apply the cold around the chest drain covering at least 5 cm circumference

5) Cold application to be kept in place for 15 minutes

6) After 15 minutes remove the cold application

7) CDR should commence within 1- 2 minutes

VARIABLES

Independent Variable: ***Cold Application***

Dependent Variable: ***Pain, ability to communicate the pain, pain threshold***

SETTING OF THE STUDY

This study was carried out in Dr. Kamakshi Memorial Hospital in Chennai. This is one of the Tertiary Care Hospital committed to deliver scientific modern medical care to the society with International standards at an affordable cost. It is a 500 bedded hospital and having Catheterization lab., Cardiothoracic operation theatre, Cardiothoracic Intensive care unit & CCU. Average daily outpatients are of 25 CAD patients, among these 5 CABG cases. This setting was identified to perform the study, considering the feasibility of conducting the study and availability of samples.

POPULATION

TARGET POPULATION

The target population for this study are post operative CABG patients with at least 1 chest drain and ready to remove the drain.

ACCESSIBLE POPULATION

The accessible populations are those who are haemodynamically stable post operative CABG patients with at least 1 chest drain and ready to remove the drain in the selected hospital during the data collection period and who are willing to participate in this research work.

SAMPLING TECHNIQUE

Convenient sampling technique was adopted for this study.

SAMPLING SIZE

Total of 60 samples in 2 groups, 30 each in experimental and control group who are haemodynamically stable post operative CABG patients with at least 1 chest drain and ready to remove the drain in the selected hospital

CRITERIA FOR SAMPLE SELECTION

Inclusion Criteria

This study includes following samples

- Post operative CABG with at least 1 chest drain
- Haemodynamically stable and with a decision to remove chest drain
- First chest drain removal
- Willing and active participation for this study
- Basic English knowledge

Exclusion Criteria

This study excludes following samples

- ❖ Patients under the age of 18 years
- ❖ Haemodynamically unstable patients
- ❖ Patients who had previous chest drain

DEVELOPMENT OF THE TOOL AND SCORE INTERPRETATION

For this experimental study 2 tools are used namely Visual Analogue Scale (VAS) and Adapted McHill questionnaire. VAS is used to find out whether cold application reduces the pain due to CDR. Adapted McHill questionnaire is utilised to find out the effectiveness of cold compression in reduction of pain due to CDR by quantifying the quality of pain. Adapting the McHill questionnaire is achieved by incorporating relevant aspects identified by literature review. Expert consultation and recommendation on both VAS and adapted questionnaire was given by delphi group which are incorporated before data collection.

TOOLS DESCRIPTION

This study questionnaire has 3 parts namely,

PART A - DEMOGRAPHIC DATA

Demographical data such as age, gender, education, occupation, resident area and along with duration of chest drain insitu will be collected to analyse any co-relation with the independent variable.

PART B – VISUAL ANALOGUE SCALE

As pain is a subjective measure the assessment should be subjective and should be able to quantify the subjective response.

Severity of the pain is a continuum from patient's point of view therefore assessment of pain has to be a continuum. For this study pain is assessed in frequent intervals and has to be quick and simple one point assessment. Visual Analogue Scale (VAS) is a preferred as this scale fit all the assumptions and criteria required for this study.

VAS is a continuous scale of horizontal line with two extreme verbal responses hanging at both ends. No pain on the left side of the line and worst possible pain on the right end of the line.

For numerical quantification, the horizontal line is of 100mm in length (0 being no pain and 100 being worst possible pain). Patients are required to mark on the line where they think they pain level is. VAS score is calculated by measuring the left end of line to the point where patient had marked their pain. For ease of use 10 mm interval vertical mark are created on the horizontal line.

PART C - ADAPTED MCHILL QUESTIONNAIRE

Quantifying the qualities of the pain is complex and it even complex to compare the effectiveness of an intervention on different quality aspect of the pain. McHill questionnaire is specific tool to quantify the qualities of pain. There are many versions of the questionnaire long form and short forms are the commonly used versions. However for this study as informed by the literature review, short form version was adapted to assess the effectiveness of cold application on specific quality aspect of pain. This questionnaire will calculate the overall quantification of pain and importantly will be able to provide the sensory, affective, evaluative and pain intensity score. Each aspect is calculated by a response to the relevant question on pain.

SCORE INTERPRETATION

Inferred pain scores can be of minimum of 4 and maximum of 20 (ranging from low to severe pain). Individual quantified quality aspect of the pain scores ranges from 0 – 5.

Inferred Pain	Total Scores
Low	<6
Mild	7 -10
Moderate	11-15
Severe	> 16

TESTING OF THE TOOL

VALIDITY AND RELIABILITY

The adapted McHill questionnaire and tools was consulted with one of the medical expert and two experts from nursing for their comments which was built in the final tool.

The reliability of the tool was verified by pilot study, 10% of the study sample size by inter rated method (r = 0.86), as the result of the test is within reliable and therefore this tool was used for the study.

PILOT STUDY

Pilot study is the small-scale version or the trial run done before the major study. The pilot study was conducted to check the clarity of items, reliability, feasibility and practicality of the research design.

With due approval from the research committee and clinic head, the pilot study was carried out at the selected hospital at Chennai for 10% of total sample size. Pilot study sample were taken as per random sampling technique. Pre-test were conducted for both the experimental and control group. Cold application was administered to the experimental group before CTR. Level of pain was assessed using VAS

for both group and effectiveness of cold compression is assessed using adapted McHill questionnaire for interventional group.

MODIFICATION / CHANGES FOLLOWED PILOT STUDY

- Modification of demographic data
- Random sampling is changed to convenient sampling

DATA COLLECTION PROCEDURE

Data collection is the process of gathering and measuring information on targeted variables in a systematic approach.

The researcher had obtained a formal permission from clinical authorities and consent from the samples, the data collection was schedule for 6 weeks from 21.11.2016 to 31.12.2016.

The sample participants were selected by convenience sampling technique. A total sample size of 60 participants was selected for this study, 30 samples experimental group and 30 samples control group. All participants were explained about VAS and how to mark the pain level. In addition explanations were given to participants in interventional group about Adapted McHill questionnaire.

STAGES OF DATA COLLECTION

Stage-I

All participants are explained about the VAS and pre test pain levels are recorded, participants in the intervention will have cold application for 15 minutes prior to CDR along with pre test adapted McHill questionnaire.

Stage-2

All participants are requested to record pain level at 0, 5, 15 and 30 minutes after CDR.

Stage-3

Participants in the intervention are requested to complete post test McHill questionnaire.

DATA COLLECTION SCHEDULE

Experimental group			Control group		
Date	**Pre-test**	**Post-test**	**Date**	**Pre-test**	**Post-test**
21.11.2016	2		10.12.2016	2	
22.11.2016	2		11.12.2016	1	
23.11.2016	2		12.12.2016	0	
24.11.2016	2		13.12.2016	2	
25.11.2016	2		14.12.2016	2	
26.11.2016	1		15.12.2016	2	
27.11.2016	0		16.12.2016	2	
28.11.2016	2		17.12.2016	2	
29.11.2016	2		18.12.2016	1	
30.11.2016	2		19.12.2016	0	
01.12.2016	2		20.12.2016	2	
02.12.2016	2		21.12.2016	2	
03.12.2016	1		22.12.2016	2	
04.12.2016	0		23.12.2016	2	
06.12.2016	2		24.12.2016	2	
07.12.2016	2		25.12.2016	2	
08.12.2016	2		26.12.2016	2	
09.12.2016	2		27.12.2016	2	

PLAN FOR DATA ANALYSIS

Data analysis is a process of collecting, categorising the data to make a logical reasoning to understand individual aspects of provided data. Descriptive and inferential statistics are used to analysis in accordance to the basis of objectives and hypothesis of the study.

S. No	Objectives	Statistical Method	Data Analysis
01	To assess pre test and post test level of pain with chest drain among CABG patients in experimental and control groups	Descriptive statistics	Frequency and percentage distribution
02	To establish the effectiveness of cold application in reducing pain due to CDR among CABG patients in experimental an control groups	Inferential statistics	'F' test – analysis of variance
03	To compare pre and post test level of pain among CABG patients in experimental and control groups	Inferential statistics	Mann - Whitney 'U' test
04	To ascertain the association between the effectiveness of cold application in reducing pain among CABG patients with selected demographic variables	Inferential statistics	Chi-square test

