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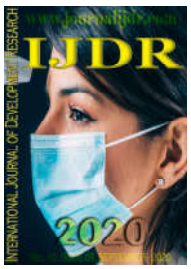

RESEARCH ARTICLE OPEN ACCESS

THE EFFECTS OF COMMUNITY BASED PULMONARY REHABILITATION PROGRAMME ON IMPROVE EXERCISE TOLERANCE

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ABSTRACT

Objectives:
Aims: The purpose of the present study was to evaluate the efficacy of pulmonary rehabilitation in a community-based setting in physiotherapy practices.
Method: Between April'2015 and May'2015, 40 patients were referred for pulmonary rehabilitation in physiotherapy practices. Patients were recruited by their pulmonary physician. Before entry into the programme, each patient underwent a physical, laboratory and lung function examination.
Methodology:
Study & Experimental design :-
Sample Size :- 40 samples were selected from.
Sampling Method :- Population by random selection using convenient sampling method.
Study duration :- 2 months.
Study Settings:- Was conducted in Government General Hospital, Vijayawada.
Criteria of Selection:-
Methodology :- 40 males subjects were selected in the rehabilitation Unit.
Design: In a randomized controlled trial with a cross-over design, the effects of rehabilitation were evaluated two months after baseline measurements in terms of exercise tolerance. Exercise tolerance was assessed using cycle Ergometer and 6 min walking tests. **Subjects:** 40 male subjects recruited for this study. Their age ranged from 30-50 years old. They were divided into two groups. Group I (experimental group) that included 20 subjects who were drugs only. Group II (control group) including the other 20 subjects who were pulmonary rehabilitation and drugs.
The study involved randomized controlled trail a cross over design.

- The Present study was conducted to investigate the effect of rehabilitation group on pulmonary functions & exercise capacity.
- 40 male subjects were participated in the program.
- I divided the subjects into two groups
- Each group contains 20 person. One group given, medication only. This group is called general group.
- The 2nd group is the rehabilitation group, were given medication & rehabilitation also.

Outcome Measurement: The significant increase of exercise tolerance & decrease of dsynopea& fatigue. To improve the total lung capacity and saturation of Oxygen also
Results: The relationship between general group and rehabilitation group of data where analyzed using the person correlation test. Comparisons between groups where done with the t-test Results are reported as mean and standard deviation where considered statistically significant p less then 0.05

Citation: ***Bhaskara Rao Jagurothula. 2020.*** "The effects of community based pulmonary rehabilitation programme on improve exercise tolerance*", International Journal of Development Research*, 10, (09), 39894-39905.

INTRODUCTION

- Pulmonary rehabilitation is a multidisciplinary programme of care for patients with chronic respiratory impairment that is individually tailored and designed to optimize each patient's physical and social performance and autonomy. Pulmonary rehabilitation leads to statistically significant and clinically meaningful

improvements in health related quality of life, functional exercise capacity, and maximum exercise capacity in patients with stable COPD and asthma.

- Pulmonary rehabilitation has many benefits. It can improve your ability to function and your quality of life. The program also may help relieve your breathing problems. Even if you have advanced lung disease, you can still benefit from Pulmonary Rehabilitation.
- The Programme was run by physiotherapist practices, and included exercise training, patient education, breathing retraining, evacuation of mucus, relaxation techniques.
- In a randomized controlled trial with a cross-over design, the effects of rehabilitation were evaluated two months after baseline measurements in terms of exercise tolerance. Exercise tolerance was assessed using cycle Ergometer and 6 min walking tests.
- After 2months, the patients who started with rehabilitation showed significant improvements in endurance time Aand Cardiac frequency (6 beats min-1) during cycling, walking distance (39 m), control group. These improvements were still significant after 2 months.
- Additional analysis indicated that the asthmatic patients and the patients with COPD responded to rehabilitation in a similar way, with the exception that there was a greater improvement in walking distance for asthmatics. Improvements in exercise tolerance.
- I assessed the feasibility and safety of an early pulmonary rehabilitation Programme for outpatients and determined the effects on exercise capacity.
- Consequently, the recent guidelines on the management of COPD and asthma published by the National Institute for Clinical Excellence (NICE) and the British Thoracic Society recommend that pulmonary rehabilitation should be made available to all appropriate patients.
- Rehabilitation of patients with asthma or chronic obstructive pulmonary disease in local physiotherapy practices improves exercise tolerance and quality of life.

Aims

The purpose of the present study was to evaluate the efficacy of pulmonary rehabilitation in a community-based setting in physiotherapy practices.

Objectives

Method: Between April'2015 and May'2015, 40 patients were referred for pulmonary rehabilitation in physiotherapy practices. Patients were recruited by their pulmonary physician. Before entry into the programme, each patient underwent a physical, laboratory and lung function examination.

Need of study

- Physical training can improve cardiopulmonary fitness & may have positive effects on health-related quality of life in patients with asthma.
- Physical training is well tolerated in people with asthma & COPD.
- The intervention Programmes that produced these benefits included aerobic conditioning using a treadmill, other aerobic exercises & swimming.
- Exercise was coupled with an asthma education program & breathing exercises that were designed to retrain the breathing pattern could reduce breathlessness, increase exercise capacity & improve well being for people with COPD.
- Trails were made, most of whom had severe COPD. The breathing techniques studied included pursed are lip breathing, yoga breathing.

