CHAPTER V

DISCUSSION

This chapter deals with the discussion of the study based on the objectives, with appropriate literature review, statistical analysis and findings. The aim of the study was to assess the effectiveness of music therapy and muscle relaxation technique on pain, anxiety and physiological parameters among the patients undergoing the cardiac surgery in a selected hospital at Coimbatore.

A total of 300 patients were selected to participate in the study. Pre-test post-test control group design was adopted in the study. The patients were selected by convenience sampling technique and assigned to the three different groups. Each group had 100 patients. The selected patients in the experimental group-I and II underwent specific interventions such as music therapy and muscle relaxation technique respectively. Pre-operative anxiety among the three groups patients was assessed using Speilberger State Anxiety Inventory Scale. After the cardiac surgery on the 2nd post-operative day morning (pretest) the patients were assessed for intensity of pain, level of anxiety and physiological parameters. The patients anxiety was assessed using State Anxiety Inventory Scale,
pain was assessed using Numerical Pain Intensity Scale and physiological parameters were assessed using cardiac monitor, sphygmomanometer and pulse oxymeter. Music therapy was provided to experimental group-I patients for 20 minutes daily in the morning and evening for a period six days. Experimental group-II patients performed muscle relaxation technique for 15 minutes daily in the morning and evening for a period of six days and the control group received standard post operative nursing care. On the 7th post-operative day evening a post-test was conducted to assess the intensity of pain, level of anxiety and physiological parameters as like pre-test using the same tool.

**The first objective of the study was to assess the level of anxiety among the patients before undergoing the cardiac surgery in the experimental group -I, II and control groups.**

Table 5 shows the **level of anxiety** among the patients in the experimental group I, II and control groups before undergoing the cardiac surgery.

Among the patients in the experimental group I, a total of 74% of patients had severe anxiety, 26% had moderate anxiety and in the experimental group II, 80% had severe anxiety and 20% had moderate anxiety. In the control group, 86% had severe anxiety, 14% had moderate anxiety, none of them had mild and no anxiety before undergoing the cardiac surgery.

<table>
<thead>
<tr>
<th>Level of Anxiety</th>
<th>Experimental Group I</th>
<th>Experimental Group II</th>
<th>Control Group</th>
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<tbody>
<tr>
<td>Severe</td>
<td>74%</td>
<td>80%</td>
<td>86%</td>
</tr>
<tr>
<td>Moderate</td>
<td>26%</td>
<td>20%</td>
<td>14%</td>
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<tr>
<td>Mild/Slight</td>
<td></td>
<td></td>
<td>0%</td>
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<tr>
<td>None</td>
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Majority of the patients (74% - 86%) had severe anxiety and 14 to 26% had moderate anxiety among patients in the three groups.
The study result is supported by the following studies:

**Gallagher (2007)** conducted a study to assess the stressors and anxiety among patients, undergoing coronary artery bypass surgery. One hundred and seventy two patients were interviewed to determine their concerns and anxiety levels before surgery, before discharge and 10 days after discharge. Results revealed that anxiety levels did not change from before to after surgery, whereas it remained low to moderate.

**Tarkka, Laippala, Paunomen and Ilmonen (2002)** examined the fear and anxiety of coronary artery bypass patients at different time points in the coronary artery bypass graft and changes between different time points. Results showed that the highest level of fear and anxiety were measured in the waiting period. Fear and anxiety levels dropped in hospital and 3 months later. Female gender, marital status, vocational education were related to changes in state anxiety, age under 55 years was related to higher trait anxiety especially in the recovery period.

It has been widely accepted that anxiety is a common emotional reaction for any surgical procedure. Patients undergoing surgery often report fear, worry, apprehension and uncertainty. Such feelings are frequently related to anticipated loss of control and feelings of helplessness. Some patients also fear that they may die or never fully recover from the anesthesia. Unfortunately,
high degree of anxiety before surgery have been shown to adversely influence the surgical procedure  (Winston et al., 2003). Patients experience varying degree of fear and anxiety while hospitalized before coronary artery bypass grafting surgery. Pre-operative anxiety is influenced by the patients concern about his or her general health, uncertainty regarding the future, type of surgery and anaesthesia to be performed, post-operative discomfort and pain, incapacitation, loss of independence and fear of death (Coagula et al., 2001).

**The second objective of the study was to assess the level of anxiety, pain and physiological parameters among the patients who have undergone the cardiac surgery in the experimental group -I, II and control groups before the intervention**

Table 6 shows the **level of anxiety on 2nd post-operative day** among the patients who have undergone the cardiac surgery in the experimental group -I, II and control groups before the intervention.

On the 2nd post-operative day, totally 84% had severe anxiety, 16% had moderate anxiety in the experimental group I and in the experimental group II, 88% had severe anxiety, 12% had moderate anxiety. In the control group, 75% had severe anxiety, 25% had moderate anxiety. The severity of anxiety was maximum (88%) in the experimental group II.
The study result is supported by the following studies:

Rymaszewska, Kiejna and Hadry (2003) studied the incidence and course of self-reported depression and anxiety in coronary artery bypass graft patients. A total of 53 patients admitted for CABG surgery were examined a few days before and after the operation and 3 months after CABG. The subjects completed the Spielberger Anxiety Questionnaire and Beck Depression Inventory. The results showed, approximately, 55% of the patients had high level of anxiety pre-operatively. Shortly after the surgery, 34% of the patients and after 3 months 32% of them had clinically relevant level of anxiety. Thirty-two percent of the patients before the surgery, 28% immediately after CABG and 26% at follow-up were depressed.