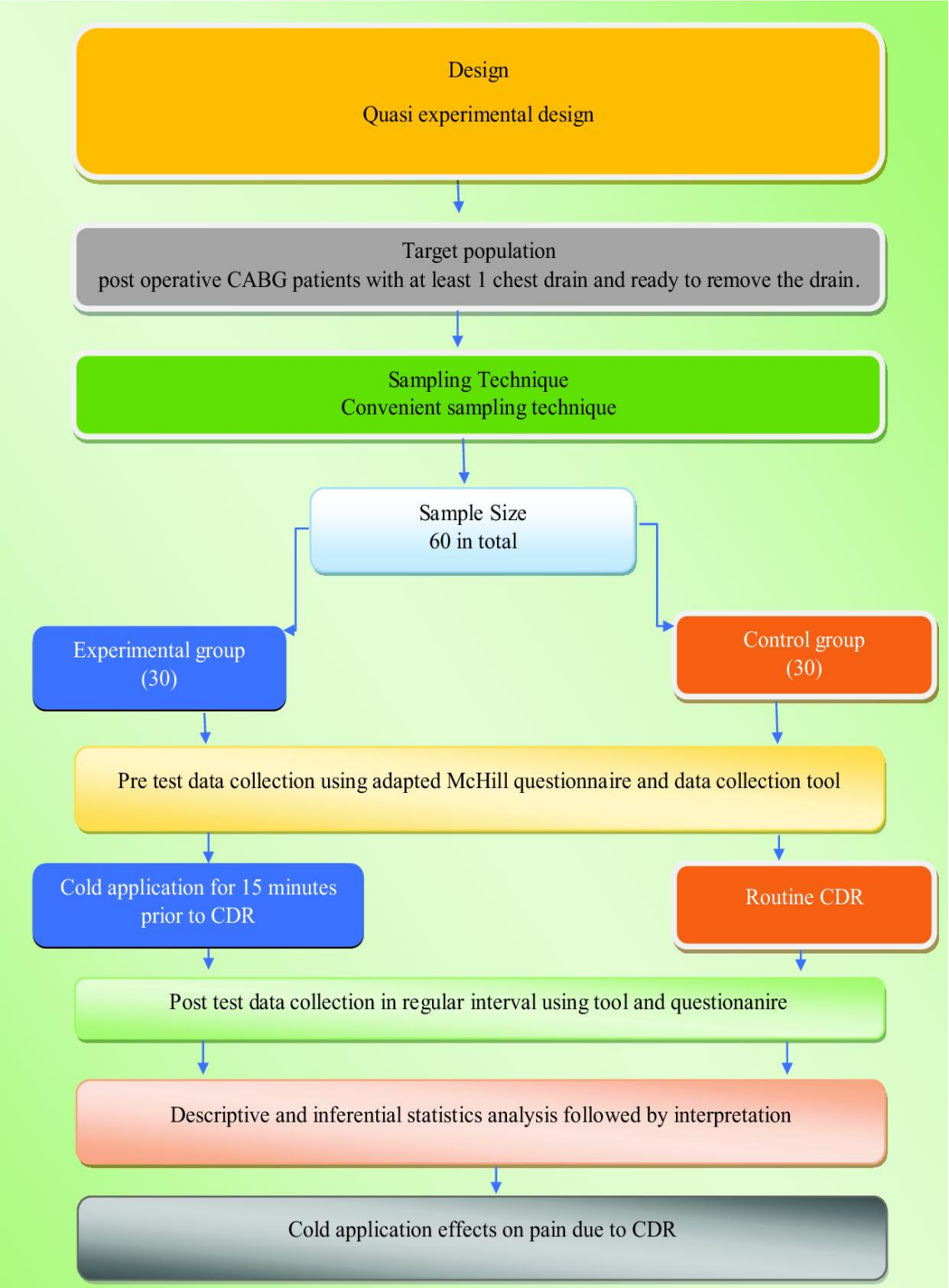

Figure II: Research methodology flow chart

Data analysis and Interpretation

CHAPTER – IV
DATA ANALYSIS AND INTERPRETATION

In this chapter data collected are analysed. The data was grouped and analysed according to the study objectives. Descriptive and inferential statistical analysis are used to explain the findings and presented under the following sections

ORGANIZATION OF THE DATA ANALYSIS

The findings of the study were grouped and analysed under the following sections

Section A: Description of the demographical variables of the CABG patients

Section B: Assessment of pre-test and post-test pain level due to CDR among patients following CABG in the experimental and control group

Section C: Effectiveness of cold application in reducing pain due to CDR among patients following CABG in the experimental and control group

Section D: Association of pre-test and post-test pain level due to CDR among patients following CABG in the experimental and control group with the selected demographic variables

SECTION A: DESCRIPTION OF THE DEMOGRAPHIC VARIABLES OF CABG PATIENTS

Table-I: Frequency and percentage distribution of demographic variables of the CABG patients

Demographic Variables	Experimental Group (n=30)		Control Group (n=30)	
AGE (Mean in years ± SD)	**53.75 ± 14.36**		**56.30 ± 18.77**	
	No	**%**	**No**	**%**
AGE				
18 – 40 Years	05	17	02	7
41 –65 Years	11	37	12	40
≥ 66 Years	14	47	16	53
GENDER				
Male	22	73	21	70
Female	08	27	09	30
EDUCATION				
No formal	05	13	03	10
High School	13	20	12	17
UG	10	40	12	53
PG	02	27	03	20
OCCUPATION				
Unemployed	1	3	0	0
Non-professional	4	13	5	17
Professional	14	37	13	43
Retired	11	37	12	40
RESIDENT				
Rural	01	03	02	07
Sub Urban	21	70	18	60
Urban	08	27	10	33
DURATION OF CHEST TUBE INSITU				
In days (Mean ± SD)	2.8±1.3		2.65±1.49	

The frequency and percentage distribution of demographic variables of the CABG patients are mapped out in the above table to understand the highest distribution in the relevant categories. However any inference on distribution is only for the targeted population.

Mean age is 54 and 56 years in experimental and control group respectively. Both in experimental and control group >65 years group is significant with 47% and 53% respectively when compared with other age groups.

73% and 72% of the sample is comprised of male gender in experimental and control group respectively. Predominately collected sample are well educated with undergraduate (UG) 40% in experimental group and 53% in control group followed by post graduate (PG) 27% and 20% in experimental and control groups.

Professional occupation and retired person are at 37% in experimental group in comparison with 43% professional and 40% retired in control group. Suburban is highly significant 70% and 27% followed by urban resident with 60% and 33% in corresponding experimental and control group.

Average duration of chest tube insitu is 3 days in both experimental and control group.

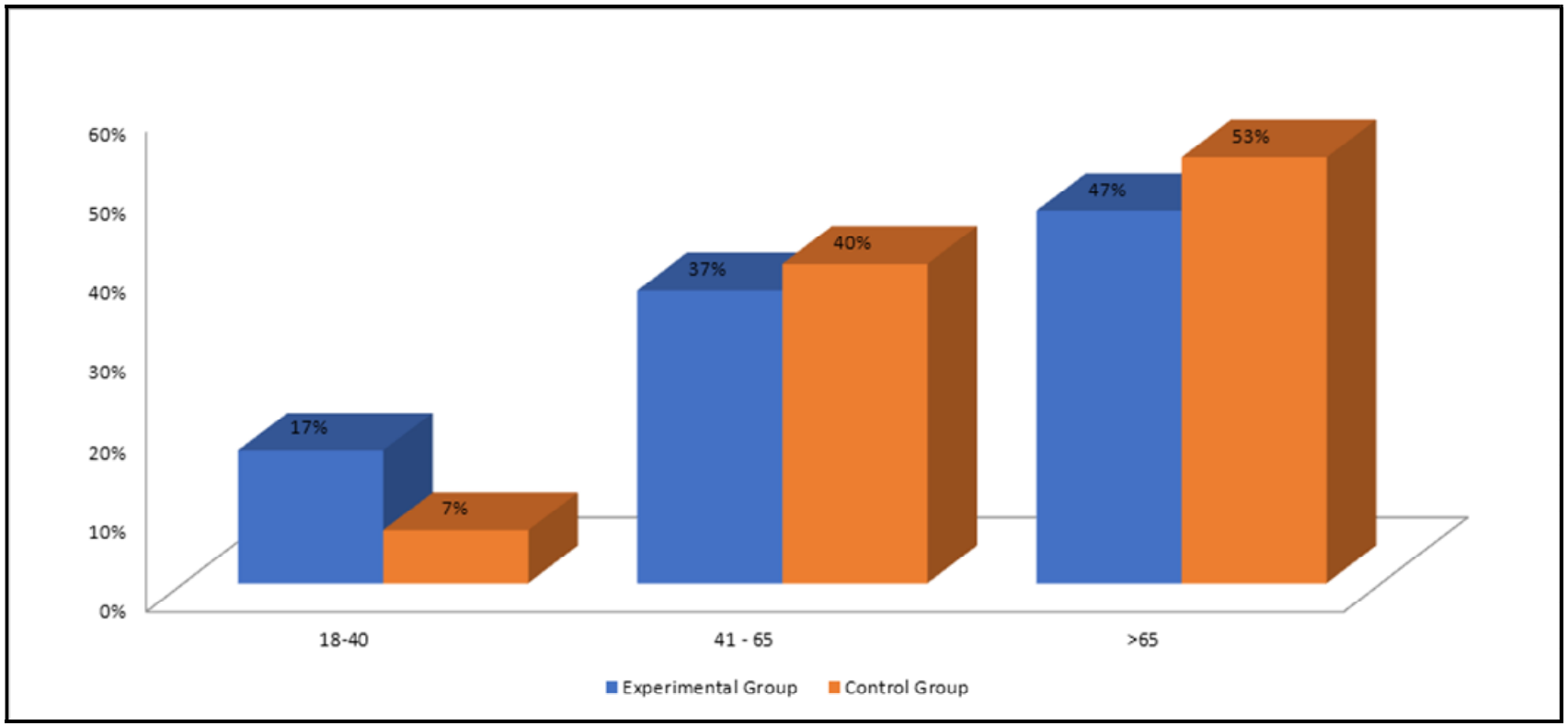

Figure-III: Percentage distribution of age group of the CABG patients.

