

## Effects of cold application on pain & anxiety during chest tube removal among post operative cardiac surgery adult patients.

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**Abstract:** A study conducted to assess the effectiveness of cold application on Pain & Anxiety during Chest Tube Removal (CTR) among post operative cardiac surgery adult patients. Pre-test post-test control group experimental design was used. Post operative cardiac surgery adult patient of the selected hospital of Delhi were selected. The study sample was purposive sampling technique with random assignment of subjects into two groups: experimental group and control group. The sample size was 60 i.e. 30 in experimental group and 30 in control group. The control group received usual standard care during chest tube removal whereas experimental group received cold application with gel pack (Temp: 0 - 2<sup>o</sup>C) after wrapping it with sterile gauze, around chest tube (5cms) for a period of 15 minutes before CTR. The tools used for the study were structured questionnaire to obtain demographic data, standardized Numerical Pain Intensity Scale (NPIS) scale to assess pain, C.D. Spielberger's State Trait Anxiety inventory (STAI) scale to assess anxiety. The obtained data was analysed and interpreted in terms of the objectives of the study using descriptive and inferential statistics. The mean post test pain scores with cold application ( $1.13 \pm 1.31$ ;  $0.27 \pm 0.44$ ;  $0.27 \pm 0.44$ ) at zero minute, 15 minute and 30 minute respectively were significantly ( $< 0.05$ ) lower than the mean pre-test score of  $6.10 \pm 1.27$  in the experimental group without cold application. In control group, pre test mean pain score was  $6.57 \pm 1.12$  as compared to mean post test pain score of  $8.57 \pm 0.49$ ;  $8.73 \pm 0.57$ ;  $8.63 \pm 0.48$  at zero minute, 15 minute and 30 minute respectively. It indicates that cold application was effective to reduce pain among post operative cardiac surgery patients while removing chest tube. To evaluate the effectiveness of cold application on anxiety related to chest tube removal, in experimental group the mean post cold application anxiety scores  $41.93 \pm 2.21$  were significantly lower ( $< 0.05$ ) than the mean anxiety score of  $53.47 \pm 1.84$  before cold application. In addition, the mean anxiety score were  $53.31 \pm 1.81$  before CRT and  $57.87 \pm 3.21$  after CRT among post operative cardiac surgery patient in control group. It indicates that the cold application on chest tube removal was effective in reducing anxiety among post operative cardiac surgery patient. Cold application is simple, cheap, non pharmacological anxiety and pain management strategy ensuring good results.

**Key Words:** Cardiothoracic patients, cold application, chest tube removal (CTR), pain score, anxiety score.

**Objectives** of the study were (i) To assess the pain among post cardiac surgery patients during chest tube removal with and without cold application. (ii) To assess the anxiety among post cardiac surgery patients during chest tube removal with and without cold application.

### I. Introduction:

Many cardiothoracic patients indicate an insertion of a chest tube, in either emergency or nonemergency situation with eventual removal (Biteman, K et al 2009)<sup>1</sup>. These chest tubes are inserted during the postoperative period to drain accumulate of air, blood, and fluid from the chest cavity (Bostanci K 2008)<sup>2</sup>. By preventing these accumulations, severe complications can be avoided to the heart and the lung.

Chest tube removal is described as one of the worst memories that the patients experience during the perioperative period. Studies show that patients who undergo chest tube removal experience moderate to severe pain with or without intervention (Cline ME et al 2006)<sup>3</sup>. This pain results from the chest endothelial tissue which is adhered to the tube tip and at the time of removal the pulling force will shear this adhesion causing severe pain. Several studies indicated that the patients always described chest tube removal (CTR) as a painful and frightening experience and intense pain occurs during the first 2 days following cardiac surgery. Patients described their pain after cardiac surgeries with terms such as sore, aching, tender, tiring and annoying more often on postoperative days 2 and 3. Anxiety and discomfort are unpleasant feelings which can results from the pain associated with chest tube removal. (De Jesus PV et al.2009 and Berthol et al.2011)<sup>4,5</sup>.

The use of cold application can be a potential solution for the pain management during chest tube removal as it has been proved that the application of cold is effective for pain relieving in patients after surgery than other sedative medications (Demir Y and Khorshid L 2010)<sup>6</sup>. It is an effective alternative or adjacent and it has been accepted for decades as an effective non pharmacologic intervention for pain. It's simple and

inexpensive therapy is commonly used as a nonpharmacologic method for relieving pain. Studies have shown that application of cold can result in pain control and can increase the threshold of pain (Etoch SW et al., 2005 and Deneuve M, 2002)<sup>7,8</sup>.