Tully, Baker and Knight (2007) conducted a retrospective study to examine the association between symptoms of depression, anxiety and mortality risk following coronary artery bypass graft surgery. The researchers assessed 440 CABG surgery patients score on the depression, anxiety using stress scale and followed up mortality status for a median of 5 years. Result showed that there were 67 (15%) deaths overall during the follow-up period. Adjusted survival analysis showed that pre-operative depressive symptoms were not associated with a significantly higher risk of mortality.
Survival analysis with pre-operative anxiety adjusted for covariates showed a significantly increased mortality risk.

The level of anxiety and stress gets increased on situations where a person cannot control the events involved. Feeling of uncertainty among patients after the cardiac surgery leads to anxiety, fear and loneliness in the intensive care unit. The patients undergone the cardiac surgery usually encounter tremendous physical and psychological threats from surgery. Intensive care unit is a place that provides post-operative care for patients undergone surgery. For closely monitoring and maintaining their vitals, they are attached to devices such as a respirator, electrocardiograph, blood pressure meter, central venous pressure meter, pulmonary artery catheter and so on. These instruments and stay in intensive care unit leads to anxiety to the patients (Hsu et al., 2010).

Table 8 shows the intensity of pain on the 2nd post-operative day among the patients who have undergone the cardiac surgery in the experimental group -I, II and control groups before the intervention.

On the 2nd post-operative day, the intensity of pain was severe among all the patients (100%) in all the three groups which was measured using the numerical pain intensity scale.
Kianfar, Shadvar, Mohoori and Azarfarin (2007) conducted a prospective study on pain after the cardiac surgery. Pain location, distribution and intensity were documented on 250 consecutive adult patients on the first, second and third Post-operative Day (POD). The result showed that maximum pain intensity which was significantly higher on POD 1, 2 and lower on POD 3.

Lahtinen, Kokki and Hynynem (2006) conducted a follow-up survey for the first 12 months after the coronary artery bypass graft. Two hundred and thirteen patients received a questionnaire pre-operatively, 4 days post-operatively and 1, 3, 6 and 12 months post-operatively. All the patients were asked about their expectations, their preferences, the location and intensity of post-operative pain. Results revealed that post-operative pain was severe (7-10) in 49% at rest, in 78% during coughing and in 62% of patients on movement after 1 month. One year after the operation, 26 patients (14%) reported mild chronic post-sternotomy pain at rest, 1 patient (1%) had moderate pain, and 3 patients (2%) had severe pain.

The post-operative severe pain reported by patients represents a very important problem after the cardiac surgery, especially after internal mammary artery harvesting. Post-operative
pain increases suffering and can contribute to complications, delayed recovery and higher health care costs.

Post-operative pain is the greater concern of surgical patients, especially for those undergoing major surgery. Pain also interferes with patient’s emotions, activities, quality of sleep and appetite and may prolong hospitalization and increase medical expenses. Proper pain management is both a demand and right of the patients as well as the responsibility of the nursing personnel. Alleviating patients post-operative pain and anxiety is a primary responsibility of nursing personnel.

Table 10 shows the physiological parameters on the 2nd post-operative day among the patients who have undergone the cardiac surgery in the experimental group -I, II and control groups before the intervention.

Majority of the patients (88%) had increased heart rate between 110 - 130 beats / mt.

Maximum number of patients (46 – 48%) had high systolic blood pressure between 150 – 160 mm of Hg.

More number of patients (77% - 78%) had high diastolic blood pressure between 110-120 mm of Hg.
Majority of the patients (98%) had increased respiratory rate between 30 – 40 breath /mt.

Majority of the patients (98%) had decreased oxygen saturation between 90 – 95%.

On the 2nd post-operative day heart rate, systolic blood pressure, diastolic blood pressure and respiratory rate was found higher than the normal but it was similar in all the three groups.

Oxygen saturation was found lesser than normal but it was similar in all the three groups.

Post-operative, changes in Physiological indicators such as blood pressure, heart rate and respiratory rate might be associated with pain and with the drugs used for treatment. The body naturally responds to pain with high stress, which leads to increased heart rate, blood pressure, quick and shallow breathing, sweaty palms and knotted muscles. During stress the sympathetic nervous system is aroused and stress hormones are released resulting in feelings of anxiety. These physiological responses can result in an increased perception of pain (Mites, 1997).
The third objective was to assess the effect of music therapy on anxiety, pain and physiological parameters among the experimental group-I patients who have undergone the cardiac surgery.

Tables 12 and 13 show the effect of music therapy on anxiety among the patients in the experimental group I after the cardiac surgery.

On the 2nd post operative day 84% of patients had severe anxiety, and 16% had moderate anxiety before the intervention. After listening to music therapy (12 sessions for 6 days) on the 7th post operative day 41% of patients had no anxiety, 58% had only mild anxiety and none had severe anxiety. The significant p value (p < 0.001) gave the inference that there was a statistically significant reduction in anxiety level among the patients who listened to music.

Music therapy was effective (p < 0.001) in reducing anxiety among patients who have undergone cardiac surgery

The study result is supported by the following studies:

Twiss, Seaver and McCaffrey (2006) studied the effect of listening to music on post-operative anxiety and intubation time in patients undergoing cardiovascular surgery. Sixty adults older than 65 years were randomly assigned to the control and experimental groups. The experimental group listened to music during and after surgery, while the control group received standard
post-operative care. The Spielberger state trait anxiety inventory was administered on both groups before surgery and 3 days post-operatively. The results showed that older adults who listened to music had less anxiety and reduced intubation time than those who did not.