MATERIALS AND METHODOLOGY

Materials

1. PFT – Spirometric
2. 6 min walking Test.
3. Pulse Oxymeter
4. Sthesescope
5. Sphygnomometer
6. Assessment chart
8. Spiro meter reports
9. Inch tape
10. Incentive Spirometer
11. Times

Methodology

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- The Present study was conducted to investigate the effect of rehabilitation group on pulmonary functions & exercise capacity.
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- I divided the subjects into two groups
- Each group contains 20 person. One group given, medication only. This group is called general group.
- The 2nd group is the rehabilitation group, were given medication & rehabilitation also.

PROCEDURE

An rehabilitation program was then prescribed to subjects involved in the study to be followed for two months.

- The initial step was the Spyrometric test was done for the both the groups, the Spyrometric values were noted. The same procedure was done at last before the completion of Rehabilitation period, the Spyrometric values were noted.
- Both the values are compared.
- During rehabilitation period, the participants attended group sessions for 3 days in a week.

The folllowing admission criteria

Evidence of dyspnoea and decreased exercise tolerance as a result of obstructive lung disease;

- Age 30-50 yrs;
- Ability to travel independently to the physiotherapy practice;
- Medication prescribed by a pulmonary physician;
- No manifest cardiac complaints or Locomotor disabilities;
- Absence of hypercapnia; arterial oxygen tension (Pa,CO_2)>6.0 kPa mmHg) and/or hypoxia; arterial oxygen tension (Pa,O2<8.7kPa (65 mmHg) during rest and/or maximal bicycle exercise testing;
- Motivation to improve self-care;
- Informed consent;

Criteria for Exclusion

- Recent trauma to chest wall
- Cardiac Problems
- Chest wall deformity
- COPD medically not control
- Chest wall Fractures
- Associated with other pulmonary conditions like TB etc.
- Patients with age less than 30 and more than 50 years.

Outcome Measurement: The significant increase of exercise tolerance & decrease of dsynopea& fatigue. To improve the total lung capacity and saturation of Oxygen also.

ASSESSMENTS

SPIROMETRY: Incentive Spirometry is a form of a ventillatory training that emphasizes sustained maximum inspirations. The patient inhales through a Spiro meter that provides visual or auditory feedback as a patient breathes in as deeply as possible. It increases the volume of inspired air. It is advocated primarily to prevent alveolar collapse and to strengthen weak inspratory muscles. The patients were told to inspire deeply enough to raise the balls of the incentive Spiro meter. It was measured three times. Place the patient in a comfortable position.

Patient should take 3 or 4 easy breaths and maximally exhale with the 4^{th} breath. Place the Spiro meter in the patients mouth and guide him to inhale maximally and hold inspiration till possible. The sequence was repeated several time a day according to the patient's capacity[4]. The patients were labeled as having asthma in case of the presence of complaints of dyspnoea, occurring periodically, with varying severity, at the present time or in the past, in combination with an increase in FEV_1 of at least 15% after bronchodilation. Patients were labeled as having COPD when they suffered from stable dyspnoea, as well as coughing and/or production of mucus, in combination with a decreased FEV_1/vital capacity (VC) ratio [9]. As patients were not classified at the outset of the study, randomization was not stratified for diagnosis. The efficiency of the pulmonary system can be assessed by performing the pulmonary function tests. The tests determine how much the air in the lungs can hold, how quickly the air can move in and out of the lungs and how well the lungs put oxygen into and remove carbon dioxide. The tests can diagnose lung diseases, measure the severity of lung problems, and check to see how well treatment for lung disease is working. The pulmonary function test procedures (PFT) were explained to each participant in details. The following ventilatory functions were calculated for each subject according to the following maneuver:

The subject is instructed to breathe in deeply and breathe out as much as possible, to measure the *Vital Capacity (VC)*. This is the amount of air (in liters) moved out of the lung by deep expiration after deep inspiration. Each subject was also instructed to breathe in with a maximal effort and then exhale as forcefully and rapidly as possible, to measure the *forced vital capacity (FVC)*which the maximum volume of air that is expelled into the Spiro meter following a maximum and deep inhalation effort. *Forced expiratory volume in the first second (FEV1)* was calculated in the same maneuver directly b y the Spiro meter and it is the volume of air exhaled deeply and rapidly into the mouthpiece in the first second. Each subject was instructed to breath as deeply and as rapidly as possible for 15 seconds, and the average air flow (liters per minute) was recorded *to calculate the Maximal voluntary ventilation (MVV)*.

The test was terminated if the subject showed signs of significant headache, chest, or abdominal discomfort while the procedure is in progress. Each subject was instructed to repeat the test 3 times with a resting interval of two minutes between each measurement to avoid the effect of fatigue, and then the maximum value of the three records was taken. Exercise capacity is one of the most important physiologic measures; it can potentially evaluate various limitations and identify factors contributing to them. Exercise capacity can be an important predictor of survival after pulmonary rehabilitation. Different methods of measuring exercise capacity have been used in clinical trials. E.g. walking test, progressive cycle ergometery and cycle endurance.

