"TO STUDY THE IMPACT OF PULMONARY REHABILITATION ON HEALTH RELATED QUALITY OF LIFE AMONG COPD PATIENTS IN A TERTIARY CARE CENTRE"

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MAY 2018

BONAFIDE CERTIFICATE

This is to certify that the dissertation "**TO STUDY THE IMPACT OF PULMONARY REHABILITATION ON HEALTH RELATED QUALITY OF LIFE AMONG COPD PATIENTS IN A TERTIARY CARE CENTRE**" is the Bonafide work done by **Dr. R.POONGUZHALI** during his **MD (Tuberculosis and Respiratory Diseases)** course from May 2015 to May 2016 at Government Kilpauk Medical College, Chennai.

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This is to certify that the dissertation titled "**TO STUDY THE IMPACT OF PULMONARY REHABILITATION ON HEALTH RELATED QUALITY OF LIFE AMONG COPD PATIENTS IN A TERTIARY CARE CENTRE"** is the Bonafide work done by **Dr.R.POONGUZHALI** during his MD **(Tuberculosis and Respiratory Diseases)** course from May 2015 to May 2018 at Government Kilpauk Medical College, Chennai, under my guidance.

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DECLARATION

I**, Dr. R.POONGUZHALI** solemnly declare that the dissertation titled "**TO STUDY THE IMPACT OF PULMONARY REHABILITATION ON HEALTH RELATED QUALITY OF LIFE AMONG COPD PATIENTS IN A TERTIARY CARE CENTRE"** has been prepared by me. This is submitted to "**The Tamil Nadu Dr. M.G.R. Medical University, Chennai"** in partial fulfillment of the requirement for the award of MD degree examination branch XVII **Tuberculosis and Respiratory Diseases** from May 2015 to May 2018.

Place: Chennai **Dr.R.Poonguzhali**

Date:

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles and gases.[1] Unlike earlier definitions, this definition does not mention emphysema or chronic bronchitis.

The chronic airflow limitation that is characteristic of COPD is caused by a mixture of small airway disease and parenchymal destruction, the relative contributors of which vary from person to person. These changes do not always together, but evolves over a time period at different rates. Chronic inflammation causes structural changes, narrowing of small airways and destruction of lung parenchyma leads to decrease lung elastic recoil, airflow limitation and mucociliary dysfunction which are characteristic of the disease.

Airflow limitation is measured by spirometry as it is the most widely available and reproducible test of lung function. It is important to recognize that chronic respiratory symptoms may precede the development of airflow obstruction and may be associated with acute respiratory events.

BURDEN OF COPD

- COPD is a major health problem worldwide[2].
- It is the leading cause of mortality and morbidity that induces an economic and social burden that is substantial and increasing[3].

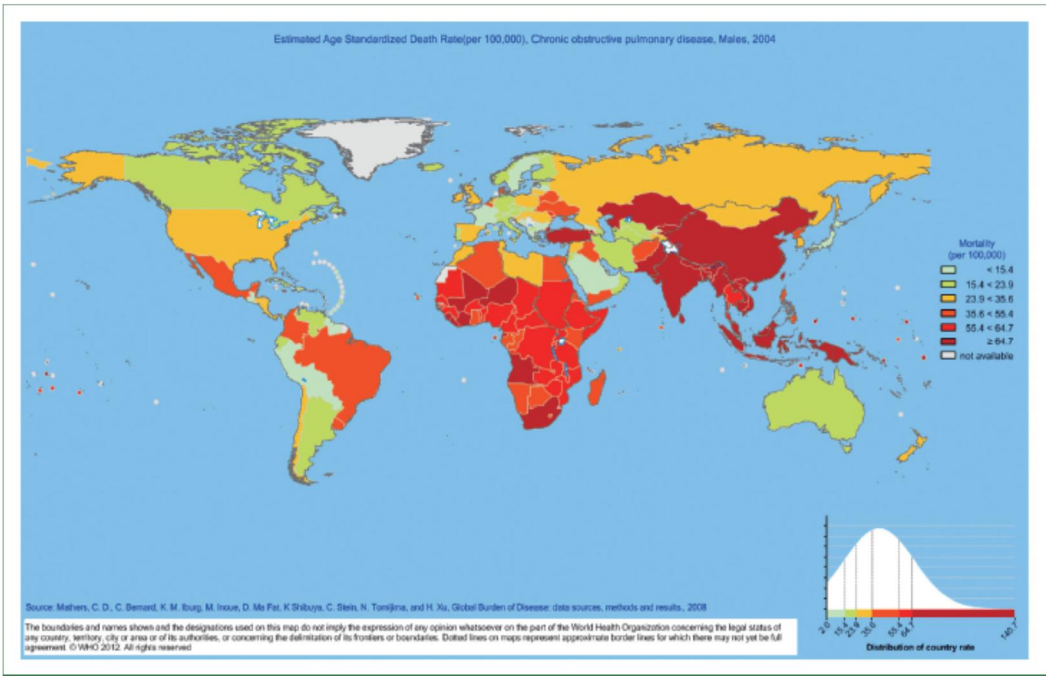

Fig 1: COPD mortality projections Global Burden of Disease Data 2011

- COPD is associated with significant economic burden
  - It accounts for 56% of the cost of respiratory disease in the total health care budget of European union[4]
  - In united states the estimated direct and indirect costs of COPD are $32 and $20.4billion respectively[5]
  - COPD exacerbations account for the larger portion of the total COPD budern on health care system

- As the disease severity and progression increases, the cost of care and the cost distribution changes
- In developing countries since human capital is often the most important national asset, the direct and indirect costs of COPD may represent a serious threat to the economy.

- The Global Burden of Disease study found that COPD increasingly contributes to reduced DALYs (Disabiltiy Adjusted Life Year) across the world.

PREVALENCE

Prevalence of COPD is being recognized increasingly in countries at all levels of development[6]. An ever-increasing number of smokers and an expanding number of elderly people are major factors in the surge in the worldwide prevalence of COPD. In large areas of the world where indoor air pollution is generated by burning biomass for heating and cooking, COPD is prevalent among nonsmokers, especially women[7].

At present, COPD is the third most common cause of death in the United States.[8] Based on BOLD (Burden of obstructive lung disease) and other largescale epidemiological studies , COPD has a global prevalence of 11.7% (95%CI 8.4% to 15.0%). There are 3 million deaths annually[9]

RISK FACTORS AND PATHOGENESIS

- Risk factors for the development of COPD are environmental and host based
- In developed countries, smoking tobacco is the predominant risk factor.
- Never-smokers also develop COPD and women predominate in this group. In places where solid fuels are burned, indoor air pollution is probably the dominant risk factor.

Environmental	Host-based
Smoking	Genetic
Indoor air pollution	Airway hyperreactivity
Occupation	
Low socioeconomic status	

Fig:2 Risk factors in COPD

- History of recurrent respiratory tract infections are considered to be one of the risk factors for COPD exacerbations. Its contribution in the pathogenesis of the disease is still un clear

PATHOGENESIS

Inhalation of cigarette smoke and other noxious particles such as smoke from biomass causes lung inflammation. Lung inflammation is a normal response that appears to be modifies in COPD. The chronic inflammatory process triggres parenchymal tissue destruction and disruption of normal defense & repair mechanisms which results in emphysema and small airway fibrosis respectively. These changes leads on to gas trapping and airflow limitation.

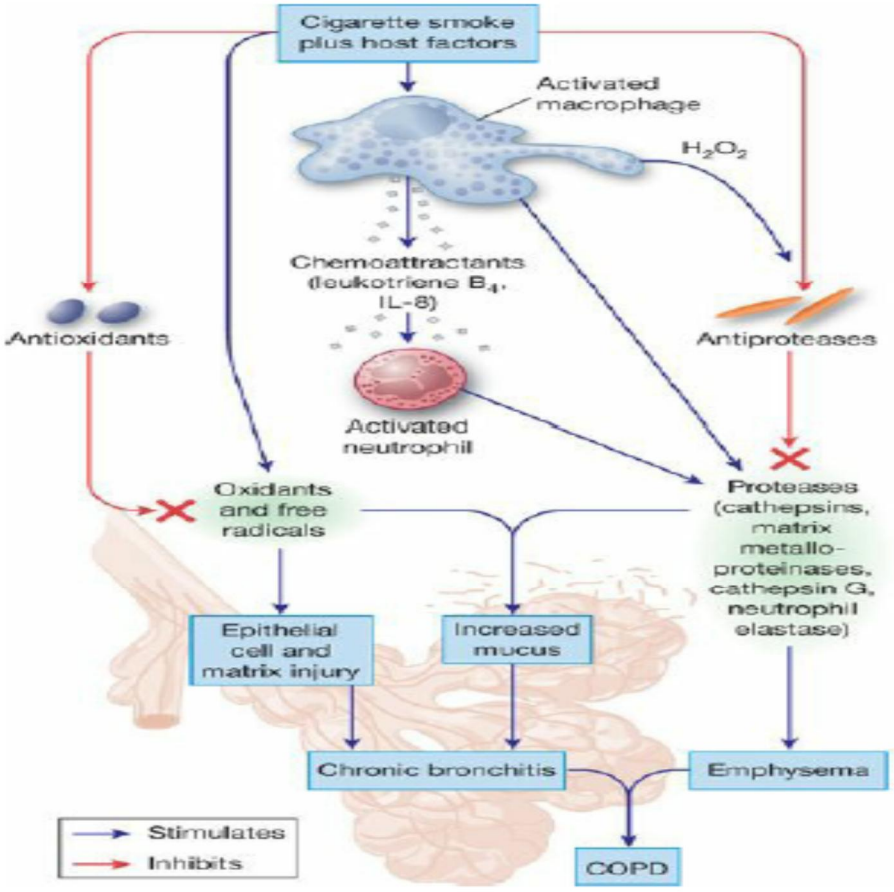

Fig 3: The pathogenesis of COPD from smoking

The various inflammatory cells that accumulate in the peripheral tissues of the lungs release proteinases and oxidants that damage or degrade extracellular matrix in the walls of alveoli, alveolar ducts, and respiratory bronchioles. In addition, agents in smoke and those released by inflammatory cells inactivate proteinase inhibitors such as α1-antitrypsin, and cause senescence and apoptosis of lung cells that produce extracellular matrix. Products of the damaged extracellular matrix, such as peptides of degraded elastin, are chemotactic for inflammatory cells; thus degradation of the extracellular matrix may lead to a feedback loop that perpetuates inflammation. These matrix-derived products may also elicit immune responses that lead to destruction of extracellular matrix

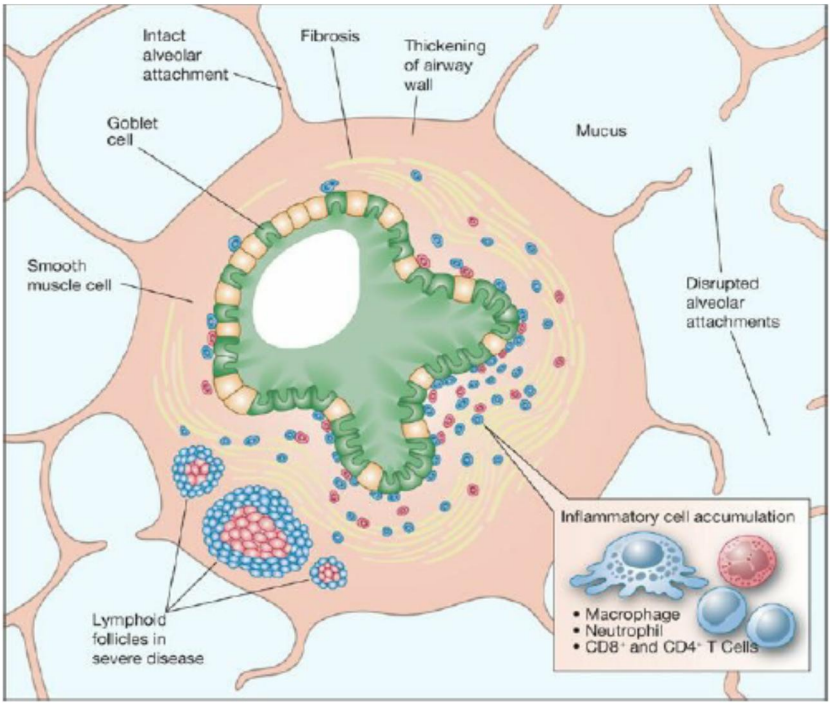

Fig 4: Pathologic lesions in small airways in COPD

Airways 2 mm or less in internal diameter normally contribute only a minor part of the total airway resistance, but that these airways are the principal sites of increased airway resistance in COPD [10]. Small airways in the lungs of individuals with COPD typically show goblet cell metaplasia, replacement of Clara cells with mucus-secreting cells, and Infiltration of the airway walls by inflammatory cells that, in severe disease, include an increased surface area of lymphoid follicles. Alveolar tissue surrounding small airways normally provides radial traction on bronchioles at points where alveolar septa attach. Loss of these bronchiolar attachments as a result of proteolytic destruction may contribute to airway distortion, narrowing, and instability [11].

A persistent reduction in FEV1/FVC is the defining physiological feature of COPD. Increased airway resistance, increased residual volume (RV), increased RV/total lung capacity ratio (RV/TLC),decreased inspiratory capacity, decreased maximum voluntary ventilation (MVV), abnormal distribution of ventilation, and ventilation–perfusion mismatching are also typical physiological features.

SYSTEMIC MANIFESTATIONS OF COPD

COPD is primarily characterized by the presence of airflow limitation, the disease is associated with several systemic manifestations that can effectively result in impaired functional capacity, worsening dyspnea, reduced health-related quality of life and increased mortality[12] . These comorbidities are due to systemic ‘‘spill-over’’ of the Inflammatory mediators and reparatory

events occurring in the lungs of patients with COPD, with the disease remaining at the center of the process.

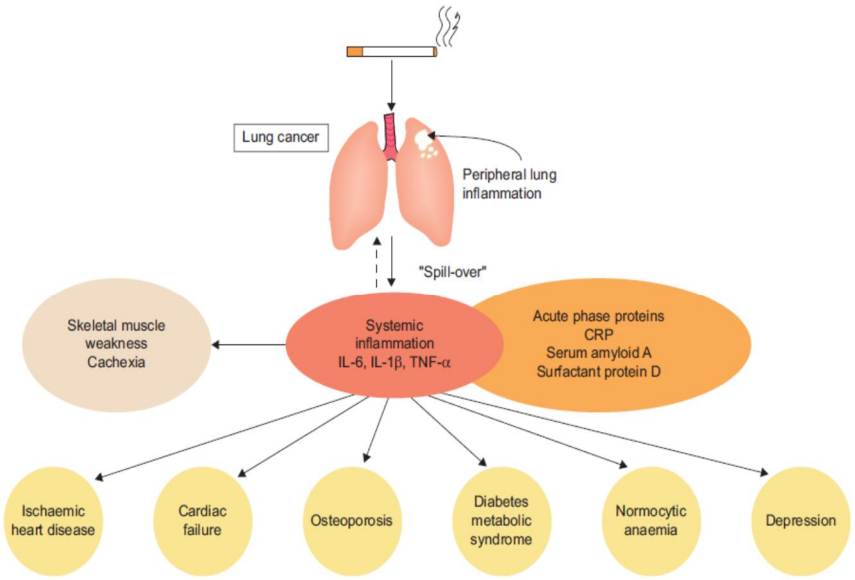

Fig 4: Systemic effects and comorbidities of COPD

Peripheral lung inflammation may cause a ‘‘spill-over’’ of cytokines, such as interlukin (IL)-6, IL-1b and tumour necrosis factor (TNF)-a, into the systemic circulation, which may increase acute-phase proteins such as C-reactive protein (CRP)[11]

TABLE 1 Systemic manifestations and comorbidities of chronic obstructive pulmonary disease

Skeletal muscle wasting
Cachexia: loss of fat-free mass
Lung cancer (small cell, nonsmall cell)
Pulmonary hypertension
Ischaemic heart disease: endothelial dysfunction
Congestive cardiac failure
Osteoporosis
Normocytic anaemia
Diabetes
Metabolic syndrome
Obstructive sleep apnoea
Depression

Comorbid diseases potentiate the morbidity of COPD, leading to increased hospitalizations, mortality and healthcare costs. Comorbidities complicate the management of COPD and need to be evaluated carefully.[13,14]

SKELETAL MUSCLE DYSFUNCTION IN COPD

Skeletal muscle weakness is one of the main systemic effects of COPD and is often accompanied by loss of fat-free mass (FFM) [15] which occurs in a slower rate. Muscle dysfunction is defined as the loss of at least one of the two main muscle properties: strength and endurance[16]

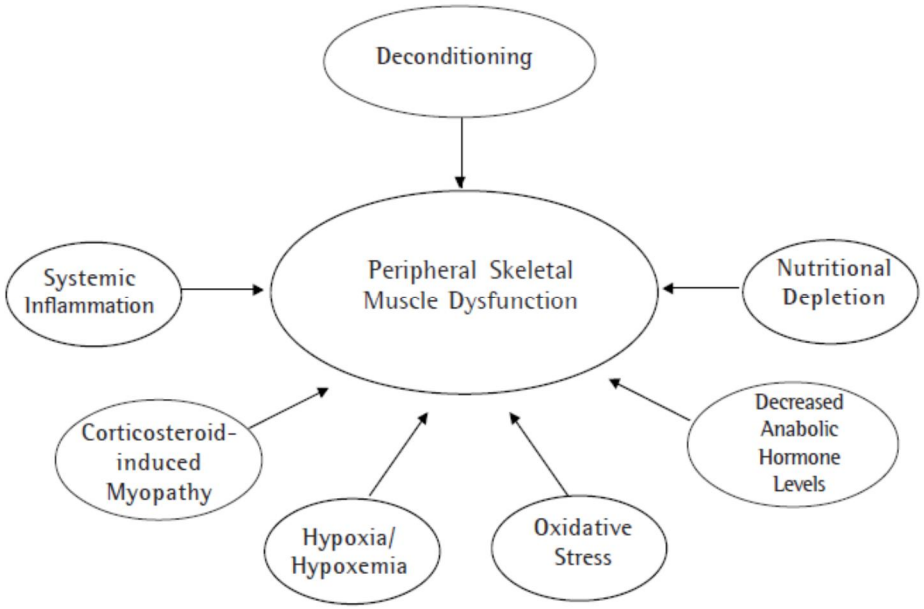

Fig 5:Pathophysiology of skeletal muscle dysfunction in COPD

Muscle strength is there defined as the amount of force generated by muscle contraction[17]. Strength mainly depends on muscle mass (which in turn is determined by the size and density of the fibers), muscle resting length, velocity of shortening, and the recruitment pattern of motor units [18].

Muscle strength is decreased in patients with COPD, the preferential reduction in lower limb strength may be due to a greater reduction in activity of the lower limbs in these patients[19,20,21]. Among the possible explanations for this are the fact that activities related to gait development are usually avoided by patients with COPD due to the sensation of dyspnea, as well as the predominance of upper-limb use in the performance of daily activities[22,23].

Muscle endurance is defined as the ability of a muscle group to execute repeated contractions over a period of time sufficient to cause muscular fatigue, or to maintain a specific percentage of the maximum voluntary contraction for a prolonged period of time[24]. Muscle endurance is decreased in patients with COPD.

Muscle fatigue developes When normal individuals exercise vigorously. With contractile fatigue, the force generated by the muscle for a given neural input decreases. Patients with COPD become breathless when they exercise, and may stop exercise because of breathlessness before they stress the exercising muscle sufficiently to develop fatigue.