**Halm (2006)** studied the effects of music therapy on physiological and psychological outcomes for the patients undergoing the cardiac surgery. Experimental group (n = 50) received 20 minutes of music whereas control group (n = 36) received 20 minutes of rest in bed. Anxiety, pain, physiological parameters and opioid consumption were measured before and 20 minutes after the intervention. The result showed that there was a significant reduction in anxiety and pain in the music group compared to the control group, but no difference was observed in systolic blood pressure, diastolic blood pressure, or heart rate. There was no reduction in opioid usage in both the groups.

Tables 14 and 15 show the **effect of music therapy on pain** among the patients in the experimental group I after the cardiac surgery.

On the 2nd post operative day all the patients (100%) in the experimental group I had severe intensity of pain. After listening to music, on the 7th post operative day, 87% had no pain, 12% had
only mild pain and none of them had severe intensity of pain. The result showed that the reduction in intensity of pain after listening to music among the patients who have undergone the cardiac surgery was statistically significant (p < 0.001).

Music therapy was effective (p < 0.001) in reducing intensity of pain among patients who have undergone cardiac surgery.

The study result is supported by the following studies:

Voss et al., (2004) studied the effect of sedative music on anxiety and pain during chair rest after open heart surgery. It was tested using a three group pre-test and post-test experimental design with 61 adult post-operative open heart surgery patients. Patients were randomly assigned to receive 30 minutes of sedative music, schedule rest or treatment as usual during chair rest. Anxiety, pain sensation and pain distress were measured at chair rest initially and 30 minutes later. Music group showed significant difference in anxiety, pain sensation and pain distress than other two groups.

Aragon, Farris and Byers (2002) studied the effect of harp music on vascular and thoracic surgery patients. Visual analog scales were used to measure the patients’ anxiety and pain. Patients’ satisfaction was measured with a 4 item questionnaire. Physiological measures (heart rate, systolic and diastolic blood
pressure, respiratory rate and oxygen saturation) were recorded from the bedside monitor. The experimental group received 20 minute of harp music and control group received routine care. The results showed more reduction in pain and anxiety level in the experimental group than in the control group.

Sendelbach et al., (2006) studied the effects of music therapy on physiological and psychological outcomes for patients undergoing the cardiac surgery. The experimental group (n = 50) listened to music for 20 minutes and were given suggestion on how to relax and control group (n = 36) were asked to comfortably rest in bed for 20 minutes without being advised how to relax. Result showed that those who listened to music had experienced significantly less pain and anxiety than control group and no significant difference was observed in blood pressure and heart rate of patients in either group.

Tables 16 and 17 show the effect of music therapy on physiological parameters among the patients in the experimental group I after the cardiac surgery.

The heart rate was high (110-130 beats/mt) among majority (88%) of the patients on the 2nd post operative day but after listening to music therapy on the 7th post operative day, 91%
had normal heart rate (70-80 beats/mt), and only 9% had increased heart rate between 80-110 beats/mt.

Regarding **systolic blood pressure** on the 2nd post operative day majority (48%) of the patients had high systolic blood pressure (150-160 mm of Hg) but after listening to music therapy, on 7th post operative day, 99% of the patients had normal systolic blood pressure.

Before the intervention a maximum number of patients (77%) had increased **diastolic blood pressure** between 110-120 mm of Hg but after listening to music therapy, on 7th post operative day, 97% had normal diastolic blood pressure (80-90 mm of Hg) and none of them had high diastolic blood pressure.

On the 2nd post operative day a majority (98%) of the patients had high **respiratory rate** (30 - 40 breaths /mt) but after listening to music therapy, on 7th post operative day 91% of patients had improved respiratory rate between 20-30 breaths/mt, 7% had normal respiratory rate between 16-20 breaths/mt, only 2% had high respiratory rate between 30-40 breaths/mt.

Regarding **oxygen saturation** on the 2nd post operative day 98% of patients had decreased oxygen saturation (90-95%) and only 2% had normal oxygen saturation (95-100%). After listening
to music therapy on the 7th post operative day all the patients in the experimental group I had normal oxygen saturation (95-100%).

Paired ‘t’ statistical test was carried out to find the significant difference in physiological parameters between the 2nd and 7th post operative day. The result revealed that the difference in the physiological parameters between 2nd and 7th post operative day were statistically significant at p level (p < 0.001).

Music therapy was effective (p < 0.001) in stabilizing post operative physiological parameters among patients who have undergone cardiac surgery.

The present study findings is consistent with the following studies:

Karaman (2013) investigated the effect of listening to personal choice of music on self-report of pain intensity and physiological parameters among patients who have undergone open heart surgery. The study was conducted with a total of 87 patients aged between 18 and 78 years who underwent open heart surgery, 44 in the music group, 43 in the control group. Using the pre-test post-test design, post-operative first day data were collected. First physiological parameters (Blood pressure, heart rate, oxygen saturation and respiratory rate) were recorded and undimentional verbal pain intensity scale applied to all the participants. Control group had rest in the bed, while the music
group listened to their choice of music for 30 minutes. The results showed that music group showed statistically significant increase in oxygen saturation ($P = 0.001$) and a lower pain score ($P = 0.001$) than in the control group. There was no difference between the group in the other physiological parameters.

**Chang (2006)** conducted a randomized controlled trial to determine the effect of music on pain intensity, heart rate, respiratory rate, blood pressure, oxygen saturation. The data were collected 15, 30 and 45 minutes after the clamp application following percutaneous cardiac intervention. The patients in the experimental group received soft, slow, nonlyric music and the control group received routine care. There was a significant difference in pain intensity after 45 minutes music therapy. The patients exposed to music found significant reduction in pain. The patients in the control group felt significant increase in pain. The systolic blood pressure, heart rate and respiratory rate was found declined more with music, in the experimental group than in the control group which was statistically significant.