Previous studies also revealed the effects of cold application on anxiety during chest tube removal. Cold application is significantly effective to reduce anxiety of post operative patients. (Raiza Abdoullah et al., 2014)<sup>9</sup>. Therefore, with combination of pharmacological agents, non-pharmacologic interventions like cold application can be used during and after chest tube removal to manage pain and the anxiety level of postoperative cardiac patients.

## **II. Methods and materials**

### **1. Design and setting:**

Pre test – post test control group experimental design was used. Post operative cardiac surgery adult patients admitted in the cardiac units with pleural and mediastinal chest tube in the selected hospital of Delhi (CTVS ICU's and wards) were selected. Ethical clearance for the study was obtained from institute Ethics Committee. Data was collected from September 2013 to January 2014. In the present study independent variable is cold application and dependent variable is pain and anxiety associated with the removal of chest tube.

### **2. Sample and sampling technique:**

In the present study the purposive sampling technique was used to select the subjects. Total 70 subjects were screened out of which 60 subjects met the eligibility criteria were randomly allocated into two groups i.e. 30 in experimental group and 30 in control group.

### **3. Participant's eligibility criteria:**

Post operative cardiac surgery patients with pleural or mediastinal chest tube, able to communicate in English or Hindi, oriented to time and place, willing to participate in the study and patients not having any associated complication after surgery.

### **4. Procedure for data collection:**

A letter explaining the purpose of the study was given to the subjects. Signed informed consent was taken from the subjects. Data were collected from September 2013 to January 2014 from the post operative cardiac surgery patients. All the patients who met the eligibility criteria were selected by total enumeration method and randomly assigned to control and experimental group. On the post operative day, before starting any pharmacological treatment, dependent variables were measured of both the groups which were pre-test observations (pain and anxiety). The independent variable (cold application on chest tube removal) was introduced to the experimental group after taking pre test. The cold application was given to the experimental group before chest tube removal and no intervention (cold application) given to control group. After the completion of the intervention, the post test of experimental as well as control group were taken for pain and anxiety.

### **5. Description of intervention (Cold Therapy):**

The intervention chosen for the experimental group was application of the cold therapy before the chest tube removal of post operative cardiac surgery patients at temperature of 0°C to 2°C for 15 minutes. The cold therapy was applied by cold gel pack with covering of sterile gauze piece and then placed over chest tube removal area for 15 minutes. Complete aseptic technique was followed. The post test score observed at zero minute, 15 minutes and 30 minutes after the administration of cold therapy for pain and post test score observed 30 minutes after cold therapy for anxiety by using standardized tools.

### **6. Measures:**

6.1. A structured tool including the demographic, clinical data and selected variables were prepared to collect data from subjects using interview technique. Reliability evaluated as 0.84.

6.2. Numerical Pain intensity scale (NIPS), standardized scale for measuring the pain at 0 (no pain) to 10 (worst possible pain). Reliability evaluated as 0.83.

6.3. Spielberger's State Trait Anxiety inventory (STAI) standardized Scale to assess the anxiety. It consists of total 20 items and range of score is 20 (mild anxiety) to 80 (severe anxiety). Reliability evaluated as 0.86.

### III. Results

#### 1. Demographic characteristics:

36.67% subjects in experimental group and 30% in control groups were in the age group of above 61 years. In experiment group, 65% were males, 60% had history of hypertension, 33.33% DM and 6.67% had history of CAD whereas in control group, 63.33% were males, and 66.67% had history of hypertension, 26.27% DM, 6.67% had history of CAD. Majority of the sample, 41.67% were having healthy personal habits and maximum 90% had bowel movement once daily.

Cardiac problems were the reasons to insert chest tube for all the subjects. Maximum 50% had 32G as size of chest tube whereas in control group, 40% of the patients had 34G. Duration of chest tube in experimental group, 60% subjects had for 12 hours and 50% had for same duration in control group. Duration of surgery was 5 to 7 hours for all the subjects.

Effects of cold application on pain and anxiety in experimental group and control group:

