CHAPTER VI
SUMMARY

6.1 PURPOSE

The purpose of this study is to evaluate the effect of multidimensional pulmonary rehabilitation (PR) in particular exercises and psychosocial support on pulmonary functional measures, six minutes walking distance and health related quality of life of patients with chronic obstructive pulmonary disease (COPD). The study was carried out both at Sri Ramachandra Hospital, Porur, Chennai -116, and at Government Hospital of Thoracic Medicine, Chennai, 47.

6.2 ORGANISING CONSTRUCT

Multidimensional pulmonary rehabilitation of patients with COPD for the present study comprises of breathing exercises, physical exercises for a period of about 20 to 30 minutes with or without psychosocial support for a total duration of 8 weeks. Outcome measures such as pulmonary functional measures (PFM) six minutes walking distance (6MWD) and health related quality of life (HRQOL). The pulmonary functional measures (PFM) was assessed prior and after 8 weeks of pulmonary rehabilitation, whereas the 6MWD and HRQOL were assessed prior, first month end and second month end.
6.3 METHOD

Randomized control trail of a single blind repeated measures design was selected for the present experimental study. The sample size was 165 patients with COPD. The subjects of this study were divided into three groups (control, exercise and exercise with psychosocial support group) with each group consists of 55 patients. In this study a single stage cluster sampling technique was used. A cluster of three wards each per gender out of the available twelve male wards and six female wards were randomly selected by lottery method. All the patients with COPD who were admitted to these six wards were considered as sample.

6.3.1 Forms and Instruments

The forms/instruments used in this study were the demographic assessment, clinical measurements, pulmonary functional measures, six minutes walking distance and health related quality of life. The patients biographic and demographic details such as 1) age, 2) sex, 3) marital status, 4) education, 5) profession 6) monthly income, 7) domicile, 8) exposure 9) pollutants 10) duration of illness 11) hospitalization were collected by an interview schedule. Pre assessment of 1) age, 2) sex, 3) height, 4) weight, Pre and post clinical measurements such as 1) pulse rate, 2) respiratory rate, and pulmonary functional measures such as FVC, FEV₁, FEV₁ / FVC and PEFR were assessed with Spirolab II.

6.3.2 New HRQOL Instrument

In order to measure the health related quality of life (HRQOL) i.e. subjective well being of the patients with COPD a new HRQOL instrument was developed by the investigator. The HRQOL instrument for the present
study was developed on considerations of Indian conditions and salient features of established HRQOL instruments such as CRQ and SGRQ. Experts related to the chosen field of research verified the content validity of the instrument. The reliability was verified by Cornbach’s analysis and test – retest procedure.

The newly developed HRQOL instrument consists of 30 items in the following sub aspects namely

Breathing status (7 items),
Physical activity (10 items),
Social status (5 items) and Emotion status (8 items).

6.3.3 Education

A handbook on pulmonary rehabilitation and an Instructional manual on breathing and physical exercises for patients with COPD were developed by the investigator. The handbook on pulmonary rehabilitation describes the disease pathology, signs and symptoms, risk factors and their avoidance with the specific emphasise on smoking cessation, coping strategies, balanced diet, necessary life style modifications and adherence to the health practices. Education based on this hand book was given to all the patients in order to equilibrate them at the start of the study.

6.3.4 Breathing and Physical Exercises

Patients of exercise and exercise with psychosocial support group were given an Instructional manual on breathing and physical exercises and demonstration. The exercises consist of breathing exercises such as pursed lip
breathing, diaphragmatic breathing, blowing out air and blowing a balloon and physical exercises such as upper extremity exercises - wall hands climbing, rope turning, rod lifting and pulley tugging and the lower extremity exercise – walking.

6.3.5 Psychosocial support

Patients of psychosocial support were provided with psychosocial support through telephonic contact every week and home visit at fortnightly.