**Vaajoki (2011)** evaluated the effect of music listening on blood pressure, heart rate and respiratory rate on operation day and on the first, second and third post-operative days among abdominal surgery patients. Using a quasi-experimental pre-test-post-test design, 168 abdominal surgery patients were assigned
every second week to the music group (n=83) or to the control group (n=85) for 25 months. In the music group, the respiratory rate, systolic blood pressure were found significantly lower after the intervention on both the first and second post-operative days than in the control group.

The commonly accepted theory explaining the pain, anxiety and stress reducing the effect of music is that, music acts as a distracter, focusing the patients attention away from negative stimuli to something pleasant and encouraging. Music also occupies the patients mind with something familiar and soothing, which allows the patients to escape into his or her own world. Listening to music is theorized to release endorphins and to reduce catecholamine levels, therapy resulting in lower blood pressure and a decreased need for analgesics. In addition, heart rate, respiratory rate are improved and oxygen consumption is decreased.

**Fourth objective was to assess the effect of muscle relaxation technique on anxiety, pain and physiological parameters among the experimental group-II patients who have undergone the cardiac surgery**

Tables 18 and 19 show the effect of **muscle relaxation technique on anxiety** among the patients in the experimental group II after the cardiac surgery.
On the 2nd post operative day 88% of the patients had severe anxiety, and 12% had moderate anxiety before the intervention. After performing muscle relaxation technique (12 sessions for 6 days) on 7th post operative day, 5% of patients had no anxiety, 93% had only mild anxiety and none had severe anxiety. The significant p value (p < 0.001) gave the inference that there was a statistically significant reduction in anxiety level after performing muscle relaxation technique among the patients who have undergone the cardiac surgery.

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**Muscle relaxation technique was effective (p < 0.001) in reducing anxiety among patients who have undergone cardiac surgery.**

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**The present study finding is consistent with the following studies**

Dehdari, Heidarnia, Ramezankhani, Sadeghian and Ghofranipour (2009) studied the effects of progressive muscle relaxation training on quality of life among anxious patients after the coronary artery bypass graft surgery. The sample were 110 anxious patients referred to the cardiac rehabilitation clinic during six weeks after coronary artery bypass graft. Patients were allocated to receive both exercise training and life style education plus relaxation therapy or only exercise training beside life style education. Duration of the relaxation therapy was 6 weeks and in the case of usual care was 8 weeks. Both the groups were followed
up one month after completion of interventions. Significant reduction in state anxiety and trait anxiety levels were observed in relaxation group after intervention compared to control group.

**Funda and Turkand (2009)** conducted a quasi-experimental study with pre-test post-test and control group design to assess the effect of progressive relaxation exercises on anxiety. The study was carried on 34 experimental and 32 control group women who had hysterectomy due to benign reasons. In gathering the data personal information form and state-trait anxiety inventory were used. The results showed that the training and progressive relaxation exercises after hysterectomy were found effective in reduction of state anxiety.

**Cheung et al., (2003)** studied the effect of progressive muscle relaxation training on anxiety and quality of life after stoma surgery among colorectal cancer patients. Experimental group received routine care and progressive muscle relaxation training through two teaching sessions and practice at home for the first 10 weeks and control group received routine care. The results revealed the fact that experimental group found more significant level of reduction in anxiety and improved quality of life than in the control group.
Tables 20 and 21 show the effect of muscle relaxation technique on pain among the patients in the experimental group II after the cardiac surgery.

On the 2\textsuperscript{nd} post operative day all the patients (100\%) in the experimental group II had severe intensity of pain. After performing muscle relaxation technique, on the 7\textsuperscript{th} post operative day none of them had severe intensity of pain, 1\% had no pain and 99\% had only mild pain. The result gave the inference that the reduction in intensity of pain after performing muscle relaxation technique among the patients who have undergone the cardiac surgery was statistically significant (p < 0.001).

The present study finding is consistent with the following studies

\textbf{Yildizeli (2010)} studied the effect of relaxation excises on controlling the post-operative pain. This cross-sectional and cross-over study conducted on 60 patients who underwent upper abdominal surgery between October 2006 and June 2007. Pain level was assessed using verbal pain scale before and after relaxation exercises. The result showed that the pain level was
found to be reduced after the relaxation exercise compared to the level before the relaxation exercise (p<0.001).

**Levin, Malloy and Hyman (2006)** studied the effect of relaxation techniques with the female cholecystectomy patients. The participants were randomly assigned to group-I, who received taped recording of a rhythmic breathing exercise, group - II who received taped recording of Benson’s relaxation technique, an attention distraction control group who received a taped recording of a history of the hospital and a standard control group who had only the routine post-operative care. Post-operative sensation and distress, number of doses of analgesic medication during the same time period and number of post-operative hospital days were assessed. The result showed that there was a significant difference in pain sensation between Benson’s relaxation technique group and the control group. No significant difference were found among the groups for doses of analgesics or post-operative hospital day.

**Roykulcharoen and Good (2004)** studied the effects of progressive muscle relaxation technique on post-operative pain, anxiety and opioid intake. The relaxation techniques used in the study consisted of focusing on relaxing muscles by group and relaxed breathing. A pre and post-test was administered at the first post-operative ambulation. Subjects in the relaxation group had
less sensation and distress of pain, anxiety and less opioid intake than the control group.

Tables 22 and 23 show the effect of muscle relaxation technique on physiological parameters among the patients in the experimental group II after the cardiac surgery.

The heart rate was found to be increased (110-130 beats/mt) among majority (88%) of the patients on 2nd post operative day but after performing muscle relaxation technique on 7th post operative day 86% of the patients had normal heart rate (70-80 beats/mt), and only 14% had increased heart rate between 80-110 beats/mt.