Endurance cycle ergometer test: An endurance cycle Ergometer test was performed on a mechanically-braked, calibrated cycle Ergometer. The patients were asked to cycle at 75% of their maximal power output (Wmax) until exhaustion; the endurance time was used as the assessment parameter.

- A score of at least 9 on the Borg scale for the variable perceived exertion and/or dyspnoea-sensation. In our experience, all patients with relatively mild asthma or COPD are able to reach Borg scores of 9 to maximum during the endurance cycle Ergometer test.
- A frequency cardiac above 85 % of that maximally attained during the maximal cycle Ergometer test.
- A cycling frequency above 50 revolutions min-1.

SIX MINUTE WALKING TEST

Before test patients should be explained about the test and before and after test patients Blood Pressure should be checked. The distance that the patient was able to walk in 6 min was determined in a measured corridor, as described for the 12-min walk test. The patients were instructed to walk at their fastest pace and to cover the longest possible distance over 6 min under the supervision of a physiotherapist. The test was performed twice, and the best result was reported.

RESPIRATORY MUSCLE STRENGTH

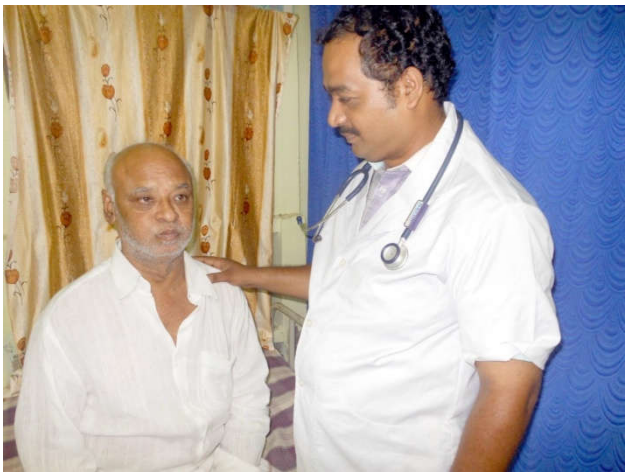
Respiratory muscle strength was assessed by measuring the maximal inspiratory pressure (Pimax) and the maximal expiratory pressure (Pemax) at residual volume and total lung capacity, respectively, as previously described by Black and Hyatt.

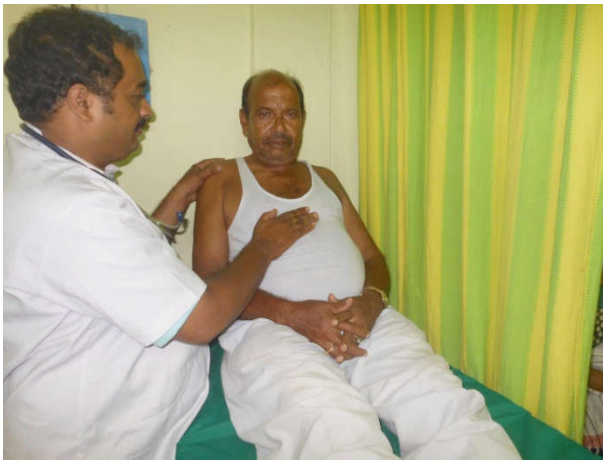
DESCRIPTION OF THE TECHNIQUES

BREATHING EXERCISE
TYPE: PURSED LIP BREATHING EXERCISE

- The subject should be in a comfortable well supported in half lying position.
- The Patient is encouraged to relax his upper chest, shoulders and arms while using the lower chest.
- One hand is placed on the upper abdomen (either patients/ therapists hand)
- Ask the patient to breath in, the hand on the abdomen should be felt to rise up and out.
- Breath out with pursed lips to generate a small positive pressure.

While patient breaths out, the hand on the abdomen should sink down and in.





DIAPHRAGMATIC TECHNIQUE

PATIENT POSITION: Supine

THERAPIST HAND PLACEMENT

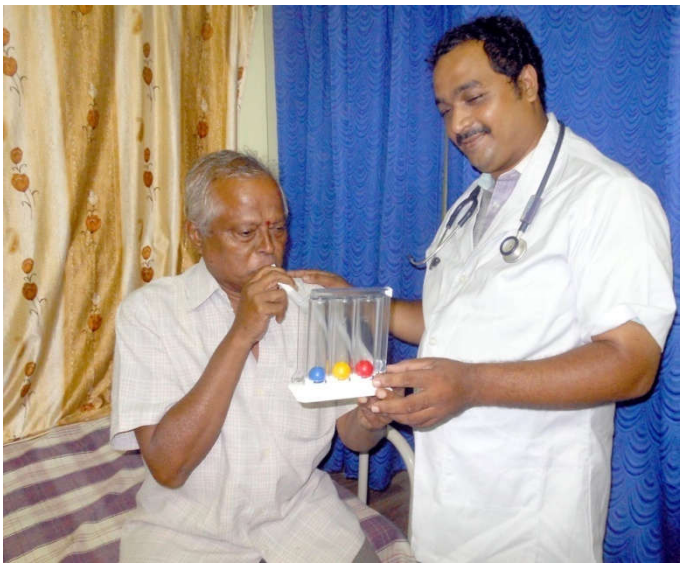
- Thumbs & Palms of the hands along the costal cartilages of the lower ribs.
- Thumbs are pointed towards xiphoid process.

