CHAPTER IV

RESULTS AND DISCUSSION

Hypotheses
Results in Tables
Discussion
RESULTS AND DISCUSSION

A detailed account of the results obtained is presented and discussed in this chapter.

Table 5.1

Presents results of analysis of stress experienced by the experimental group before and after cardiac surgery.

Table 5.2

Presents results of analysis of state anxiety experienced by the experimental group before and after cardiac surgery.

Table 5.3

Presents results of analysis of trait anxiety experienced by the experimental group before and after cardiac surgery.

Table 5.4

Presents results of analysis of stress experienced by experimental and control group after cardiac surgery.

Table 5.5

Presents results of analysis of state anxiety experienced by the experimental and control group after cardiac surgery.

Table 5.6

Presents the results of analysis of trait anxiety experienced by the experimental and control group after cardiac surgery.
Table 5.7

Presents the results of analysis of post-operative complications found in experimental and control group of cardiac surgical patients.

The Hypotheses formulated for the study are given below for easy reference and clarification.

**Hypotheses**

H.1. There will be significant difference between the pre-operative stress and post-operative stress in the experimental group.

H.2. There will be significant difference between the pre-operative state anxiety and post-operative state anxiety in the experimental group.

H.3. There will be significant difference between the pre-operative trait anxiety and post-operative trait anxiety in the experimental group.

H.4. There will be significant difference between the experimental group and control group in the post-operative stress.

H.5. There will be significant difference between experimental group and control group in the post-operative state anxiety.

H.6. There will be significant difference between the experimental group and control group in the post-operative trait anxiety.
H.7. There will be significant difference between the experimental group and control group in the occurrence of post-operative complications.

The experimental group consisted of cardiac surgical patients who received the stress management programme and the control group consisted of cardiac surgical patients who did not receive the stress management programme.

The first hypothesis, that there would be significant difference in stress state anxiety and trait anxiety experienced before and after cardiac surgery for the experimental group, was tested using paired ‘t’ test. The results obtained are presented in table 5.1, 5.2 and 5.3 respectively.

**Table 5.1:** Means, standard deviations, and ‘t’ value of stress before and after cardiac surgery in the experimental group (N=50)

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Group</th>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>‘t’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Experimental</td>
<td>Stress before cardiac surgery</td>
<td>50</td>
<td>30.64</td>
<td>5.95</td>
<td>17.45*</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Stress after cardiac surgery</td>
<td>50</td>
<td>8.62</td>
<td>6.06</td>
<td></td>
</tr>
</tbody>
</table>

* P<0.01

From the table it can be seen that the ‘t’ value is 17.45. The value is significant at 0.01 level. This indicates that the difference in stress before and after cardiac surgery is highly
significant for the experimental group of cardiac surgical patients who received stress management programme (SMP). Hence the hypothesis 1 that there would be significant difference between the pre-operative stress and post-operative stress in cardiac surgical patients belonging to the experimental group is accepted.

The mean scores of the patients belonging to the experimental group before and after cardiac surgery are 30.64 and 8.62 respectively. From the mean scores it is clear that the patients have a lower mean score in stress after cardiac surgery when compared to the stress experienced by them prior to cardiac surgery.

The State Anxiety of the experimental group before and after cardiac surgery was analysed statistically to test the hypothesis which states that there would be significant difference between the pre-operative state anxiety and post-operative state anxiety for the experimental group. The result obtained is presented in table 5.2.

**Table 5.2:** Means, standard deviations and ‘t’ value of state anxiety before and after cardiac surgery in the experimental group (N = 50)

<table>
<thead>
<tr>
<th>State anxiety</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before surgery</td>
<td>56.68</td>
<td>9.10</td>
<td>16.14*</td>
</tr>
<tr>
<td>After surgery</td>
<td>25.96</td>
<td>9.66</td>
<td></td>
</tr>
</tbody>
</table>

* P<0.01
The 't' value obtained is 16.14 which is significant at 0.01 level. This indicates that the difference in state anxiety experienced before and after cardiac surgery is highly significant for the experimental group who received SMP. Hence the hypothesis that there would be significant difference between pre-operative state anxiety in the experimental group of cardiac surgical patients is accepted.

The table also presents the mean scores for state anxiety before and after cardiac surgery. The mean scores of state anxiety before and after cardiac surgery is found to be 56.68 and 25.96 respectively. It can be inferred from the mean scores that the state anxiety has been reduced significantly after cardiac surgery in the experimental group.