Regarding systolic blood pressure, on the 2nd post operative day, majority (47%) of the patients had high systolic blood pressure (150-160 mm of Hg) but after performing the muscle relaxation technique, on the 7th post operative day 94% of the patients had normal systolic blood pressure (120-130 mm of Hg), and only 6% of the patients had (130-140 mm of Hg) increased systolic blood pressure.

Before the intervention maximum number of patients (78%) had high diastolic blood pressure, between 110-120 mm of Hg, but after performing the muscle relaxation technique, on the 7th post operative day, 87% of patients had normal diastolic blood pressure.
pressure (80-90 mm of Hg) and none of them had high diastolic blood pressure.

On 2\textsuperscript{nd} post operative day majority (98\%) of the patients had increased \textit{respiratory rate} (30-40 breaths/mt), but after performing muscle relaxation technique, on the 7\textsuperscript{th} post-operative day 93\% of patients had improved respiratory rate between 20-30 breaths/mt, 4\% had normal respiratory rate between 16-20 breaths/mt, only 3\% had high respiratory rate between 30-40 breaths/mt.

Regarding \textit{oxygen saturation} on the 2\textsuperscript{nd} post-operative day 98\% of patients had decreased (90-95\%) oxygen saturation and only 2\% had normal (95-100\%) oxygen saturation. After performing muscle relaxation technique, on 7\textsuperscript{th} post operative day all the patients in the experimental group II had normal (95-100\%) oxygen saturation.

Paired ‘t’ statistical test was carried out to find the significant difference in physiological parameters between 2\textsuperscript{nd} and 7\textsuperscript{th} post-operative day. The results revealed that the difference in the physiological parameters between 2\textsuperscript{nd} and 7\textsuperscript{th} post-operative day were statistically significant at p level (p < 0.001).

| Muscle relaxation technique was effective (p < 0.001) in stabilizing physiological parameters such as heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate and oxygen saturation among patients who have undergone cardiac surgery |

| Muscle relaxation technique was effective (p < 0.001) in stabilizing physiological parameters such as heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate and oxygen saturation among patients who have undergone cardiac surgery |
The present study finding is consistent with the following studies

Harrison (2008) determined the effect of progressive muscle relaxation technique on anxiety and physiological parameters of the patients undergoing endoscopy. The result revealed that mean anxiety was less and the physiological parameters were found more stabilized in the experimental group than the control group.

Barber and Hann (2003) studied the effect of progressive muscle relaxation technique and guided imagery on anxiety and physiological parameters among the endoscopy patients. The result revealed that both the interventions were more effective in reducing the level of anxiety and stabilizing the physiological parameters in the experimental group than in the control group.

Fifth objective was to assess the level of anxiety, pain and physiological parameters among the control group patients who have undergone the cardiac surgery

Table 24 reveals the level of anxiety on the 2nd and the 7th post-operative day among the patients in the control group after the cardiac surgery.

On the 2nd post-operative day, 75% had severe anxiety, 25% had moderate anxiety. On the 7th post-operative day the anxiety level was not found changed markedly, 62% had severe anxiety,
38% had moderate anxiety and none of them had mild and no anxiety.

The paired ‘t’ statistical test was carried out to find whether significant difference existed between 2\textsuperscript{nd} and 7\textsuperscript{th} post-operative day. The significant p value (p < 0.003) inferred that the difference between the 2\textsuperscript{nd} and the 7\textsuperscript{th} post-operative day anxiety among the patients who have undergone the cardiac surgery was statistically significant.

Table 26 reveals the intensity of pain on the 2\textsuperscript{nd} and the 7\textsuperscript{th} post-operative day among the patients in the control group after the cardiac surgery.

On the 2\textsuperscript{nd} post-operative day, all the patients (100\%) in the control group had severe pain and on the 7\textsuperscript{th} post-operative day, 4\% had mild pain, and 96\% had moderate pain and none of them had severe pain and no pain.

Paired ‘t’ statistical test was carried out to find whether significant difference existed between 2\textsuperscript{nd} and 7\textsuperscript{th} post-operative day. The significant p value (p < 0.003) inferred that the difference

Statistically significant reduction (p < 0.003) was found in the level of anxiety between 2\textsuperscript{nd} and 7\textsuperscript{th} post operative day among patients in the control group after cardiac surgery.
between 2\textsuperscript{nd} and 7\textsuperscript{th} post-operative day pain intensity was statistically significant.

*Statistically significant reduction (p < 0.003) was found in pain intensity between 2\textsuperscript{nd} and 7\textsuperscript{th} post operative day among patients in the control group after cardiac surgery.*

Table 28 reveals the *physiological parameters* on 2\textsuperscript{nd} and 7\textsuperscript{th} post-operative day among the patients in the *control group* after the cardiac surgery.

On the 2\textsuperscript{nd} post-operative day, 88% of the patients had increased *heart rate* between 110-130 beats/mt, 12% had between 80-110 beats/mt and on the 7\textsuperscript{th} post-operative day, 76% of the patients had improved heart rate between 70-80 beats/mt, 24% had between 80-110 beats/mt.

The *Systolic blood pressure*, on the 2\textsuperscript{nd} post-operative day showed 46% of patients having increased systolic blood pressure between 150 – 160mm of Hg, 29% had between 140-150 mm of Hg and 25% had between 130-140mm of Hg. On 7\textsuperscript{th} post-operative day 66% of patients had normal systolic blood pressure between 120-130 mm of Hg and 34% had between 130-140 mm of Hg.