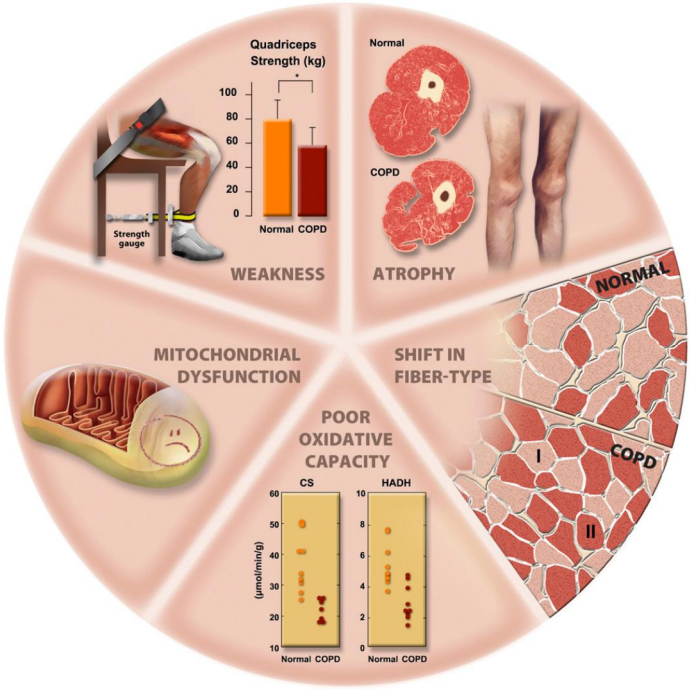

Fig 5: Skeletal muscle dysfunction vicious cycle

In COPD patients Muscle strength and endurance are decreased, whereas muscle fatigability is increased[25] reason being a reduced proportion of type I fibers and an increase in the proportion of type II fibers as compared with normal individuals[26-30]. ***Type I fibers*** are slow-twitch fibers, develop a relatively small tension, have increased oxidative capacity, and are resistant to fatigue***. Type IIb fibers*** are fast-twitch fibers, develop high tensions, depend primarily on anaerobic glycolytic metabolism, and are highly susceptible to fatigue. ***Type IIa fibers*** are intermediate in character. The increased proportion of type II fibers was of type IIb in most studies, this shift in fiber proportion should help to preserve strength, but at the cost of increased fatigability and reduced muscle endurance.In addition to the shift in fiber type, there is a reduction in cross-sectional area of type I and type IIa fibers (ie muscle atrophy).

Muscle deconditioning happens when exposed to repetitive dynamic situations, patients with COPD present an increase in the ventilatory demand, which forces them to avoid these activities and, as a consequence, they suffer from chronic sedentary behavior.[31] This in turn, reduces strength and muscle mass, as well as aerobic capacity, resulting in an even more intense ventilatory demand for the same dynamic activities, closing the dyspnea-sedentary lifestyle-dyspnea cycle[31]. Due to this knowledge and to findings in the literature, it became necessary to investigate the changes in muscle function that might be responsible for the exercise intolerance seen in patients with COPD[31].

PULMONARY REHABILITATION IN COPD PATIENTS

Pulmonary rehabilitation has been clearly demonstrated to reduce dyspnea, increase exercise capacity, and improve quality of life in individuals with COPD[33].

"***Pulmonary rehabilitation is defined as*** a comprehensive intervention based on a thorough patient assessment followed by patienttailored therapies that include, but are not limited to, exercise training, education, and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors."

The ***Goals Of Pulmonary Rehabilitation*** include minimizing symptom burden, maximizing exercise performance, promoting autonomy, increasing participation in everyday activities, enhancing (health-related) quality of life, and effecting long-term health enhancing behavior change [34].

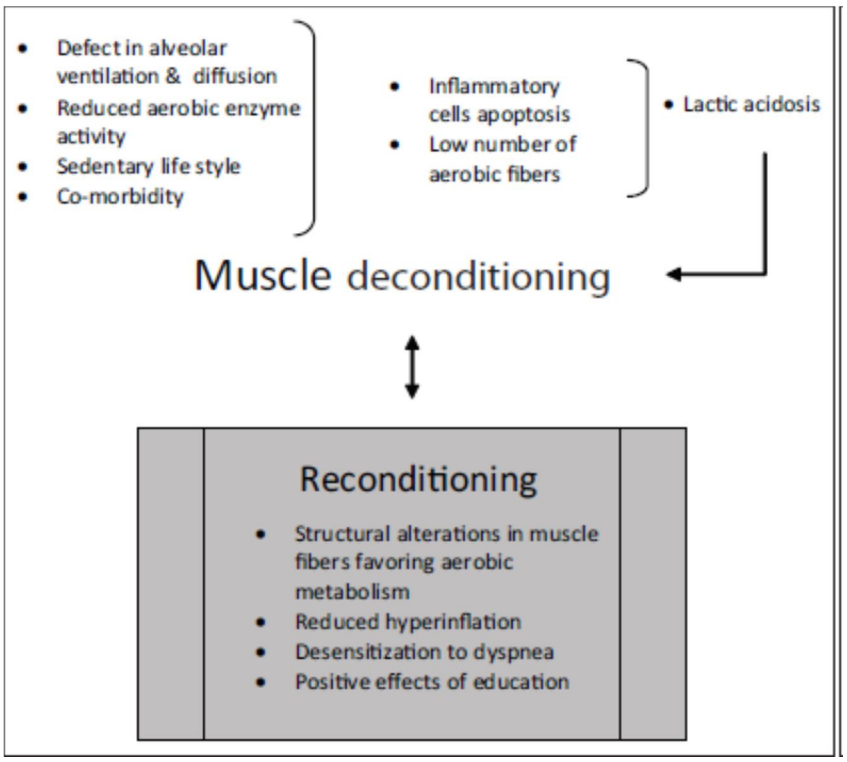

Fig 6: Effects of Pulmonary Rehabilitation

High-intensity rehabilitation exercises alter the muscle metabolism in a direction that enables a person to tolerate higher magnitude of work without appreciable dyspnea.

Peak oxygen consumption (VO2 max) is improved by such training. With rehabilitation, structural changes are also observed such as conversion of type IIb muscle fibers to type IIa fibers, increased number of mitochondria in

type I fibers and increased activity of mitochondrial enzymes like citrate synthetase and 3-hydroxyacyl-COA dehydrogenase. It leads to more aerobic metabolism and therefore less lactic acid and less CO2 production for a given level of exercise[35-37].

Exercise training includes endurance training, strength starining, interval training concentrating on lower limbs, inspiratory muscle training, neuromuscular electrical stimulation, upper limb training etc..[34]

AIM OF THE STUDY

Primary Aim: To study the impact of pulmonary rehabilitation on quality of life, exercise capacity, symptoms, exacerbations, hospital admissions and mortality in COPD patients.

Secondary Aim: To compare the outcomes of hospital based outpatient pulmonary rehabilitation and home based pulmonary rehabilitation.

REVIEW OF LITERATURE

Shahin Barakat et al [38]in 2008 conducted a prospective, parallel-group controlled study in france aimed at evaluating an outpatient rehabilitation program for COPD, using St.George's Respiratory questionnaire (SGRQ) measuring quality of life, the 6-minutes walk test (6-MWT) and BODE index as the primary outcome measures in 80 patients. The active group (n = 40) took part in a 14-week rehabilitation, control group (n=40) received usual out patient care. After rehabilitation there were significant changes within the components of the SGRQ (12.3 for the score total) with a P value of <0.05. They observed a significant increase in 6MWD and a decrease of two points (from 6 to 4) was noted in the score of the active group's BODE index without any change in the control group. They concluded that ***an outpatient-based 14-week rehabilitation program significantly improved the quality of life and exercise capacity without any change in the pulmonary function in patients with moderate COPD, and there was also a large decrease in the risk of death in rehabilitated patients*** as measured using the BODE index.

Zanchet et al*[39],** in 2005 evaluated the efficacy of pulmonary rehabilitation in improving exercise capacity, respiratory muscle strength and quality of life of 27 stable ex-smokers with chronic obstructive pulmonary disease in Brazil. After 6 weeks of PR there was a statistically significant decrease in the SGRQ scores: activities (pre-PR= 55 ± 21% vs. post-PR = 52 ± 19%), impact (pre-PR = 38 ± 16% vs. post-PR = 29 ± 14%) and total score (pre-PR = 46 ± 15% vs. post-PR= 38 ± 15%) ($p < 0.05$). 6MWD significantly improved post rehabilitation(pre-PR = 513 ± 99 m vs. post-PR = 570 ± 104 m).They finally described ***Pulmonary rehabilitation, when focused on physical training, is efficacious in increasing not only the distance walked in the 6-minute walk test but maximum upper limb load, maximal inspiratory pressure and quality of life as well.

Virendra singh et al[40] in 2001 studied the effect of domiciliary pulmonary rehabilitation in patients with COPD in Jaipur. 40 Severe COPD patients were included in a 4 week rehabilitation program and were divided into experimental and control group. 6MWD, FEV1 and various indices of Chronic Respiratory Disease Questionnaire were measured in both groups. ***Rehabilitation improved quality of life and exercise tolerance in the experimental group significantly with a P***

value <0.001 when compared to the control group. Though all the above parameters improved FEV1 did not show any significant improvement.

Shaik et al[41] in 2014 assessed the effect of Pulmonary rehabilitation on exercise tolerance and health related quality of life in COPD patients in Guntur. 30 subjects were randomly selected and divided into Experimental group and control group. After ***8 weeks of pulmonary rehabilitation the experimental group showed a clinical and statistical improvement in 6MWD and quality of life***(measured by SF-36). The study concluded that ***when pulmonary rehabilitation is started at the earliest following hospital admission*** leads to notable improvements in all the above mentioned parameters.

Elkhateeb et al[42] in 2014 evaluated the role of Pulmonary Rehabilitation program to Improve functional capacity as assessed by 6MWD test , dyspnea level assessed by MRC dyspnoea scale, PFT and ABG. 45 patients were enrolled and divded into 3 groups namely aerobic training group, respiratory training group and control group. There was a statistically significant improvement in 6MWD (Pvalue0.001) and BODE score (P-value 0.001) in aerobic training group. There was a higher % of improvement (66.7%) of dyspnea score grade within the respiratory training group. no statistically significant difference of both physiological parameters and ABG variables was observed between control and

respiratory training groups. ***A Short 6–8 week program especially aerobic training has improved exercise capacity, dyspnea scores and some components of BODE Index.***

Puhan et al [43] in 2008 did a pooled analysis of 9 randomized control trial involving 432 patients. Pulmonary rehabilitation significantly reduced hospital admissions (pooled odds ratio 0.22 [95% CI 0.08 to 0.58] and mortality (OR 0.28; 95% CI 0.10 to 0.84). Effects of pulmonary rehabilitation on health-related quality of life were well above the minimal important difference when measured by the CRQ and SGRQ. Pulmonary rehabilitation significantly improved exercise capacity and the improvement was above the minimally important difference (six-minute walk test (MD 77.70 meters; 95% CI 12.21 to 143.20) and shuttle walk test (MD 64.35; 95% CI 41.28 to 87.43).

Cote et al[44] conducted a prospective observational cohort study in USA. They included 246 patients, and grouped them into no PR (130 who declined rehabilitation/dropped out from PR), and PR (116 who completed PR). BODE was determined at entry, after PR, and at 1 and 2 yrs. Other outcomes were: length of stay (LOS) for respiratory-related hospitalisations and mortality. After PR, the BODE improved by 19% and returned to baseline after 2 yrs. The BODE worsened in the no PR group by 4% at 12 months and 18% at 2 yrs. Respiratory mortality at 2

yrs for PR was 7%, compared with 39% for no PR. LOS at 1 yr for COPD decreased 20% in PR, while it increased 25% in no PR. The study concluded that the BODE index improved whereas Hospital admissions, Length of stay in hospital and Mortality risk has reduced significantly following PR.

Holland et al[45] in 2016 conducted a randomised controlled equivalence trial with 12 months follow-up in Australia. Stable COPD patients were randomly assigned to receive 8 weeks of pulmonary rehabilitation. 166 patients were enrolled in to center based and home based rehabilitation program with 6MWD as the primary outcome measure. Post rehabilitation both the groups showed improvements in 6MWD. None of the groups outcome sustained till 12 months. They concluded that a ***home-based pulmonary rehabilitation model, delivered with minimal resources, produced significant shortterm clinical outcomes that were equivalent to centrebased pulmonary rehabilitation.*** Homebased pulmonary rehabilitation could be considered for people with COPD who cannot access centre-based rehabilitation services.

Oliveira et al[46] in 2010 at Brazil evaluated the outcomes of Outpatient and homebased rehabilitation. Study population was randomized into three distinct groups: an outpatient group, a home-based group and a control group. PR consisted of a combination of aerobic

exercises and strengthening of upper and lower limbs 3 times a week for 12 weeks. There was a significant difference in the distance covered on the six-minute walk test ($p < 0.05$) and BODE index ($p< 0.001$) in the outpatient and at-home groups after participating in the rehabilitation program compared to baseline. ***This study concluded that a home-based self-monitoring pulmonary rehabilitation program is as effective as outpatient pulmonary rehabilitation and is a valid alternative for the management of patients with COPD.***

Güell et al[47] in 2008 conducted a prospective, multicenter trial in Spain comparing the effects of a homebased pulmonary rehabilitation program and hospital-based program in terms of the exercise tolerance and health-related quality of life (HRQL) of patients with severe chronic obstructive pulmonary disease (COPD). Twenty-eight patients were randomized into 2 groups. Both groups showed a similar improvement in 6-minute walk test (mean difference, 8.7 m; *P*=.61). HRQOL measured with the Chronic Respiratory Questionnaire. The benefits were maintained in both groups 6 months after the programs ended. ***The study demonstrated the improvement in exercise tolerance achieved by COPD patients with an unsupervised home pulmonary rehabilitation program is similar to the outcomes of patients in a hospital-based program.***

Alison et al[48] in 2014 evaluated few Randomised controlled trials that used minimal, low cost equipment for endurance (eight trials) and strength training (three trials) compared to no training in people with COPD. Statistically and clinically significant differences in exercise capacity and quality of life, were demonstrated when exercise training with minimal equipment was compared to no training [six-minute walk test: mean difference 40 (95% CI: 13 to 67) metres; SGRQ Scores: the mean difference -7 (95% CI: -12 to -3) points]. While the number of studies are relatively small and of variable quality, ***there is growing evidence that exercise training using minimal, low cost equipment may be an alternative to equipment-intensive pulmonary rehabilitation programs.***

METHODOLOGY

Study group : Patients attending our COPD clinic

Study design : Prospective Comparative Study

Place of Study : Govt. Kilpauk Medical College and Govt Thiruvotteeswarar Hospital of Thoracic Medicine, Chennai.

Collaborating department : Department of Physical medicine and rehabilitation
Govt. Kilpauk Medical College

Duration of study : 6 months

Sample size : 72

Sampling method : Systematic Random Sampling

Inclusion Criteria :

- Patients with diagnosis of COPD as per GOLD guidelines[(1)]
- GOLD stage II,III&IV (moderate, severe and very severe COPD)
- Stable COPD patients

Exclusion Criteria

- Acute exacerbation of COPD
- Bronchial Asthma
- Bronchiectasis
- Interstitial lung disease
- Ischemic heart disease
- Neurological and orthopedic conditions
- Decompensated liver disease
- Renal failure
- Peripheral vascular disease
- Active pulmonary tuberculosis
- Retroviral disease

Data Collection Tools

- Spirometry – degree of airflow limitation
- St George Respiratory Questionnaire (SGRQ) - Quality of life
- Six minute walk test (6MWT) – Exercise capacity
- BODE Index (BMI,Obstruction,Dyspnea and exercise capacity) – Mortality
- COPD Assesment Test score (CAT) - severity of symptoms

STUDY DESIGN : FLOW CHART

Selection of study participants according to inclusion and exclusion criteria based on systematic random sampling from Pulmonary rehabilitation (PR) & COPD clinic register
(n= 72)

Hospital based Outpatient rehabilitation group

(n=24)

Who are newly registered to undergo Endurance training, lower limb, upperlimb and deep breathing exercises in Dept of Physical Medicine & Rehabilitation under supervision twice or thrice weekly for 3months will be observed & followed up at every visit to PR clinic.

Homebased rehabilitation group (n=24)

Who are newly registered for home based rehabilitation. who Will be taught lower limb endurance training, upperlimb excercises and deep breathing exercises at OPD and will practice at home thrice weekly for 3months. Patient will maintain a dairy of endurance training at home and will be followed up biweekly at PR clinic.

Non rehabilitation group (n=24)

Who were offered PR services but instead opted only for Usual care and medications. Will be followed up biweekly at COPD clinic till end of 3 months.

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Informed consent

INITIAL ASSESSMENT

- Relavent history
- Anthropometric measures
- Spirometry
- SGRQ
- 6MWT
- BODE index
- CAT score

FINAL ASSESMENT

OUTCOMES MEASURED USING:

- SGRQ
- 6MWT
- BODE index
- CAT score

DATA COLLECTION TOOLS

Health Related Quality of Life by St.George Respiratory questionnaire

Health Related Quality of Life (HRQL) in our patients was determined using St George Respiratory Questionnaire (SGRQ). Tamil version of SGRQ obtained from University of London was used in our study after obtaining their permission. The SGRQ was designed to measure HRQL in patients with COPD and bronchial asthma. It can also be used in bronchiectasis. It has also proven to be effective in those with kyphoscoliosis, sarcoidosis and cystic fibrosis.

The questionnaire has two parts. Part I generates the Symptoms score, while Part 2 generates the Activity and Impacts scores. Total score is also generated.

Part 1 assesses the patients' recollection of symptoms over the past 1 year. The questionnaire has not been designed to be an accurate tool for epidemiological purposes. The actual purpose of it is to measure the patient's perception of their recent pulmonary problems.

Part 2 of the questionnaire measures the patients' current functional status. The Activity score measures the disturbances in the daily physical activities of the patients.

The Impacts score measures the range of disturbances in psychological and sociological functions. It has been shown that Impact score relates not only to respiratory symptoms, but also correlates strongly with exercise performance as measured by 6minute walking test, level of dyspnoea as measured by

Modified Medical Council Research (mMRC) breathlessness grade and mood disturbances. Therefore the Impacts score is the most essential component of the questionnaire that covers a wide range of disturbances experienced in their daily lives by respiratory patients.

The questionnaire was interpreted using excel based SGRQ calculator provided by University of London. The calculator generates 4 scores namely Symptom score, Activity score, Impact Score ant Total score.

The Total score summarises the impact of COPD on the overall health status of the patient. Total score is expressed as a percentage of overall impairment. A total score 100 denotes worst possible health status while a total score of 0 denotes best possible health status. That is, as the SGRQ score increases, the HRQL of patient worsens.

A SGRQ total score of 10 is considered as the upper limit of normal population. Patients' HRQL was considered to be impaired if their SGRQ score was more than 10. However no methodology has been described to grade the impairment of HRQL using SGRQ score.

Hence we arbitrarily used the gradation **SGRQ total score HRQL impairment**

0-10 No impairment

10-40 Mild impairment

40-70 Moderate impairment

70-100 Severe impairment

EXERCISE CAPACITY BY SIX MINUTE WALK TEST

Exercise capacity was measured using six minute walk test (6MWT).The six minute walk test was done as per the American Thoracic Society recommendations.

The 6MWT was performed indoors, along a long, flat, straight, enclosed corridor with a hard surface that was least used by patients. The length of the corridor was marked every 3 meters. The turnaround points were highlighted using coloured obstacles. A starting line was also marked using coloured tape.

The patients were asked to wear comfortable dresses and foot wear.

They were asked to continue their usual medications. They were asked to avoid heavy meals before the test or indulge in any strenuous physical activity before 2 hours of beginning the test.

The patients were instructed to rest for 10 minutes in a comfortable chair before beginning the test. During this period their vitals were measured. The patients were then instructed to walk as far as possible in six minutes. They were allowed to slow down or rest and then continue the test if needed. A visual demonstration of the test was given before starting the test. Encouragement was given using standard phrases and body languages. Post testing, the patients were made to relax and vitals monitored again. The distance covered by them in 6 minutes was measured in metres.

BODE index

The BODE index incorporates four factors

- **B**ody Mass Index
- Degree of airflow **O**bstruction by FEV1
- **D**yspnoea level by mMRC grades
- **E**xercise capacity by 6MWD

The BODE index was calculated as follows(51)

1. Post bronchodilator FEV1 %

a. >= 65% 0 points

b. 50 - 64% 1 point

c. 36 - 49% 2 points

d. <= 35% 3 points

2.6MWD (m)

a. >=350m 0 points

b. 250 – 349m 1 point

c. 150 - 249m 2 points

d. <= 149m 3 points

3. MMRC scale

a. MMRC 0 0 points

b. MMRC 1 0 points

c. MMRC 2 1 point

d. MMRC 3 2 points

e. MMRC 4 3 points

4. Body Mass Index

a. > 21 0 points

b. <= 21 1 point

BODE index is calculated by the sum of the points got in each of these four categories(BMI,FEV1,mMRC,6MWD). Minimum score in BODE

index is 0 and the maximum score is 10.

COPD Assessment Test (CAT)

The COPD Assessment Test is a short and simple patient filled questionnaire used to assess the impact of symptoms of COPD on the health status of a COPD patient. It consists of 8 questions. Each question is given a maximum score of 5 and a minimum score of 0. Thus the total CAT score ranges from 0 to 40.