**Table 5.3**

Means, standard deviations and 't' value of trait anxiety before and after cardiac surgery in the experimental group (N = 50)

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before cardiac</td>
<td>50</td>
<td>55.74</td>
<td>11.86</td>
<td>15.65*</td>
</tr>
<tr>
<td>surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After cardiac</td>
<td>50</td>
<td>26.76</td>
<td>7.90</td>
<td></td>
</tr>
<tr>
<td>surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P<0.01

The 't' value obtained is 15.65. The value is highly significant (P<0.01 level). This shows that the difference in trait
anxiety for the experimental group between the pre-operative period and post-operative period is highly significant. Hence the third hypothesis, which states that there would be significant difference between pre-operative trait anxiety and post-operative trait anxiety in the experimental group, is accepted.

The mean scores of the patients in trait anxiety before and after cardiac surgery are presented in table 5.3. It is found to be 55.74 before cardiac surgery and 26.76 after cardiac surgery. It can be seen from the mean scores that the trait anxiety is found to be significantly lower after surgery.

An attempt was made in the study to test whether there would be any difference between the experimental group and the control group in stress, state anxiety and trait anxiety after surgery.

The data obtained were analysed statistically using ‘t’ test. The experimental group was given training in SMP along with the routine hospital pre-operative care, and the control group was given only routine hospital pre-operative care. These two groups were matched for age, sex, type of operation, pre-operative and post-operative management and clinical settings. The only difference was that the SMP was given to the experimental group
and the control group was not given any SMP before undergoing cardiac surgery.

The result obtained when the mean scores in stress of the two groups were analysed are presented in table 5.4.

**Table 5.4**: Means, standard deviations and 't' value obtained by the experimental and control groups in the post-operative stress

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>'t'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>50</td>
<td>21.18</td>
<td>10.01</td>
<td>7.59*</td>
</tr>
<tr>
<td>Experimental group</td>
<td>50</td>
<td>8.68</td>
<td>6.01</td>
<td></td>
</tr>
</tbody>
</table>

* P<0.01

From the table it can be observed that the 't' value obtained is 7.59, which is significant at 0.01 level. This reveals that the difference in stress after cardiac surgery between the experimental and control groups is highly significant. Hence the fourth hypothesis, which state that there would be significant difference in the post-operative stress between the experimental and control groups, is accepted.

Table 5.4 also shows the mean scores of stress experienced after cardiac surgery by the experimental and control groups as 8.68 and 21.18 respectively. From the mean scores, it is evident
that the experimental group, which had undergone SMP, has a lower mean score in stress after surgery than the control group.

The difference in the post-operative state anxiety between the experimental group and control group was also analysed statistically using ‘t’ test. The result obtained is presented in table 5.5.

**Table 5.5:** Means, standard deviations and ‘t’ value obtained by the experimental and control groups in post-operative state anxiety

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control group</td>
<td>50</td>
<td>44.16</td>
<td>10.23</td>
<td>8.85*</td>
</tr>
<tr>
<td>2</td>
<td>Experimental group</td>
<td>50</td>
<td>25.96</td>
<td>9.66</td>
<td></td>
</tr>
</tbody>
</table>

* P<0.01

The ‘t’ value obtained is 8.85. The value is significant at 0.01 level. This indicates that the difference in State Anxiety after cardiac surgery between the experimental and control groups is highly significant. Hence the fifth hypothesis, which states that there would be significant difference in post-operative state anxiety between the experimental and control groups is accepted.

The experimental group who received SMP has a mean score of 25.96 for state anxiety. The mean score of state anxiety is 44.16 for the control group. From the mean scores, it can be
inferred that the patients who received SMP, belonging to the experimental group, have a considerably lower score for post-operative state anxiety than their counterpart.

The trait anxiety of the experimental group and control group was also analysed. The result obtained is presented in table 5.6.

Table 5.6: Means, standard deviations and 't' value obtained by the experimental and control group in post-operative trait anxiety

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>'t'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>50</td>
<td>47.97</td>
<td>12.47</td>
<td>9.81*</td>
</tr>
<tr>
<td>Experimental</td>
<td>50</td>
<td>26.76</td>
<td>7.9</td>
<td></td>
</tr>
</tbody>
</table>

* P<0.01

It can be seen from the table that the 't' value obtained is 9.81 which is highly significant (0.01 level). Hence the hypothesis that there would be significant difference in post-operative trait anxiety between the experimental and control group is also accepted.