The *Diastolic blood pressure* on the 2\textsuperscript{nd} post-operative day showed 78% of the patients having high diastolic between 110-120 mm of Hg, 17% had between 90-100 mm of Hg and 5% had between 80-90 mm of Hg. On the 7\textsuperscript{th} post-operative day, 57% of
the patients had normal diastolic blood pressure between 80-90 mm of Hg and 43% had between 90-100 mm of Hg.

The **Respiratory rate** on 2\(^{nd}\) post-operative day, showed 98% of patients having increased respiratory rate between 30-40 breaths/mt, 2% had between 20-30 breaths/mt. On the 7\(^{th}\) post-operative day 1% had between 16-20 breaths/mt, 80% of patients had respiratory rate between 20-30 breaths/mt and 19% had between 30-40 breaths/mt.

The **Oxygen saturation** on the 2\(^{nd}\) post-operative day showed 98% of patients had between 90-95% and 2% had between 95-100%. On the 7\(^{th}\) post-operative day 100% of patients had oxygen saturation between 95-100%.

Paired ‘t’ statistical test was carried out to find the significant difference in physiological parameters between 2\(^{nd}\) and 7\(^{th}\) post operative day. The results revealed the fact that the calculated difference in the physiological parameters between 2\(^{nd}\) and 7\(^{th}\) post operative day were statistically significant at p level (p < 0.001).

Statistically significant (p < 0.001) positive changes had occurred in physiological parameters on 7\(^{th}\) post-operative day than 2\(^{nd}\) postoperative day among patients in control group who have undergone cardiac surgery.
Sixth objective was to compare the effect of music therapy and muscle relaxation technique on anxiety, pain and physiological parameters among the experimental group-I, II and control group patients who have undergone the cardiac surgery after adjusting with the selected demographic variable.

- **Comparison of the Anxiety Level on 7th Post-operative Day Among the three groups**

Table 30 shows the comparison of the effect of music therapy and muscle relaxation technique on level of anxiety among the patients in the three groups on 7th post-operative day after the cardiac surgery.

The post-test mean score in the three groups (24.08, 25.73, 62.42) were compared using the ANCOVA after controlling the significant variables on anxiety. The three groups’ anxiety mean value on 7th post-operative day was found to be statistically different at p level (p < 0.001).

The Scheffe multiple comparison test was conducted to find out the statistically significant difference in the level of anxiety among the groups. The results indicated that there was no significant difference existed between music therapy and muscle relaxation technique. In otherwise to say both the therapies were equally effective in reducing the level of anxiety. However, control
group differed from the experimental group I and experimental group II.

**$H_1$ was rejected (p > 0.05).**

$H_1$ The reduction in the level of anxiety among post-operative cardiac patients who receive music therapy will be different from the patients who practice muscle relaxation technique and the patients in the control group.

The music therapy and muscle relaxation technique were significantly effective (p < 0.05) in reducing the level of anxiety and also they were equally effective.

➢ **The present study finding is consistent with the following studies**

**Ruiz (2005)** studied the effect of music therapy (participant selected music with progressive muscle relaxation technique) on the anxiety level and sleep pattern of twenty eight abused women residing in 2 domestic violence shelter for 5 consecutive days for half an hour. The results indicated that music therapy constituted an effective method in reducing the anxiety levels and improve the quality of sleep in the experimental group, and such result was not found in the control group.

**David and Roland (2003)** conducted a study to assess the effect of progressive muscle relaxation technique and music therapy on anxiety among the colonoscopy patients. The results revealed that both the interventions were effective in reducing anxiety.
Comparison of the Intensity of Pain on 7th Post-operative Day Among the three groups

Table 31 shows the comparison of the effect of music therapy and muscle relaxation technique in reducing the intensity of pain among the patients, in the three groups, on the 7th post-operative day after the cardiac surgery.

The post-test mean score among the three groups (0.23, 1.97, 4.12) were compared using the ANCOVA after controlling the significant variables on pain. The pain intensity mean value of the three groups on the 7th post-operative day was found to be statistically significant at p level (p < 0.001).

The Scheffe multiple comparison test was conducted to find out the statistically significant difference in the pain intensity among the groups. The result indicated that the music therapy was found more effective than the muscle relaxation technique in reducing intensity of pain among the patients who have undergone the cardiac surgery.

**H2 was accepted (p < 0.05).**

\( H_2 \) The reduction in the pain intensity among the post-operative cardiac patients who receive music therapy will be different from the patients who practice muscle relaxation technique and the patients in the control group.

The music therapy and muscle relaxation technique were significantly effective (p < 0.05) in reducing the intensity of pain, but music therapy was more effective than the muscle relaxation technique.
The present study is supported by the following studies:

Marion et al., (2005) conducted a randomized clinical trial to find out the effect of relaxation and music on pain reducing following intestinal surgery. Pain sensation and distress were measured with visual analog scale during ambulation and rest on post-operative day 1 and 2. The results showed significant difference in the pain in intervention group than in the control group on both days after rest and in ambulation.

Alice et al., (2004) conducted a study on the effect of relaxation techniques for reducing pain and anxiety during screening mammography. A total of 137 samples were randomly assigned to relaxation, music or control group. Spielberger State Trait Anxiety Inventory (STAI) and the McGill Pain Questionnaire (MPQ) was distributed to the sample. The relaxation audiotape contained information that led the subjects through breath focus, body scan and meditation. The music subjects had a choice of classical music, Jazz or soft rock. Control subjects listened to a blank tape. Subjects were asked to complete the STAI and the MPQ after the intervention. The results showed significant difference in STAI, MPQ between the groups.

Good et al., (2002) studied the effect of relaxation and music on pain after gynecologic surgery. The samples were randomly assigned to a control group, relaxation, music and the
combination of music and muscle relaxation group. The results revealed that relaxation, music or the combination of music and muscle relaxation group reported significant decrease in pain than the control group.