Higher score implies greater impact of level of symptoms on the health status of the patient.

The questionnaire has been shown to be highly reproducible and to have

a high level of internal consistency.It has also been shown to have high level of correlation with other measures of health status in COPD like SGRQ.

Tamil version of the document was used in our study.

CAT score Impact level of symptoms

0-5 None

5-10 Low

10-20 Medium

20-30 High

30-40 Very high

Analysis

- The collected data were analysed with IBM.SPSS statistics software 23.0 Version.
- To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables.
- To find the significant difference between the bivariate samples in Paired groups the Paired sample t-test was used & for Independent groups the Unpaired sample t-test was used.
- For the multivariate analysis the one way ANOVA with Tukey's Post-Hoc test was used.
- To find the significance in categorical data Chi-Square test was used. In all the above statistical tools the probability value .05 is considered as significant level.

RESULTS

A total of 72 patients were enrolled in the study

SOCIODEMOGRAPHIC CHARECTERISTICS OF OVER ALL STUDY POPULATION

AGE DISTRIBUTION AMONG OVERALL STUDY POPULATION

Among the study population (72) 62.44% of patients were between 51-60yrs of ageTable 2: Age Distribution among overall study population (n=72)

Age group	45-50 Yrs	51-55 Yrs	56-60 Yrs	61-65 Yrs	66-70 Yrs
No.Patients	7	22	23	16	2

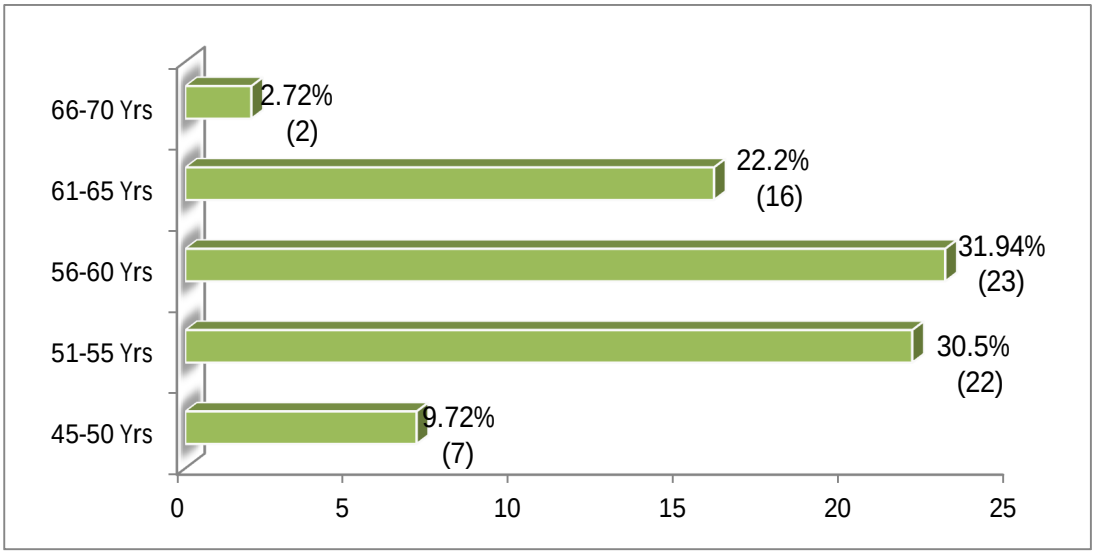


Fig 7: Age Distribution among overall study population (n=72)

SEX DISTRIBUTION AMONG OVERALL STUDY POPULATION

83.3% of patients were males and 16.6% were females among the study population Table 3: Sex Distribution among over all study population (n=72)

Sex	Males.	Females.
No.of Patients	60	12

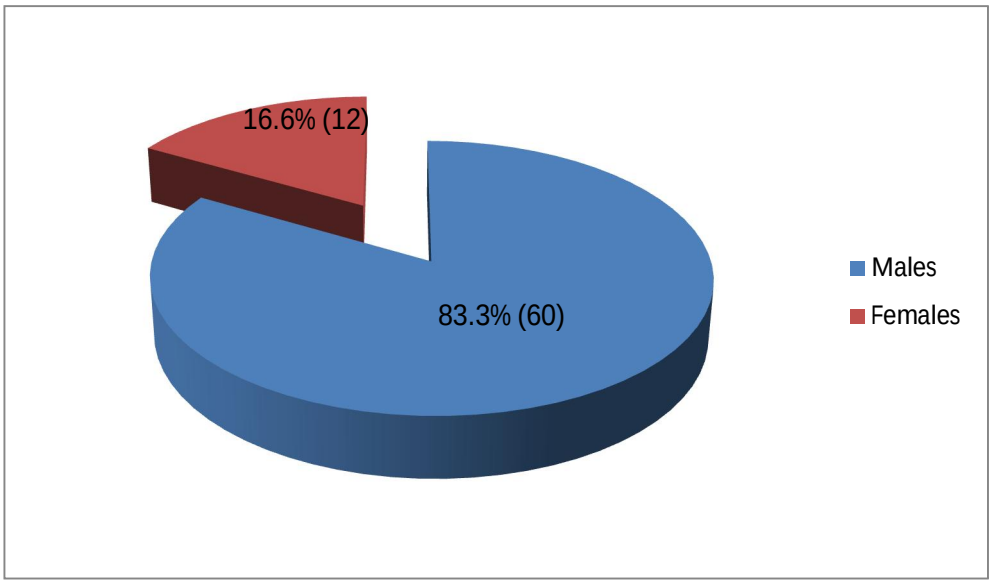


Fig 8: Sex Distribution among over all study population (n=72)

BMI DISTRIBUTION AMONG OVERALL STUDY POPULATION

Nearly 45.83% of the study patients were underweight among the study population Table 4: BMI Distribution among over all study population (n=72)

Body Mass Index	UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESE
No.Of.Patients	33	37	2	0

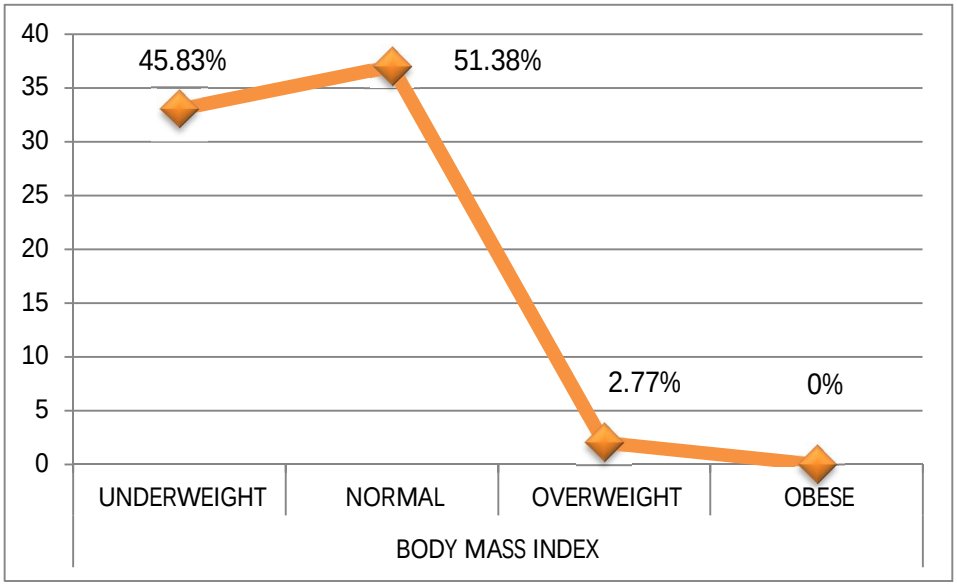


Fig 9: BMI Distribution among over all study population (n=72)

COPD SEVERITY BY GOLD STAGING AMONG OVERALL STUDY POPULATION

Among the overall study population 34.5% of patients had Moderate disease, 45.83% had Severe disease and 19.4% of patients had Very Severe disease.

Table 5: GOLD stage in study population (n=72)

GOLD Stage	MODERATE	SEVERE	V.SEVERE
No.of patients	25	33	14

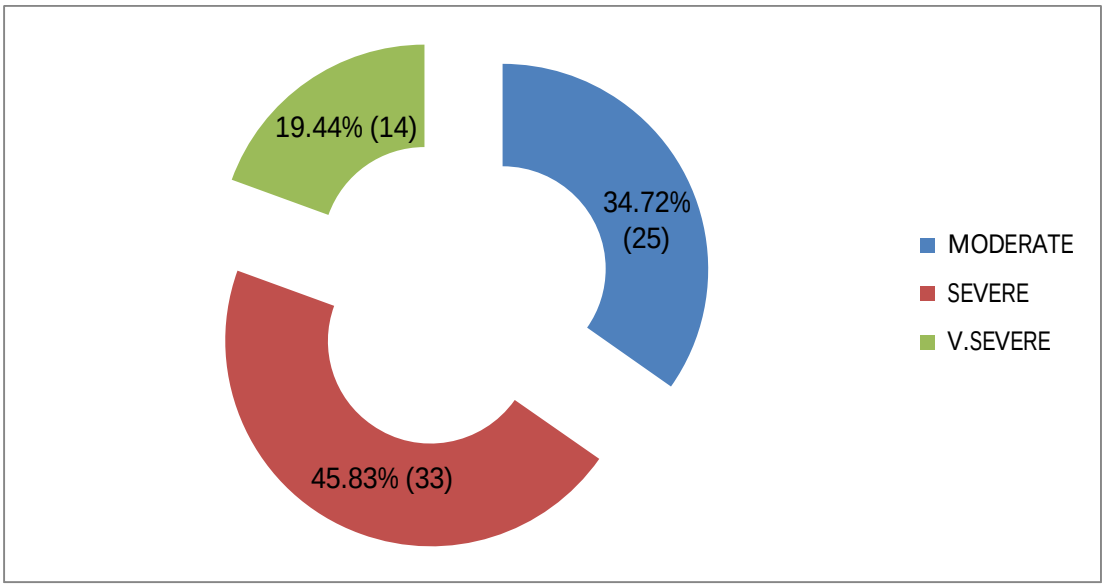
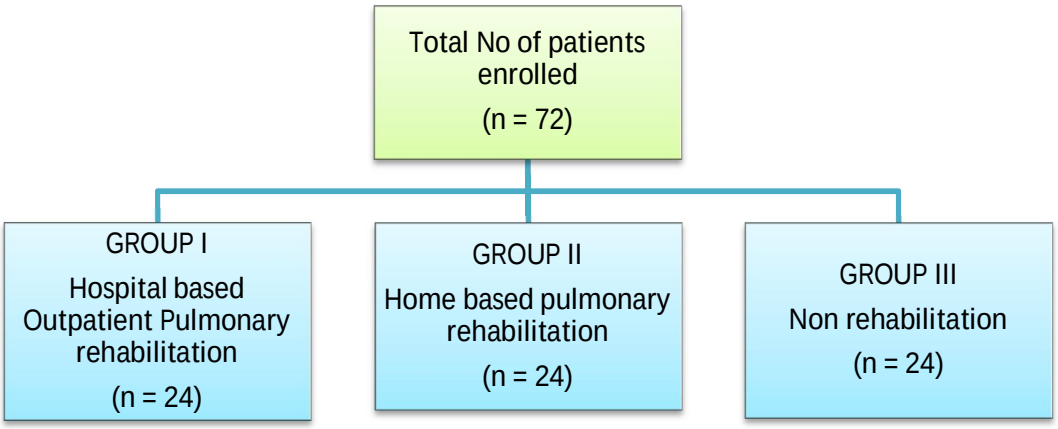


Fig 10: GOLD stage in study population (n=72)

GROUPING OF THE STUDY POPULATION

72 patients were enrolled in the study and they were grouped into 3 by random sampling



GROUP I – Hospital based Outpatient pulmonary rehabilitation

GROUP II – Home based pulmonary rehabilitation

GROUP III – Non Rehabilitation

All 3 groups contained 24 patients each

AGE DISTRIBUTION IN EACH GROUP

In Out patient group 50% of the patients were between 56-60yrs , 37.5% of them were between 51-55yrs in Homebased Group and Non Rehabilitation group

Table 6: Age Distribution In Each Group (n=24)

AGE	OP REHAB	HOME BASED	NON REHAB
45-50 Yrs	0	4	3
51-55 Yrs	6	9	9
56-60 Yrs	12	4	7
61-65 Yrs	6	6	7
66-70 Yrs	0	1	1

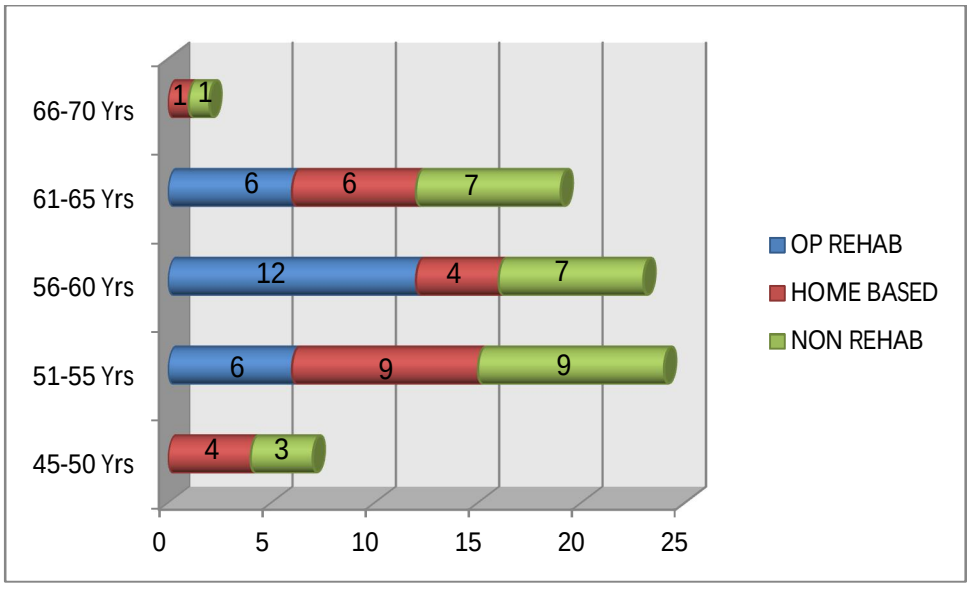


Fig 11: Age Distribution In Each Group (n=24)

SEX DISTRIBUTION IN EACH GROUP

In Out patient Group 91.6 % were males and 8.33% were females, 83.3% of males and 16.6% of females belonged to Homebased group. In Non rehabilitation group 87.5% were males and 12.5% were females.

Table 7: Sex Distribution In Each Group (n=24)

SEX	OP REHAB	HOME BASED	NON REHAB
MALES	22	20	21
FEMALES	2	4	3

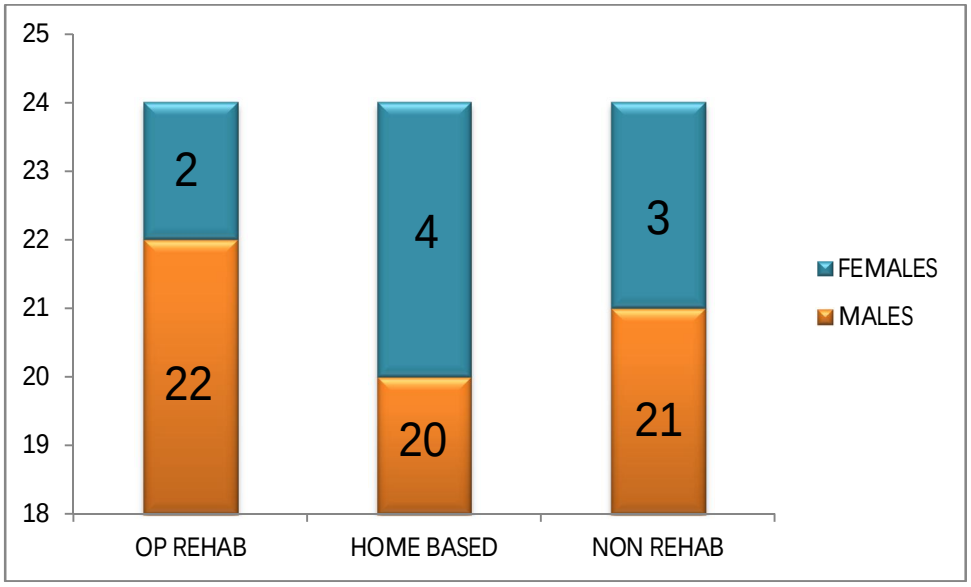


Fig 12: Sex Distribution In Each Group (n=24)

BMI DISTRIBUTION IN EACH GROUP

50% of them were under weight in Outpatient group. 43.8% and 41.6% were underweight in Homebased and Non Rehabilitation group respectively.

Table 8: BMI Distribution In Each Group (n=24)

BMI	OP REHAB	HOME BASED	NON REHAB
UNDERWEIGHT	12	11	10
NORMAL	12	13	12
OVERWEIGHT	0	0	2
OBESE	0	0	0

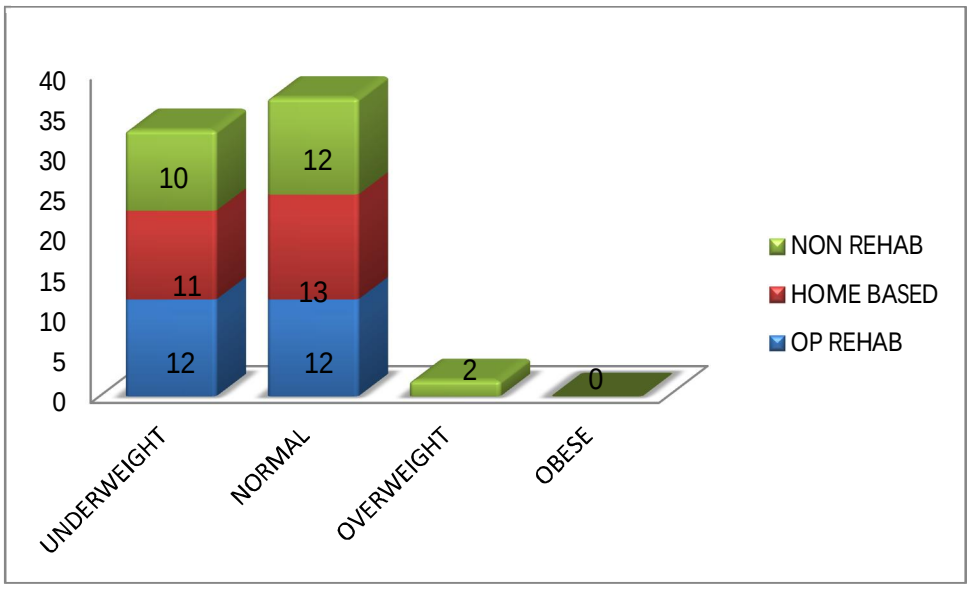


Fig 13: BMI Distribution In Each Group (n=24)

COPD SEVERITY BY GOLD STAGING IN EACH GROUP

54% of them had Severe COPD in Outpatient group, 45.8% had Moderate COPD in Homebased group. In Non rehabilitation group 37.5% had Severe COPD

Table 9: GOLD Stage In Each Group (n=24)

GOLD STAGE	OP REHAB	HOME BASED	NON REHAB
MODERATE	7	11	8
SEVERE	13	8	9
V.SEVERE	4	5	4

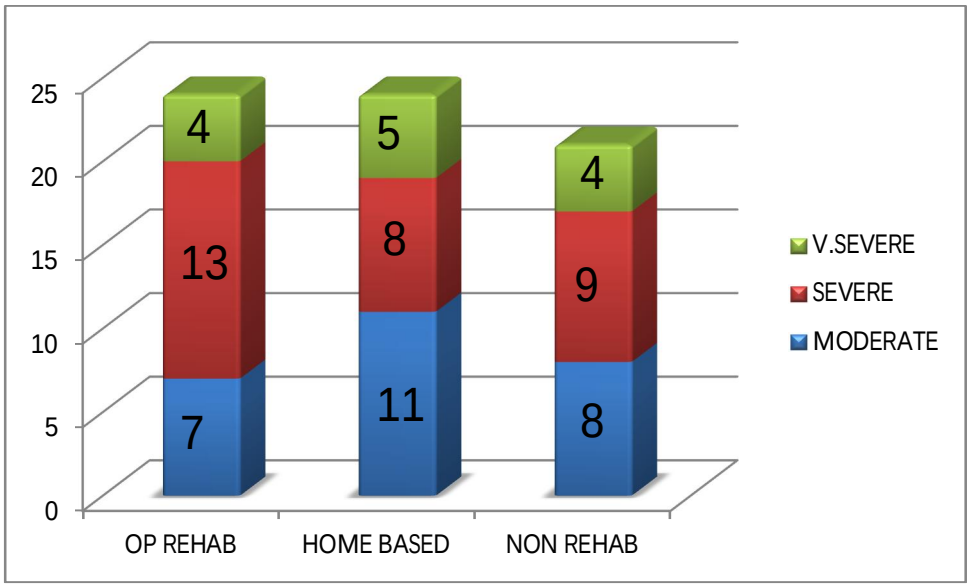


Fig 14: GOLD Stage In Each Group (n=24)

OVER ALL DROP OUTS AMONG THE STUDY POPULATION

Among the overall study population 23.6% of them dropped out, only 76.3% of the patients were adherent. 50% of them dropped out in Outpatient rehabilitation group. 20.83% of them dropped out in Homebased group. There were no dropouts in Non rehabilitation group.