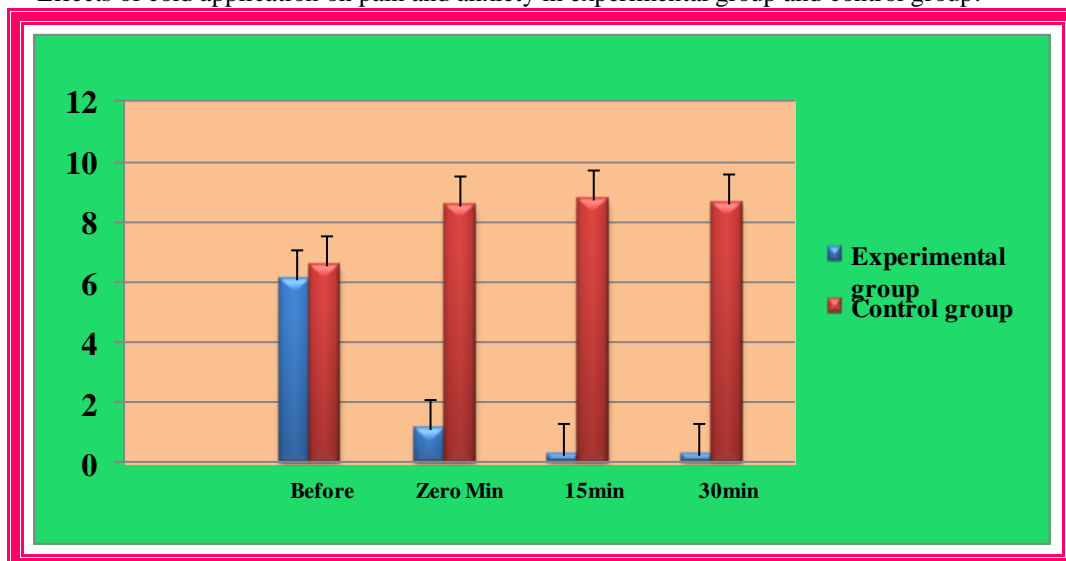


Fig. 1: Bar diagram showing mean and standard deviation before and after observations pain score of experimental and control groups.

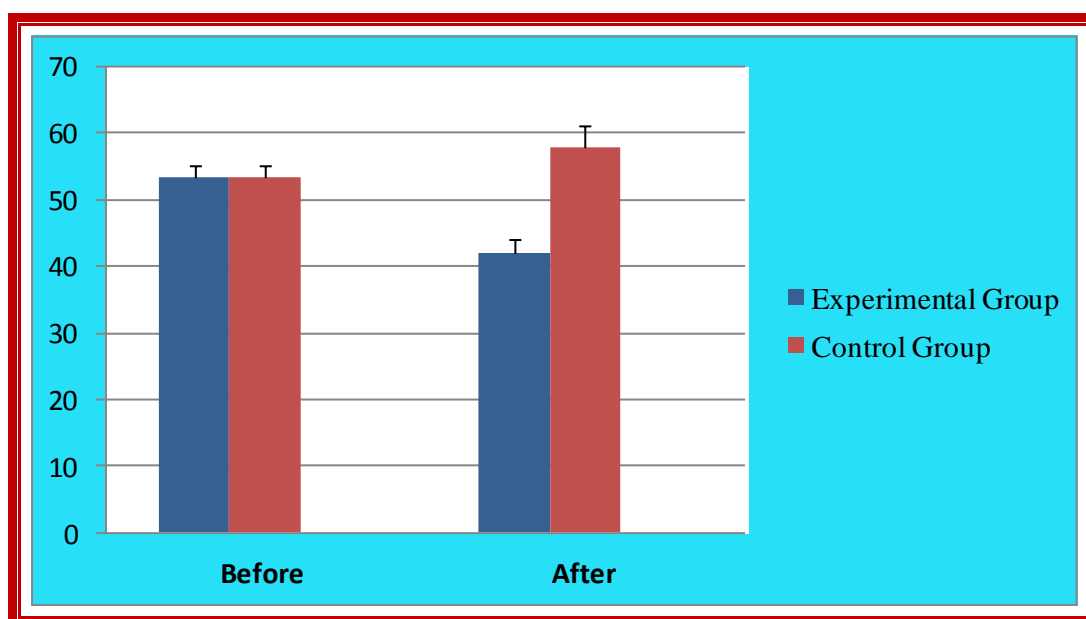


Fig. 2: Bar diagram showing mean and standard deviation before and after observations anxiety score of the experimental and control groups.

As shown in figure 1, in experimental group, after application of cold, the mean pain score was  $1.13 \pm 1.31$  at zero minute,  $0.27 \pm 0.44$  at 15 minutes and  $0.27 \pm 0.44$  at 30 minutes of chest tube removal were lower than the mean pain score of  $6.10 \pm 1.27$  before application of cold whereas in control group (without cold application), mean pain score was  $8.57 \pm 0.49$  at zero minute,  $8.73 \pm 0.57$  at 15 minutes and  $8.63 \pm 0.48$  at 30 minutes after chest tube removal were higher than the mean pain score of  $6.57 \pm 1.12$  before chest tube removal among post operative cardiac surgery patients.

As shown in figure 2, in experimental group, after cold application, the mean anxiety score of  $41.93 \pm 2.21$  were lower than the mean anxiety score of  $53.47 \pm 1.84$  before application of cold whereas in control group, before chest tube removal, mean anxiety score was  $53.31 \pm 1.81$  and after removal of chest tube, mean anxiety score was  $57.87 \pm 3.21$  among post operative cardiac surgery patients.