The table also presents the mean scores in trait anxiety after cardiac surgery. The mean score of the experimental group is 26.76 and that of the control group is 47.97. From the mean scores, it is
clear that the experimental group has a significantly lower score in post-operative trait anxiety than the control group.

The occurrence of post-operative complications following cardiac surgery among the experimental and control groups was analysed statistically using 't' test. This analysis was made to test the hypothesis that there would be significant difference in the occurrence of post-operative complications between the experimental and control groups. The result is presented in table 5.7.

**Table 5.7:** Mean, standard deviation, and 't' value obtained by the experimental and control groups in post-operative complications

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
<td>50</td>
<td>4.32</td>
<td>2.74</td>
<td>9.91*</td>
</tr>
<tr>
<td>Experimental group</td>
<td>50</td>
<td>0.26</td>
<td>0.63</td>
<td></td>
</tr>
</tbody>
</table>

* P<0.01

The 't' value obtained is 9.91, which is highly significant (P<0.01 level). Hence the hypothesis that there would be significant difference in the occurrence of post-operative complications between the experimental and control groups is accepted.

The table also shows the mean scores obtained for post-operative complications in the control and experimental groups. The mean scores are 4.32 and 0.26 respectively for the control
and the experimental groups. From the table it is clear that the occurrence of complications after cardiac surgery in the experimental group, who received SMP, is much lower than that of the control group, who did not receive SMP.

DISCUSSION

The results of the present study reveal that the stress, state anxiety and trait anxiety of the experimental group after cardiac surgery are significantly lower than the stress, state anxiety and trait anxiety experienced by them prior to surgery. (Tables 5.1, 5.2 and 5.3). The second major finding of the study is that the patients who belonged to the experimental group had significantly lower level of stress, state anxiety and trait anxiety after cardiac surgery than that experienced by the control group after cardiac surgery (Tables 5.4, 5.5 and 5.6). With regard to the occurrence of post-operative complications, the control group is found to score significantly higher than the experimental group (table 5.7).

Results obtained in the present study are indicative of the effectiveness of the Stress Management Programme (SMP) in reducing stress and anxiety and also in bringing down the post-operative complications among the cardiac surgical patients.
The mind-body relationship has been an interesting topic of research among several investigators in the field of psychology and health sciences. There are clear evidences for the interrelationship between the mind and the body. The concept of a healthy mind in a healthy body has been nurtured by several professionals in the field of health and psychology.

When a person suffers from physical ailments, especially serious ones, it is natural that he or she becomes disturbed mentally. There are several diseases like Asthma, Coronary Artery diseases, Peptic Ulcer, Ulcerative Colitis and Irritable Bowel Syndrome which have psychological causes [Sreedhar (989)]. That psychological stress and strains of modern life may precipitate psychosomatic illness such as allergies and Asthma, has been well established.

Any injury, surgery or accidents may lead to amputation of parts of the body, resulting in disabilities, disfigurement and handicap. This results in mental agony, pain, stress, anxiety, depression and mental fatigue. The gravity of the problem may be heightened when it comes to cardiac problems, as the risk involved is much higher, and sometimes fatal consequences may follow.
It is observed that the rate of wound healing is different though the mode of surgery is the same in clinical area. Those people who have a positive attitude towards surgical interventions and their management are generally seen to co-operate well with the surgical team in the medical and nursing management irrespective of the seriousness of their disease conditions and surgical procedures. They adjust well to the stressful surgical procedures and hospital situations. Those who are courageous and mentally healthy show little fuss in the post-operative period of severe stress, pain and agony. As a result they are ambulated early and they develop less post-operative complications. It is well known that those patients who are mentally healthy develop less complications following surgeries. Their wounds heal by first intention ie, without any complications, reducing their hospital stay. The rate of wound healing is delayed among patients who suffer any debilitating diseases such as diabetes mellitus, cancer or kidney diseases. Those who have poor mental health as evidenced by emotional immaturity, increased anxiety and tension, have prolonged hospital stay due to one or more wound complications, following surgery. The investigator has experienced the above phenomenon in the existing clinical set up during the past few years of her service. Infection, wound gaping, wound dehiscence, increased scar tissue formation etc. are some of
the wound complications which delay wound healing among surgical patients.