Table 11: Drop Outs Among The Study Population

STUDY GROUPS	TOTAL ENROLLED	DROPPED OUT
Outpatient Rehabilitation Group	24	12
Home Based Rehabilitation Group	24	5
Non Rehabilitation	**24**	**0**
Grand Total	**72**	**17**

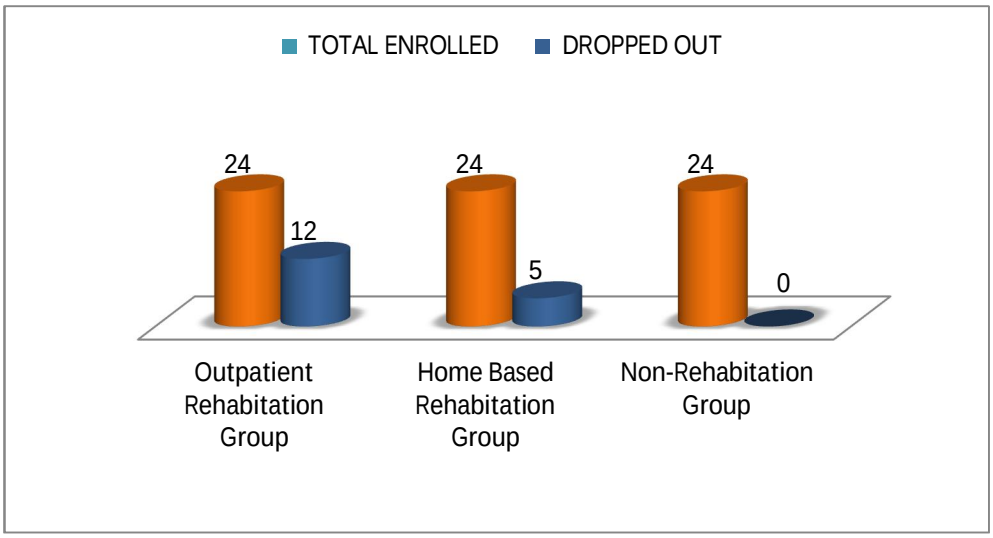


Fig 16: Drop Outs Among The Study Population in each group

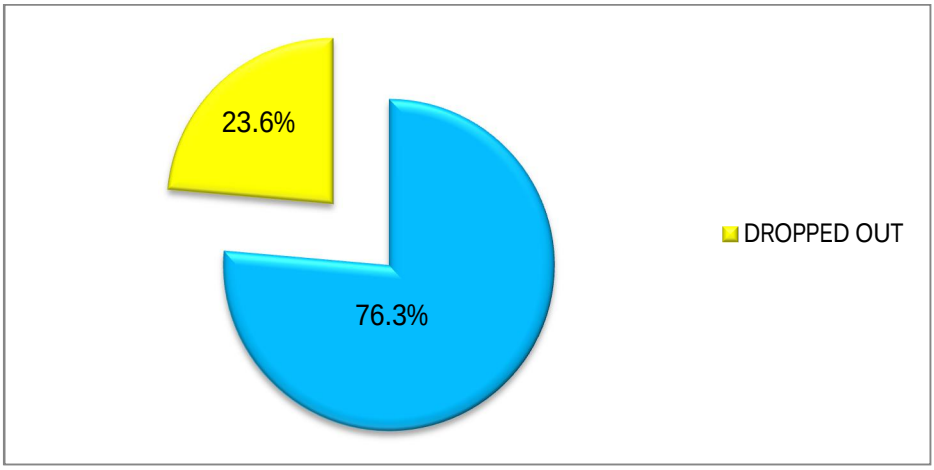


Fig 17: Drop Outs Among Overall Study Population

COPD SEVERITY IN DROP OUTS

Among the Outpatient group 50% of them dropped out in V.Severe COPD, 53.84% of them dropped out in Severe COPD, 42.8% dropped out in Moderate COPD

Table 12: COPD Severity of Drop outs in Outpatient Rehabilitation Group

GOLD Stage	completed	Drop Out
Moderate	4	3
severe	6	7
v.severe	2	2

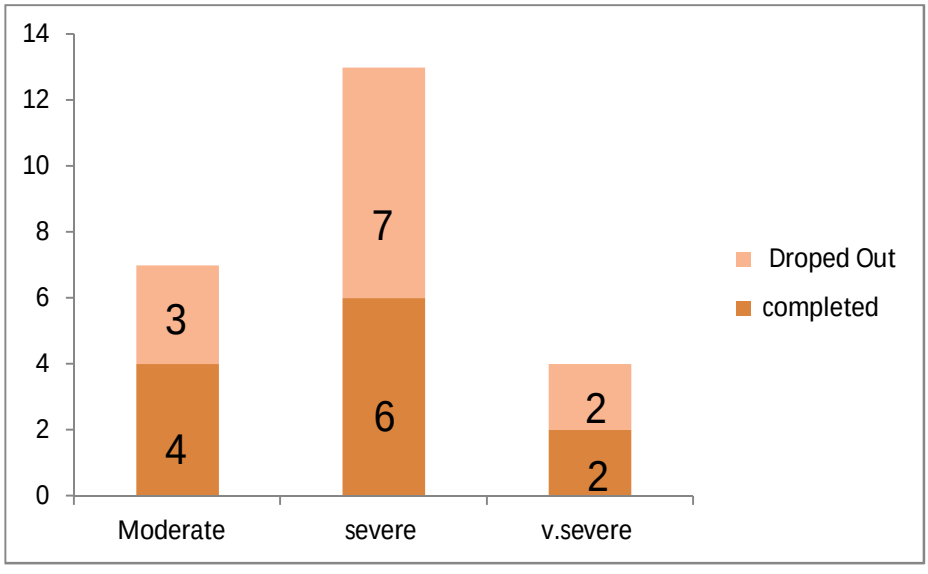


Fig 18: COPD Severity of Drop outs in Outpatient Rehabilitation Group

Table 13: COPD Severity of Drop outs in HomeBased Rehabilitation Group

GOLD Stage	completed	Droped Out
Moderate	11	0
severe	6	2
v.severe	2	3

There were no drop outs in Moderate COPD. 25% dropped out in Severe COPD. 60% dropped out in V.severe COPD

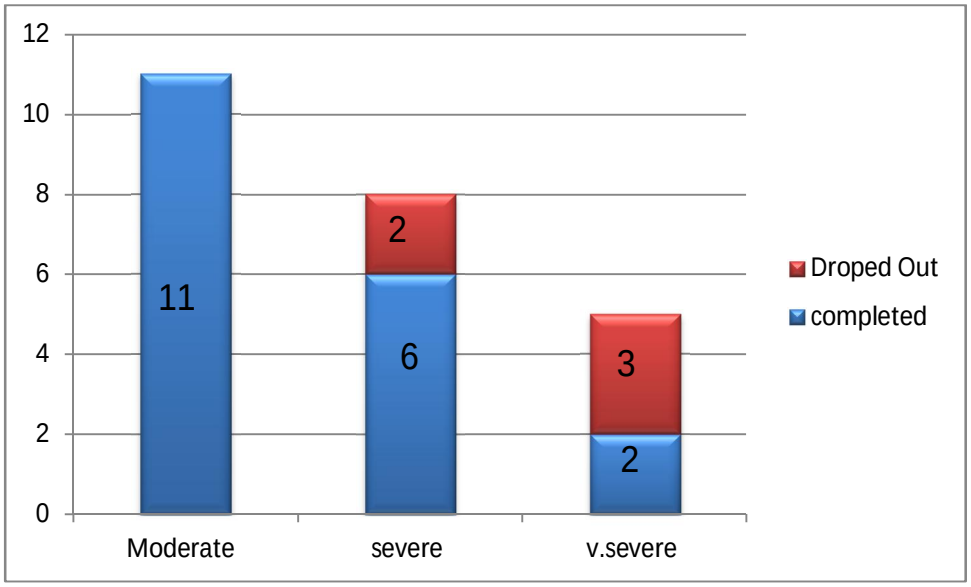


Fig 19: COPD Severity of Drop outs in Outpatient Rehabilitation Group

COMPARISON OF ST.GEORGE RESPIRATORY QUESTIONNAIRE SCORES IN EACH GROUP

Mean Pre & Post SGRQ scores in Group I are 59.8±15.9 and 46.6±23.7 respectively. As the severity of the disease increases the scores increases (worsens). The mean difference in Post SGRQ scores was 13.2±8.09 with statistical significance, **P value <0.0001**

Table 14: SGRQ Scores In Outpatient Group (I) in comparision with COPD severity

S.I.No	GOLD STAGE	Pre SGRQ	Post SGRQ	Mean Pre SGRQ	Mean Post SGRQ
1	Moderate	36.72	10.28		
2	Moderate	43.48	27.34	38.84	15.97
3	Moderate	35.17	8.65		
4	Moderate	40	17.63		
5	Severe	69.58	58.5		
6	Severe	72.69	64.43		
7	Severe	71.34	67.52	69.00	59.33
8	Severe	68.32	56.88		
9	Severe	66.68	53.85		
10	Severe	65.44	54.82		
11	V.Severe	75.49	70.52	74.55	69.95
12	V.Severe	73.62	69.38		

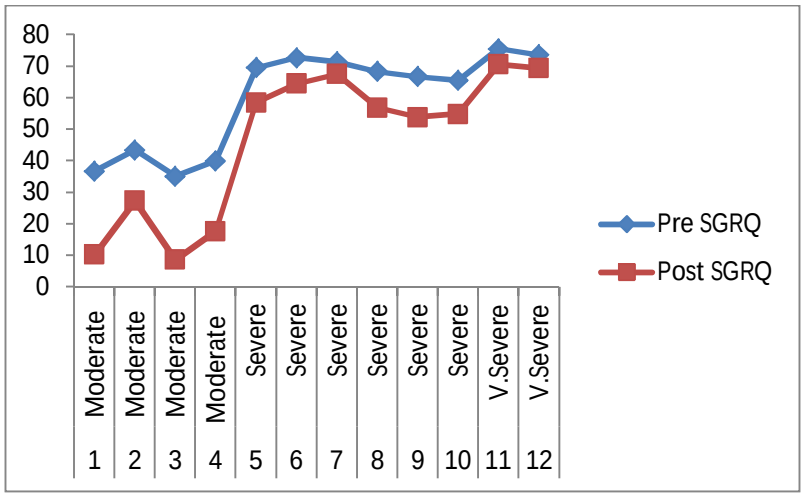


Fig 20: SGRQ Scores In Outpatient Group(I) in comparision with COPD severity

Table 15: SGRQ Scores In Home Based Rehabiltation Group (II) in comparision with COPD Severity

Mean Pre & Post SGRQ scores in Group II are 50.9±19.5 and 34.2±27.1 respectively. As the severity of the disease increases the scores increases (worsens). The mean difference in Post SGRQ scores was 16.69±8.29 with statistical significance, **P value <0.0001.**

S.NO	GOLD STAGE	Pre SGRQ	Post SGRQ	Mean Pre SGRQ	Mean Pre SGRQ
1	Moderate	32.91	8.91		
2	Moderate	30.4	9.4		
3	Moderate	35.33	10.62		
4	Moderate	33.75	10.75		
5	Moderate	37	10.57		
6	Moderate	32.3	8.78	35.05	12.07
7	Moderate	32.3	10.82		
8	Moderate	35.59	23.65		
9	Moderate	38	14.76		
10	Moderate	40	12.76		
11	Moderate	38	11.8		
12	Severe	68.43	59.43		
13	Severe	79	70.62		
14	Severe	78	69.54	71.71	62.78
15	Severe	69.85	57.53		
16	Severe	70	62.72		
17	Severe	65	56.84		
18	V.Severe	76.15	71.24	75.80	70.35
19	V.Severe	75.46	69.46		

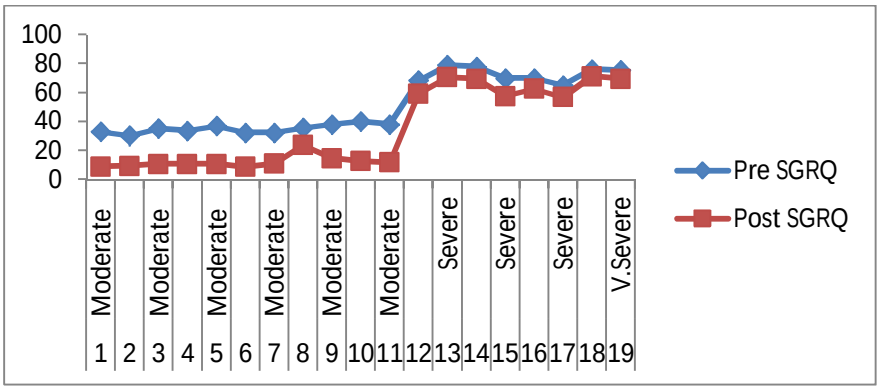


Fig 21:: SGRQ Scores In Home Based Rehabiltation Group (II) in comparision with COPD Severity

Table 16: SGRQ Scores In Non-Rehabilitation Group(III) in comparision with COPD severity

Mean Pre & Post SGRQ scores in Group III are 49.7±13.2 and 47.1±13.1 respectively. As the severity of the disease increases the scores increases (worsens). The mean difference in Post SGRQ scores was 2.6±3.3 with no statistical significance (P Value = 0.110)

S.NO	GOLD STAGE	Pre SGRQ	Post SGRQ	Mean Pre SGRQ	Mean Post SGRQ
1	Moderate	31.22	29.22		
2	Moderate	28.6	24		
3	Moderate	32	28		
4	Moderate	31.69	30.69	31.37	29.07
5	Moderate	30.4	29.34		
6	Moderate	34.83	32.83		
7	Moderate	30.91	29.41		
8	severe	55.4	50.45		
9	severe	50.7	53.65		
10	severe	47.45	42.45		
11	severe	56.78	58.82		
12	severe	60.2	56.2		
13	severe	54.32	52.54	54.17	52.26
14	severe	55	52.34		
15	severe	49.83	50.53		
16	severe	62.97	64.97		
17	severe	49.5	40.64		
18	severe	54.26	52.26		
19	severe	53.64	52.37		
20	v.severe	60.5	58.5		
21	v.severe	62.74	61.74		
22	v.severe	65.12	62.12	64.98	60.26
23	v.severe	65.3	60.3		
24	v.severe	71.25	58.64		

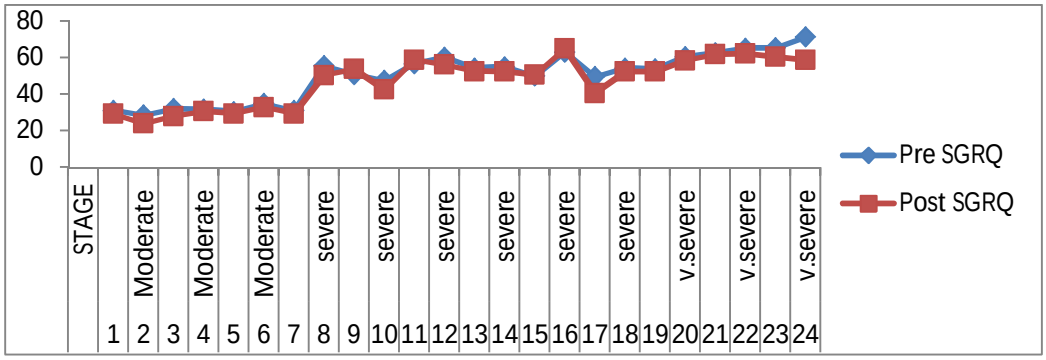


Fig 22:SGRQ Scores In Non-Rehabilitation Group(III) in comparision with COPD severity

Table 17: Comparison Of SGRQ Scores In Each Group

Post rehabilitation 16.66% and 36.84% of study population reached No Impairment level in OPD and Homebased group

SGRQ Scores	OP		Homebased		Non-rehab	
	Pre	Post	Pre	Post	Pre	Post
0 - 10 (No impairment)	0	2	0	7	0	0
11 - 40 (Mild impairment)	1	2	11	4	7	9
41 - 70 (Moderate impairment)	7	8	4	8	16	12
> 70 (Severe impairment)	4	0	4	0	1	3

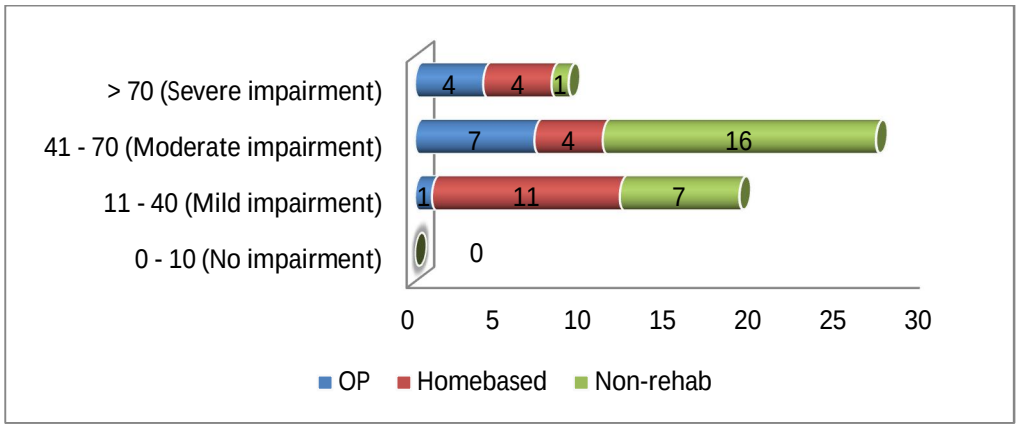


Fig 23: Comparison Of Pre SGRQ Scores In Each Group

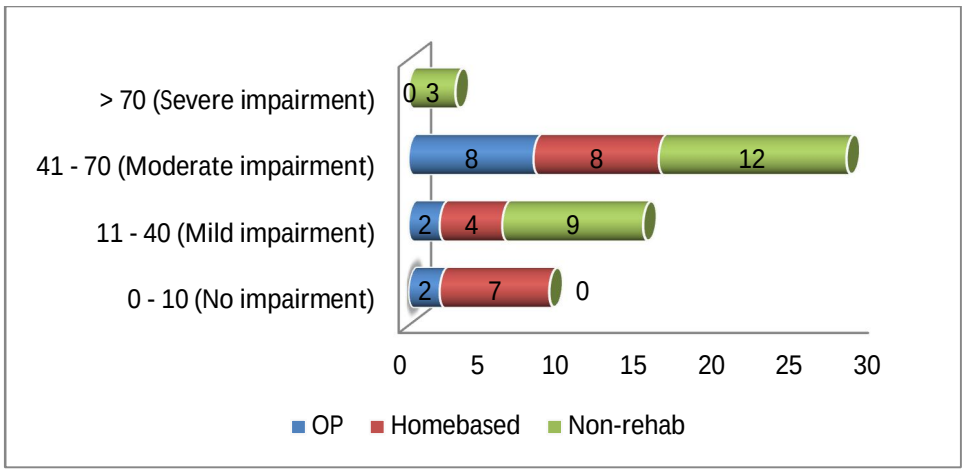


Fig 24: Comparison Of Post SGRQ Scores In Each Group

COMPARISION OF SIX MINUITE WALK DISTANCE IN EACH GROUP

Table 18: 6MWD In Outpatient Rehabilitation Group (I) in comparision with COPD severity