A significance effect on pain and anxiety were seen in intervention group as compared to non intervention group at 0.05 levels. The treatment effect;  $p < 0.01$ , signifies that, cold application have highly significant effect to reduce pain and anxiety among post operative cardiac surgery patients with chest tubes.

#### **IV. Discussion**

In this study, in experimental group, after cold application, the mean pain score was  $1.13 \pm 1.31$  at zero minute,  $0.27 \pm 0.44$  at 15 minutes and  $0.27 \pm 0.44$  at 30 minutes of chest tube removal were lower than the mean pain score of  $6.10 \pm 1.27$  before application of cold whereas in control group (without cold application), mean pain score was  $8.57 \pm 0.49$  at zero minute,  $8.73 \pm 0.57$  at 15 minutes, and  $8.63 \pm 0.48$  at 30 minutes after chest tube removal and the mean pain score was  $6.57 \pm 1.12$  before chest tube removal among post operative cardiac surgery patients. Cold application has highly significant effect ( $p < 0.01$ ) to reduce pain during chest tube removal among post operative cardiac surgery patients.

The above findings were similar to the study done by **Ertug N and Ulker S (2012)**<sup>10</sup> conducted a controlled clinical trial, to assess effect of cold application on pain due to chest tube removal. The study was conducted in 140 patients, of whom 70 were in the control group and 70 were in the experimental group. Cold was applied to the experimental group and the skin temperature and pain intensity was measured at 4 time points; prior to the application of cold, before removing chest tube, soon after the removal of chest tube, five minutes after the removal of the chest tube. The data collected using visual analogue scale. The visual analogue scale score was measured immediately after the removal of the tube in the experimental group was 3.85, compared with 5.6 in the control group. There was significant difference in pain with cold application between the two groups.

The results of the present study also revealed that in experimental group, after cold application, the mean anxiety score of  $41.93 \pm 2.21$  were lower than the mean anxiety score of  $53.47 \pm 1.84$  before application of cold whereas in control group, before chest tube removal, mean anxiety score was  $53.31 \pm 1.81$  and after removal of chest tube, mean anxiety score was  $57.87 \pm 3.21$  among post operative cardiac surgery patients.

The above findings were similar to the study conducted by **Raiza Abdoullah Al Otaibi., Fatma M Mokabel and Yasser AL-Ghuneimy (2014)**<sup>9</sup> conducted a study to examine the effect of cold application on pain intensity and anxiety during chest tube removal. Single – blinded randomized experimental design was used. The study was conducted at the cardiothoracic, surgical ward and intensive care unit at King Fahd Hospital of the University, Al-Khobar. Forty patients who had a chest tube after cardio-thoracic surgery was randomly assigned into two groups. The study group received ice therapy 20 minutes before CTR, whereas control group without cold application. One tool was used it covered three part: 1) Demographic data , tube and surgical information's , 2) Visual Analogue Scale for measuring pain intensity and 3)Hamilton Anxiety Scale for measuring Anxiety Level. Results: revealed that the correlation between pre anxiety and pain before and during chest tube removal was insignificant correlated, while it was significantly correlated after removal with =  $p < .05$ , and the main pain during chest tube removal for the cold application group were 2.00 which mean mild pain sensation and 7.95 for the control group which mean severe pain sensation. The ice packs application able to reduce the intensity of pain and anxiety level associated with chest tube removal.

#### **1. Study limitation:**

The study was confined to a small sample size, confounding variables like nutritional status, exercise, drugs not taken into the study.

#### **2. Implications:**

##### **2.1. Nursing practice:**

Nurses caring for patient with chest tube can be encouraged to use cold application as an adjuvant therapy for effective pain management during chest tube removal.

## **2.2. Nursing education**

As a routine chest tube removal care, cold therapy can be taught to the students by integrating this procedure in the existing curriculum.

## **2.3. Future Recommendation**

A multicentre study with larger sample size can be undertaken. Comparative and experimental study can be done to evaluate the effectiveness of cold application on pain related to chest tube removal against the use of parenteral and oral analgesics. Study can be replicated with other form of cryotherapy such as cold spray.

## **V. Conclusion**

Based on the findings of the present study it is concluded that there was a significant difference in pain and anxiety scores among post operative cardiac surgery patients after administration of cold therapy on chest tube removal. Cold application can be used as a non-pharmacologic intervention and is recommended as a pain relief technique during chest tube removal, irrespective of age, sex, size of chest tube, duration of chest tube in situ related its simplicity and being inexpensive therapy. Clinician and nurses can make important decisions regarding application of nonpharmacologic therapeutic interventions for pain management.

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