Wound healing takes place as a result of the tendency of the human body for repair and maintenance of its own homeostasis. The edges of the wound, when sutured after operation, undergo a process of repair resulting in scar tissue formation. The nature of wound, depth of wound, the location, the blood supply to the site of the wound etc influence wound healing. Moreover, the general health status and nutritional status of the person, care of the wound, the medications taken by the patient, the psychological well being of the patient etc. are considered as some of the factors influencing wound healing process. If the person is mentally healthy, the metabolic activities, growth, development, repair and maintenance of the body will be quiet normal. In the case of mental agony and psychological stress and anxiety the stress hormones may be produced in the body precipitating alarm reaction in the human body and the body will be subjected to General Adaptation Syndrome (GAS) and Local Adaptation Syndrome (LAS). LAS is described in detail in chapter III. Hence the wound healing may be delayed due to local inflammatory reactions, which is an example of LAS, resulting from physiological stress and strain of surgical interventions, the cut injuries.
The stress management programme used in the study included GSPR, breathing exercises and an information module about cardiac surgery. GSPR helps for progressive muscular relaxation and mental relaxation of the cardiac surgical patients. Since the mind and the body are closely interrelated, the mind cannot remain tensed in a relaxed body. This concept is the basis of GSPR. During the practice of GSPR the cardiac surgical patients are given training to experience and enjoy relaxation of mind and body by inducing progressive muscular relaxation from head to foot using an audio tape. After GSPR these patients were found to be calm, quiet, peaceful and less anxious. These patients were assessed for pulse rate, respiratory rate, blood pressure and heart rate just before and soon after GSPR by the investigator herself. These vital signs were found to be considerably lower than the readings prior to GSPR, indicating a complete physical and mental relaxation. Hence it may be concluded that GSPR was effective in reducing the muscular tension and stress and anxiety of the cardiac surgical patients. These patients were practicing GSPR during their most stressful post-operative period. Their muscles of the body were completely relaxed even after cardiac surgery. In a relaxed muscle the blood supply will be normal since the walls of the arteries and veins are not compressed and constricted by tension or stress. This helps
in adequate blood supply, i.e. supply of oxygen and nutrients necessary for the repair of the injured and mutilated tissues. This result in improved wound healing process. The whole body receives adequate blood supply since the pathological defect of the heart as a pump is surgically corrected. More over, the blood will be rich in oxygen due to continuous practice of deep breathing exercises. *Deep breathing exercises* such as diaphragmatic breathing and pursed lip breathing exercises were practiced daily by the experimental group throughout their hospital stay. This must have definitely helped in increased oxygen uptake by the lungs and the expulsion of Carbon dioxide (CO₂) from the patient's body. This helps to prevent respiratory complications such as Pneumonia, respiratory failure etc. which usually follow cardiac surgery.

In short, the internal environment of the patient’s body is prepared well and is made favorable for a speedy wound healing by practicing GSPR and Deep breathing exercises regularly before and after cardiac surgery. Hence the wound healing takes place with first intention avoiding all possible wound complications such as infection and inflammation, among the cardiac surgical patients who had undergone SMP.
The patients undergoing cardiac surgery experience anxiety—the emotional component of stress. State Anxiety is provoked by stressful life events such as accidents, major surgeries, disasters and other similar crisis situations. Trait anxiety refers to individual differences in anxiety proneness. The individual is prone to develop increased Trait anxiety if the personality is more towards neurotic direction (Spielberger 1966, 1972).

In the present study it is observed that the level of Trait Anxiety and State Anxiety was very high among cardiac surgical patients who scored high in their stress inventory. It has been proved that if a person is put to an unfamiliar stressful situation, the state anxiety gets increased. The trait anxiety also may be precipitated by ignorance about the hospital routines and painful pre-operative surgical procedures. The mere fact that the patients need to undergo serious open heart surgery precipitate state anxiety and trait anxiety among the cardiac surgical patients. [Carr and Powers, (1986)].