Mean Pre & Post 6MWD in Group I are 267.5±76 mts and 346.3±94mts respectively. As the severity of the disease increases the distance walked decreases. The mean difference in Post 6MWD was 78.8±24 with statistical significance (**P Value < 0.0001**)

S.I.No.	GOLD STAGE	Pre 6MWD	Post 6MWD	Mean Pre 6MWD	Mean Post 6MWD
1	Moderate	390.35	483.59		
2	Moderate	350.60	447.61	368.23	468.43
3	Moderate	340.00	456.52		
4	Moderate	392.00	486.00		
5	Severe	220.86	303.00		
6	Severe	225.00	296.45		
7	Severe	237.61	305.49	223.34	302.68
8	Severe	230.00	311.72		
9	Severe	210.45	297.00		
10	Severe	216.12	302.42		
11	V.Severe	212.20	243.84	198.51	233.23
12	V.Severe	184.83	222.62		

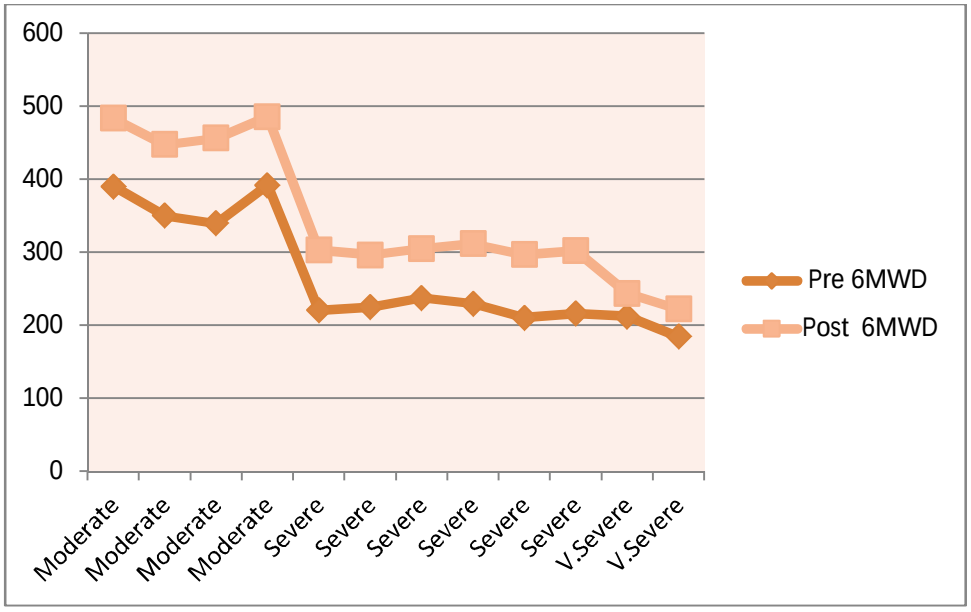


Fig 25: 6MWD In Outpatient Rehabilitation Group (I) in comparision with COPD severity

Table 19: 6MWD In Comparision With COPD Severity In Homebased Rehabilitation Group (II)

Mean Pre & Post 6MWD in Group II are 329.4±95mts and 416±119mts respectively. As the severity of the disease increases the distance walked decreases. The mean difference in Post 6MWD was 87±28mts with statistical significance (**P Value < 0.0001**)

S.NO	GOLD STAGE	Pre 6MWD.	Post 6MWD.	Mean Pre 6MWD	Mean Post 6MWD
1	Moderate	404.00	524.00		
2	Moderate	395.00	510.00		
3	Moderate	415.00	522.00		
4	Moderate	388.00	494.00		
5	Moderate	395.00	506.00		
6	Moderate	393.00	513.00	406.81	513.32
7	Moderate	432.00	514.00		
8	Moderate	415.00	532.00		
9	Moderate	426.00	526.34		
10	Moderate	389.00	487.00		
11	Moderate	423.00	518.20		
12	Severe	261.73	301.23		
13	Severe	234.00	298.00		
14	Severe	230.00	310.00	235.78	305.70
15	Severe	241.00	317.28		
16	Severe	210.00	306.89		
17	Severe	238.00	300.83		
18	V.Severe	193.00	230.00	184.51	218.21
19	V.Severe	176.00	206.43		

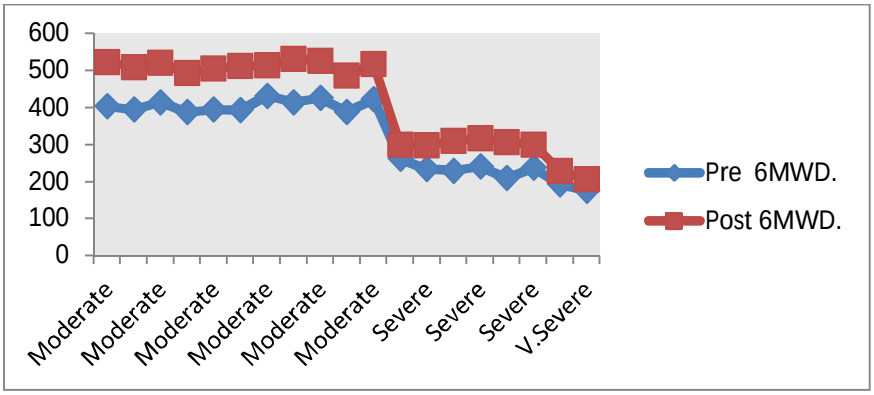


Fig 26: 6MWD In Comparision With COPD Severity Homebased Rehabilitation Group (II)

Table 20: 6MWD In Comparision With COPD Severity Non Rehabilitation Group (III)

Mean Pre & Post 6MWD in Group III are 248±52mts and 252±59mts respectively. As the severity of the disease increases the distance walked decreases. The mean difference in Post 6MWD was 3.2±2.2mts with no statistical significance (**P Value 0.176**)

S.NO	GOLD Stage	Pre 6MWDT	Post 6MWDT	Mean Pre 6MWD	Mean Post 6MWD
1	Moderate	300	320.43		
2	Moderate	300	314		
3	Moderate	300	318		
4	Moderate	307.3	323.3	307.61	323.79
5	Moderate	300	320		
6	Moderate	310	329		
7	Moderate	336	341.84		
8	Severe	264.3	255		
9	Severe	240	245.3		
10	Severe	270	274.45		
11	Severe	246	251.23		
12	Severe	252	237		
13	Severe	270	263		
14	Severe	240	251	248.62	246.44
15	Severe	266.2	261		
16	Severe	254	266.52		
17	Severe	215	205.78		
18	Severe	256	245		
19	Severe	210	202		
20	V.Severe	144	138.62		
21	V.Severe	180	175.34		
22	V.Severe	164	162.42	167.8	165.76
23	V.Severe	167	160.45		
24	V.Severe	184	192		

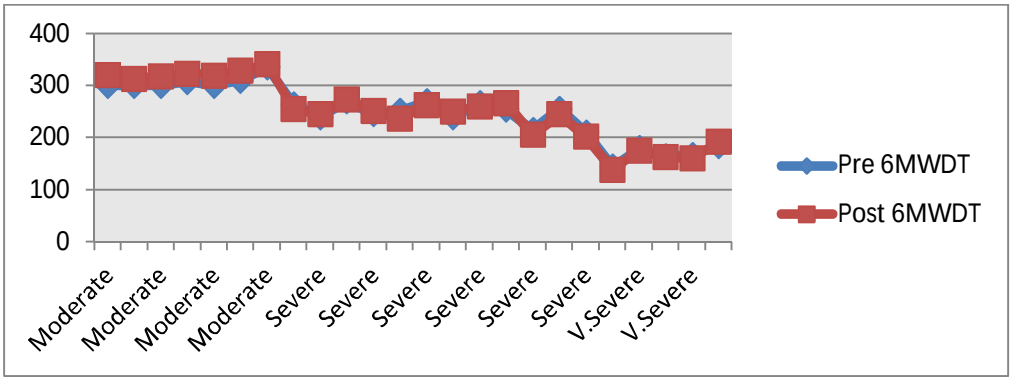


Fig 27: 6MWD In Comparision With COPD Severity Non Rehabilitation Group (III)

Table 21: Comparison Of 6MWD In Each Group

Post rehabilitation 41.6% in OPD group and 42.1% in homebased group walked > 450mts

6MWD	OP		Homebased		Non-rehab	
	Pre	Post	Pre	Post	Pre	Post
>450	0	3	1	11	0	0
351-450	2	1	10	1	0	0
251-350	4	8	1	7	14	14
<250	8	0	7	1	10	10

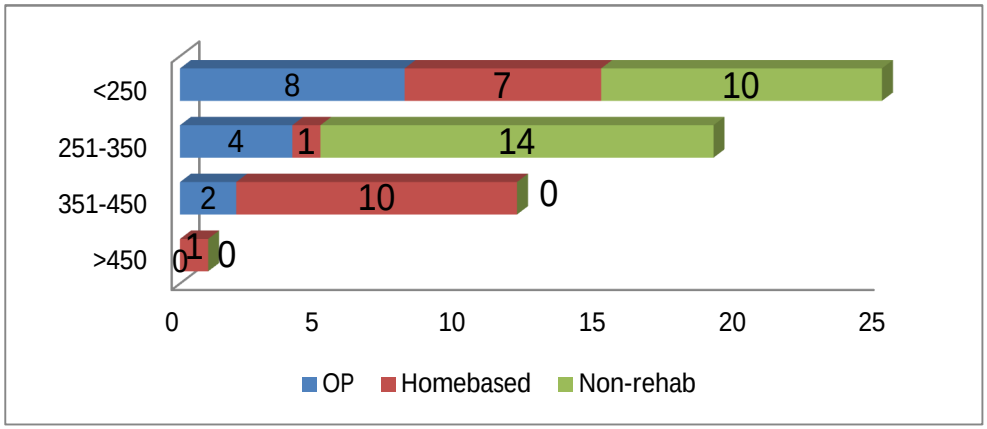


Fig 28: Comparison Of Pre 6MWD In Each Group

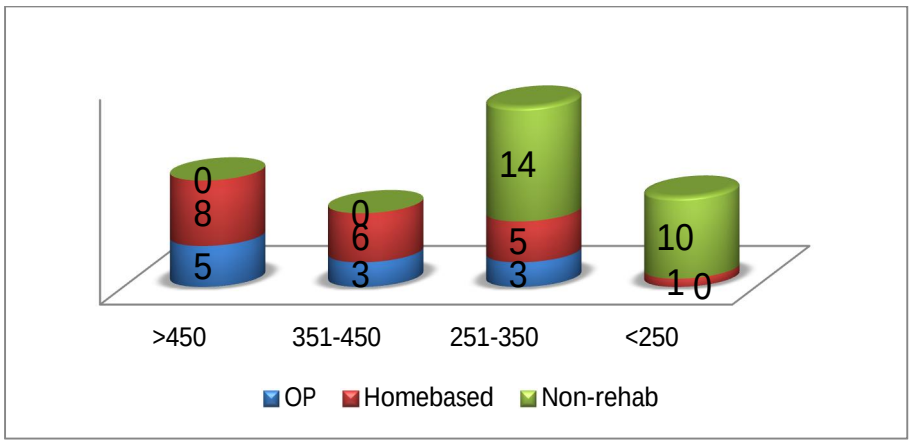


Fig 29: Comparison Of Post 6MWD In Each Group

COMPARISON OF COPD ASSESSMENT TEST – CAT SCORES IN EACH GROUPS

Post rehabilitation 33.3% in OPD group and 57.8% in homebased group had a low CAT score of >10, with a statistical significance. (P Value < 0.0001)

Table 22: Comparison Of CAT Scores In Each Groups

CAT Score	OP		Homebased		Non-rehab	
	Pre	Post	Pre	Post	Pre	Post
< 10 (LOW)	2	4	6	11	5	7
11 - 20 (MEDIUM)	2	4	4	4	2	4
21 - 30 (HIGH)	7	4	6	4	8	6
> 30 (V. HIGH)	1	0	3	0	8	5

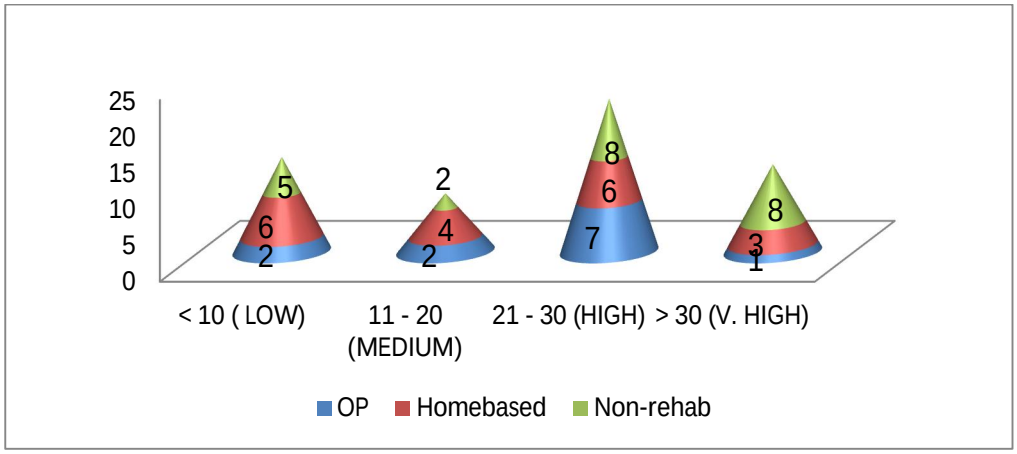


Fig 30: Comparison Of Pre CAT Scores In Each Groups

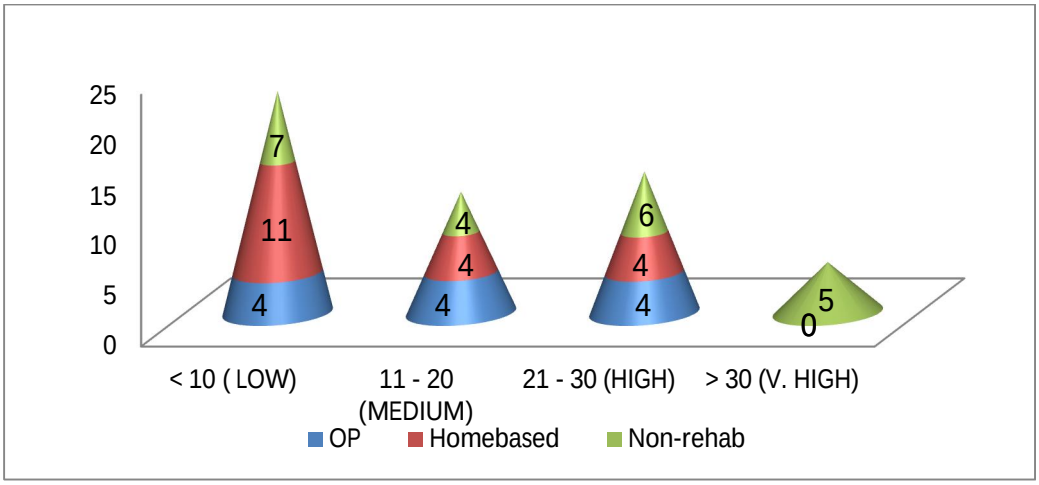


Fig 31: Comparison Of Post CAT Scores In Each Groups

COMPARISON OF BODE INDEX IN EACH GROUPS

Mean Pre & Post BODE in Group I are 5.6±2 and 4.5±2 respectively. As the severity of the disease increases the scores increase. The mean difference in Post BODE Index was 5.5±1.3 with statistical significance (**P Value < 0.0001**)

Table 23: Comparison Of BODE Index With COPD In Outpatient Rehabilitation Group (I)

S.NO	GOLD STAGE	Pre BODE	Post BODE	Mean Pre	Mean Post
1	Moderate obstruction	2	1		
2	Moderate obstruction	3	1	2.5	1
3	Moderate obstruction	2	1		
4	Moderate obstruction	3	1		
5	Severeobstruction	7	5		
6	Severeobstruction	6	5		
7	Severeobstruction	7	6	6.83	5.66
8	Severeobstruction	6	5		
9	Severeobstruction	7	6		
10	Severeobstruction	8	7		
11	V.Severeobstruction	8	8	8.5	8.5
12	V.Severeobstruction	9	9		

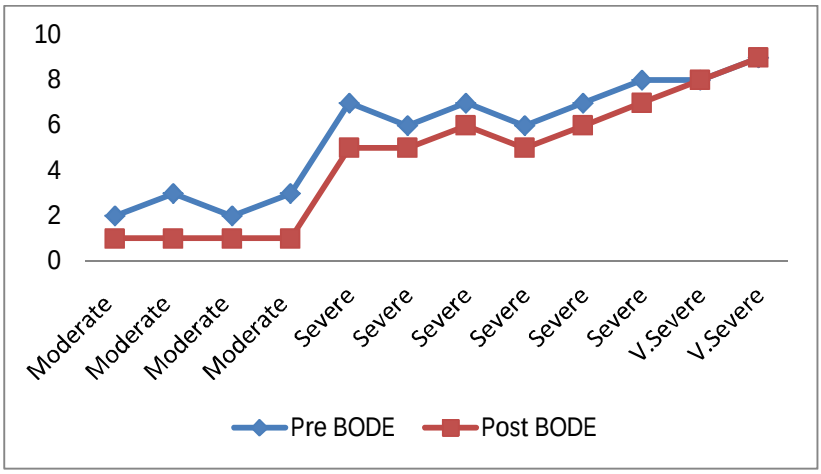


Fig 32: Comparison Of BODE Index With COPD In Outpatient Rehabilitation Group (I)

Table 24: Comparison Of BODE Index With COPD Severity In Homebased Rehabilitation Group (II)

Mean Pre & Post BODE in Group II are 4.6±2 and 3.3±2 respectively. As the severity of the disease increases the score increases. The mean difference in Post BODE Index was 1.3±0.6 with statistical significance (**P Value < 0.0001**)

S.N0	GOLD STAGE	Pre BODE	Post BODE	Mean Pre	Mean Post
1	Moderate	2	1		
2	Moderate	3	2		
3	Moderate	3	1		
4	Moderate	2	1		
5	Moderate	2	1		
6	Moderate	3	1	2.54	1.18
7	Moderate	2	1		
8	Moderate	3	1		
9	Moderate	3	1		
10	Moderate	3	2		
11	Moderate	2	1		
12	Severe	7	5		
13	Severe	7	5		
14	Severe	8	7		
15	Severe	8	6	7.16	5.5
16	Severe	6	5		
17	Severe	7	5		
18	V.Severe	9	9	8.5	8.5
19	V.Severe	8	8		

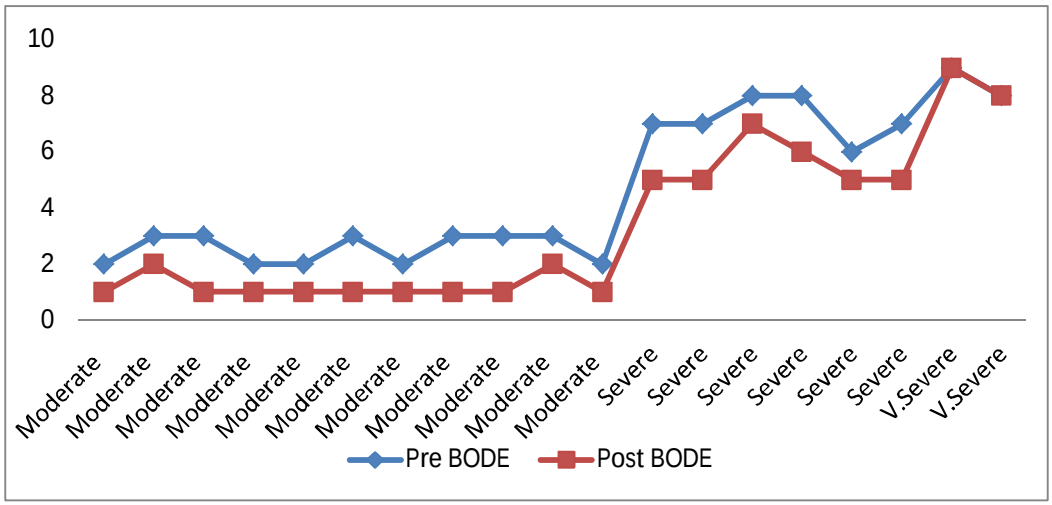


Fig 33: Comparison Of BODE Index With COPD Severity In Homebased Rehabilitation Group (II)

