CHAPTER - V
DISCUSSION

This chapter deals with the detailed discussion on the findings of the study interpreted from the statistical analysis.

The first objective was to determine the effectiveness of nurse-led cardiac rehabilitation on adherence among the patients with heart failure.

Knowledge on heart failure

The present study data revealed that 95% of the study group had inadequate knowledge on heart failure in the pretest. After participating in the cardiac rehabilitation program 76.29% in the study group had moderately adequate knowledge on heart failure. The overall mean score on the level of knowledge among the study group was 6.52 after the implementation of structured teaching on cardiac rehabilitation the mean score was increased to 10.38. This indicates that the patients in the study group had increased level of knowledge on heart failure.

Paired ‘t’ test value was highly significant at p <0.001 level, on knowledge at different period of time. The mean value showed an increase of 3.28 from pretest to posttest-1; 3.85 in posttest-2 and an increase of 0.56 from posttest-1 to posttest-2. This revealed that there was a significant effect of structured teaching on cardiac rehabilitation on the level of knowledge on heart failure at different period of time from pretest to posttest-2 in the study group.
The present study data revealed that 92% of the control group had inadequate knowledge on heart failure in the pretest and 8% had moderately adequate knowledge on heart failure in the pretest. The overall mean score on the level of knowledge on heart failure among the control group was 6.56 and in the posttest-2 mean score was 8.58.

Paired ‘t’ test value was highly significant at p <0.001 level, on knowledge score taken at different durations. The mean value in the pretest was 6.56, in the posttest -1 it was 7.58 and posttest -2 it was 8.58. This revealed that there was a significant improvement on the level of knowledge at different period of time from pretest to posttest-2 in the control group.

The study findings showed a comparison of effect of cardiac rehabilitation between the study and control group with independent ‘t’ test, the study group had significant improvement in the level of knowledge on heart failure and it was significant at p <0.001 level both in posttest-1 and posttest-2. The mean difference between the study group and the control group were high at 0.040, 2.220 and 1.804 in all 3 durations respectively. The variation between the repeated measure values of knowledge at different period of time between the groups revealed a statistically significant difference between the groups at p<0.001.

The present study also highlights the fact that the patients with heart failure have cognitive impairment and nurses need to address the learning needs of those patients. This can be achieved through structured teaching on cardiac rehabilitation and reinforcement through telephone and booklet on cardiac rehabilitation.
Adherence to cardiac rehabilitation

The present study results revealed the study group had adherence only to appointment keeping, medication and smoking cessation components of cardiac rehabilitation in the pretest whereas non-adherence to weight checking (12%), exercise (9%) and lifestyle modification (4%) in the pretest. After participating in the cardiac rehabilitation almost all the components of rehabilitation were adhered by the study group except weight checking (23%) and lifestyle modification (23%).

Present study finding was also supported by Martje, H.L. Van der Wal1., et al., (2005) that compliance with medication and appointment keeping was high. In contrast, compliance with diet, fluid restriction, exercise and weighing was markedly lower.

Present study finding also supported by Gonzalez, B., Lupon, J., et al. (2005), initially 63% monitored their weight only at the medical visit and 21% monitored at least once a week. No significant difference was found in sodium restricted diet compliance whereas exercise performance increased which was statistically significant at p<0.01.

Paired ‘t’ test value was highly significant at p < 0.001 in adherence from pretest to posttest-2 which showed an increase in the mean change from 0.84 to 1.16 from pretest to posttest-2. The study data observed significant increase in adherence after participating in the cardiac rehabilitation in posttest-1 and posttest-2 the study group mean score was 4.83 which was significant at p<0.001 level.
The present study results revealed that the control group had adherence only to medication, sodium restriction and smoking cessation components of cardiac rehabilitation in the pretest & posttest -2, additionally patients were adherent to fluid restriction. Paired ‘t’ test revealed that in the pretest mean score was 2.37, posttest-1 was 3.06 and posttest -2 3.30 respectively in the control group, which was statistically significant at p <0.001.

The study findings showed a comparison of effect of cardiac rehabilitation on adherence between the study and control groups, there was a significant increase in the mean score of adherence at posttest-1 and posttest-2 at p <0.001 level. These outcome measurements revealed that cardiac rehabilitation was significantly effective on adherence among the study group than control group at all measures.