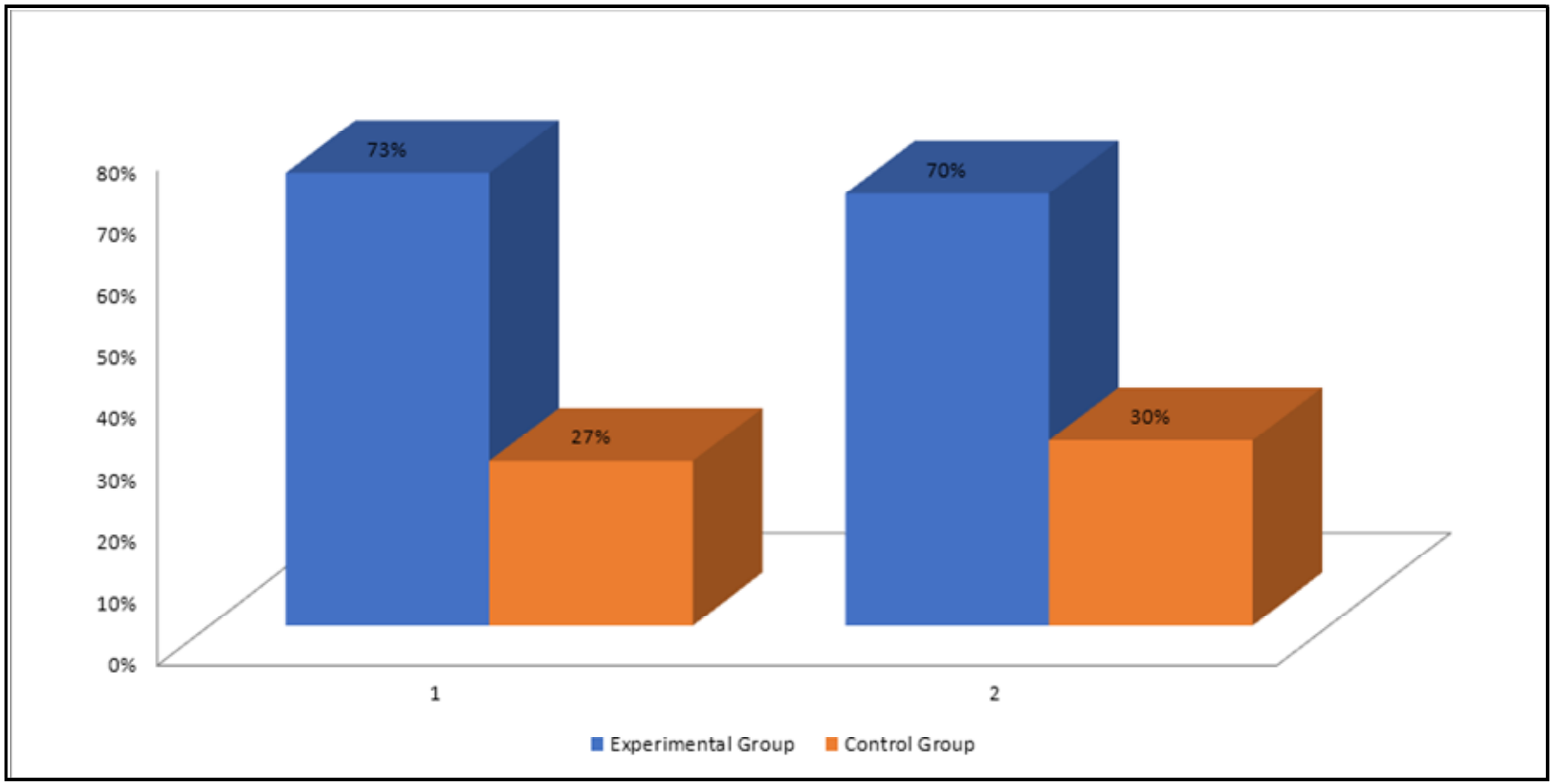

Figure-IV: Percentage distribution of CABG patient gender

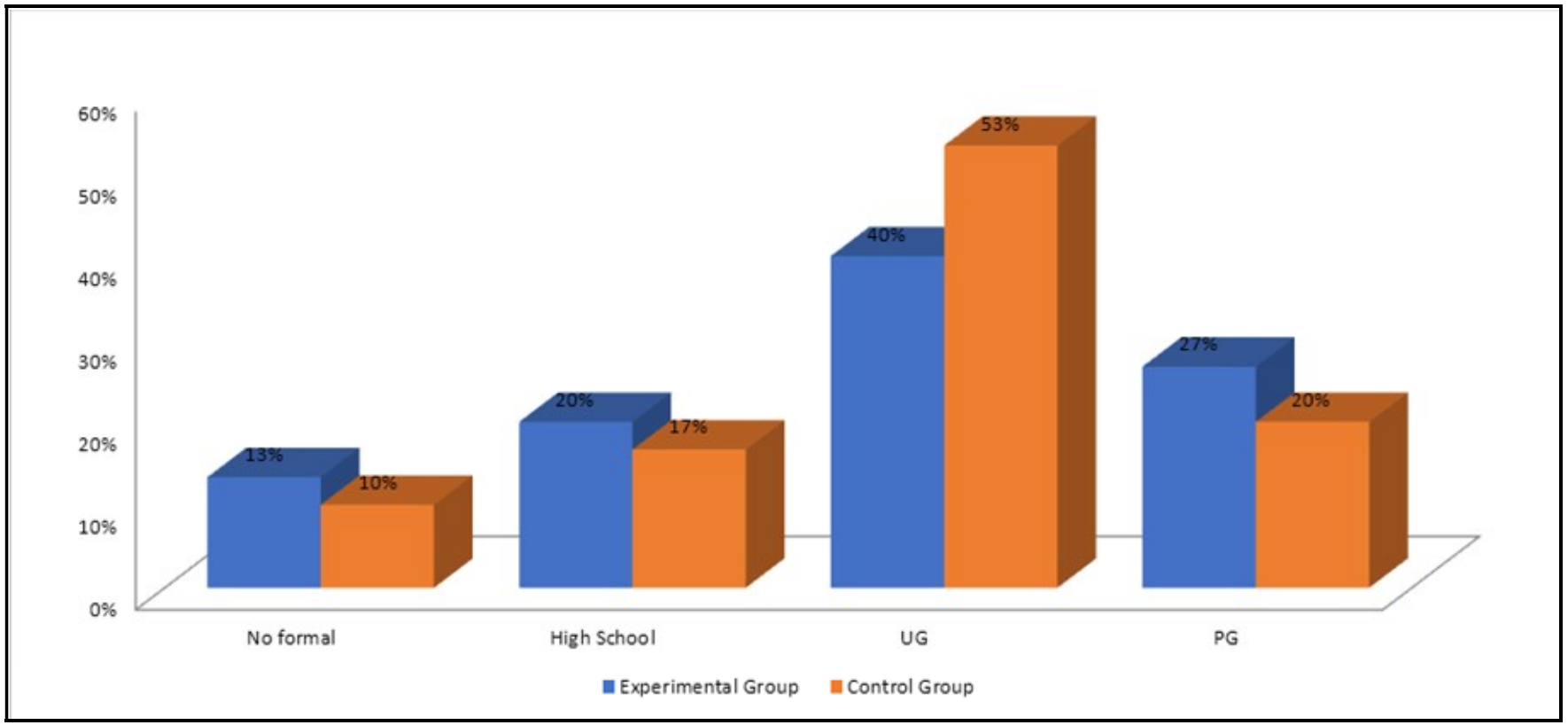

Figure-V: Percentage distribution of education among CABG patients.