PRESSURE APPLICATION

- Pressure and stretch is applied with the thumbs pushed up and under the rib cape as jar as possible with out producing pain.
- Repeated contractions may be performed to both side simultaneously or one side may be emphasized with sustained pressure to the other side.

STIMULATION OF DIAPHRAGM

- Thumbs in Position
- Fingers are placed in contact with the lower chest walls
- The patient is instructed
- Breath in, hold it
- Patient sustains hold, while the therapist applied pressure and stretch alternately to the chest walls and the diaphragm.
- After two or three alterations, patients instructed, breath in again !Again !and again !.
- While the therapist repeats with increasing and decreasing pressure to the diaphragmatic area.



REHABILITATION PROGRAMME

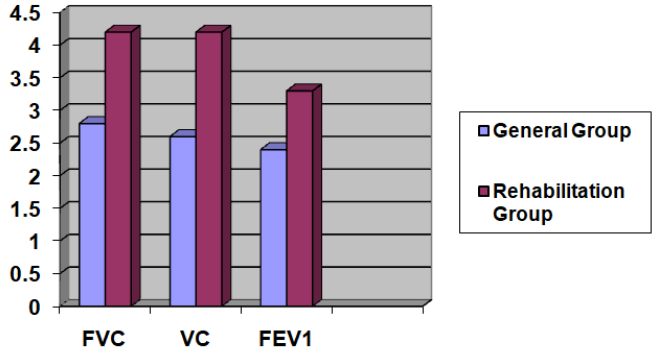
The patients with asthma or COPD received the same rehabilitation Programme, comprising techniques of breathing Re training and evacuation of mucus, exercise training (both for lower and upper extremities), patient education, relaxation techniques and recreational activities. Although the physiotherapist* followed strict guidelines with respect to al l components of the Programme, allowances were made for individual needs. In each day physiotherapy practice, Participants attended group sessions 3 days a week for 90 min. The exercise training was performed twice a week on a cycle Ergometer, on a rowing machine and by stair-walking. During the Programme, a bicycle training scheme was used in which:1) the intensity progressively increased from 60 to 75% W_{max} and 2) the duration increased from 3 min to 12 min We aimed at an intensity in the "rowing" and "walking up- and downstairs" exercises of 60% or more of maximum frequent cardiac, directed by the physiotherapists. The duration of these latter activities was extended during treatment from 3 min in Week l to 5 min in Week. The purpose of the recreational activities was to direct participant toward regular physical activities deemed essential to maintain benefits after rehabilitation.

DATA COLLECTION AND STATISTICAL ANALYSIS:

Data Analysis: Data was expressed in mean and standard deviation. One-tail unpaired t-test was used to compare the values of Vo_{2max}, VC, FVC, FEV1 and MVV between rehabilitation group and control group. P Value of 0.05 was used to mark the significant difference. All P values less than 0.05 considered statistically significant. The present study was conducted to investigate the effect of rehabilitation group on pulmonary functions and exercise capacity. Forty subjects participated in this study. Their age ranged from 30-50 years old. They were divided into two group. General Group included 20 subjects who were COPD & Asthma who were collected from Government GeneralHospital, Vijayawada including the other 20 subjects who were COPD who were collected from Government GeneralHospital, Vijayawada.

Table : Statistical comparison of the General Group and Rehabilitation Group.

Parameter (Mean±SD)	General Group (N=20)	Rehabilitation Group (N=20)	Mean difference	P-Value
Age-Years	21.8±2.6	20.6±1.9	1.2±2.9	0.88
Weight-Kg	58.8±7.6	63.65±7.7	4.85±13.6	0.128
Height-cm	167.7±7.1	169.4±6.7	1.65±8.5	0.97
BMI-kg/m^2	2.9±2.7	22.2±1.6	1.27±3.0	0.82



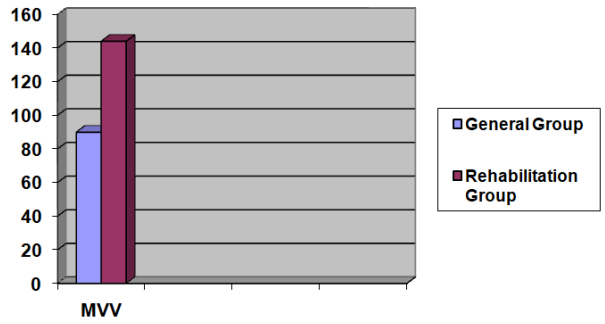
The General characteristics of the all subjects General Group and Rehabilitation subjects are presented in table (1). Un-paired t-test had revealed that there were no significant differences (P>0.05) between the subjects of the two groups as

regards to the age, weight, height and BMI, which indicated that they were homogenous groups.