A study by McKelvie, R.S., et al. (1995) supported that adherence to exercise was good during supervised training but reduced during home-based training. After 9 months of the study, there was little improvement, suggesting that supervision is required for these patients.

**Six minute walk test**

The present study findings showed that 63% of the study group were able to walk more than 210 meter distance in the pretest whereas after attending cardiac rehabilitation 92.78% of the study group was able to walk more than 210 metres in the posttest 2.
Paired ‘t’ test value was highly significant at P < 0.001 in 6 minutes walk test at different period of time. The pretest mean score was 233.41; posttest-1 mean value was 255.67 whereas the posttest -2 the mean score was 287.37 which were statistically significant at all durations.

The present study findings showed that 65% of the control group was able to walk more than 210 meter distance in the pretest whereas 88.66% of the control group was able to walk more than 210 metres in the posttest 2. Paired ‘t’ test value was highly significant with p < 0.001 in 6 minutes walk test at different period of time. The pretest mean score was 238.97; posttest-1 mean value was 276.18 whereas the posttest -2 the mean score was 283.14 which were statistically significant at posttest-1 and posttest-2.

The study findings compared the effect of cardiac rehabilitation of 6 minute walk test between the study group and control group which was significant at  p <0.05 level in the posttest-1. Variation between the repeated measure values of 6 minute walk test at different period of follow up between the groups was statistically significant at p<0.001.

This is congruent with the study conducted by Jayadevappa, R., et al., (2007) the functional capacity significantly improved on the six-minute walk test from baseline to six months after treatment in the study group compared to the control group at p <0.034.
Austin, J., et al., (2005) the study results showed that there were significant improvements in quality of life scores, NYHA classification and 6-minute walking distance (meters) at 24 weeks between the groups at p<0.001 level.

McKelvie, R.S., et al., (1995) examined the effects of exercise training on functional capacity in patients with heart failure. There was a significant increase in 6-minute walk distance at 3 and 12 months but not between the groups.

Meta-analyses demonstrated that patients randomized to exercise-based CR have statistically significant reduction in all-cause and cardiac mortality of about 20 to 25% compared to patients receiving conventional care (Jolliffe, et al., 2001). Comprehensive cardiac rehabilitation improves selected cardiovascular parameters such as exercise tolerance, segmental and global left ventricular function (Dendale, et al., 2008; Piestrzeniewicz, et al., 2004).

These findings suggest that some more supervision is required for patients with heart failure both in the hospital based or home based cardiac rehabilitation program. The nurse can take up this lead and guide the patients in exercise based cardiac rehabilitation program.

Biophysiological parameters

Paired ‘t’ test value was significant among study group in certain biophysiological parameters such as body mass index, diastolic blood pressure, random blood sugar, serum sodium and serum potassium in posttest-1. These biophysiological parameters were significant at p value < 0.01 level. There was a significant effect of cardiac rehabilitation on biophysiological parameters, such as
body mass index, diastolic blood pressure, LDL, HDL, triglyceride, random blood sugar and sr. sodium which was statistically significant in posttest-2 among study group.


Aggie, Casey., et al.(2009) found that after intervention of cardiac rehabilitation men and women improved significantly with respect to medical outcomes such as blood pressure, lipids, weight, exercise conditioning, frequency of symptoms of chest pain and shortness of breath.

Fard, N.M., (2003) found that after eight weeks of cardiac rehabilitation total cholesterol, TG, LDL-C, and HDL-C was within normal in the intervention group. There were 0.8 reductions in LDL-C/HDL-C at p < 0.05 and 5 mg/dl increase in serum HDL-C at p < 0.05 of intervention group.

Paired ‘t’ test value was significant among control group in certain biophysiological parameters such as systolic blood pressure, diastolic blood pressure, hemoglobin and serum sodium in posttest-1. These biophysiological parameters were significant at p < 0.01 level. There was a statistically significant improvement on certain biophysiological parameters, such as diastolic blood
pressure, LDL, HDL, hemoglobin and sr. sodium which was statistically significant in posttest-2 among control group.

The study findings showed comparison of effect of cardiac rehabilitation between the study and control group. There was a high level of significance at p<0.001 level in certain biophysiological parameters such as diastolic blood pressure, HDL, hemoglobin, random blood sugar, serum sodium and serum potassium in the posttest-2.