➢ **Comparison of the Heart Rate on 7th Post-operative Day Among the three groups**

Table 32 shows the comparison of the effect of music therapy and muscle relaxation technique on heart rate among the patients in the three groups on 7th post-operative day after the cardiac surgery.

The post-test mean score among the three groups (72.0, 72.7, 73.64) were compared using the ANCOVA after controlling the significant variables on heart rate. Three groups heart rate mean value on 7th post-operative day was found to be non significant at p level (p > 0.15).

The result concluded that the reduction in heart rate among the three groups was not statistically significant.

*H₃ was rejected (p > 0.15).*

**H₃** Heart rate of the post-operative cardiac patients who receive music therapy will be different from the patient who practice muscle relaxation technique and the patients in the control group.

There is no significant difference (p > 0.15) observed among the three groups on heart rate on the 7th post operative day
Comparison of the Systolic Blood Pressure on 7th Post-operative Day Among the three groups

Table 33 shows the comparison of the effect of music therapy and muscle relaxation technique on systolic blood pressure among the patients in all the three groups on 7th post-operative day after the cardiac surgery.

The post-test mean score among the three groups (123.10, 126.50, 131.40) were compared using the ANCOVA after controlling the significant variables on systolic blood pressure. The three groups systolic blood pressure mean value on 7th post-operative day was found to be statistically significant at p level (p < 0.001).

The Scheffe multiple comparison test was conducted to find out the statistically significant difference in systolic pressure among the groups. The result indicated that the music therapy was found more effective than the muscle relaxation technique in reducing systolic blood pressure of patients who have undergone the cardiac surgery.

H₄ was accepted (p < 0.05).

H₄ Systolic blood pressure of the post-operative cardiac patients who receive music therapy will be different from the patient who practice muscle relaxation technique and the patients in the control group.

The music therapy and muscle relaxation technique were significantly effective (p < 0.05) in reducing the systolic blood pressure, but music therapy was more effective than the muscle relaxation technique.
Comparison of the Diastolic Blood Pressure on 7th Post-operative Day Among the three groups

Table 34 shows the comparison of the effect of music therapy and muscle relaxation technique on *diastolic blood pressure* among the patients in all the three groups on 7th post-operative day after the cardiac surgery.

The post-test mean score among the three groups (80.90, 86.50, 96.70) were compared using the ANCOVA after controlling the significant variables on diastolic blood pressure. The three groups diastolic blood pressure mean value on the 7th post-operative day was found to be statistically significant at p level (p < 0.001).

The Scheffe *multiple comparison test* was conducted to find out the statistically significant difference in diastolic blood pressure among the groups. The result indicated that the music therapy was found more effective than the muscle relaxation technique in reducing the diastolic blood pressure of the patients who have undergone the cardiac surgery.

*H5 was accepted (p < 0.05).*

**H5** Diastolic blood pressure of the post-operative cardiac patients who receive music therapy will be different from the patient who practice muscle relaxation technique and the patients in the control group.
The music therapy and muscle relaxation technique were significantly effective ($p < 0.05$) in reducing the diastolic blood pressure, but music therapy was more effective than the muscle relaxation technique.

- **Comparison of the Respiratory Rate on the 7th Post-operative Day Among the three groups**

Table 35 shows the comparison of the effect of music therapy and muscle relaxation technique on respiratory rate among the patients in all the three groups on the 7th post-operative day after the cardiac surgery.

The post-test mean score among the three groups (24.76, 26.64, 28.02) were compared using the ANCOVA after controlling the significant variables on respiratory rate. The three groups respiratory rate mean value on the 7th post-operative day was found to be statistically significant at $p$ level ($p < 0.001$).

The Scheffe **multiple comparison test** was conducted to find out the statistically significant difference in respiratory rate among the groups. The result indicated that the music therapy was found more effective than the muscle relaxation technique in reducing the respiratory rate of the patients who have undergone the cardiac surgery.
\( H_6 \) was accepted (\( p < 0.05 \)).

\( H_6 \) Respiratory rate of the post-operative cardiac patients who receive music therapy will be different from the patient who practice muscle relaxation technique and the patients in the control group.

The music therapy and muscle relaxation technique were significantly effective (\( p < 0.05 \)) in reducing the respiratory rate, but music therapy was more effective than the muscle relaxation technique.

> **Comparison of the Oxygen Saturation on 7th Post-operative Day Among the three groups**

Table 36 shows the comparison of the effect of music therapy and muscle relaxation technique on oxygen saturation among the patients in all the three group on 7th post-operative day after the cardiac surgery.

The post-test mean score among the three groups (99.96, 99.89, 99.85) were compared using the ANCOVA after controlling the significant variables on oxygen saturation. The three groups oxygen saturation mean value on 7th post-operative day was found to be non significant at \( p \) level (\( p > 0.073 \)).

The result concluded that the improvement in oxygen saturation among the three groups was not statistically significant.
*H₇ was rejected (p > 0.073).*

H₇ Oxygen saturation of the post-operative cardiac patients who receive music therapy will be different from the patient who practice muscle relaxation technique and the patients in the control group.

There is no significant difference (p > 0.073) among the three groups on oxygen saturation on the 7th post-operative day.

**The study result is supported by the following studies:**

*Singh and Rao (2009)* compared the effect of music and progressive muscle relaxation on anxiety among Chronic Obstructive Pulmonary Disease (COPD) subjects after a recent episode of exacerbation. The music group listened to a self-selected music of 60-80 beats per minutes for 30 minutes. Progressive muscle relaxation group practiced relaxation through a pre-recorded audio of instructions of 16 muscle groups. The results showed that the music and the progressive muscle relaxation techniques are effective in reducing the anxiety and dyspnoea along with physiologic measures such as systolic blood pressure, pulse rate and respiratory rate in two sessions in COPD patients. However, reduction in the music group were greater compared to the progressive muscle relaxation group.