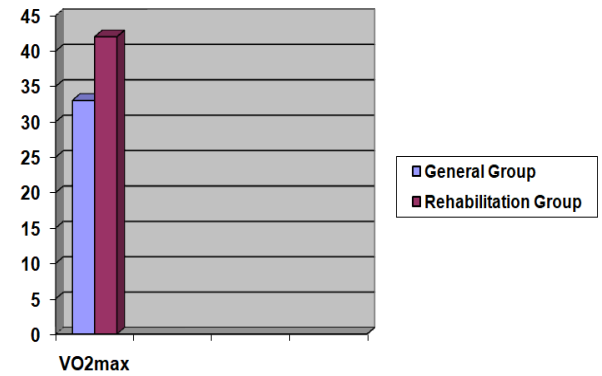
Table. Statistical comparison of the pulmonary functions and exercise capacity indices between Water pipe smokers and healthy subjects

Paramenter	General Group Mean±SD	Rehabilitation Group Mean±SD	Mean differences Mean±SD	P-Value
FVC (Liter)	2.8±0.3	4.2±0.4	1.6±0.5	0.000
VC (Liter)	2.63±0.4	4.2±0.4	1.8±0.6	0.000
FEVU (Liter)	2.4±0.6	3.33±0.4	0.93±0.6	0.000
MVV (Liter)	89.9±10.5	144±7.4	51.2±14.5	0.000
VO_2max (ml/kg/min)	33.3±1.6	42.3±0.4	9.0±1.3	0.000

Table showed significant reduction of FVC in the General group than in Rehabilitation group, as its mean value in the group was 2.8±0.3 liters, while its mean value in Rehabilitation Group was 4.2±0.4 liters with a mean difference of 1.6±0.5 liters (P<0.05). The mean value of VC had decreased significantly in General Group than in Rehabilitation group, as its mean value in the General group was 2.63±0.4 liters, while its mean value in the Rehabilitation group was 4.2±0.4 liters with a mean difference of 1.8±0.06 liters (P<0.05). The mean value of FEV_1 had decreased significantly in General Group than in Rehabilitation group. Its mean value in the General group was 2.4±0.6 liter, value in the Rehabilitation group was 3.33±0.4 liter with mean difference of 0.93±0.6 liter.



The mean value of MVV had decreased significantly in the General group than in Rehabilitation group. Its mean value in the General group was 89.9±10.5 liter/min, and its mean value in the Rehabilitation group was 144±7.4 liter/min with mean difference of 51.2±14.55 liter/min.



The present study had also showed significant reduction of the mean value of the VO2max in General group than in Rehabilitation group, as its mean value in the General group was 33.3±1.6 ml/kg/min, while its mean value in the Rehabilitation group was 42.3±0.4ml/kg/min with mean difference of 9.0±1.3 ml/kg/min.

RESULTS

The relationship between general group and rehabilitation group of data where analyzed using the person correlation test. Comparisons between groups where done with the **t-test** Results are reported as mean and standard deviation where considered statistically significant p less then 0.05 I studied a total 40 male patients with COPD and Asthma. I completed the 2 months pulmonary rehabilitation Programme and I had complete data sets. The general and rehabilitation group exercise performance values. There where statically improved in all indices of exercise performance 6MWD (p 0.001) Vo_{max} (p=0.004) W_{max} (p=0.001) and endurance time (p0.001) Of those values show the endurance time improved from 438+373s to 760+485s(increased 322+479s). The difference in exercise responses to pulmonary rehabilitation. The percent changes in the measures of exercise performance after pulmonary rehabilitation in the 3 exercise tests. The endurance time showed the most striking improvement the 6MWD,Vo_{2max} and W_{max} also improved before pulmonary rehabilitation all the values of exercise performance where significantly correlated with another shows the relationship between the general and rehabilitation group changes in values of exercise performance. This study reveled substantial improvements in cycling endurance time and substantial improvements in walking distance (6MWD). The present study demonstrated significant improved in cycling endurance time and walking distance at follow–up assessment compared to base line assessments, a similar tendency was observed for who received 2 months pulmonary rehabilitation Programme in under physiotherapy .to improved exercise tolerance more effective.

Table. Outcome Measurement Tools

Index of Exercise Performance	Before PR	After PR	P
V_{o2}max (ml/min)	860 ± 312	1.032 ± 454	0.004
W_{max}(watts)	50 ± 24	56 ± 27	0.001
Endurance time(s)	438 ± 373	760 ± 485	<0.001
6MWD (m)	398 ± 127	434 ± 122	< 0.001

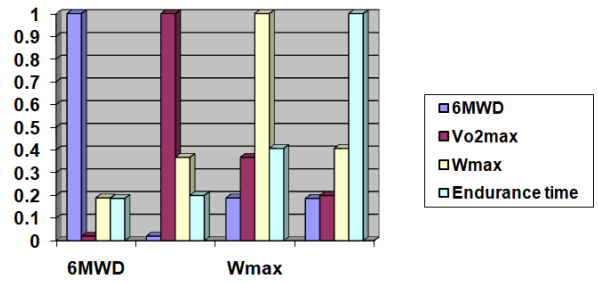
Table. Correlation Between Exercise Indices at Baseline

	6MWD	**V_{o2max}**	**W_{max}**	**Endurance Time**
6MWD	1	0.554 ±	0.704 ±	0.513 ±
V_{o2}max	0.554 ±	1	0.694 ±	0.652 ±
W_{max}	0.704 ±	0.694 ±	1	0.728 ±
Endurance time	0.513 ±	0.652 ±	0.728 ±	1

Table : Correlation Between the Changes in Exercise Indices.