Serious somatic illness and their signs and symptoms also precipitate neurotic anxiety and auto aggression among these patients. These patients lack emotional balance (Puchalski, 1985) when an individual is experiencing stress before surgery, his level of anxiety is elevated and his cognitive thinking diminishes.
(Nayamathi, 1988). Scott, D in 1983 reported that the reasoning ability of anxious surgical patients becomes depressed during the pre-operative period, when critical decisions are required regarding their own therapy. (Scott, D. 1983). The pre-operative anxiety of the surgical patients was found to be very high when compared to their post-operative anxiety (Mc.Cleane, 1990). It was in fact, these findings and several other similar reports which motivated other researchers to work on techniques for reducing pre-operative stress and anxiety among patients. Researchers like Walters (1968), Goldmann (1988), Kroll (1990), Margo (1986), and John (1989) have been able to suggest several techniques for reducing the stress and anxiety prior to cardiac surgery.

A visit by the anesthesiologist and medications such as temazepam were found to be effective in reducing pre-operative anxiety. [Walters (1968) and Mc.Cleane, (1990)].

Pre-operative hypnosis as a quick and effective remedy for reducing pre-operative anxiety was suggested by Goldmann (1988). Adequate premeditation minimises the preoperative anxiety of the surgical patients (Kroll 1990). Relaxation by special breathing techniques could be used effectively by surgical patients to reduce their pre-operative anxiety (Margo, 1986). Pre-operative teaching for patients undergoing cardiac surgery was
found to be effective in reducing pre-operative anxiety, as was reported by researchers (John 1989). The nurse's calm, competent manners, her technical skills, and obvious concern for the patient's welfare, add to the psychological well being of the patients undergoing cardiac surgery (Louise, 1963). The physician's tape recorded words of psychological reassurance were found effective in reducing the stress of cardiac surgical patients in ICU.

From the above reports given by various researchers, it is clear that the pre-operative anxiety could be managed effectively by using several techniques such as hypnosis, pre-medications, relaxation, reassurance, breathing exercises and proper health education. SMP, designed for the present study, also includes an information module along with GSPR and breathing exercise training. The information module describes ways to cope with pre-operative surgical preparation and post-operative cardiac management. The information module consists of clear, unambiguous and simple instructions which need to be followed by the cardiac surgical patients before, during and after the cardiac surgery; these information are presented in three sections: Section A, Section B, and Section C. Section A describes in detail the physical preparation, physiological preparation, psychological preparation and legal preparation required before undergoing cardiac surgery. Section B deals with ways and means to co-operate and adjust with care givers, while
transferring the client from the ward to operation theatre. Section C consists of instructions to follow after cardiac surgery till discharge from the hospital. This information has been found to be highly effective for cardiac surgical patients, clarifying all their doubts regarding surgery and its management. Since they acquire adequate knowledge to cope with the stress and strains of cardiac surgery through SMP, the unknown fearful situations become known and adjustable for them. This makes a change in their attitude towards cardiac surgery and its outcome, i.e., turning the negative attitude towards a positive and achievable one.

GSPR proved effective in giving mental and physical relaxation to the normal individuals. It was found practical and simple to be administered in cardiac surgical patients, during pilot study. The movements were slow, steady and systematic in GSPR and this was found easy to administer on cardiac surgical patients. It is observed that wound healing is rapid and without any complication in relaxed muscles. Once the patient is relaxed mentally and physically by GSPR, the blood flow of the body improves which facilitates supply of adequate nutrients and oxygen required for rapid wound healing. All the metabolic activities of the body become normal, and gradually the patient recovers without any complications.
Deep breathing exercises—diaphragmatic breathing exercises and pursed lip breathing exercises—enable the cardiac surgical patients to absorb more oxygen from the air they breathe in and thereby refreshes their body. This also helps to prevent accumulation of secretions in the lungs, which may result in respiratory complications following cardiac surgery. Patients were more relaxed and refreshed and reported a feeling of well-being following deep breathing exercises.

In short, cardiac patients belonging to the experimental group who received SMP were physically, psychologically and educationally prepared well ahead of time for undergoing the cardiac surgery. They were physically prepared by the routine pre-operative preparation and Deep Breathing exercises and were psychologically prepared by relaxation training using GSPR to deal with the stress and stains of cardiac surgery. They were educationally prepared by the component of information module of SMP, which converted the unknown to known, leaving no room for anxiety.

Thus, as the results indicate, the patients belonging to the experimental group experienced a lower level of stress, anxiety and post-operative complications when compared to the patients of the control group.