Lavie, C.J., et al., (2006) stated that young patients had higher body-mass indexes and worse cholesterol profiles when compared with elderly patients. Following cardiac rehabilitation and exercise training, all patients showed benefits to their risk profiles, but these were particularly pronounced in the younger group.

Sarrafzadegan, N. et al., (2009) found that except for diastolic blood pressure, all other biophysical parameters like biochemical, total cholesterol, low-density lipoprotein, high-density lipoprotein and triglyceride, functional, and psychosocial parameters had significant response to cardiac rehabilitation program.

The second objective was to determine the effectiveness of nurse-led cardiac rehabilitation on quality of life among the patients with heart failure.

Physical component summary

The present study data revealed that the physical component summary mean score was 33.69 in the study group in the pretest. After the implementation of structured teaching on cardiac rehabilitation the mean score in the study group
increased to 46.53 in the posttest-2. Paired ‘t’ test value was highly significant at p < 0.001 in physical component summary between pretest and posttest-2 and between pretest, posttest-1 and posttest-2 which were significant at p < 0.001 level.

Quittan, M., et al., (1999) in the exercise group the perception of quality of life improved significantly in the domains of vitality at p< 0.001, physical role fulfillment at p < 0.001, physical at p< 0.02 and social at p < 0.002 functioning.

The present study data revealed that the physical component summary mean score was 35.47 in the control group in the pretest. The mean score in the control group increased to 44.87 in the posttest-2. Paired ‘t’ test value was highly significant at p < 0.001 in physical component summary between pretest and posttest-2 and between posttest-1 and posttest-2 which were significant at p < 0.05 level in the control group.

Comparison of physical component summary between the study and control group demonstrated statistically significant difference at p < 0.05 in the posttest-2 among study group.

The same was supported by Martensson. J, et al. (2005) a nurse-led intervention directed toward patients with heart failure in a primary health care setting resulted in limited effects between the groups, although the physical and mental status were retained at 12 months of follow-up to a greater extent in the study group than in the control group.
Miche, E, Herrmann, et al., (2003) found that quality of life improved significantly at discharge and follow-up in nearly all domains and in the summary score for physical health.

**Mental component summary**

In the present study, the mental component summary mean score was 38.64 in the study group in the pretest, whereas after the implementation of cardiac rehabilitation the mean score was 45.93 in the study group at posttest-2. The paired 't' test value was highly significant at p < 0.001 level in mental component summary at different period of time in posttest-1 and posttest-2 respectively.

In the present study, the mental component summary mean score was 41.87 in the control group in the pretest, whereas the mean score in posttest-2 was 34.87. The Paired ‘t’ test value was highly significant at p < 0.001 level in mental component summary in different period of time in posttest-1 and posttest-2 respectively.

The comparison of effect of cardiac rehabilitation on mental component summary score between the study and control group revealed that there was statistically significant difference at p < 0.001 in posttest-2 among study group.

A similar study by Meyer, K., Laederach-Hofmann, K. (2003) found that the physical functioning at p<0.001, role functioning at p<0.05 and mental component score at p<0.001 on the questionnaire improved significantly.
Disease specific quality of life

In the present study, the disease specific quality of life mean score was 48.51 in the study group in the pretest, whereas after the implementation of cardiac rehabilitation the mean score was 33.24 in the study group in posttest-2. The Paired ‘t’ test value was highly significant at p < 0.001 level in disease specific quality of life in different durations in posttest-1 and posttest-2 respectively. Though the t test value is not significant from posttest-1 to posttest-2, the mean score has reduced gradually. These outcome measurements revealed that there was a significant effect of cardiac rehabilitation on disease specific health related quality of life at different period of time in the study group.


In the present study, the disease specific quality of life mean score was 43.70 in the control group in pretest, whereas the mean score was 43.33 in the control group at posttest-2. The Paired ‘t’ test value was not significant in disease specific quality of life at different period of time.

The study findings showed the comparison of effect of cardiac rehabilitation between the groups with independent t test value which demonstrated that there was a statistical significance at p < 0.05 level in the posttest-1 and p < 0.001 level in the posttest-2. Variation between the repeated
measure values of disease specific quality of life at different period of time between the groups revealed statistically significant difference at p<0.001.