	6MWD	V_{o2max}	W_{max}	Endurance Time
6MWD	1	0.02	0.188	0.186
V_{o2}max	0.02	1	0.3671 ±	0.199
W_{max}	0.188	0.3671	1	0.406 ±
Endurance time	0.186	0.199	0.406 ±	1

Values are Pearson correlation Coefficients6MWD = 6-minute walk distance Vo2max = maximum oxygen uptake during progressive cycle ergometry.
Wmax = maximum work-rate during progressive cycle ergometry



t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

DISCUSSION

The endurance time showed the largest post-PR increase among the 3 exercise test. Endurance tests measure the ability to sustain a submaximal exercise level, which could characteristically improve when there was no significant increase in maximum exercise capacity. Consistent with what has been previously observed, the Vo_{2max} and W_{max}were insensitive measures of post-PR improvement, compared to the endurance time. The present study shows significant improvement of 6MWD and SpO2% at resting condition in pulmonary rehabilitated COPD patients after 60 days of follow up and it was further improved compared to the patient without PR. Similar observation were reported by several investigators. In addition, significant improvement in mean Borg score was observed in PR intervened patients but it was not improved in patients without PR after 60 days. Similar observation were also reported by several investigators. The results of this study demonstrate statistically significant improvements in exercise tolerance and QOL following a community based rehabilitation programme. A major limitation of the present study concerns the high number of patients dropping out after randomization.

In addition, the present rehabilitation programme led to substantial improvements in walking distance (by 39m) in favour of the patients receiving the rehabilitation programme (the minimum clinically important difference for the 6 min walking test has been estimated to b e 30 m. This is in accordance with the findings of Goldstein et al who showed that the patients receiving rehabilitation walked 38 m more during a 6 min walking test than the patients receiving conventional treatment. The present study demonstrated significant improvements in cycling endurance time, frequent cardiac during cycling, and walking distance at follow-up assessments compared to baseline assessments. However, the cycling endurance time dropped off significantly between the Rehabilitation Group and General Group. In other studies, the rehabilitation programme was followed by a structured exercise maintenance programme observed that although the 12 min walking distance decreased significant after finishing a 6 week rehabilitation programme, the walking distance measured 2 months after rehabilitation remained significantly greater than at baseline. They did not find significant additional differences in walking distance between patients who received a structured exercise maintenance programme after rehabilitation compared to patients who did not.

Conclusion

Among the frequently used post-PR exercise tests, the most responsive index, as measured by the percentage change from baseline, is the endurance time. The correlation between the post-PR changes in these exercise indices is poor.

Limitations & Scope for Other Study

Only male subjects were included in this study.

In this study, training is given for a short duration (2 months). I observed so many articles maximum rehabilitation period taken three months above all researchers. A similar study can be done in male subjects only, so many persons study to children also. I comparative study can be done on both the COPD & Asthma also. I understood this type of study used to other lung diseases also.

REVIEW OF LITERATURE

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1995. Exercise for pulmonary invalids by Charles Dension, A.M., M.D. the Professor of Disease of Chest and Climatology and Published in 1893. its help to upper and lower limbs exercise pattern to improve the respiratory muscles. Unsupervised exercise training versus no exercise training for COPD (Protocol).Published by the Cochrane Library in 2015. I takenBrogs and Fatigue scales in Pulmonary Rehabilitation Programme at the Australian Lung Foundation (APA) in internet. The recent guidelines on management of COPD and Asthma published by National Institute of Clinical Excellence and British Thoracic Society recommended that Pulmonary Rehabilitations taken in internet.

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THE SIX-MIUTE WALK TEST ?

Essential Requirements	Yes	No
Do I have access to a health professional trained in CPR and with the expertise to run the test?		
Do I have access to a flat continuous (oval or rectangular) or point-to-point (stop, turn around, go) walking track at least 25 meters in length?		
Is the walking track clear of hospital traffic and obstacles, with minimal blind tunrs?		
Can the waling test be conducted in a comfortable ambient temperature and humidity?		
Do I havea stethoscope?		
Do I havea sphygmomanometer?		
Do I have a pulse oximeter?		
Do I have a stopwatch?		
Do I have a portable oxygen delivery system?		
Do I have chairs positioned to allow for patient rest?		
Do I have a dyspnoea scale?		
Do I have a measuring tape or can the walking track be marked in one meter increments.		

FATIGUE SEVERITY SCALE (FSS)

The Fatigue Severity Scale (FSS) is a method of evaluating the impact of fatigue on you. The FSS is a short questionnaire that requires you to rate your level of fatigue.

- A low value (e.g.1) indicates strong disagreement with the statement, whereas a high value (e.g.7) indicates strong agreement.
- It is important that you circle a number (1to 7) for every question.