In the present study, music therapy and muscle relaxation technique was offered to patients to relieve pain, reduce anxiety
and stabilize physiological parameters after the open heart surgery. It was considered that analgesic drug intake would not affect this findings because the control group, music therapy group and muscle relaxation technique group received same analgesic treatment. On the first post-operative day the medication given to all the three groups patients were pethidine (IM infection) to relieve pain and prophylactic beta-blockers, digitalis and antihypertensive agents after the cardiac surgery in an attempt to prevent the development of atrial fibrillation or to control the ventricular or atrial fibrillation.

**Seventh objective was to associate the anxiety, pain and physiological parameters with the selected demographic variables of patients undergone the cardiac surgery.**

Table 37 shows the association between anxiety, pain, and physiological parameters and the *age* of the patients who have undergone the cardiac surgery.

*Anxiety:* One way the ANOVA was calculated to find out the association between anxiety and age of patients after the cardiac surgery. The non-significant p value ($p > 0.55$) showed that there was no association between anxiety and age of patients.

*Pain:* One way the ANOVA statistical test was calculated to find out the association between pain and age of the patients after the cardiac surgery. The non-significant p value ($p > 0.55$) showed
that there was no association between pain and the age of the patients.

**Heart rate:** One way the ANOVA statistical analysis was carried out to find the association between heart rate and the age of the patients after the cardiac surgery. The result confirmed that there was no association \((p > 0.20)\) between heart rate and the age of the patients.

**Systolic blood pressure:** One way the ANOVA statistical analysis showed that there was no significant association \((p > 0.10)\) between systolic blood pressure and the age of the patients.

**Diastolic blood pressure:** One way the ANOVA statistical test was carried out to find the association between diastolic blood pressure and the age of the patients. The significant \(p\) value \((p < 0.01)\) showed that there was an association between diastolic blood pressure and age of the patients. **The results confirmed that age has influence on diastolic blood pressure.**

**Respiratory rate:** One way the ANOVA result showed, that there was no significant association \((p > 0.13)\) between the respiratory rate and age of the patients.
**Oxygen saturation:** One way the ANOVA statistical test showed that there was no association \((p > 0.56)\) between oxygen saturation and the age of the patients.

The above findings concluded that there was no significant association between the variables such as anxiety, pain, heart rate, systolic blood pressure, respiratory rate and oxygen saturation with age of the patients in all the three groups except the diastolic blood pressure which showed a significant association \((p < 0.01)\) with the age.

Table 38 shows the association between anxiety, pain, and physiological parameters and the **sex** of the patients in all the three groups who have undergone the cardiac surgery.

**Anxiety:** One way the ANOVA was calculated to find out the association between anxiety and sex of the patients who have undergone the cardiac surgery. The non-significant \(p\) value \((p > 0.10)\) showed that there was no association between the anxiety and sex of the patients.

**Pain:** One way the ANOVA statistical test was calculated to find the association between the pain intensity and sex of the patients who have undergone the cardiac surgery. The non-significant \(p\) value \((p > 0.80)\) showed that there was no association between the pain intensity and sex of the patients.
Heart rate: One way the ANOVA statistical analysis was carried out to find the association between heart rate and sex of the patients. The result confirmed that there was no association (p > 0.81) between heart rate and sex of the patients.

Systolic blood pressure: One way the ANOVA statistical analysis showed that there was no significant association (p > 0.49) between the systolic blood pressure and sex of the patients.

Diastolic blood pressure: One way the ANOVA statistical test was carried out to find the association between the diastolic blood pressure and the sex of the patient. The non significant p value (p>0.60) showed that there was no significant association between the diastolic blood pressure and the sex of the patients.

Respiratory rate: One way the ANOVA result showed the point that there was no significant association (p > 0.52) between the respiratory rate and the sex of the patients.

Oxygen saturation: One way THE ANOVA statistical test showed that there was no association (p > 0.94) between the oxygen saturation and the sex of the patients.

The above findings concluded the fact that there was no significant association between the variables such as anxiety, pain, heart rate, systolic blood pressure, diastolic blood pressure,
respiratory rate and oxygen saturation together and the sex of the patients in all the three groups.

**The study result is supported by the following studies:**

*Miguel (2011)* conducted a prospective longitudinal study to estimate the pre-operative level of anxiety and depression in patients awaiting heart surgery and to identify the risk factors associated with the development of these mood disorders. A total of 100 patients undergoing heart surgery participated in the study. The patients completed the hospital anxiety and depression scale. Results showed 32% of the patients developed pre-operative anxiety and 19% depressions. Age <65 years was the only significant risk factors for developing pre-operative anxiety.

*Romanik et al., (2009)* conducted a study to assess the pre-operative anxiety. Thirty-eight adult patients of both sexes, aged 18-60 years, scheduled for elective abdominal or ENT surgery, were enrolled in the study. All patients were interviewed one day before the procedure and were asked to complete the STAI questionnaire, rate their fear on the Visual Analog Scale (VAS). Results showed pre-operative anxiety and fear among females were more than males.

*Nijkamp et al., (2004)* determined surgery related anxiety in cataract patients. In 128 cataract patients, state anxiety was
assessed at four different time points using the state trait anxiety inventory (STAI). Result revealed that the level of anxiety was highest before surgery, decreased immediately after surgery, and increased again after the post-operative visit. Patients with higher trait anxiety levels (p<0.001) and women (p<0.001) were reported to have more anxiety.