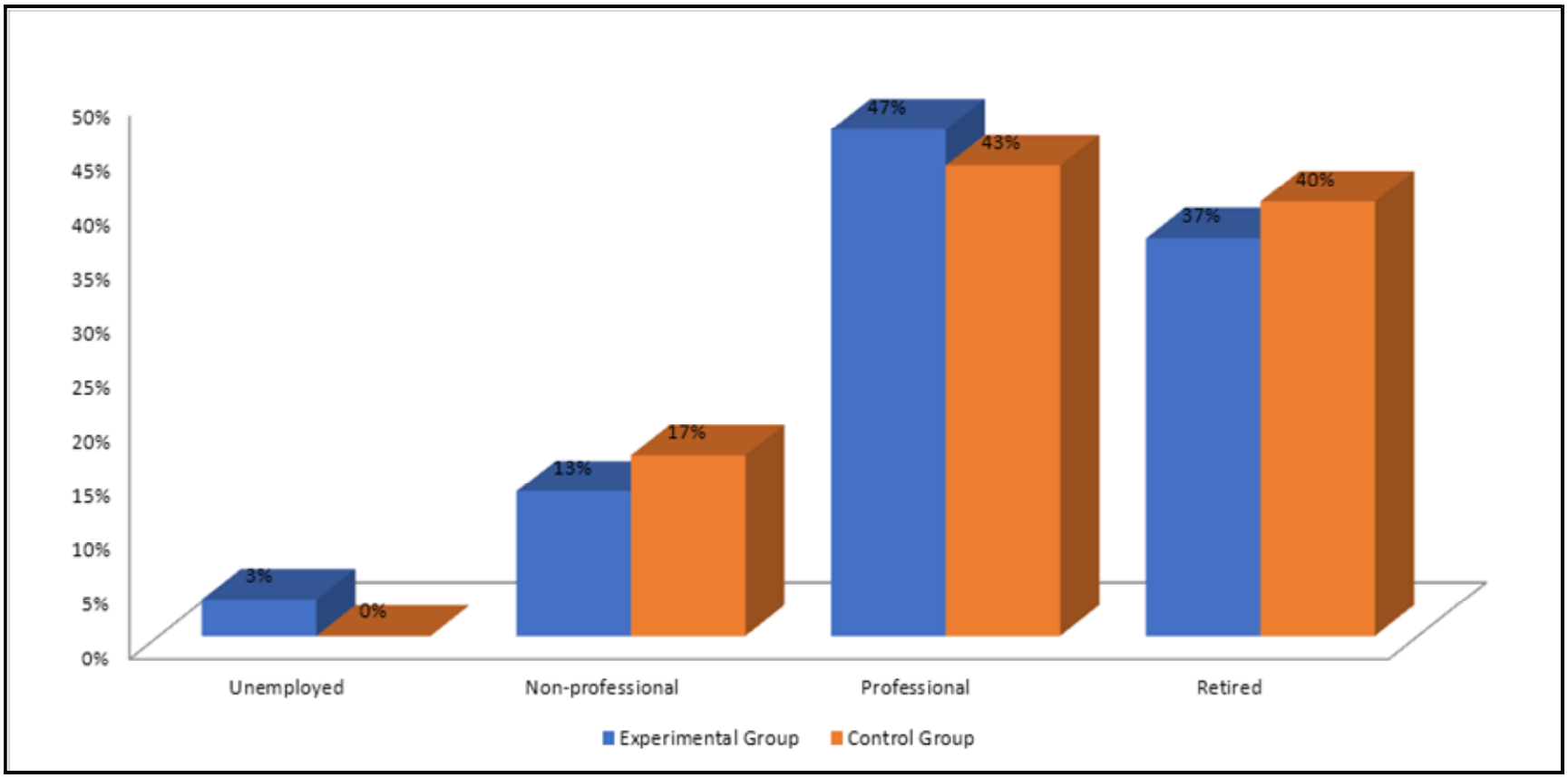

Figure-VI: Percentage distribution of occupation of the CABG patients

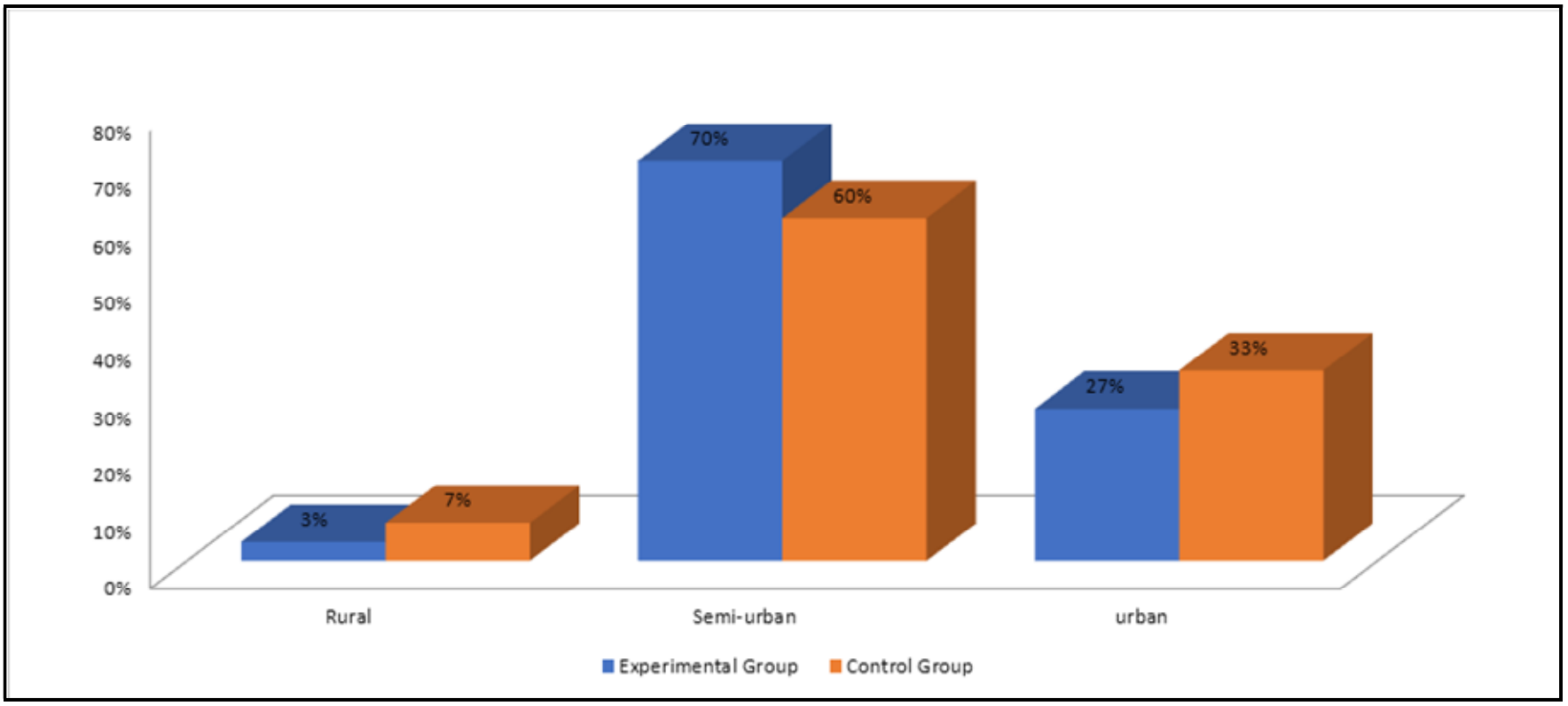

Figure-VII: Percentage distribution of CABG patient resident

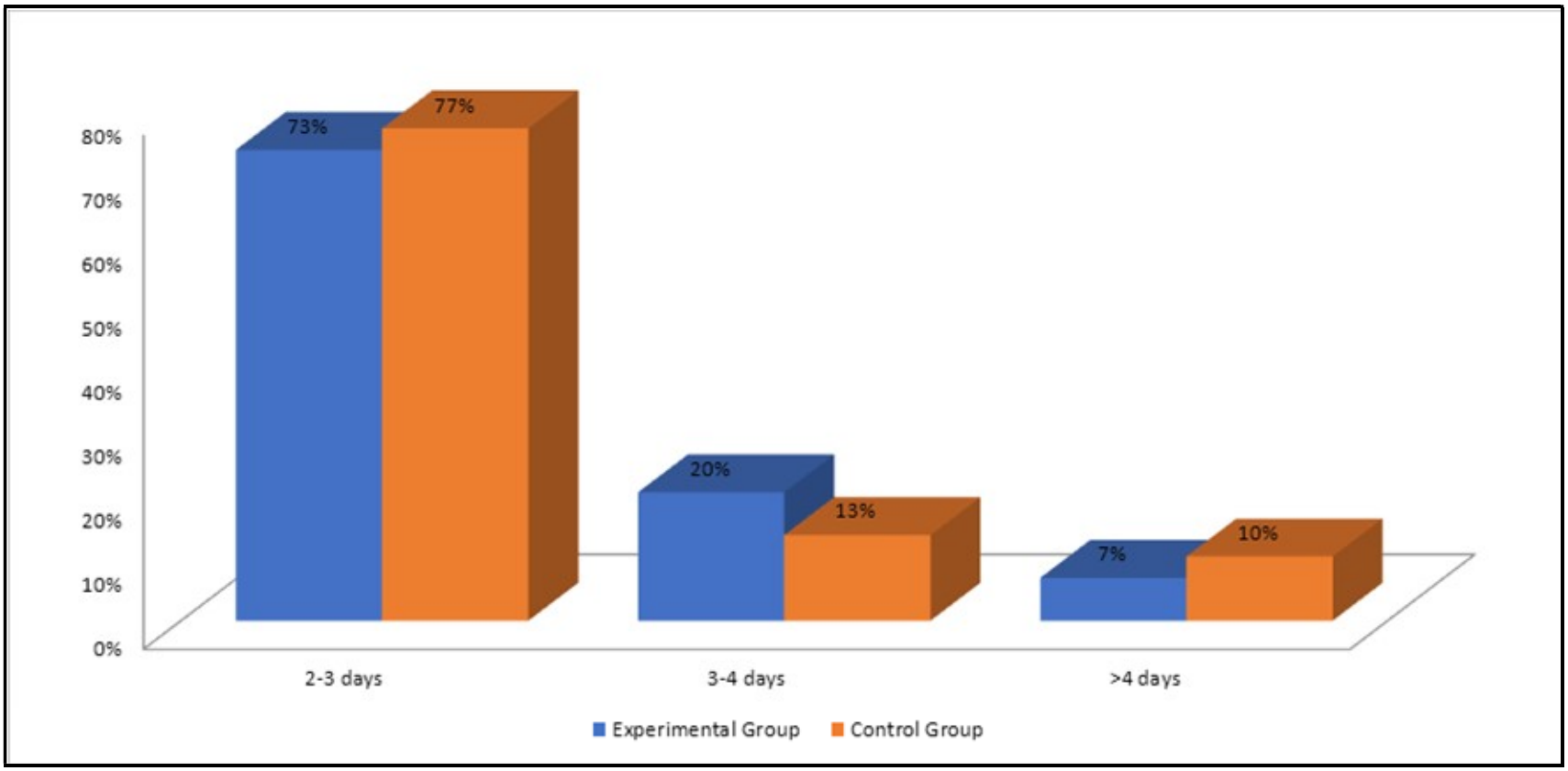

Figure-VIII: Percentage distribution of chest tube insitu in CABG patient

SECTION B: ASSESSMENT OF PRE-TEST AND POST-TEST LEVEL OF PAIN AMONG CABG PATIENTS IN THE EXPERIMENTAL AND CONTROL GROUP

Table-II: Distribution of pre-test and post-test level of pain due to CDR among CABG patients in experimental group.