Table 25: Comparison Of BODE Index With COPD Severity In Non Rehabilitation Group (III)

Mean Pre & Post BODE in Group III are 6.4±2 and 6.1±2 respectively. As the severity of the disease increases the score increases. The mean difference in Post BODE Index was 0.25±0.15 with no statistical significance (**P Value = 0.110**)

S.NO	GOLD STAGE	Pre BODE	Post BODE	Mean Pre	Mean Post
1	Moderate	3	2		
2	Moderate	3	3		
3	Moderate	3	2		
4	Moderate	2	2	2.71	2.14
5	Moderate	3	2		
6	Moderate	2	2		
7	Moderate	3	2		
8	severe	8	8		
9	severe	9	8		
10	severe	8	7		
11	severe	8	7		
12	severe	7	8		
13	severe	7	8		
14	severe	8	8	7.66	7.58
15	severe	8	8		
16	severe	7	7		
17	severe	7	8		
18	severe	7	7		
19	severe	8	7		
20	v.severe	9	9		
21	v.severe	8	8		
22	v.severe	9	8	8.6	8.6
23	v.severe	8	9		
24	v.severe	9	9		

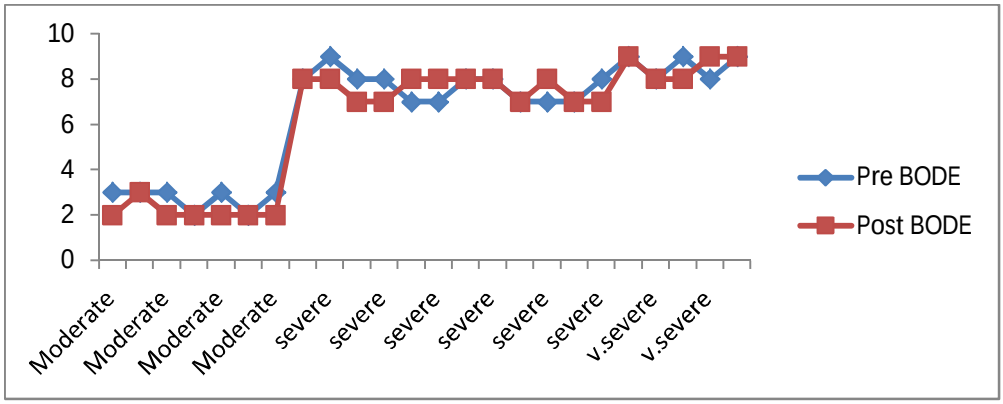


Fig 34: Comparison Of BODE Index With COPD Severity In Non Rehabilitation Group (III)

Table 26: Comparison Of BODE Index In Each Group

Post rehabilitation 33.3% in OPD group and 57.8% in homebased group had a low BODE score of <2, with a statistical significance. (P Value < 0.0001)

BODE INDEX	OP		Homebased		Non-rehab	
	Pre	Post	Pre	Post	Pre	Post
0 to 2	2	4	5	11	2	6
3 to 4	2	0	6	0	5	1
5 to 6	2	5	1	5	0	0
7 to 10	6	3	4	3	17	15

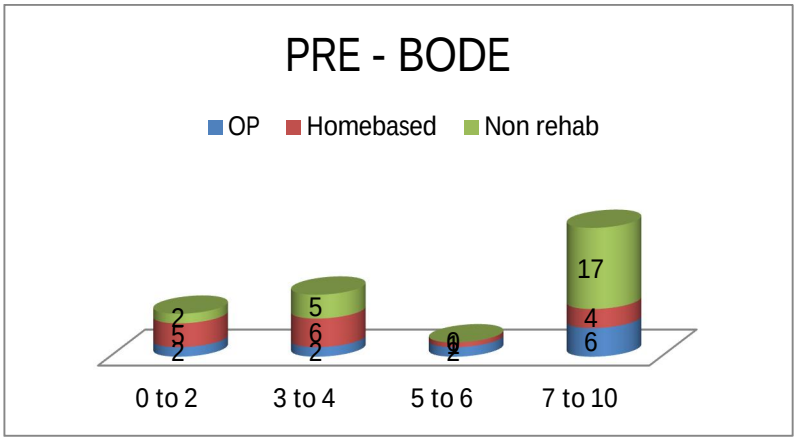


Table 35: Comparison Of Pre BODE Index In Each Group

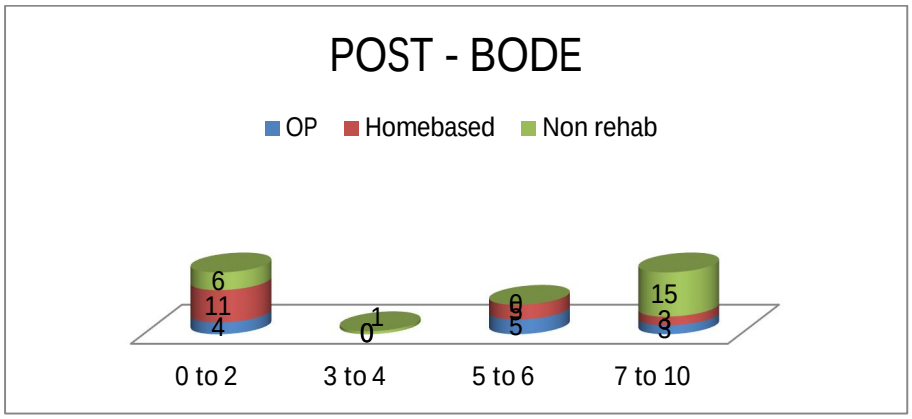


Table 36: Comparison Of Post BODE Index In Each Group

COMPARISION OF EXACERBATIONS TREATED AS OP IN EACH GROUP

The mean OP visits for exacerbations in group I were 3±1 visit. Post rehabilitation the OPD visits reduced to 1 with a statistical significance. (**P Value <0.001**). As the COPD severity increases the exacerbation rates increase.

Table 27: Comparision Of Exacerbations Treated As OP In Outpatient Rehabilitation Group(I)

S.NO	GOLD STAGE	PRE	POST	Mean PRE	Mean POST
1	Moderate	2	0		
2	Moderate	2	1	2.25	0.75
3	Moderate	2	1		
4	Moderate	3	1		
5	severe	5	4		
6	severe	4	3		
7	severe	4	3	4	3.16
8	severe	4	3		
9	severe	3	3		
10	severe	4	3		
11	v.severe	5	4	5	4.5
12	v.severe	5	5		

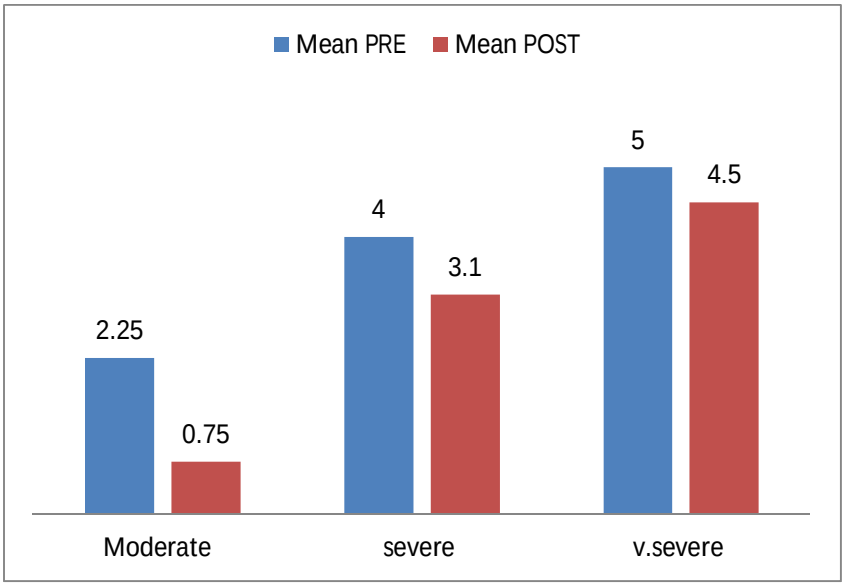


Fig 37: Comparision Of Exacerbations Treated As OP In Outpatient Rehabilitation Group(I)

Table 28: Comparision Of Exacerbations Treated As OP In Home-Based Rehabilitation Group(II)

The mean OP visits for exacerbations in group I were 3±1 visit. Post rehabilitation the OPD visits reduced to 2±1 with a statistical significance. (**P Value <0.001**) As the COPD severity increases the exacerbation rates increase.

S.NO	GOLD STAGE	PRE	POST	Mean PRE	Mean POST
1	Moderate	2	1		
2	Moderate	3	1		
3	Moderate	3	2		
4	Moderate	3	1		
5	Moderate	2	1		
6	Moderate	4	2	2.81	1.45
7	Moderate	3	1		
8	Moderate	2	1		
9	Moderate	3	2		
10	Moderate	4	3		
11	Moderate	2	1		
12	severe	4	3		
13	severe	5	4		
14	severe	4	4	4	3.16
15	severe	3	2		
16	severe	5	4		
17	severe	3	2		
18	v.severe	5	5	5	4.5
19	v.severe	5	4		

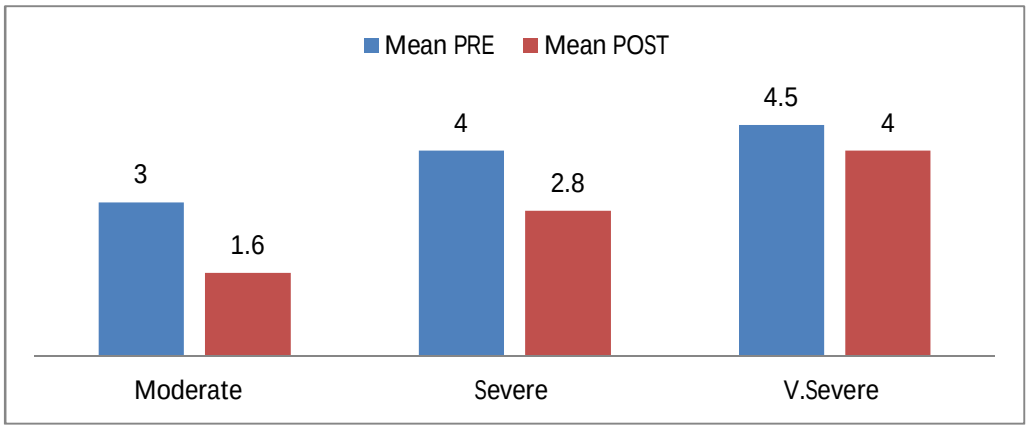


Fig 38: Comparision Of Exacerbations Treated As OP In Home-Based Rehabilitation Group(II)

Table 29: Comparision Of Exacerbations Treated As OP In Non Rehabilitation Group(III)

The mean OP visits for exacerbations in group I were 3±1 visit. Post rehabilitation the OPD visits remained the same with no statistical significance. (**P Value 0.621**) As the COPD severity increases the exacerbation rates increase.

S.NO	GOLD STAGE	PRE	POST	Mean PRE	Mean POST
1	Moderate	3	3		
2	Moderate	2	3		
3	Moderate	2	3		
4	Moderate	2	3	2.71	2.85
5	Moderate	3	2		
6	Moderate	3	3		
7	Moderate	4	3		
8	Severe	3	4		
9	Severe	2	3		
10	Severe	3	4		
11	Severe	4	3		
12	Severe	3	2		
13	Severe	3	3		
14	Severe	4	3	3.25	3.33
15	Severe	3	3		
16	Severe	3	4		
17	Severe	4	5		
18	Severe	3	2		
19	Severe	4	4		
20	Severe	3	4		
21	V.Severe	5	5		
22	V.Severe	4	3	4.2	4.2
23	V.Severe	4	4		
24	V.Severe	5	5		

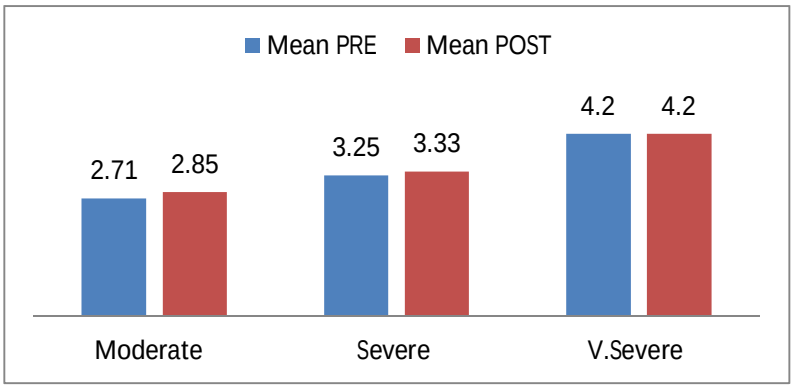


Fig 39: Comparision Of Exacerbations Treated As OP In Non Rehabilitation Group(III)

COMPARISION OF TREATED OP EXACERBATIONS IN EACH GROUP

Pre rehabilitation no patient had OPD visits less the 1. Post rehabilitation 33.3% and 36.8% of them in group 1 & 2 respectively had ≤1 OPD exacerbations with a statistical significance. **(P<0.001)**

Table 30: Comparision Of Treated Op Exacerbations In Each Group

Pre OP exacerbations	OP		Homebased		Non Rehab	
	Pre	Post	Pre	Post	Pre	Post
0 to 1	0	4	0	7	0	0
2 to 3	5	5	11	9	16	17
4 to 5	7	3	8	3	8	7

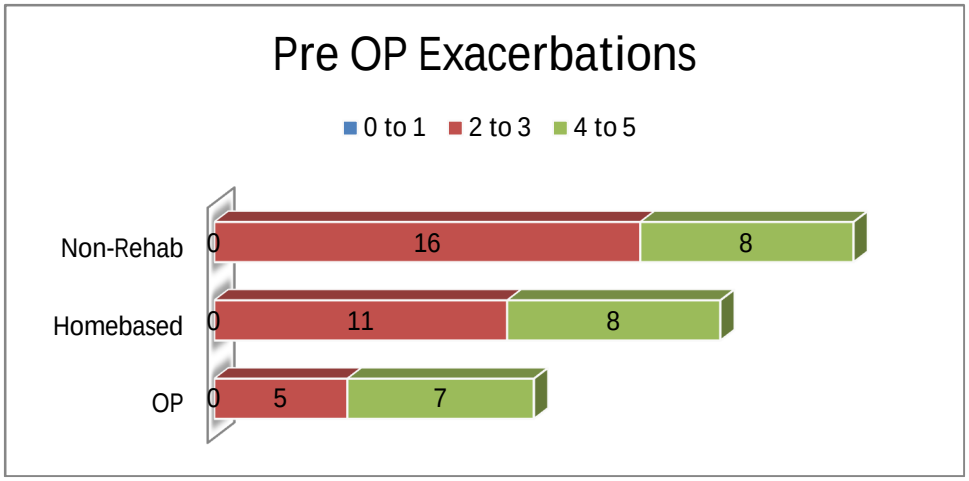


Fig 40: Comparision Of Pre Op Exacerbations In Each Group

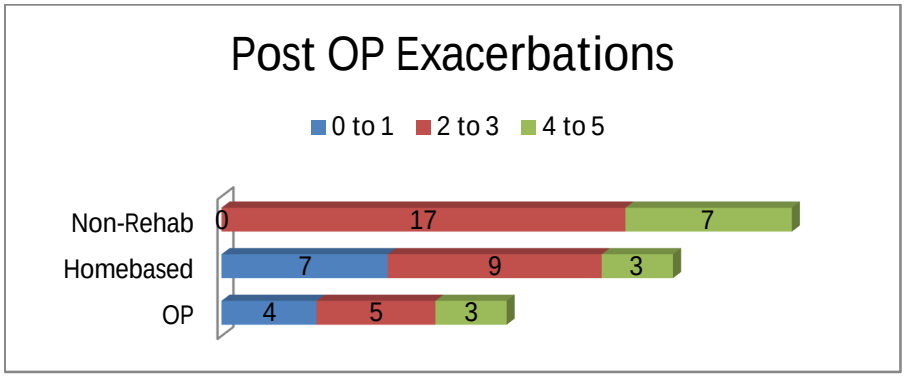


Fig 41: Comparision Of Post Op Exacerbations In Each Group

COMPARISION OF HOSPITAL ADMISSIONS IN EACH GROUP

Mean Post rehabilitation hospital admissions for Moderate and severe COPD were 0 and ≤1 respectively which is statistically significant **(P value <0.001)**

Table 31: Hospital Admissions In Comparison With COPD Severity In OP Rehabilitation Group(I)

GOLD Stage	Mean Pre	Mean Post
Moderate	0.25	0
severe	1.6	0.83
v.severe	1.5	1.5

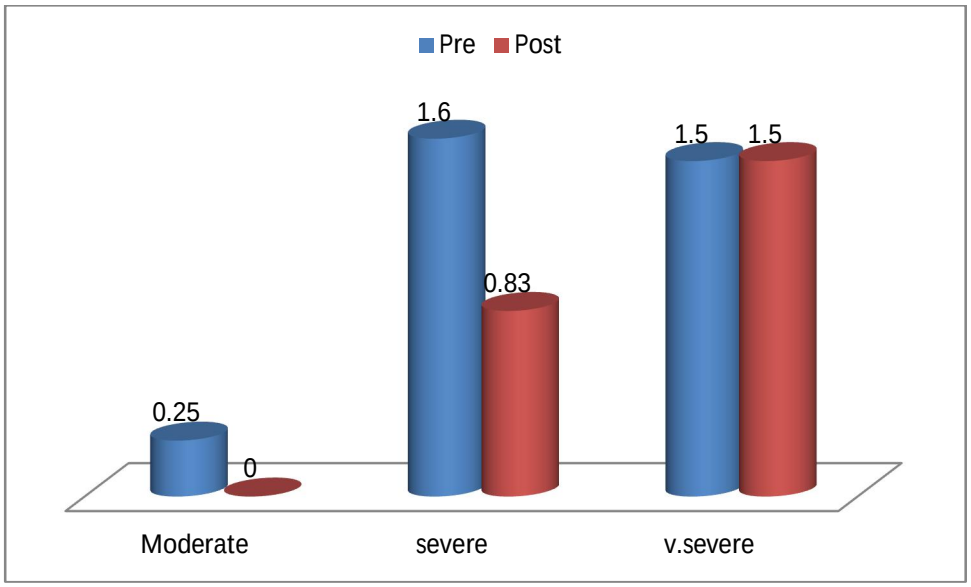


Fig 42: Hospital Admissions In Comparison With COPD Severity In OP Rehabilitation Group(I)

Table 32: Hospital Admissions In Comparison With COPD Severity In Homebased Rehabilitation Group(II)

Mean Post rehabilitation hospital admissions for Moderate and severe COPD were 0 and ≤1 respectively which is statistically significant **(P value <0.001)**

GOLD Stage	Pre	Post
Moderate	0.09	0
Severe	1	0.5
v.severe	2	1.5

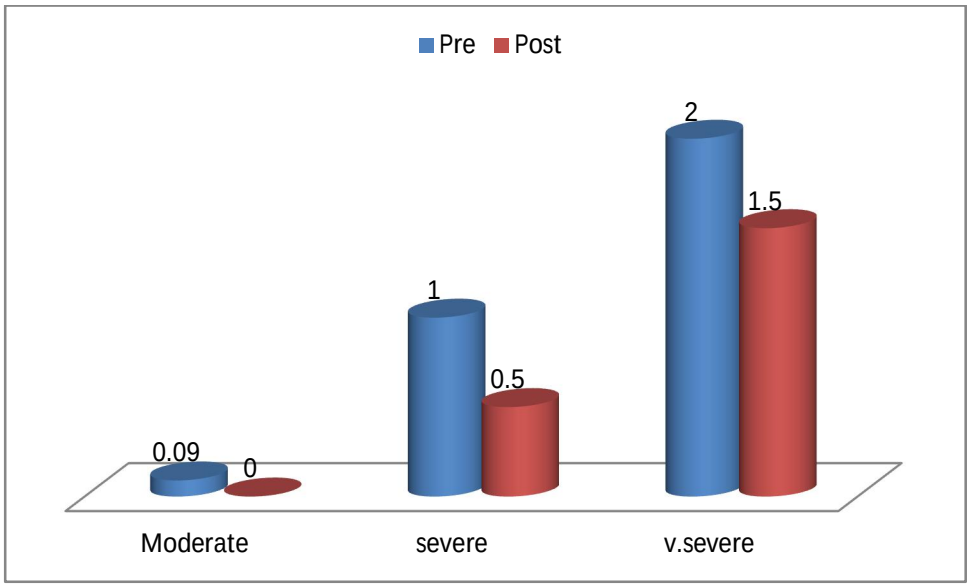


Fig 43: Hospital Admissions In Comparison With COPD Severity In Homebased Rehabilitation Group(II)