Terzic, Z., et al. (2005) study result revealed considerable improvement in the overall quality of life between the baseline and second measurements, as well as considerable improvement in the physical dimension of quality of life.

Shively, M., et al., (2005) found that patients who underwent cardiac rehabilitation demonstrated significant improvement on self-reported disease specific quality of life over a period of time.

The third objective was to correlate the adherence with quality of life among the patients with heart failure.

Knowledge with Quality of life

The current study findings on correlation coefficient value of knowledge and quality of life showed that there was a positive relationship between knowledge and quality of life in both generic and disease specific quality of life in the posttest-1, but, it was not statistically significant. These findings revealed that patients with heart failure were taking a long time to gain knowledge on heart failure, though the correlation was not statistically significant, it has a positive relationship in study group.

Correlation coefficient value of knowledge and quality of life revealed that there was a positive correlation between knowledge with quality of life in the posttest-1, but, it was not statistically significant.
These data suggest that there is a clear need for structured teaching on disease condition and cardiac rehabilitation. This indicates the importance of participating in the cardiac rehabilitation program, which helps the patients to increase the level of knowledge on heart failure and its management thereby the quality of life, is enhanced.

**Adherence with Quality of life**

The correlation coefficient value between adherence and quality of life in the study group, showed a positive correlation between adherence and generic quality of life both in posttest 1 and posttest 2, but, it was not statistically significant. At the same time the adherence score had a statistically significant positive correlation both in the posttest-1 and posttest-2 in the study group at P <0.001 and p < 0.05 level respectively.

The correlation of overall adherence score with quality of life in the control group had a statistical significant positive correlation with generic quality of life. This revealed that when adherence increased, the generic health related quality of life also increased and this was statistically significant, whereas the adherence score had a negative correlation with disease specific quality of life.

Alexander, J.L., et al., (2006) found that no relationship between cardiac rehabilitation adherence and improvements in HRQL. Study findings demonstrated the effectiveness of CR in improving patient’s short- and long-term HRQL regardless of patient’s adherence rate.
**Six minute walk test**

The correlation of overall 6 minutes walk test with the generic quality of life in the study group had a positive relationship with both generic and disease specific health related quality of life, but, it was not statistically significant. It revealed that when the walking distance increased the quality of life also increased. These data suggest that there is a clear relationship between 6 MWT and Quality of life in the study group.

The study results are congruent with the Mitani, H., et al., (2003) exercise capacity and the cardiothoracic ratio were correlated with the quality of life related to physical functioning, although the correlation between exercise capacity and mental health was not significant. Factor analysis revealed LVEF was independent of physical functioning and exercise capacity.

The correlation of overall 6 minute walk test with the generic quality of life in the control group showed a positive relationship with physical component summary of quality of life and negative relationship with disease specific health related quality of life, and, it is statistically significant at P < 0.01 level both in posttest-1 and posttest-2. It revealed that when the walking distance increased, the general quality of life score also increased, but, disease specific quality of life decreased.

The same findings were supported by Masoudi, F.A., et al. (2004) compared the relationship between functional limitation and HRQL between older and younger patients with heart failure. After multivariable adjustment including
baseline NYHA class, older age was independently correlated with better HRQL. Analyses using 6-minute walk distance as the functional measure yielded similar results.

Karapolat, H., et al., (2006) found that there was a correlation between peak VO2 and sub maximal test, but there was no correlation between left ventricular ejection fraction, peak VO2 and NYHA class.

The fourth objective is to associate the background variables with adherence and quality of life.

Knowledge with demographic variables

Association of knowledge score on heart failure in posttest-2 of the study group revealed that demographic variables were not having statistically significant association with knowledge. Regression analysis on knowledge revealed a significant association with religion which was significant at p <0.05 in the study group at posttest-2.

Adherence with demographic variables

Association of adherence to cardiac rehabilitation in posttest-2 of the study group revealed that demographic variables were not statistically significant. Regression analysis on adherence score revealed that there was no statistically significant association between adherence and demographic variables.
Six minute walk test

Association of 6 minute walk test in posttest-2 among study group revealed that demographic variables were not statistically significant. Regression analysis on 6 minute walk test revealed a significant association with gender and tobacco use at $P < 0.01$ and $P < 0.05$ level respectively.