FSS Questionnaire							
During the part week, I have found that	Disagree←---------→ Agree						
My motivation is lower when I am fatigued.	1	2	3	4	5	6	7
Exercise brings on my fatigue	1	2	3	4	5	6	7
I am easily fatigued	1	2	3	4	5	6	7
Fatigue interferes with my physical functioning	1	2	3	4	5	6	7
Fatigue causes frequent problems for me	1	2	3	4	5	6	7
My fatigue prevents sustained physical functioning	1	2	3	4	5	6	7
Fatigue interferes with carrying out certain duties and responsibilities	1	2	3	4	5	6	7
Fatigue is among my three most disabling symptoms	1	2	3	4	5	6	7
Fatigue interferes with my work, family, or social life.	1	2	3	4	5	6	7
	Total Score :						

Scoring your results: Now that you have completed the questionnaire, it is time to score your results and evaluate your level of fatigue. It's simple : Add all the numbers you circled to get your total score.
The Fatigue Severity Scale Key :

- A total score of less than 36 suggests that you may not be suffering from fatigue.
- A total score of 36 more suggests that you may need further evaluation by a physician.

Your next steps

This scale should not be used to make your own diagnosis. If your score is 36 more, please share this information with your physician. Be sure to describe all your symptoms as clearly as possible to aid in your diagnosis and treatment.

Modified Borg Dyspnoes Scale

0. Nothing at all
0.5 Very, very slight (just noticeable)
1. Very slight
2. Slight
3. Moderate - Exercise Training Zone.
4. Somewhat severe
5. Severe
6.
7. Very severe
8.
9. Very, Very severe (almost maximal)
10. Maximal

Patient Instructions for Borg Dyspnoea Scale

"This is a scale that asks you to rate the difficulty of your breathing. Its starts at number 0 where your breathing is causing you no difficulty at all and progresses through to number 10 where you breathing difficulty is maximal. How much difficulty is your breathing causing you right now?"

Six Minute Walking Test Recording Sheet

Name :
Date :
Age : Predicted HRmax
Group :

Initial Assessment

SWT 1
Date :
Time :

Time mins	SpO_2	HR	Dyspnoea	Rests
Rest				
1				
2				
3				
4				
5				
6				
Recovery 1				
2				

Distance :(Number of shuttles x 10)

Limiting factor to the test:

SOB Low SpO_2
Leg fatigue Other_____

SWT 2
Date :
Time :

Time mins	SpO_2	HR	Dyspnoea	Rests
Rest				
1				
2				
3				
4				
5				
6				
Recovery 1				
2				

Distance :

Limiting factor to the test ;

SOB Low SpO_2
Leg fatigue Other_____

Consent To Participate In The Study

I, _____ Voluntarily consent to participate in the Cardio Respiratory Research study to find efficiency of Pulmonary functions and breathing pattern in improving lung functions and increasing the exercise tolerancy. The Researchers has explained to me the treatment approach in brief, the risk of participation and answered the questions related to the research to my satisfaction.

Participant Signature :
Signature of Witness :
Signature of the Researcher :

PATIENT PROFORMA

SUBJECTIVE ASSESSMENT

PERSONAL DATA

Name :
Date :
Age :
Height :
Gender :
Weight:
Occupation :

Address :
Chief Complaints :

HOSTORY
History of chief complaints: on Set, duration, frequency etc.,

Past History :
Medical History :
Family History :
Personal History :

OBJECTIVE ASSESSMENT EXAMINATION

Vital Signs:

Respiratory rate
Temperature
Heart Rate
Blood Pressure

Observation

Physique
Cyanosis or Pallor
Clubbing
Intercostal Recession
Use of accessory Muscles

CHEST EXAMINATION

Inspection:

Appearance of Chest :
Appearance of Shoulder &Neck :
Movement of Chest :