Table 33: Hospital Admissions In Comparison With COPD Severity In Non Rehabilitation Group(III)

There was no statistically significant reduction in number of In hospital admissions post rehabilitation

GOLD Stage	Pre	Post
Moderate	0	0
Severe	1.4	1.5
v.severe	1.6	1.8

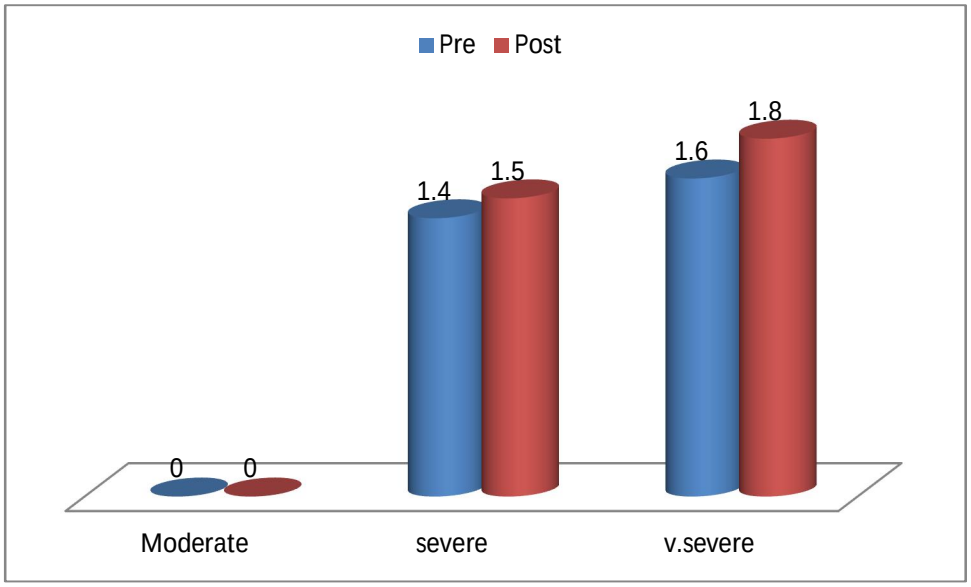


Table 44: Hospital Admissions In Comparison With COPD Severity In Non Rehabilitation Group(III)

COMPARISION OF HOSPITAL STAY – WARDS AND IRCU IN EACH GROUP

Post rehabilitation duration of hospital stay in wards and ICU for moderate COPD is 0 days and severe it is 5 days & <1 days respectively

Table 34: Hospital Stay In Comparison With COPD Severity In OP Rehabilitation Group(I)

GOLD Stage	Moderate	severe	v.severe
Pre Wards	1.25	11.16	13.5
Post Wards	0	5.66	10
Pre IRCU	0	3.5	6
Post IRCU	0	0.33	4

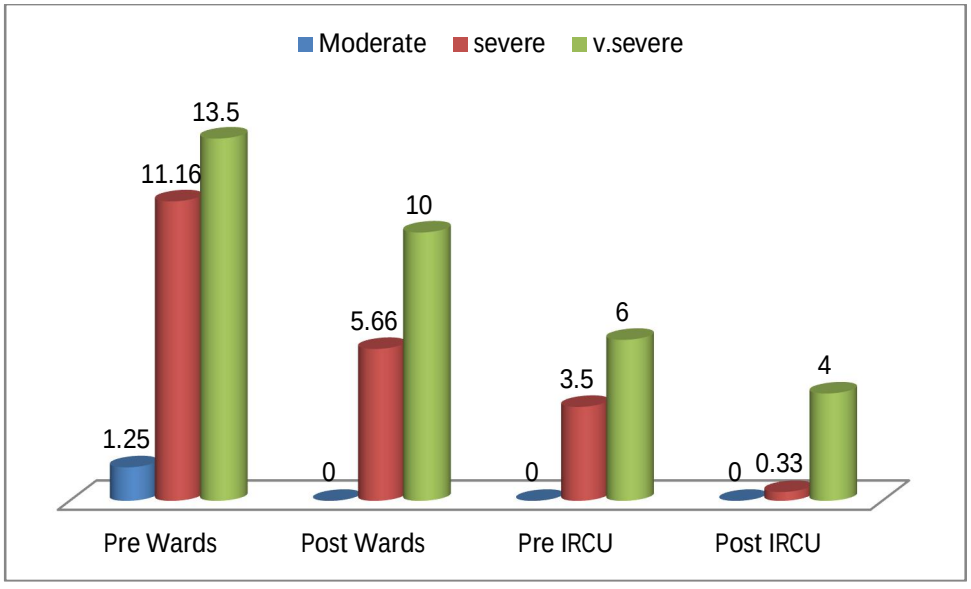


Table 45: Hospital Stay In Comparison With COPD Severity In OP Rehabilitation Group(I)

Table 35: Hospital Stay In Comparison With COPD Severity In Homebased Rehabilitation Group(II)

Post rehabilitation duration of hospital stay in wards and ICU for moderate COPD is 0 days and severe it is 3 days & 1 day respectively

GOLD Stage	Moderate	severe	v.severe
Pre Wards	0.45	7.4	12
Post Wards	0	3.33	8
Pre IRCU	0	5	5
Post IRCU	0	1	3

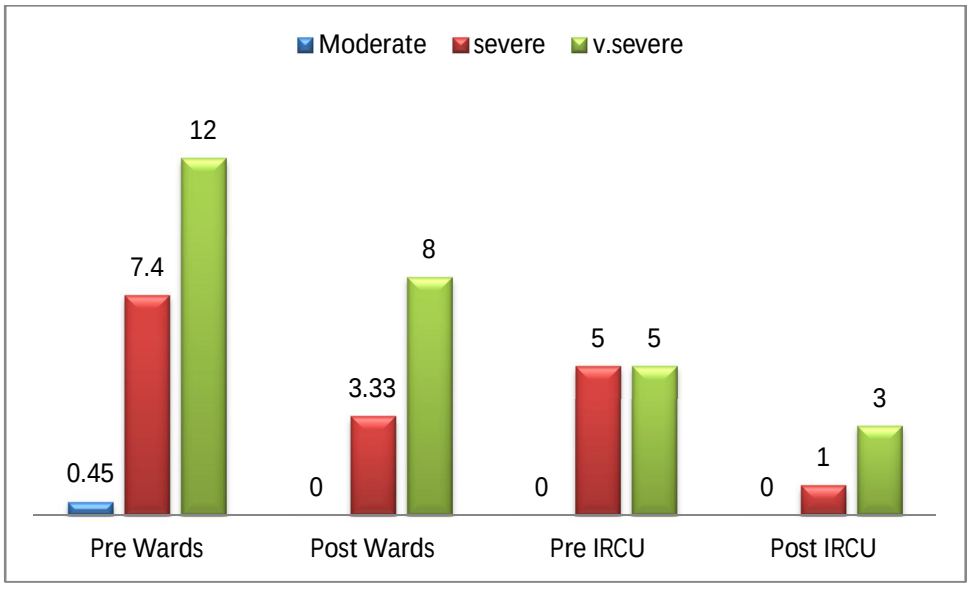


Fig 46: Hospital Stay In Comparison With COPD Severity In Homebased Rehabilitation Group(II)

Table 36: Hospital Stay (in days) In Comparison With COPD Severity In Non Rehabilitation Group(III)

Post rehabilitation duration of hospital stay in wards and ICU for moderate COPD is 0 days and severe it is 8 days & 3 day respectively

GOLD Stage	Moderate	severe	v.severe
Pre Wards	0	8.5	14
Post Wards	0	8.58	14
Pre IRCU	0	3.25	4
Post IRCU	0	3.33	4.6

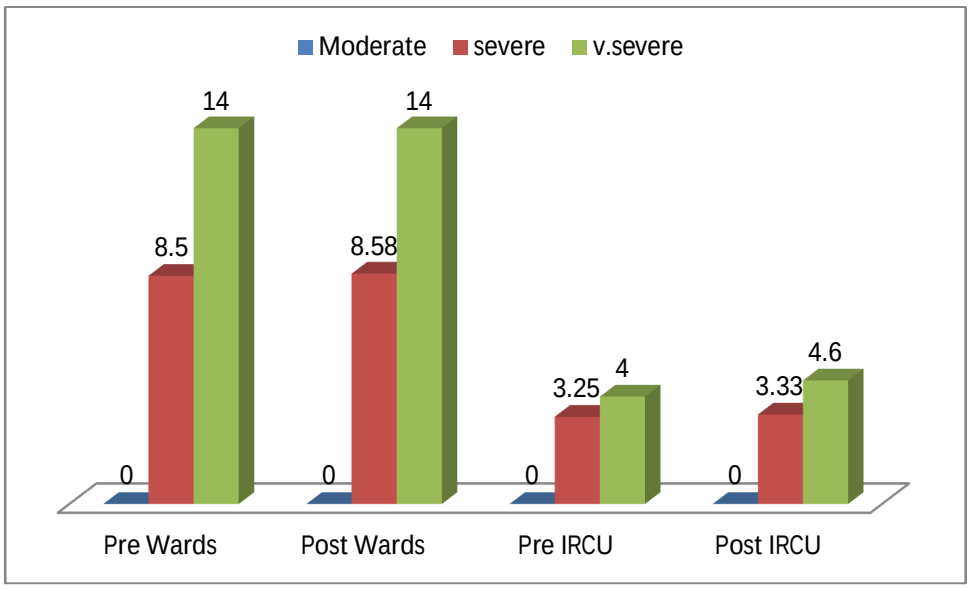


Fig 47: Hospital Stay In Comparison With COPD Severity In Non Rehabilitation Group(III)

Table 37: Multivariate Analysis With Tukey's Post-Hoc Test

On doing multivariate analysis with Tukeys Post Hoc test comparison between the mean difference Post rehabilitation in terms of Health related quality of life (SGRQ scores), Exercise capacity (6MWD), symptoms(CAT Score) & BODE Index was done between 3 groups. There is no statistical significance between Out patient rehabilitaion group(I) and Homebased rehabilitation group(II), the results were comparable without difference. When comparing Post rehabilitation variables of Group I & II with Non rehabilitation Group (III) there is statistical significance with a P value **<0.001**

Dependent Variable in each group			Mean Difference (I-J)	Std. Error	Sig.
CAT SCORE	1	2	.9211	.5053	**.172**
		3	4.5000*	.4844	.000
	2	1	-.9211	.5053	.172
		3	3.5789*	.4208	.000
	3	1	-4.5000*	.4844	**.000**
		2	-3.5789*	.4208	**.000**
BODE SCORE	1	2	-.2325	.2583	**.643**
		3	.8333*	.2477	.004
	2	1	.2325	.2583	.643
		3	1.0658*	.2151	.000
	3	1	-.8333*	.2477	**.000**
		2	-1.0658*	.2151	**.000**
SGRQ	1	2	-3.4709	2.4087	**.328**
		3	10.6192*	2.3095	.000
	2	1	3.4709	2.4087	.328
		3	14.0901*	2.0059	.000
	3	1	-10.6192*	2.3095	**.000**
		2	-14.0901*	2.0059	**.000**
6MWD	1	2	-8.4346	7.9615	**.543**
		3	75.6500*	7.6337	.000
	2	1	8.4346	7.9615	.543
		3	84.0846*	6.6303	.000
	3	1	-75.6500*	7.6337	**.000**
		2	-84.0846*	6.6303	**.000**

PREDICTORS OF POOR ADHERENCE

In our study nearly 76.5% of the dropouts attributed their poor adherence to lack of motivation. 58.8% pointed out lack of family support and financial instability. Illness per say was a factor in 52.9% of them. 47.9% of them had job as their reason for poor adherence

Table 38 : Predictors Of Poor Adherence In Pulmonary Rehabilitation

	Illness	Lack of family support	Lack of motivation	Financially unstable	Job
Yes	9 (52.94%)	10 (58.82%)	13 (76.54%)	10 (58.82%)	8 (47.05%)
No	8	7	4	7	9

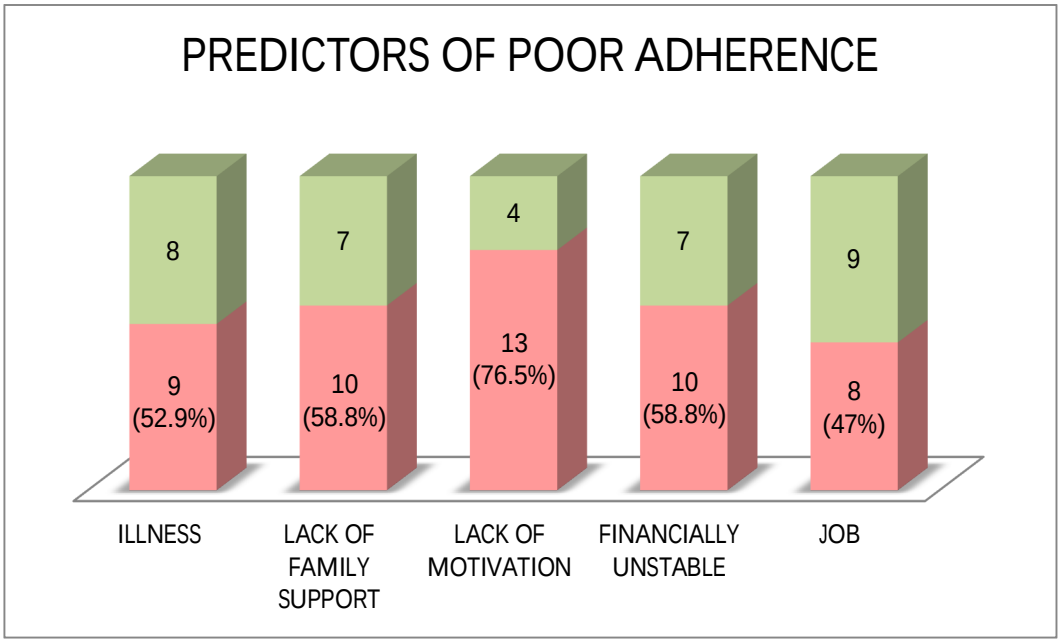


Fig 48 : Predictors Of Poor Adherence In Pulmonary Rehabilitation

DISCUSSION

AGE DISTRIBUTION AMONG THE STUDY POPULATION

Among the overall study population (72) 62.44% of patients were between 51-60yrs of age, 22.2% of them belonged to 61-65yrs of age, 9.72% were between 45-50yrs and 2.7% were between 66-70yrs.

In Out patient rehabilitation group 50% of the patients were between 56-60yrs , 37.5% of them were between 51-55yrs in Homebased Group and Non Rehabilitation group. Majority of study population belonged to 50 – 60yrs of age.

SEX DISTRIBUTION AMONG THE STUDY POPULATION

83.3% of patients were males and 16.6% were females among the study population.In Out patient Group 91.6 % were males and 8.33% were females, 83.3% of males and 16.6% of females belonged to Homebased group. In Non rehabilitation group 87.5% were males and 12.5% were females. Majority of the study population were males.

BMI DISTRIBUTION AMONG THE STUDY POPULATION

Among the overall study population of 72 nearly 45.83% of the study patients were Underweight among the study population 51.38% belonged to Normal range. 50% of them were under weight in Outpatient

group. 43.8% and 41.6% were underweight in Homebased and Non Rehabilitation group respectively. Majority of them belong to underweight category.

COPD SEVERITY AMONG STUDY POPULATION

Among the overall study population 34.5% of patients had Moderate disease, 45.83% had Severe disease and 19.4% of patients had Very Severe disease. 54% of them had Severe COPD in Outpatient group, 45.8% had Moderate COPD in Homebased group. In Non rehabilitation group 37.5% had Severe COPD. Majority of them in the study population had severe COPD as per GOLD guidelines.

OVER ALL DROP OUTS AMONG THE STUDY POPULATION WITH COPD SEVERITY

Among the overall study population 23.6% of them dropped out of the rehabilitation program, only 76.3% of the patients were adherent. 50% of them dropped out in Outpatient rehabilitation group. 20.83% of them dropped out in Homebased group. There were no dropouts in Non rehabilitation group.

Among the Outpatient group 50% of them dropped out in V.Severe COPD, 53.84% of them dropped out in Severe COPD, 42.8% dropped out in Moderate COPD . In homebased rehabilitation there were no drop outs in Moderate COPD. 25% dropped out in Severe COPD. 60% dropped out in V.severe COPD.

PREDICTORS OF POOR ADHERENCE

In our study nearly 76.5% of the dropouts attributed their poor adherence to lack of motivation. 58.8% pointed out lack of family support and financial instability. Illness per say was a factor in 52.9% of them.

47.9% of them had job as their reason for poor adherence.

COMPARISON OF HEALTH RELATED QUALITY OF LIFE BY ST.GEORGE RESPIRATORY QUESTIONNAIRE SCORES IN EACH GROUP

Mean Pre & Post Rehabilitation SGRQ scores in Group I are 59.8±15.9 and 46.6±23.7 respectively. As the severity of the disease increases the scores increases (worsens). An improvement in SGRQ score is denoted by recduction in scores. The mean difference in Post SGRQ scores was **13.2±8.09** With Statistical significance, **P Value <0.0001.**

Mean Pre & Post Rehabilitation SGRQ scores in Group II are 50.9±19.5 and 34.2±27.1 respectively. The mean difference in Post SGRQ scores was **16.69±8.29** with statistical significance, **P value <0.0001.**

Mean Pre & Post SGRQ scores in Group III are 49.7±13.2 and 47.1±13.1 respectively. The mean difference in Post SGRQ scores was 2.6±3.3 with no statistical significance (P Value = 0.110)

Post pulmonary rehabilitation there is a statistically and clinically significant improvement in the health related quality of life measured in terms of SGRQ Scores in outpatient and homebased rehabilitation group. Non rehabilitation group doesnot show any significant improvement. SGRQ scores improved despite COPD severity, however moderate and severe had better results when compared to Very severe group.

Our result correlates with the work of

- ***Shahin Barakat et al***,[38] in 2008 proved that there was a significant difference from baseline SGRQ Scores (p _ 0.05, paired *t*- test) with a mean reduction of total scores of 12.8. following a 14 week rehabilitation.
- ***Zanchet et al,*** [39] in 2005 on comparing of pre- and post-pulmonary rehabilitation values revealed improvement in SGRQ total scores (pre-PR = 46 ± 15% vs. post-PR= 38 ± 15%) (p < 0.05). following a 6 week rehabilitation program.

COMPARISION OF EXERCISE CAPACITY BY SIX MINUITE WALK DISTANCE IN EACH GROUP

Mean Pre & Post Rehabilitation 6MWD in Group I are 267.5±76 mts and 346.3±94mts respectively. As the severity of the disease increases the distance walked decreases. The mean difference in Post 6MWD was **78.8±24mts** with statistical significance (**P Value < 0.0001**)

Mean Pre & Post Rehabilitation 6MWD in Group II are 329.4±95mts and 416±119mts respectively.. The mean difference in Post 6MWD was **87±28mts** with statistical significance (**P Value < 0.0001**).

Mean Pre & Post Rehabilitation 6MWD in Group III are 248±52mts and 252±59mts respectively. As the severity of the disease increases the distance walked decreases. The mean difference in Post 6MWD was 3.2±2.2mts with no statistical significance (P Value 0.176) Post pulmonary rehabilitation there is a statistically and clinically significant improvement in exercise capacity which is measured in terms of Six minute walk distance in outpatient and homebased rehabilitation group. Non rehabilitation group doesnot show any significant improvement. Mean 6MWD increased following rehabilitation despite severeity of COPD. However Moderate and severe COPD had better improvement when compared to Very severe group.

Our result correlates with the work of

- ***Shahin Barakat et al***[38], in 2008 France there was a mean increase in 6MWD of more than 54 m a

  in the rehabilitation group after 14 weeks, which was significantly greater than the mean change in the control group ($p < 0.05$).

- ***Renata Cláudia Zanchet et al,*** in 2005 Brazil there was significant improvement in the 6MWD results (pre-PR = 513 ± 99 m vs. post-PR = 570 ± 104 m) post rehabilitation.