Average VAS (n=30)	Before CDR	0 Minutes	5 minutes after CDR	15 minutes after CDR	30 minutes after CDR
Experimental Group	36	23	56	33	23

Average VAS is tabulated in the above table of pain due to CDR among CABG patients in experimental group. VAS of 56 mm at 5 minutes of CDR from 23mm just before CDR confirms that CDR causes pain to the individual.

VAS is represented in mm ranging from 0 to 100 mm of pain. In this time series, the average level of pain with chest drain is 36 mm. With the intervention at 0 minutes the level of pain is 23 mm which shows pain can be reduced with this intervention. However 15 minutes after CDR average level of pain is 56 mm, this confirms CDR is painful procedure. Despite of this increase average level of pain is in decreasing trend with 33 mm and 23 mm at 15 and 30 minutes respectively. At 30 minutes pain level is same as at 0 minutes which is lower than the pre-intervention level of pain.

With the above information it is suggested that cold application reduces pain due to CDR among CABG patients.

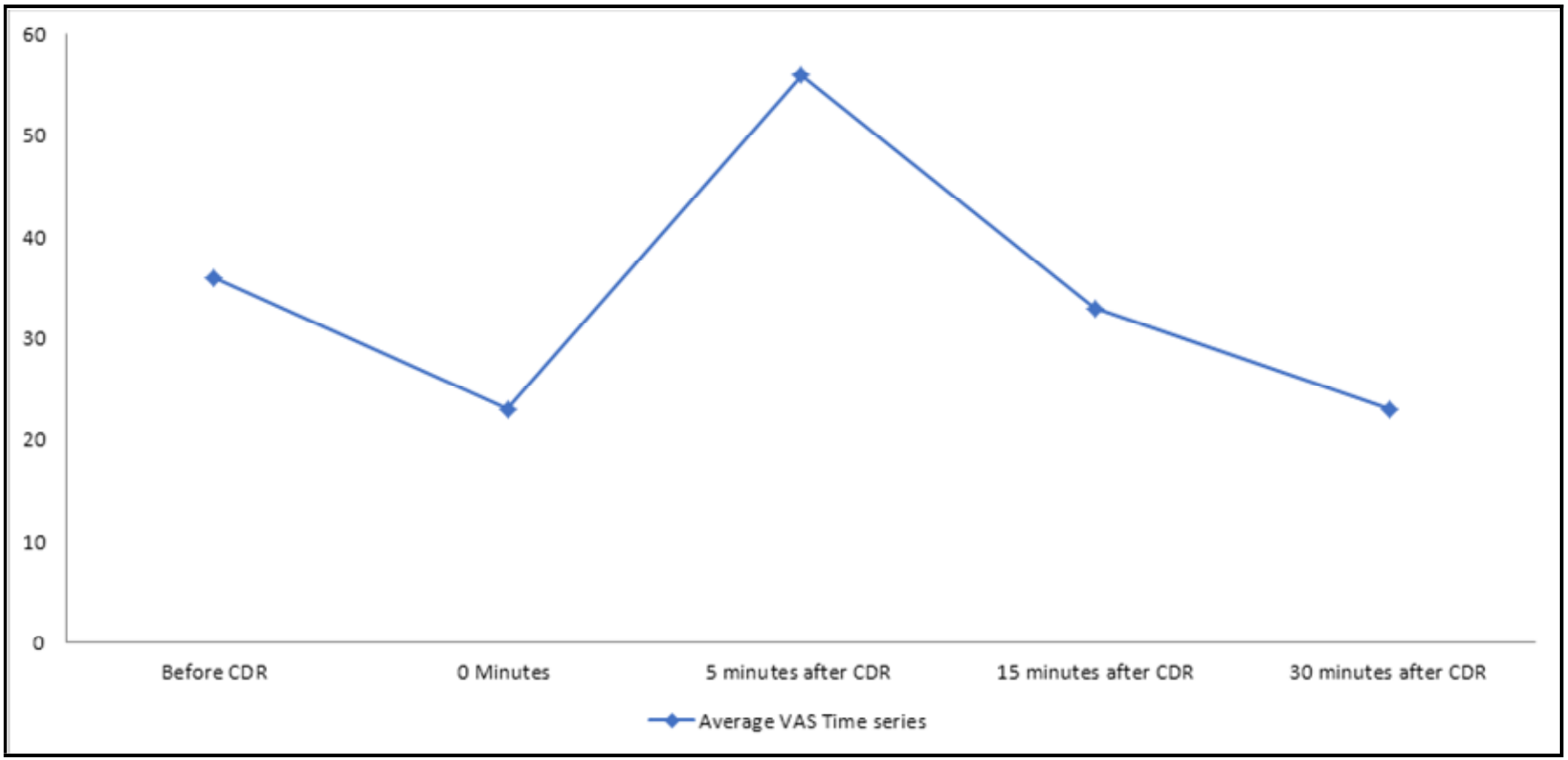

Figure-IX: Time series level of pain due to CDR among CABG patient in experimental group

Table-III: Distribution of pre-test and post-test level of pain due to CDR among CABG patients in control group.

VAS average	Before CDR	0 Minutes	5 minutes after CDR	15 minutes after CDR	30 minutes after CDR
Control Group	42	54	88	66	61

Average VAS is tabulated in the above table of pain due to CDR among CABG patients in control group. VAS of 54 mm at 5 minutes of CDR from 42 mm just before CDR initiates the questioning of anxiety of CDR increases the pain perception to the individual.

In these times series, level pain increases from 42 mm to 54 mm raises the possibility that anxiety increases the pain perception. There is increasing trend with 42 mm, 54 mm, 88 mm, 66 mm and 61mm in before, 0 minutes, 5 minutes, 15 minutes, and 30 minutes after CDR respectively. There is sharp increase of 1.5 times more than at 0 minutes level of pain due to CDR at 5 minutes. Also level of pain is very slow to diminish with time.

This is a strong indicative to intervene and reduce pain due to CDR among CABG patients.

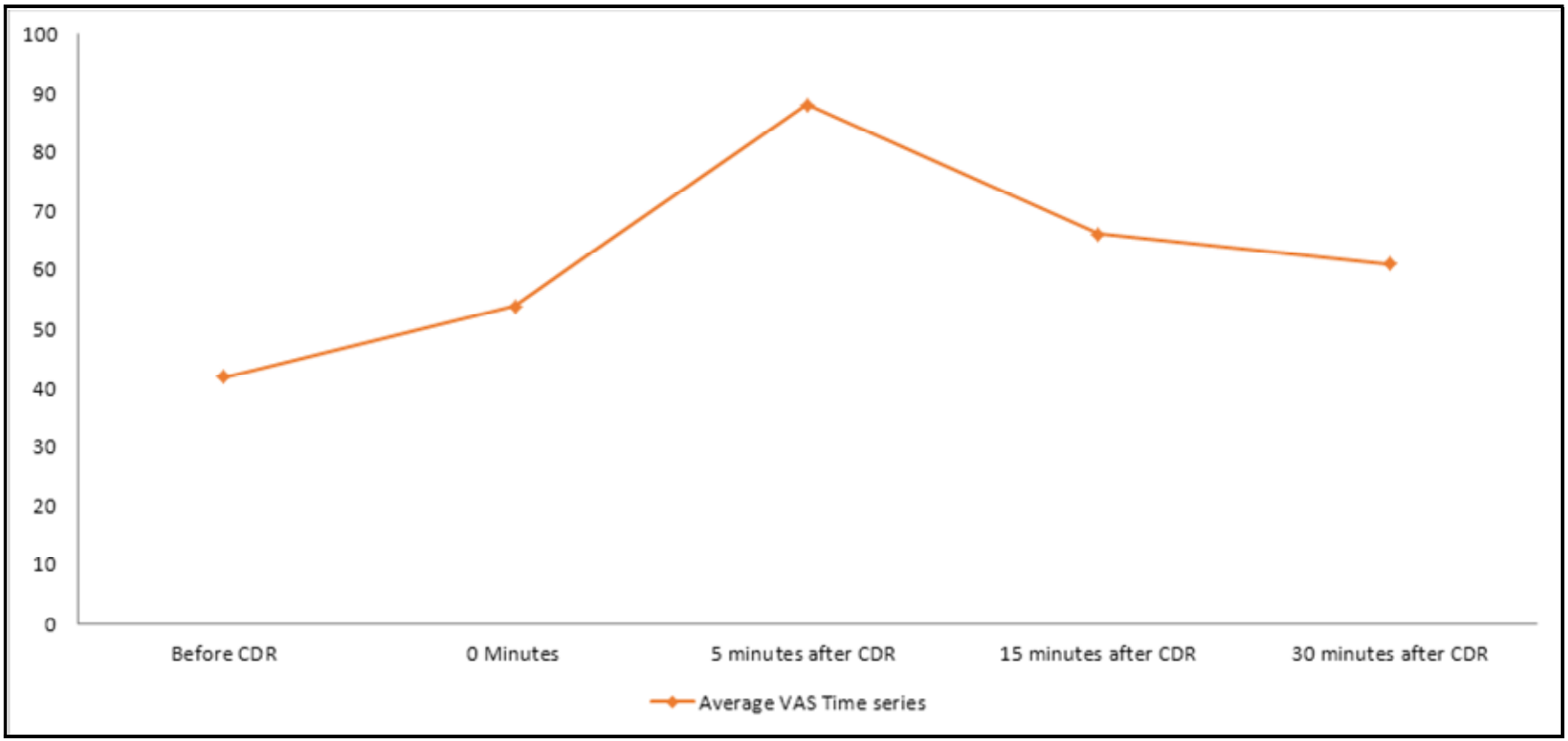

Figure-X: Time series level of pain due to CDR among CABG patient in control group

SECTION C: EFFECTIVENESS OF COLD APPLICATION ON PAIN DUE TO CDR AMONG CABG PATIENTS WITHIN AND BETWEEN THE EXPERIMENTAL AND CONTROL GROUP

Table-IV: Comparison of pre-test and post-test level of pain due to CDR among CABG patients between the experimental and control group.