6.3.6 Analysis of Data

Analysis was performed with the assistance of computer based statistical tool SPSS Version 10. Descriptive method was used to analyze the demographic data. Inferential technique was adopted to analyse the significance in differences between the groups and within the subjects. Paired t test was performed to find any significant changes occur in PFM and clinical measures after pulmonary rehabilitation. A simple random design analysis of variance (ANOVA - SRD) was used to test the differences between three group means each of PFM, 6MWD and HRQOL. A Tukey’s honestly significant difference (HSD) post hoc test was performed following ANOVA for the significantly different groups. Repeated measures analysis of variance (ANOVA – RMD) was used to find out the significant differences in the pre, intermediate and post measures of each group. The aspects which indicated significant difference were analysed further using a post hoc pair wise comparison with Bonferroni correction to find out in which phase the differences occurred and the trends. Pearson correlation between HRQOL and FEV₁, HRQOL and 6MWD were also found out.
6.4 FINDINGS OF THE STUDY

Findings of the present study is given in six subsections such as Demographic distribution and characteristics, Clinical measurements, Pulmonary functional measurements, Six minutes walking distance, and Health related quality of life scores and Correlation among PFM, 6 MWD and HRQOL.

6.4.1 Findings on Demographic Distribution and Characteristics

The present study revealed that most of the patients 142(86%) are of age greater than 44 years. The mean age of the patients was 55 ± 10 (mean ± SD) years and the age ranged between 36 and 77 years. The mean age of COPD patients of this study falls into the category of middle adulthood (41-60 years). Whereas the mean age of the COPD patients in many other countries indicates (Table 5.1) that majority of them were in late adulthood (61 – 80 years)

Chi square test revealed the significant unevenness in the distribution of age, sex, marital status, education, occupation, income, domicile, exposure to pollutant, type of pollutant, duration of the problem and hospitalization. The analysis on demographic data of the patients indicates the prevalence of COPD among educationally and economically downtrodden middle adulthood rural population.

6.4.2 Findings on Clinical Measurements

A paired ‘t’ comparison on the pre – post values of pulse and respiration rates of patients in exercise with psychosocial support group revealed that a medium (p <0.01) and low (p < 0.05) significant improvement
(decrease) respectively has occurred. Though the observed changes are significant, the quantity of the changes is too small to make any noteworthy conclusion. The mean decrements in pulse and respiration rates of exercise with psychosocial support group on completion of rehabilitation programme are 1.42 and 0.73 per minute respectively.

6.4.3 Findings on Pulmonary Functional Measurements

The ANOVA (SRD) on PFM measurements in the start and end of the pulmonary rehabilitation programme did not reveal any statistical significant difference between the control, exercise and exercise with psychosocial support groups. Paired ‘t’ comparisons on the pre and post PFM measurements of control, exercise and exercise with psychosocial support groups also did not reveal any significant improvement. However a noteworthy improvement in post measures FEV$_1$ (from 38.8 ± 13.1 to 42.7 ± 15.5 % predicted; p = 0.074; 10.1% improvement) of exercise with psychosocial support group and in post measures of FVC (from 60.31 ± 18.84 to 65.4 ± 21.9 % predicted; p = 0.065; 8.5% improvement) of exercise group have occurred.

6.4.4 Findings on Six Minutes Walking Distance

The ANOVA on pre measures of 6MWD did not reveal any significant difference between the control, exercise and exercise with psychosocial support groups. Whereas ANOVA on the intermediate and post measures of 6MWD indicated a low level (p < 0.05) and a high level (p < 0.001) significant difference between the groups respectively. The results of the multiple comparisons in intermediate test values of 6 MWD reveal that there is a low significant difference (p <0.05) between the control and
exercise with psychosocial support group, whereas the exercise group does not differ significantly from both control and exercise with psychosocial support group. The multiple comparisons of the post values indicated a high significant difference \((p < 0.001)\) between the control and exercise with psychosocial support group, whereas a low significant difference \((p < 0.05)\) is noticed on comparing exercise group with both control and exercise with psychosocial support groups.

The results of ANOVA repeated measurements of 6MWD in control group revealed no significant difference between the pre, intermediate and post measures, whereas a medium \((p < 0.01)\) and high significant difference \((p < 0.001)\) are observed in exercise and exercise with psychosocial support group respectively. The pairwise comparison in exercise group indicates no significant difference in pre and intermediate values of 6MWD, whereas the post values differ at medium \((p < 0.01)\) and low significance \((p < 0.05)\) on comparison with pre and intermediate values of 6MWD. The pairwise comparison in exercise with psychosocial support group indicated no significant difference between pre and intermediate values of 6MWD, whereas the post values differ at high \((p < 0.001)\) and medium significance \((p < 0.01)\) on comparison with pre and intermediate values of 6MWD.

During the first phase in control group the mean 6MWD decreased marginally from 368 to 366 meters, whereas in exercise and exercise with psychosocial support groups the 6MWD increased marginally from 369 & 374 to 370 & 381 meters. These changes are insignificant in quantity. A dramatic increase in 6MWD is observed during the second phase in exercise group 370 to 393m and psycho social support group from 381 to 415m.