- ***Shaik et al*** [41]in 2014 Guntur on a comparison between pre and post treatment scores in 6 min walk distance test for rehablilitation group increased significantly with a P <0.0001 following an 8 week program.
- ***Virendra singh et al***[40] in Jaipur 2001 following a 4 week pulmonary rehabilitation demonstrated a significant increase in 6MWD with a Pvalue< 0.001.
- ***Oliveira et al,*** [46] 2010 in Brazil found a variation in the distance walked on the 6MWT following participation in the PR program was statistically significant in both the outpatient and at-home groups in comparison to the control group ($p < 0.05$).
- ***Elkhateeb et al***, [42] 2014 in Egypt demonstrated a statistically significant improvement in BODE score (P-value 0.001) following a 6 – 8 weeks rehabilitation program.
- ***Cote et al***, [44] 2005 in USA pulmonary rehabilitation participation improves BODE and is associated with better outcomes (P<0.001)

COMPARISON OF COPD ASSESSMENT TEST – CAT SCORES IN EACH GROUP

Post rehabilitation 33.3% in OPD group and 57.8% in homebased group had a low CAT score of >10, with a statistical significance. (P Value < 0.0001). Mean pre and post CAT scores in group I are 21±8 and 16±8 respectively. Mean difference in CAT score post rehabilitation is 5.5±1.3 with a statistical significance. (**Pvalue <0.001**)

Mean pre and post CAT scores in group II are 18±9 and 14±9 respectively. Mean difference in CAT score post rehabilitation is 4.5±1 with a statistical significance. (**Pvalue <0.001**)

Mean pre and post CAT scores in group III are 23±9 and 22±10 respectively. Mean difference in CAT score post rehabilitation is 1.5±1 with no statistical significance (p value 1.760)

Our result correlated with ***Broderick J et al***[49] who studied Exercise capacity and self-report disease impact based on CAT Scores of individuals with COPD which improved similarly in response to PR.

COMPARISON OF BODE INDEX IN EACH GROUPS

Mean Pre & Post BODE in Group I are 5.6±2 and 4.5±2 respectively. The mean difference in Post BODE Index was 5.5±1.3 with statistical significance (**P Value < 0.0001**)

Mean Pre & Post BODE in Group II are 4.6±2 and 3.3±2 respectively. The mean difference in Post BODE Index was 1.3±0.6 with statistical significance (**P Value < 0.0001**)

Mean Pre & Post BODE in Group III are 6.4±2 and 6.1±2 respectively. The mean difference in Post BODE was 0.25±0.15 with no statistical significance (**P Value = 0.110**)

Post pulmonary rehabilitation there is a statistically significant improvement in BODE Index in outpatient and homebased rehabilitation group. Non rehabilitation group doesnot show any significant improvement.

Our result correlates with the work of

- ***Shahin Barakat et al***[38], found a large decrease of two points (from 6 to 4) in the score of BODE index for the patients of the rehabilitation group the largest part of this decrease was due to the decrease in the dyspnea.

- ***Oliveira et al,*** [38] 2010 in Brazil there was a significant reduction BODE index in the outpatient and at-home groups at the end of the 12-week period ($p < 0.001$)
- ***Elkhateeb et a***[42]***l***, 2014 in Egypt demonstrated a statistically significant improvement in BODE score (P-value 0.001) following a 6 – 8 weeks rehabilitation program.
- ***Cote et al***[44], 2005 in USA pulmonary rehabilitation participation improves BODE and is associated with better outcomes ($P<0.001$)

COMPARISION OF EXACERBATIONS TREATED AS OP IN EACH GROUP

The mean OP visits for exacerbations in group I were 3±1 visit. Post rehabilitation the OPD visits reduced to 1 with a statistical significance. (**P Value <0.001**).

The mean OP visits for exacerbations in group I were 3±1 visit. Post rehabilitation the OPD visits reduced to 2±1 with a statistical significance. (**P Value <0.001**)

The mean OP visits for exacerbations in group I were 3±1 visit. Post rehabilitation the OPD visits remained the same with no statistical significance. (**P Value 0.621**)

As the severity of the disease increases the exacerbations increase. Pre rehabilitation no patient had OPD visits less the 1. Post rehabilitation 33.3% and 36.8% of them in group 1 & 2 respectively had ≤1 OPD exacerbations with a statistical significance. **(P<0.001)**

Our results correlated with work of

Kosmas, MD et al[50] concluded that there was a significant reduction in no of emergency visits, hospital admissions and duration of hospital stay post pulmonary rehabilitation.

COMPARISION OF HOSPITAL ADMISSIONS AND STAY (WARDs & IRCU) IN EACH GROUP

Mean Post rehabilitation hospital admissions in Group I for Moderate and severe COPD were 0 and ≤1 respectively which is statistically significant **(P value <0.001)**

Mean Post rehabilitation hospital admissions in Group II for Moderate and severe COPD were 0 and ≤1 respectively which is statistically significant **(P value <0.001)**

There was no statistically significant reduction in number of In hospital admissions post rehabilitation

Post rehabilitation duration of hospital stay in wards and ICU for moderate COPD is 0 days and severe it is 5 days & <1 days respectively in group I.

Duration of hospital stay in wards and ICU for moderate COPD is 0 days and severe it is 3 days & 1 day respectively after rehabilitation in group II

In group III post rehabilitation duration of hospital stay in wards and ICU for moderate COPD is 0 days and severe it is 8 days & 3 day respectively

Our work correlated with

- ***Puhan et al***[43] in 2008 which was a pooled analysis concluded that pulmonary rehabilitation significantly reduced hospital admissions (pooled odds ratio 0.13 [95% CI 0.04 to 0.35], number needed to treat (NNT) 3 [95% CI 2 to 4], over 34 weeks).
- ***Kosmas, MD et al***[50] concluded that a comprehensive pulmonary rehabilitation program results to a significant reduction in frequency and duration of hospitalizations in patients with moderate-to-severe COPD. There is also a trend towards reducing the annual number of exacerbations and the emergency hospital visits.

- ***Cote et al***[44] demonstrated improvement in BODE Index, significant reduction of Hospital admissions, length of stay following PR

COMPARING THE OUTCOMES OF HOSPITAL BASED OUTPATIENT AND HOMEBASED REHABILITATION

Multivariate analysis with Tukeys Post Hoc test comparison between the mean difference Post rehabilitation in terms of Health related quality of life (SGRQ scores), Exercise capacity (6MWD), symptoms(CAT Score) & BODE Index was done between 3 groups.

There is no statistical significance between Out patient rehabilitaion group(I) and Homebased rehabilitation group(II), the results were comparable without difference. When comparing Post rehabilitation variables of Group I & II with Non rehabilitation Group (III) there is statistical significance with a P value **<0.001**

Our results correlates with the work of

- ***Oliveira et al***[46] in brazil 2010 identified that there was a significant difference in the distance covered on the six-minute walk test ($p < 0.05$) and BODE index ($p< 0.001$) in the outpatient and at-home groups after participating in the rehabilitation program compared to baseline. a self-monitored home pulmonary

rehabilitation program can achieve similar results to a supervised outpatient pulmonary rehabilitation program and is a valid alternative in the therapeutic approach to patients with COPD.

- ***Güell et al***[47] in spain 2016 demonstrated that the improvement in exercise tolerance achieved by COPD patients with an unsupervised home pulmonary rehabilitation program is similar to the gains of patients in an intensive hospital-based program. However, the hospital program afforded greater benefit on the HRQOL emotional function domain.
- ***Holland AE, et al***[45] 2016 in Austraila a home-based pulmonary rehabilitation programme,using minimal resources and little direct supervision, delivers short-term improvements in functional exercise capacity and HRQL that are at least equivalent to conventional centrebased pulmonary rehabilitation in people with COPD.
- ***Alison et al***[46] demonstrated when exercise training with minimal equipment was compared to no training [six-minute walk test: mean difference 40 (95% CI: 13 to 67) metres; SGRQ Scores: the mean difference -7 (95% CI: -12 to -3) points].

CONCLUSION

Looking at the increasing burden of COPD patients in developing countries, there is an urgent need of advocacy of pulmonary rehabilitation in complete management of this disease. Despite its proven effectiveness and the strong scientific recommendations for its routine use in the care of COPD, Pulmonary rehabilitation is generally underutilized and strategies for increasing access to rehabilitation services are needed. The present study, demonstrates that a self-monitored home based pulmonary rehabilitation program can achieve similar results to a supervised outpatient pulmonary rehabilitation program and is a valid alternative in the therapeutic approach to patients with COPD. The data we provide show that self-monitored exercise, truly home-based, following a short period of instruction and education, can achieve equivalent benefits in exercise capacity , quality of life scores. Considering the limited access to pulmonary rehabilitation programs worldwide, offering patients the opportunity of a home-based rehabilitation program can overcome the problems related to outpatient rehabilitation (i.e. it is costly to provide and many patients have problems travelling to the center several times per week). Hence, a broadscale use of the home program is recommended, as this treatment modality is not limited by geographic location and would enable a greater access of patients with COPD to pulmonary rehabilitation.

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ANNEXURES

ABBREVIATIONS

COPD	Chronic obstructive pulmonary disease
PR	Pulmonary Rehabilitation
OPD	Outpatient department
mMRC	Modified Medical Research Council
FEV1	Forced expiratory volume in 1 second
6MWD	Six minute walk distance
6MWT	Six minute walk time
SGRQ	St.George Respiratory Questionnaire
CAT	COPD Assessment Score
BMI	Body Mass Index
FFMI	Fat Free Mass Index
S.D	Standard deviation
ATS	American Thoracic Society
GOLD	Global initiaitive for obstructive lung diseases

PROFORMA

1. Serial No:

2. Date:

3. Name:

4. Age:

5. Gender:

6. Address:

7. Phone:

8. BMI

Underweight	(Below 18.5)
Normal	(18.5-24.9)
Overweight	(25.0-29.9)
Obese	(30 and above)

9. Dyspnea grading by MMRC:

10. Occupational history:

11. Smoking history:

12. Treatment and Hospitilisation history

13. Spirometry – GOLD Stage

14. SGRQ Score

15. 6MW distance

16. BODE Index

17. CAT score

PARTICIPANTS' INFORMATION SHEET

Investigator : Dr.R.Poonguzhali

Name of the participant :

Study title: "TO STUDY THE IMPACT OF PULMONARY REHABILITATION ON HEALTH RELATED QUALITY OF LIFE AMONG COPD PATIENTS IN A TERTIARY CARE CENTRE".

What is the purpose of this research?

We aim at studying the the impact of pulmonary rehabilitation on exercise capacity and quality of life.We also compare the outcomes of hospital based outpatient pulmonary rehabilitation and home based pulmonary rehabilitation. Skeletal muscle deconditioning and weakness is the main extrapulmonary manifestation of COPD due to which patients have poor quality of life and excercise capacity.Pulmonary rehabilitation. This study will benefit all people who are undergoing outpatient and home based pulmonary rehabilitation.

Discomforts and risks: NIL

Confidentiality:

Patients who participate in the study and their details will be maintained confidentially and at any cost, those details will not be let out.

Right to withdraw:

Patients will not be forced to complete the study. At any cost, in such circumstances the treatment will not be compromised.

Signature/Thumb impression of the participant:

Signature of the investigator:

PLAGIARISM CERTIFICATE

This is to certify that this dissertation work titled **"TO STUDY THE IMPACT OF PULMONARY REHABILITATION ON HEALTH RELATED QUALITY OF LIFE AMONG COPD PATIENTS IN A TERTIARY CARE CENTRE"** of the candidate **DR.R.POONGUZHALI** with registration Number 201527252 for the award of MD Degree in the branch of TB& RD I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows 2 percentage of plagiarism in the dissertation.

Guide & Supervisor sign with Seal

MASTER CHART

S.NO	sex	Age	exacerbations treated as OP	hospital admissions	hospital stay	Smoking index	Family involvement	BMI	Spirometry	St.George RQ	6MWDT	BODE index
1	M	56	3	0	0	120	yes	21.7	Moderate obstruction	36.72	390.35 mts	4
2	M	60	5	1	7days	215	yes	20.8	severe obstruction	69.58	220.86mts	6
3	M	62	4	0	0	250	yes	18.6	severe obstruction	72.69	225mts	4
4	M	58	6	2	12days	322	no	16.7	v.severe obstruction	74.38	162.56mts	7
5	M	55	3	1	10days	304	yes	17.6	severe obstruction	71.62	240mts	5
6	M	56	4	2	15days	344	yes	15.53	v.severe obstruction	75.49	212.2mts	6
7	M	65	4	1	7 days	564	yes	16.38	v.severe obstruction	72.69	184.83mts	7
8	M	52	3	0	0	340	no	19	Moderate obstruction	68.32	350mts	3
9	M	58	4	2	14days	435	yes	15.6	severe obstruction	75.49	337.61mts	4
10	F	64	3	1	5days	336	no	20.8	Moderate obstruction	73.62	320.6mts	4
11	M	55	4	2	10 days	528	no	16.31	severe obstruction	71.34	270mts	5
12	M	58	5	2	15 days	376	no	15.6	v.severe obstruction	65.44	122mts	7
13	M	54	3	1	6days	470	no	17.62	severe obstruction	50.46	236mts	5
14	M	57	4	2	15 days	402	yes	19.4	severe obstruction	52.82	248mts	5
15	M	63	5	1	7 days	452	yes	17.6	severe obstruction	50.42	255.8mts	4
16	M	58	4	1	6days	404	no	21	Moderate obstruction	42	368.52mts	3
17	F	65	3	0	0	410	n0	20.2	Moderate obstruction		340mts	3
18	M	60	4	1	5days	471	no	18.74	severe obstruction	53.61	219mts	5
19	M	56	5	2	18days	592	yes	18	severe obstruction	60.85	205mts	6
20	F	59	3	2	16 days	500	no	16.5	severe obstruction		200.45mts	5
21	M	62	3	1	5days	462	yes	21.78	Moderate obstruction	52.16	325mts	4
22	M	54	3	0	0	398	no	23.3	Moderate obstruction		392mts	3
23	M	60	4	2	15 days	542	no	18.67	severe obstruction		246.12mts	5
24	F	55	5	1	5days	479	no	16.89	severe obstruction	54	221mts	5

S.NO	sex	Age	exacerbations treated	hospital admissions	hospital stay	Smoking index	Family involvement	BMI	Spirometry	St.George RQ	6MWDT	BODE index
1	M	53	2	0	0	302	yes	23	moderate obstruction	32.91	404mts	3
2	M	57	4	1	5 days	479	yes	18.63	severe obstruction	52.43	261.73mts	5
3	M	61	5	2	14 days	484	yes	20.86	v.severe obstruction	59.51	140mts	6
4	M	55	4	1	10days	523	yes	24.5	v.severe obstruction	56.15	203mts	7
5	M	48	3	0	0	431	yes	19.6	Moderate obstruction	30.4	395mts	3
6	M	62	4	2	15days	462	no	21	v.severe obstruction	59	184mts	6
7	M	58	5	2	14days	525	yes	16.7	v.severe obstruction	56.46	176mts	6
8	M	64	3	0	0	334	no	18.2	moderate obstruction	35.33	415mts	3
9	F	55	3	1	7days	562	no	23.7	severe obstruction	50.5	260mts	4
10	M	67	4	2	10 days	438	no	22	severe obstruction	54.6	205mts	5
11	M	52	5	1	10days	437	yes	16.9	severe obstruction	59	170mts	5
12	M	51	3	0	0	400	yes	19.3	Moderate obstruction	33.75	388mts	4
13	F	63	2	0	0	450	no	24.7	Moderate obstruction	37	395mts	3
14	M	65	4	1	10days	398	no	23.7	severe obstruction	48	290mts	4
15	M	65	3	1	5days	431	yes	25	severe obstruction	53.85	301mts	5
16	M	57	4	1	5 days	487	no	20.3	Moderate obstruction	46.3	323mts	4
17	F	60	5	0	0	360	yes	24.5	severe obstruction	50	250	4
18	M	51	3	0	0	270	yes	25	Moderate obstruction	42.3	432	3
19	M	45	2	0	0	360	yes	24.8	Moderate obstruction	42.59	415mts	2
20	M	54	3	1	10days	434	yes	18.2	severe obstruction	45	270	4
21	M	53	4	1	15days	590	no	16.7	v.severe obstruction	60	152	6
22	M	51	3	0	0	480	no	25.6	Moderate obstruction	38	426	2
23	F	50	4	0	0	300	yes	21	Moderate obstruction	40	389	2
24	M	48	2	0	0	450	no	25.6	moderate obstruction	38	453	4

S.NO	Sex	Age	exacerbations treated	hospital admissions	hospital stay	Smoking	Family involvement	BMI	Spirometry	St.George RQ	6MWDT	BODE index
1	M	49	3	0	0	500		22.5	severe obstruction	55.4	264.3	5
2	M	52	2	1	5days	420		18.7	severe obstruction	50.7	240	4
3	M	50	3	0	0	336		24.3	severe obstruction	47.45	270	5
4	M	54	3	1	10days	420		20.2	v.severe obstruction	60.5	144	7
5	M	56	3	0	0	294		16.8	Moderate obstruction	31.22	300	3
6	M	55	2	0	0	270		17.3	Moderate obstruction	28.6	300	3
7	M	53	4	1	7days	495		23.4	severe obstruction	56.78	246	6
8	M	55	3	1	10days	482		17.8	severe obstruction	60.2	252	5
9	M	58	2	0	0	420		18.2	Moderate obstruction	32	300	3
10	M	60	4	1	15 days	540		25.2	v.severe obstruction	62.74	180	8
11	M	56	3	0	0	402		22.8	severe obstruction	54.32	270	6
12	F	57	4	1	7days	348		21	severe obstruction	55	240	6
13	M	62	2	0	0	520		20.5	Moderate obstruction	31.69	307.3	4
14	F	65	3	1	10 days	493		24.6	severe obstruction	49.83	266.2	7
15	M	60	4	1	20days	224		15.6	v.severe obstruction	65.12	164	8
16	M	66	3	0	0	458		17.9	Moderate obstruction	30.4	300	3
17	M	54	3	0	0	394		16.4	severe obstruction	62.97	254	6
18	F	55	5	2	15 days	480		17.3	v.severe obstruction	65.3	167	8
19	M	65	4	1	7 days	394		24.5	severe obstruction	49.5	215	7
20	M	60	3	1	10 days	528		20	severe obstruction	54.26	256	7
21	M	61	3	0	0	252		22.8	Moderate obstruction	34.83	310	3
22	M	48	4	0	0	605		14.3	Moderate obstruction	30.91	336	4
23	F	55	4	1	10days	359		17.4	severe obstruction	53.64	210	6
24	M	53	3	1	10days	482		18.9	v.severe obstruction		184	8

ETHICAL COMMITTEE APPROVAL CERTIFICATE

INSTITUTIONAL ETHICS COMMITTEE
GOVT. KILPAUK MEDICAL COLLEGE,
CHENNAI-10
Protocol ID. No.02/2017 Meeting held on 20/01/2017
CERTIFICATE OF APPROVAL

The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval "**To study the impact of pulmonary rehabilitation on health related quality of life among COPD patients in a tertiary care centre.** "submitted by Dr.R.Poonguzhali,, Post Graduate in TB and Respiratory Diseases, Govt. Kilpauk Medical College, Chennai.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

DEAN
Govt. Kilpauk Medical College,
Chennai-10.

14/8/17

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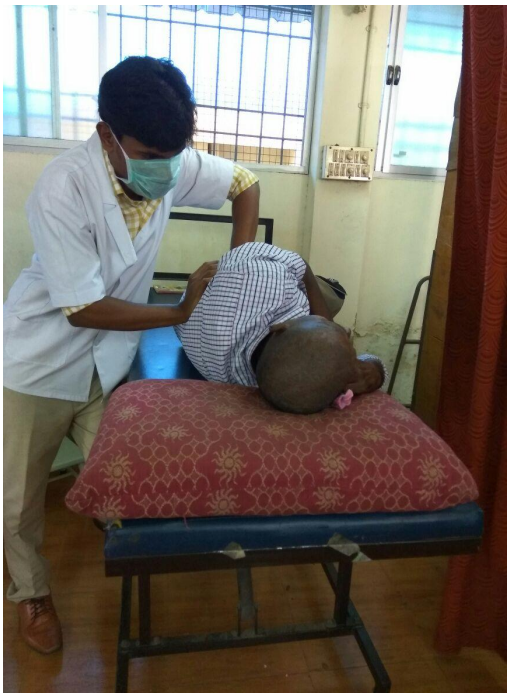


MARINER'S WHEEL