Level of pain assessment time	VAS		Tests		
	Experimental group Mean (SD) (n=30)	Control Group Mean (SD) (n=30)	"F"	"P"	Result
Before	2.16 (1.36)	2.52 (1.51)	1.823	<0.05	Significant
0 minutes	1.16 (1.06)	2.16 (1.56)	3.352		
5 minutes	3.52 (1.61)	5.81 (2.14)	33.572		
15 minutes	2.16 (1.36)	4.51 (1.81)	37.486		
30 minutes	1.18 (1.03)	3.64 (1.51)	22.358		

Data is complied in the table to compare pre-test and post-test level of pain due to CDR among patients between the experimental and control group. To test the equality of means "F" test as part of analysis of variance is used and the result shows highly significant especially at 5 minutes, 15 minutes and 30 minutes after intervention and CDR.

The responses to the intervention, "F" test along with "P" value (< 0.05) is significant. Hence it proved that intervention makes a significant reduction in pain due to CDR.

Therefore, hypotheses one **(H1)** is true, can be accepted and stated that

There is a significant reduction in level of pain due to CDR among CABG patients after cold application.

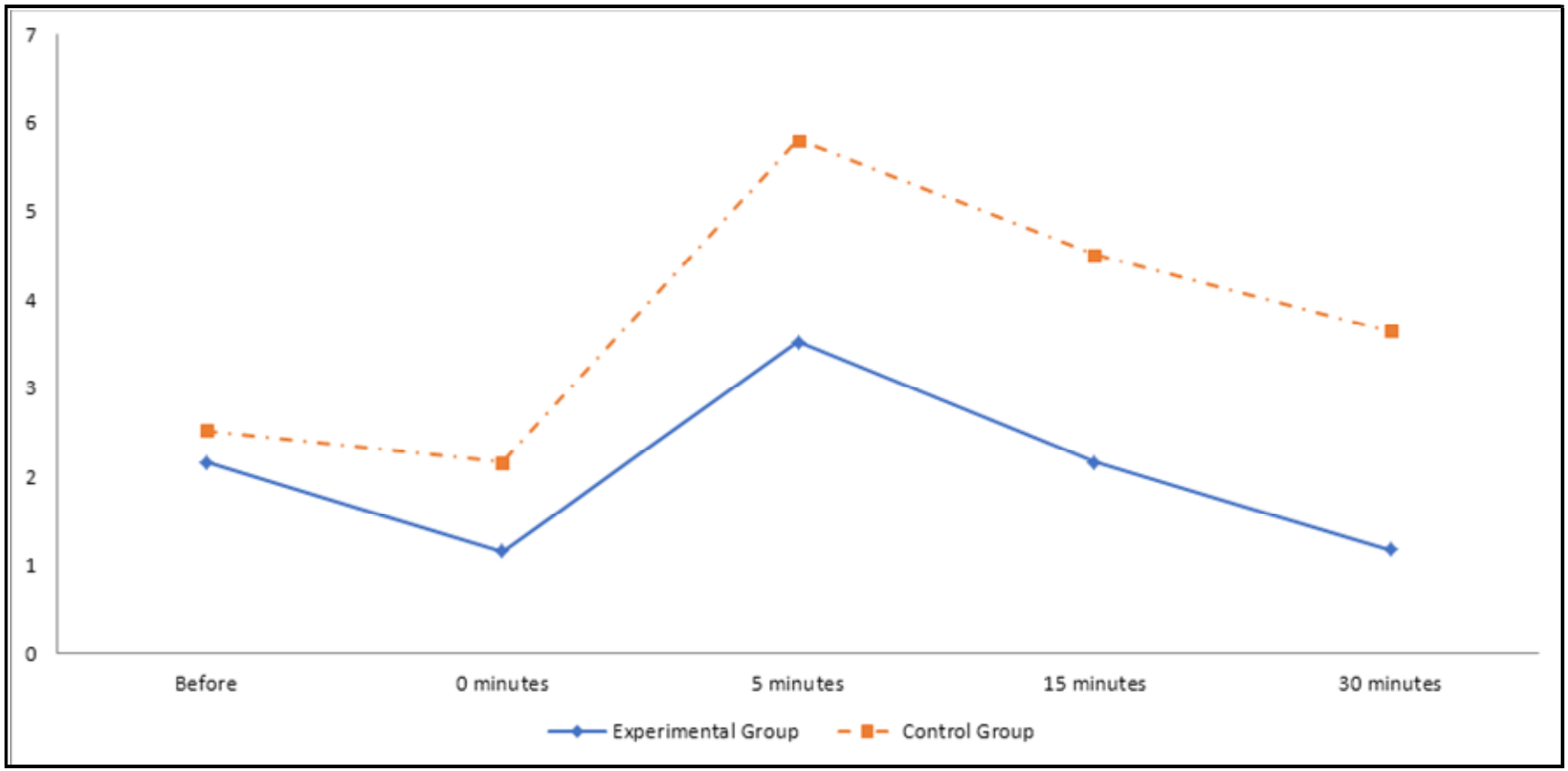

Figure-XI: Time series level of pain due to CDR among CABG patient between experimental and control group

Table-V: Comparison of pre-test and post-test pain aspects based on adapted McHill questionnaire due to CDR among CABG patients between the experimental and control group.

Pain Aspects	Pre-test Score		Post-test Score	
	Experimental	Control	Experimental	Control
Sensory	2	3	1	3
Affective	2	2	2	3
Evaluative	2	2	1	3
Pain Index	2	3	1	3

Quality aspects of pain are quantified using the adapted McHill questionnaire which highlights sensory, affective and evaluation of the pain by the individual and the pain index to refer the pain at the time.

Pre-test score are similar in both groups; sensory aspect is referred as sore and hurting in experimental and control group. In both group affective and evaluative aspect is perceived as nauseating and miserable respectively. Pain index correspondingly varied as discomforting and distressing in experimental and control group.

In experimental group post test score generally improved where as control group got worsened. Experimental group corresponds as dull, nauseating, annoying and mild in comparatively hurting, agony, miserable and distressing to sensory, affective, evaluative and pain index. In Control group sensory and pain index remained same as hurting and distressing; affective and evaluative aspects got worsen as agony and miserable.

Again the intervention Cold Application is not only effective in reducing pain due to CDR but also enhance the quality aspects and perception of pain.

Table-VI: Comparison of pre-test and post-test level of pain due to CDR among CABG patients between the experimental and control group.

Level of Pain	Median	Mann–Whitney "U" test	P Level	Remarks
Experimental group	1.34	13	< 0.05	Significant
Control group	3			

For analysis of comparison of pre-test and post-test level of pain due to CDR among CABG patients between experimental and control group data is collated in this table. In this analysis Mann-Whitney "U" test, percentage change from pre-test to post-test is compared between experiment and control groups are analysed. It is evident from the result that Mann-Whitney Test U test result is significant (p" value < 0.05). Hence it proved that intervention makes a significant reduction in pain due to CDR in experimental group.

Therefore, hypothesis **(H2)** is true, can be accepted and stated that,

There is a significant difference of level of pain between experimental and control group.

SECTION D: ASSOCIATION OF POST-TEST LEVEL OF PAIN DUE TO CDR AMONG CABG PATIENTS WITH THE SELECTED DEMOGRAPHIC VARIABLES

Table-VII: Association of post test level of pain due to CDR among CABG patients with the selected demographic variables.

Demographic Variables	Experimental Group (n=30)		Control Group (n=30)		Chi square	"p"
AGE (Mean in years ± SD)	**53.75 ± 14.36**		**56.30 ± 18.77**			
	No	**%**	**No**	**%**		
AGE						
18 – 40 Years	05	17	02	7	0.693	>0.05
41 –65 Years	11	37	12	40		
≥ 66 Years	14	47	16	53		
GENDER						
Male	22	73	21	70	1.26	>0.05
Female	08	27	09	30		
EDUCATION						
No formal	05	13	03	10	0.937	>0.05
High School	13	20	12	17		
UG	10	40	12	53		
PG	02	27	03	20		
OCCUPATION						
Unemployed	1	3	0	0	0.372	>0.05
Non-professional	4	13	5	17		
Professional	14	37	13	43		
Retired	11	37	12	40		

Demographic Variables	Experimental Group (n=30)		Control Group (n=30)		Chi square	"p"
RESIDENT						
Rural	01	03	02	07	0.841	>0.05
Sub Urban	21	70	18	60		
Urban	08	27	10	33		
DURATION OF CHEST TUBE INSITU						
In days (Mean ± SD)	2.8±1.3		2.65±1.49			

Data for association of post-test level of pain due to CDR among CABG patients with the selected demographic variables is tabulated above. For analysis of this objective, chi-square test was used and analysis showed that there is no significant between the demographic variable and level of pain.

Discussion

CHAPTER – V
DISCUSSION

Chest drain is essential in post CABG to remove the excessive accumulation of air, blood and other fluids from the chest cavity. CDR is a common procedure to remove the chest drain swiftly, usually within 2 to 3 days, however in some cases it can be delayed for various clinical reasons. CDR is associated with pain; various studies have shown as that patient remembers the CDR as the painful event in the whole patient journey. Cold application is proven to reduce pain locally and well explained by gate control theory. However, effectiveness of cold application has not been explored in reducing the pain due to CDR. This study data confirms cold application is effective in reducing pain due to CDR among CABG patients.