From these observations it could be stated that at the end of the rehabilitation programme all the groups distinctively differ from one another
in the aspect of 6MWD. In both exercise and exercise with psychosocial support groups significant change in 6MWD occurred only during the second phase of the rehabilitation that is between the first and second month of the rehabilitation.

### 6.4.5 Findings on Health Related Quality of Life

The ANOVA on pre measures of all the components of HRQOL did not reveal any significant difference between the control, exercise and exercise with psychosocial support groups. Whereas ANOVA on intermediate and post measures of all the components and the total scores of HRQOL revealed a high significant difference (p < 0.001) between the control, exercise and exercise with psychosocial support groups.

Multiple Comparisons on Intermediate HRQOL scores revealed that the exercise with psychosocial support group distinctively differs from the control and exercise groups in all components of HRQOL except emotion status score at a high significance of (p < 0.001). The intermediate scores of the emotional status score are lower than the pre score for all the three groups and in particular the reduction is more in exercise group. Multiple Comparisons on Post HRQOL Scores of exercise with psychosocial support group indicates a high significant (p < 0.001) difference in all components of HRQOL and in the total score of HRQOL in comparison with control group, whereas on comparing with exercise group a high significant (p < 0.001) difference is observed in activity, emotion status scores and total HRQOL score. At the end of the rehabilitation programme all the three groups significantly differ from one another in all the components of HRQOL and total HRQOL score.
ANOVA (RMD) on HRQOL repeated measures of control group indicates no significant difference between the pre, intermediate and post measures of breathing status score and activity score, whereas a high significant difference (p < 0.001) and medium significant difference (p < 0.01) are observed in social status score and emotion status score respectively. At the end of the rehabilitation programme a low significant (p < 0.05) improvement in HRQOL score has occurred in control group. The improvement has occurred only during the second phase of the rehabilitation. The significant improvement is observed only in social status and emotional components and not in the breathing status and activity components. The observed low significant (p < 0.05) improvement in HRQOL score could be attributed to the education on pulmonary rehabilitation.

The results of ANOVA (RMD) on the HRQOL of the exercise and exercise with psychosocial support group indicate that a high significant difference (p < 0.001) is present between the pre, intermediate and post scores of all components and total HRQOL score. In exercise group a significant and great improvement in total HRQOL score has occurred during the second phase of rehabilitation, whereas in exercise with psychosocial support group the improvement has occurred during both the first and second phase of the rehabilitation. An overall improvement of 36% in total HRQOL has occurred in the post measures of exercise with psychosocial support group in comparison with pre measures. Similar comparison in exercise and control group indicates overall improvements of 22 and 6% in total HRQOL respectively.

6.4.6 Findings on Correlation Among PFM, 6MWD and HRQOL

Pearson correlation analysis indicates that none of the PFM has any significant correlation with HRQOL and 6MWD, whereas the analysis
indicates that the 6MWD has a moderate but a high significant correlation
(r = 0.31; p < 0.001) with HRQOL.

6.5 CONCLUSION

The major conclusions of the present study on the effect of eight weeks pulmonary rehabilitation programme incorporating breathing, physical exercises and psychosocial support on pulmonary functional measures, exercise capacity and health related quality of life of patients with chronic obstructive pulmonary disease are as follows

1. Practice of physical and breathing exercises with or without psychosocial support does not significantly improve pulmonary functional measures of patients with COPD

2. Practice of physical and breathing exercises improves
   i) Six minutes walking distance (24m; p < 0.05) and
   ii) Health related quality of life (22%; p < 0.001) of patients with COPD

3. Practice of physical and breathing exercises along with psychosocial support improves
   i) Six minutes walking distance (42m; p < 0.05) and
   ii) Health related quality of life (36%; p < 0.001) of patients with COPD

4. A significant improvement in six minutes walking distance occurs only during the second month (Phase II) of pulmonary rehabilitation in both exercise and exercise with psychosocial support groups
5. In the exercise with psychosocial support group statistically significant and clinically important improvements in health related quality of life have occurred in both phases of the rehabilitation programme, whereas in the exercise group statistically significant and clinically important improvement have occurred only in the second phase of the rehabilitation programme.