Physical component summary with demographic variables

Association of study group with physical component summary revealed that the diagnosis had a significant association and it was statistically significant at $P < 0.01$ level in posttest-2. Regression analysis on physical component score revealed significant association with age and occupation at $P < 0.001$ level and $P < 0.05$ level respectively in the study group posttest-2.

Mental component summary with demographic variables

Association of mental component score in posttest-2 with study group revealed that the gender had a significant association and it was statistically significant at $P < 0.05$ level. Regression analysis on mental component summary revealed a significant association with education and marital status at $P < 0.01$ level.

Disease specific quality of life

Association of disease specific quality of life in posttest-2 with study group revealed that there was a statistically significant association with the education, occupation and type of family at $P < 0.05$ level. Regression analysis on disease
specific quality of life score revealed that a significant association with gender, education and occupation at P value < 0.01 level.

Lewis, E.F., et al. (2007) conducted a study to determine the factors associated with worse HRQL. Independent factors associated with worse HRQL in both populations included female gender, younger age; higher body mass index, lower systolic blood pressure, greater symptom burden, and worse functional status.

Knowledge with clinical variables

Association between knowledge on heart failure with clinical variables was not statistically significant. Regression analysis on knowledge score revealed that there was no statistically significant association between knowledge and clinical variables.

Adherence with clinical variables

Association between adherences to cardiac rehabilitation and clinical variables were not statistically significant. Regression analysis on adherence score revealed that there was no statistically significant association between adherences and clinical variables.

Six minute walk test

NYHA and ejection fraction had a statistical significant association with 6 minute walk test at P <0.01. Regression analysis on 6 minute walk test score
revealed that there was no statistical significant association between 6 minute walk tests with clinical variables.

**Physical component summary with clinical variables**

A significant association was found between physical component summary with the diagnosis and it was statistically significant at $P < 0.01$ level in posttest-2 in the study group. Regression analysis on 6 minute walk test score revealed that there was no statistical significant association between 6 minute walk test and clinical variables.

**Mental component summary score with clinical variables**

A significant association was found between mental component score with the EF and it was statistically significant at $P < 0.05$ level in posttest 2 in the study group. Regression analysis on mental component summary revealed that there was no statistical significant association with clinical variables.

**Disease specific quality of life with clinical variables**

Disease specific quality of life score in the current study was associated with NYHA at $p < 0.05$ level in the study group. Regression analysis on disease specific quality of life revealed that there was no statistically significant association with clinical variables.

Few studies which have investigated the relation between quality of life and clinical variables (reflecting the severity of disease) achieved inconclusive results (Majani G., et al., 1999; Steptoe A., et al., 2000; Cox S., et al., 1997).
Another study (Hulsmann M, et al., 2002) disease specific quality of life was associated with a greater frequency of the combined event of death or worsening of HF.

A review by Parajon, T., et al., (2004) found a strong correlation (P<.001) between the score and functional class, gender (women had higher scores) and diabetes. They also found a correlation between the score and number of hospital admissions in the previous year at P<0.001, anemia at P<0.001, etiology at P<0.01 and a weak trend toward higher scores with increasing age at P<0.04.

Almost a similar study by Clark, D.O., et al. (2003) multivariate regression analyses showed that the pathophysiologic measures, ejection fraction and comorbidity were not associated with any of the HRQL measures.

Two non directional hypotheses were formulated for the study. Hypothesis one states that “there is a significant change in the adherence among the patients who participated in cardiac rehabilitation programme than the patients who do not”.

The study outcome measurements revealed that, the independent' test values of adherence scores were highly significant at P <0.001. Structured teaching program on cardiac rehabilitation had made a difference in changing the level of knowledge, adherence, 6 minutes walking distance and bio-physiological parameters in the study group than in control group. Hence, the study supports and retains hypothesis one.
The second hypothesis states that “there is a significant change in the quality of life among the patients who participated in cardiac rehabilitation programme than the patients who do not”.

The study outcome measurements revealed that independent ‘t’ test values of quality of life were highly significant at \( P < 0.001 \). Structured teaching program on cardiac rehabilitation had made a difference in the quality of life among study group than control group. Hence, the study supports and retains hypothesis two.