DISCUSSION OF THE POPULATION

Demographic data analysis (Table I) informs that the average age is 54 and 56 years for male and female respectively. Common assumption is that females will be above 65 years on average before CABG; however this sample population showed that the gap between average male and female is only 2 years. In contrast, highest percentage is from >65 years group (47% experimental and 53% control group). 72 – 75% of the sample is male gender and around 70- 80 % are well educated. It is noted that 70 % are professionals and retired persons and also it has highlighted that non-professional and rural composition is very small in this small. Almost 90 % are from semi urban and urban residency. All this data may indicate that sedentary, urbanised life style should be considered in as well.

DISCUSSION BASED ON THE OBJECTIVES

Objective 1 is to assess pre test and post test level of pain with chest drain among CABG patients in experimental and control groups

Pain is assessed in VAS, in this time series (Table II and III), the average level of pre test pain with chest drain is 36 mm in experimental group and 56 in control group respectively. Pre-test quality pain score (Table V) are similar in both groups; sensory aspect is referred as sore and hurting in experimental and control group. In both group affective and evaluative aspect is perceived as nauseating and miserable respectively. Pain index correspondingly varied as discomforting and distressing in experimental and control group.

In comparison to pres test data, post test results shows; Pain is assessed in VAS, in this time series (Table II and III), there is a decreasing trend with 33 mm and 23 mm at 15 and 30 minutes respectively. At 30 minutes pain level is same as at 0 minutes which is lower than the pre-intervention level of pain. The average level of pain with chest drain is 56 mm in control group. There is sharp increase of 1.5 times more than at 0 minutes level of pain due to CDR at 5 minutes and an increasing trend. Also level of pain is very slow to diminish with time. In experimental group post test quality pain score (Table V and VI) generally improved where as control group got worsened. Experimental group corresponds as dull, nauseating, annoying and mild in comparatively hurting, agony, miserable and distressing to sensory, affective, evaluative and pain index. This is a strong indicative to intervene and reduce pain due to CDR among CABG patients. Therefore hypothesis one is true and accepted as “there is a significant reduction in level of pain due to CDR among CABG patients after cold application”

Objective 2 is to establish the effectiveness of cold application in reducing pain due to CDR among CABG patients in experimental and control groups

Table VI confirms cold application is significant in reducing pain due to CDR among CABG patients in experimental group when compared to control group ($P<0.05$). Table II and III shows that in experimental group average level of pain are in decreasing trend with 33 mm and 23 mm at 15 and 30 minutes respectively. At 30 minutes pain level is same as at 0 minutes which is lower than the pre-intervention level of pain. Where as in control group there is increasing trend with 42 mm, 54 mm, 88 mm, 66 mm and 61mm in before, 0 minutes, 5 minutes, 15 minutes, and 30 minutes after CDR respectively. There is sharp increase of 1.5 times level of pain due to CDR at between 0-5 minutes.

Objective 3 is to compare pre and post test level of pain among CABG patients in experimental and control groups

F" test as part of analysis of variance (Table IV) shows highly significant ($P<0.05$) especially at 5 minutes, 15 minutes and 30 minutes after intervention and CDR. This is a strong indicative to intervene and reduce pain due to CDR among CABG patients. Quality aspects of the pain (Table V) are assessed and reveal a high significance difference between experimental and control group. Mann-Whitney Test U test result (Table VI) is significant (P value < 0.05). Hence it proved that intervention makes a significant reduction in pain due to CDR in experimental group. Therefore hypothesis two is true and accepted as there is a significant difference level of pain in between experimental and control group.

Objective 4 is to ascertain the association between the effectiveness of cold application in reducing pain among CABG patients with selected demographic variables

Analysis showed (Table VII) that no demographic variable is significant (P>0.05) in level of pain.

Summary, Implications & Recommendations

CHAPTER – VI
SUMMARY, IMPLICATIONS AND RECOMMENDATIONS

SUMMARY OF THE STUDY

Summary of this study, findings, implication and recommendations for further research for an evidence based approach to in CDR are discussed here.

Study was aimed to assess the effectiveness of cold application in reducing level of pain due to CDR among CABG using Quasi experimental pre-test and post-test design with experimental and control group.

Objectives and hypothesis of the study were

OBJECTIVES

1) To assess pre test and post level of pain with chest drain among CABG patients in experimental and control groups

2) To establish the effectiveness of cold application in reducing pain due to CDR among CABG patients in experimental and control groups

3) To compare pre and post test level of pain among CABG patients in experimental and control groups

4) To ascertain the association between the effectiveness of cold application in reducing pain among CABG patients with selected demographic variables

HYPOTHESIS

H1 – There will be reduction in level of pain due to CDR among CABG patients after cold application

H2 – There will be significant difference of level of pain between experimental and control group

Practical experience and literature review informed the statement of the problems, and design for the research methodology. Pilot study was carried out to better the design and the tool for the main study. This is a quasi experimental pre-test post-test design with experimental and control group. The planned duration for data collection is for 6 weeks with appropriate formal permission from the officials and consent from participants was obtained during the data collection process.

Total of 60 samples with 30 samples for experimental group and 30 samples for control group using convenience sampling were selected. VAS is used to assess the level pain and effectiveness of cold application on quality aspects of pain is quantified using McHill questionnaire. Cold application is applied with 6 cubes of ice in clean gloves over a sterile gauze is placed to cover the circumference of the tube covering 5 cms directly over the skin after removing the dressing for 15 minutes. Series of VAS is recorded before, 0 minutes, 5 minutes, 15 minutes and 30 minutes of CDR. Also McHill questionnaire is completed by the patient before an at 30 minutes.

Descriptive and inferential statistical methods are used to analyse the data. The data confirms that cold application reduces level of pain due to CDR among CABG patients with F" test as part of analysis of variance shows highly significant especially at 5 minutes, 15 minutes and 30 minutes after cold application and CDR which strongly indicates cold application reduces pain due to CDR among CABG patients. Mann-Whitney Test U test result is significant (p" value < 0.05) in

experimental group and control group application reduces pain due to CDR among CABG patients.

MAJOR FINDINGS

1) There is a significant ($P<0.005$) reduction in level of pain due to CDR among CABG patients after cold application as shown in Table V and VI

2) There is a significant ($P<0.05$) difference of level of pain between experimental and control group with F value of 2.16, 1.16, 3.52, 2.16, 1.18 in before, 0, 5, 15 and 30 minutes respectively and Mann U test 13.

3) There is no demographic variable that is significant ($P>0.05$) in level of pain ranging from 0.6 to 1.2 as shown in Table VII.

CONCLUSION

Cold application is very simple and effective way to manage the pain. This study has highlighted that cold application is effective in reducing pain due to CDR among CABG patients.

The result is useful in all aspect of nursing and will be beneficial for patients in reducing pain and avoiding complication related to chest drains.

NURSING IMPLICATION

This is explained in the following domains

NURSING EDUCATION

- Only through we can empower the patient, nurses and other health care professional.

- Cold application is simple but training and understanding the mechanism is important

NURSING PRACTICE

- To enhance the nurses to independently manage pain including non-pharmaceutical therapy
- Change the current practice with this evidence if agreed in the clinical procedures meeting

NURSING RESEARCH

- Academic and clinical researcher to focus on various alternatives therapies in the management of pain
- As suggested in the recommended research

NURSING ADMINISTRATION

- The nursing administrator can schedule CME for their nurses emphasize the need for alternative therapies
- Nursing administrator has to create evidence based practice resource within their healthcare settings.

RECOMMENDATIONS FOR FURTHER RESEARCH

1) All cardiothoracic cases with chest drain to be included in the study
2) Similar study with all CDR carried out by same person
3) Study to accurately record the cooling with skin thermometer and tolerance by patients
4) Further study in the quality of pain perception
5) A similar study can be conducted by using a large sample so that the findings can be generalized
6) Study with same intervention in other drains.

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Appendix - I

APPENDIX – I

RESEARCH QUESTIONNAIRE

Dear,

I am Ms. Sumithra Jennifer Jeevaneson M. Sc Nursing 2nd year student from Mohamed Sathak A.J College of Nursing. As a part of the course I have to undertake a research and I seek your kind consent and participation in this research to provide comfort to CABG patients while removing the chest drain. I can assure all data collected will be kept confidential and used only for this research purpose.