6. There is a moderate and high significant correlation \( r = 0.31; p < 0.001 \) between health related quality of life scores and six minutes walking distance, whereas pulmonary functional measures do not have any significant correlation with health related quality of life scores and six minutes walking distance.

### 6.6 IMPLICATIONS

The study has implications for nursing practice, nursing education, nursing administration, and nursing research.

#### 6.6.1 Nursing Practice

The nurses working in the hospital, clinical setting and in community could administer multi faceted pulmonary rehabilitation programme for patients with COPD. The handbook on pulmonary rehabilitation and exercise programme developed by the investigator may be used to educate, instruct and demonstrate the breathing and physical exercises to the patients with COPD. Continuous practice of breathing and physical exercises may be advised to alleviate dyspnoea and as much as possible, reverse the symptoms and patho-physiologic process leading to pulmonary
impairment and also to improve quality of life and survival. The developed HRQOL instrument could be used to evaluate the breathing, physical, social and emotional aspects and the progress of the patients with COPD who practice breathing and physical exercises regularly. Six minutes walking distance could be used as an outcome to measure the exercise capacity.

6.6.2 Nursing Education

The syllabus of Medical Surgical and Community Health Nursing need to be updated with recent modality like respiratory muscle training, concepts and technique of multidimensional pulmonary rehabilitation programme and administration of physical and breathing exercises along with drugs and oxygen. The study emphasises the need to organise a short-term course, workshop and in service education to nurses and paramedical workers.

6.6.3 Nursing Research

The essence of research is to build up a body of knowledge in nursing as it is an evolving profession. The effectiveness of the research study is verified by its utility by the nurses in the practical field. The finding of the present study serves as the base for the professionals and students to conduct further studies. The study helps the researchers to investigate further on the benefit of physical and respiratory exercises on patients with chronic obstructive pulmonary disease.

6.6.4 Nursing Administration

Leaders in nursing are challenged to undertake health needs, effective organization and management of the respiratory diseases such as COPD, Asthma etc. The nurse administrator should take active part in policy making, helps in developing, validating, approving protocols, procedures and standing orders related to pulmonary rehabilitation of patients with COPD. They
should concentrate on proper selection, placement and effective utilization of
the nurses and to allow them for creativity, interest and ability to rehabilitate
the patients with respiratory disorder specifically patients with COPD.
Ongoing educational programme on rehabilitative role of the nurses along
with good supervision of nursing care service helps to motivate nurses to
carry out rehabilitative aspects of patients with COPD in day to day nursing
practice. Establish a unit of pulmonary rehabilitation for patients with COPD.
Publishing the trends in use of multidimensional rehabilitative therapy.
Arrange telenursing conferences for nursing service and education with
national and international institutions would develop confidence among
nursing personnel.

6.7 RECOMMENDATIONS FOR FURTHER STUDY

1. A comparative study could be done between urban and rural
setting / inpatient and home rehabilitation programme for
COPD patients.

2. The newly developed HRQOL instrument could be tested for
its reliability and utilized for future research to find the
correlation between pulmonary function, exercise capacity and
HRQOL of COPD patients.

3. Effect of Yogic breathing exercise along with other routine
interventions could be studied.

4. Effect of rhythmic music during exercise training could be
studied. Since music therapy may reduce boredom, improve
concentration and coordination of COPD patients.

Long term maintenance and follow up study after pulmonary rehabilitation in
patients with COPD could be done for sustaining the benefits.
SELF CARE REQUISITES OF PATIENTS WITH COPD

Seeking & securing assistance for
- Dyspnoea management
- Breathing and physical exercise training
- Improvement of HRQOL

For continuous Improvement

Assessment of changes in
- Pulmonary functional measures (FVC, FEV₁, FEV₁/ FVC, PEFR)
- HRQOL
- 6 Minutes walking distance

Educative Role
- Disease Condition
- Risk Factors
- Drugs & Diet
- Coping Techniques

Supportive Role
- Demonstration of Exercises
- Guidance and supervision
- Periodic follow up

UNABLE TO

Unable to
- Acquire instruction on exercise training
- Practice and regulate breathing and physical exercise
- Cope with impairment
- Modify the life style and self concept

Identification of suitable
- Breathing exercises and
- Physical exercises

Development of
- Manual on education & exercises
- Tool for assessment of HRQOL

Fig. 2.1 Conceptual Frame Work Based on Dorothea Orem’s Self Care Nursing Model for The Study on Effect of Multi Dimensional Pulmonary Rehabilitation of Patients with COPD