- ***Sumithra Jennifer Jeevaneson***

Demographic Data

Sample ID:

Name:

PART A - Demographic Data

Kindly circle the relevant response

1. ***Age in years: (_____)***
    a. 18 - 40 Years
    b. 41 – 65 Years
    c. ≥ 66 Years
2. ***Gender***: ***(_____)***
    a. Male
    b. Female
3. ***Education Level: (_____)***
    a. No formal
    b. High School
    c. UG
    d. PG

4. ***Occupation: (_____)***

    a. Unemployed

    b. Non-Professional

    c. Professional

    d. Retired

5. ***Resident Area: (_____)***

    a. Rural

    b. Sub-Urban

    c. Urban

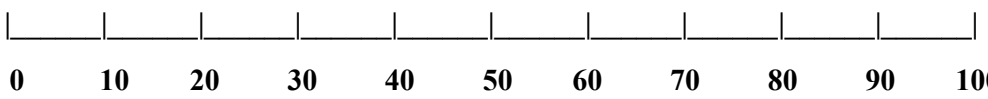
6. ***Duration of tube in situ in days: (_____)***

PART B – Visual Analogue Scale (VAS) with Numerical Pain Rating Scale

Kindly mark on the line the amount of pain you are experiencing

Before Tube Removal

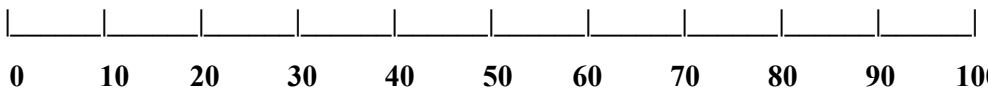
No pain (0) **Worst Possible Pain (100)**



After Tube Removal

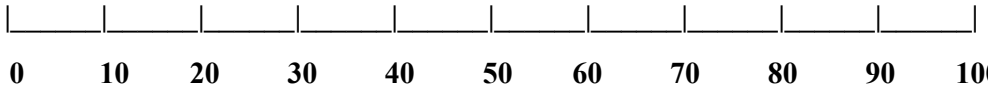
At 0 Minutes

No pain (0) **Worst Possible Pain (100)**



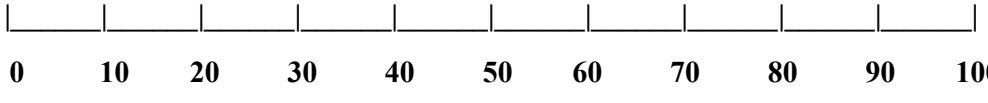
At 5 Minutes

No pain (0) **Worst Possible Pain (100)**



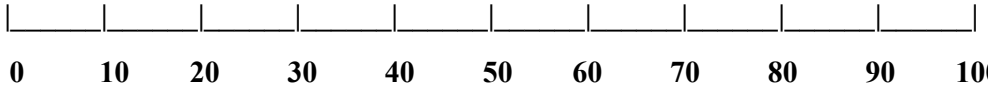
At 15 Minutes

No pain (0) **Worst Possible Pain (100)**



At 30 Minutes

No pain (0) **Worst Possible Pain (100)**



Section 3 - Adapted McHill Pain Questionnaire

1. How strong is the pain now (Sensory)
    a. Dull
    b. Sore
    c. Hurting
    d. Aching
    e. Heavy
2. How does the pain make you feel like (Affective)
    a. Torture
    b. Dreadful
    c. Agony
    d. Nauseating
    e. Nagging
3. How can you characterize the pain (Evaluative)
    a. Annoying
    b. Troublesome
    c. Miserable
    d. Intense
    e. Unbearable
4. How intense is the pain (Pain intensity)
    a. Excruciating
    b. Horrible
    c. Distressing
    d. Discomforting
    e. Mild

Appendix - II

APPENDIX – II

COLD APPLICATION

Steps in cold application

1. Explaining and obtain consent for cold application for CDR
2. Prepare 6 ice cubes in the clean gloves
3. Remove the dressing around the chest drain and place a sterile gauze
4. Apply the cold around the chest drain covering at least 5 cm circumference
5. Cold application to be kept in place for 15 minutes
6. After 15 minutes remove the cold application
7. CDR should commence within 1- 2 minutes

Appendix - III

CERTIFICATE FOR CONTENT VALIDITY

This is to certify that the tool developed by MS. SUMITHRA JENNIFER JEEVANESON, II year M. Sc., (Nursing) student of Mohamed Sathak A J College of Nursing on **"A STUDY TO ASSESS THE EFFECTIVENESS OF COLD APPLICATION IN REDUCING PAIN DURING CHEST DRAIN REMOVAL (CDR) AMONG PATIENTS FOLLOWING CORONARY ARTERY BYPASS GRAFT SURGERY (CABG) IN SELECTED HOSPITAL".** is validated by the undersigned and can proceed with this tool to conduct the study.

SIGNATURE:

PLACE: Chennai

NAME:

DATE: 09.06.2016

DESIGNATION:

Dr. M. DINAKARAN, MD., DM., FNB.,
(Consultant Interventional Cardiology)
CHENNAI NATIONAL HOSPITAL
CHENNAI - 600 001

COLLEGE SEAL:

CERTIFICATE FOR CONTENT VALIDITY

This is to certify that the tool developed by MS. SUMITHRA JENNIFER JEEVANESON, II year M. Sc., (Nursing) student of Mohamed Sathak A J College of Nursing on **"A STUDY TO ASSESS THE EFFECTIVENESS OF COLD APPLICATION IN REDUCING PAIN DURING CHEST DRAIN REMOVAL (CDR) AMONG PATIENTS FOLLOWING CORONARY ARTERY BYPASS GRAFT SURGERY (CABG) IN SELECTED HOSPITAL".** is validated by the undersigned and can proceed with this tool to conduct the study.

S. Anna

SIGNATURE: PLACE: THANDALAM

NAME: Dr. S. Anna, DATE: 08.7.17

DESIGNATION: Vice principal and HoD of Medical-Surgical Nursing

COLLEGE SEAL:

HEAD OF THE DEPARTMENT
DEPARTMENT OF MEDICAL SURGICAL NURSING,
SAVEETHA COLLEGE OF NURSING
SAVEETHA UNIVERSITY,
THANDALAM-602 105.

CERTIFICATE FOR CONTENT VALIDITY

This is to certify that the tool developed by MS. SUMITHRA JENNIFER JEEVANESON, II year M. Sc., (Nursing) student of Mohamed Sathak A J College of Nursing on **"A STUDY TO ASSESS THE EFFECTIVENESS OF COLD APPLICATION IN REDUCING PAIN DURING CHEST DRAIN REMOVAL (CDR) AMONG PATIENTS FOLLOWING CORONARY ARTERY BYPASS GRAFT SURGERY (CABG) IN SELECTED HOSPITAL".** is validated by the undersigned and can proceed with this tool to conduct the study.

INCORPORATE THE CORRECTIONS MADE

SIGNATURE: Prathiba

PLACE: CHENNAI

NAME: PRATHIBA SIVAKUMAR

DATE: 10.06.2016

DESIGNATION: ASSOCIATE PROFESSOR

COLLEGE SEAL:

HOD Medical Surgical Nursing
Venkateswara Nursing College
Thalambur, Chennai-600 130

Appendix - IV

TO WHOMSOEVER IT MAY CONCERN

Certified that the dissertation paper titled "***A STUDY TO ASSESS THE EFFECTIVENESS OF COLD APPLICATION IN REDUCING PAIN DURING CHEST DRAIN REMOVAL AMONG PATIENTS FOLLOWING CORONARY ARTERY BYPASS GRAFT SURGERY (CABG) IN SELECTED HOSPITAL, CHENNAI***" by Sumithra Jennifer Jeevaneson. It has been checked for accuracy and correctness of English language used in presenting the paper is lucid, unambiguous free of grammatical and spelling errors and is apt for the purpose.

Signature: S. Amutha

Place: Chennai 81.

Name: S. Amutha Sreevaishnava. M.A. B.Ed. M.Phil

Designation: P.G. Asst (Engl)

Date:

Seal:

CHENNAI HR. SEC. SCHOOL
PATEL NAGAR, TONDIARPET,
CHENNAI - 600 081.

Appendix - V

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Extension: 113

E-Mail ID: academicboard@drkmh.com

Website: www.drkmh.com

Expanding the Frontiers of Healthcare

கல்வித்துறை,
டாக்டர்.காமாட்சி நினைவு மருத்துவமனை,
எண்.1, ரேடியல் சாலை, பள்ளிக்கரணை,
சென்னை - 600100, தமிழ்நாடு.

ACADEMIC SECTION
Dr.Kamakshi Memorial Hospital,
No.1, Radial Road Pallikkaranai,
Chennai – 600100, Tamil Nadu

THESIS / DISSERTATION / PROJECT / RESEARCH STUDY – GUIDANCE / ASSISTANCE – PERMISSION ORDER

Ref.No.:— Acad./16 -17/PG/N-06/2016 / Dated:— 20.11.2016

To
THE PRINCIPAL,
MOHAMED SATHAAK A.J. COLLEGE OF NURSING,
CHENNAI-600001,
TAMIL NADU, INDIA
PHONE: 044 – 27470037

Sir/Madam,

SUB:— ACADEMIC – Research Study / Dissertation / Project Guidance by the Faculty(s) of Dr.Kamakshi Memorial Hospital Pvt. Ltd. for the Candidate of Mohammed sathak A.J. College of Nursing, Chennai – Permission – Reg.

REF:— Your Letter No.NIL dated 20.11.2016

Kindly refer your letter(s) cited above. We would like to inform you that the candidate whose name is mentioned below is permitted to carry out the following Study at our institution.

Name of the Candidate : Ms. SUMITHRA JENNIFER JEEVANESON.
Study Title : **"A study to assess the effectiveness of cold application in reducing pain during chest drain removal (CDR)ong patients following coronary artery bypass graft surgery (CABG) in selected Hospital"**

Under the guidance for ; Dr.Saravanae MD Cardiologist

This Permission Order is VALID for THIRTY (30) DAYS only from the Date of Commencement of Study / Project Work / Thesis / Dissertation practice in our institution. A copy of this letter may be issued to the candidate with your authorization.

Date of Commencement : **21.11.2016**
Valid Upto : **31.12.2016**

The receipt of this communication may kindly be acknowledged at the earliest.

Yours faithfully

Authorized Signatory
THE PRINCIPAL
Dr. Kamakshi Institute of Medical Sciences and Research,
No.1, Radial Road, Pallikaranai,
Chennai-600 100.

CHENNAI