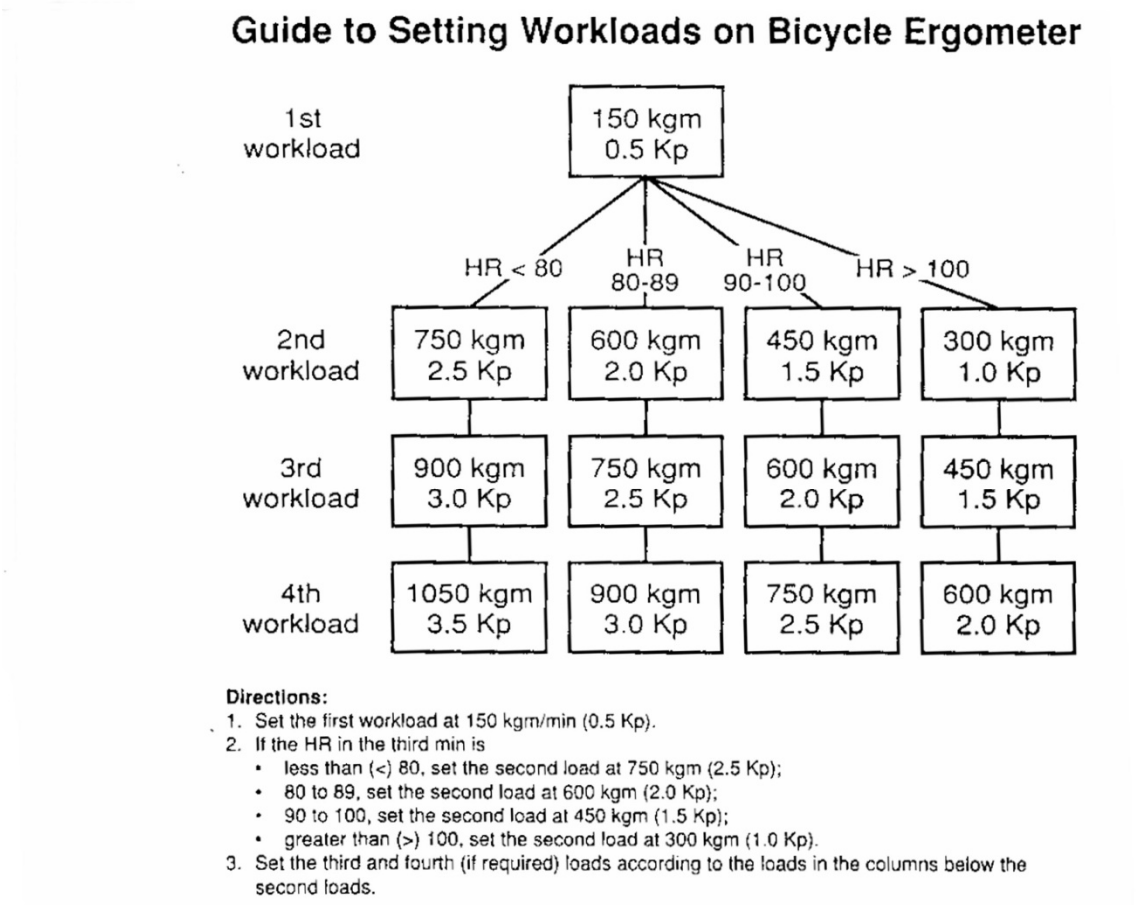
Palpation

Swelling and tenderness :
Chest Expansion :
Percussion:
Auscultation :

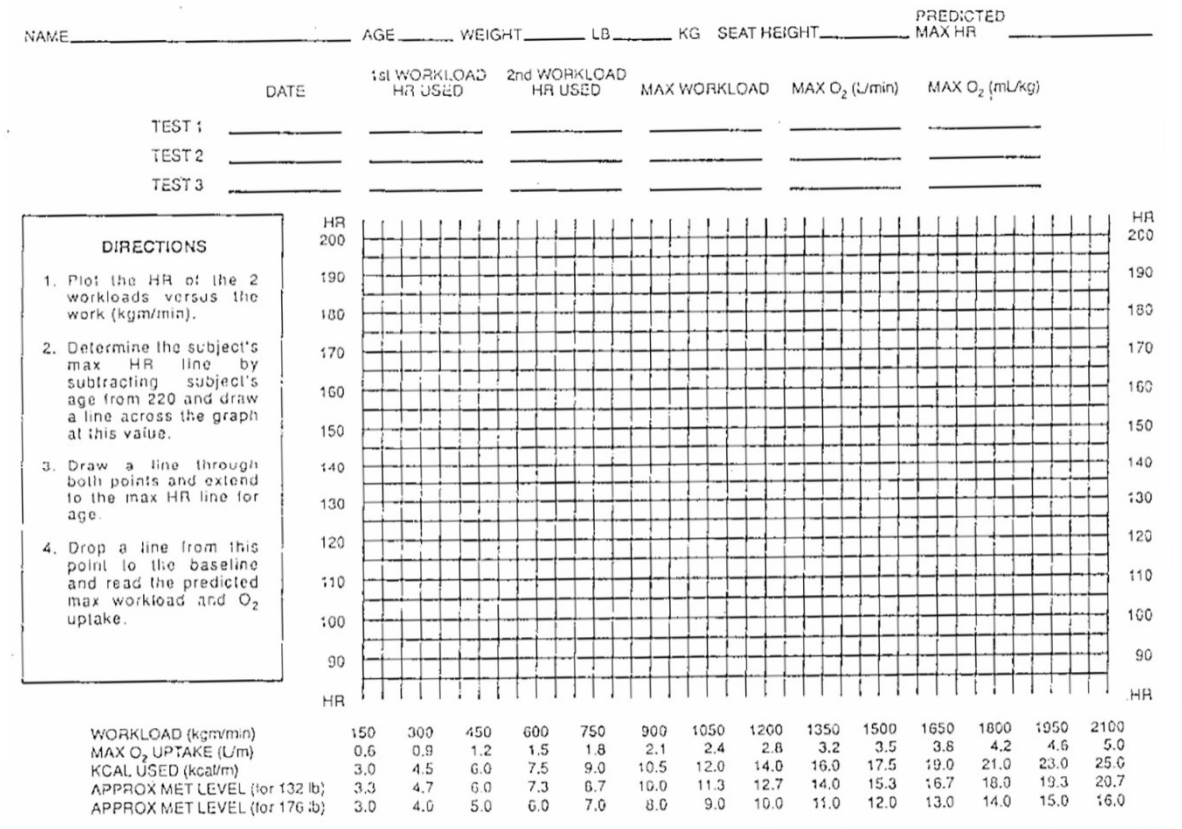
INVESTITATIONS

Pulmonary Function Tests :

FEV1 :
FVC :
TLC :
PEFR :
Chest X-ray:



igure 4.10 Guide to setting workloads for males on the YMCA's submaximal bicycle ergometer test. *Source:* Reprinted from 's Way to Physical Fitness (3rd ed.) with permission of the YMCA of the U.S.A., 101 N. Wacker Drive, Chicago, IL 60606.



igure 4.13 Graph for determining $\dot{V}O_{2max}$ from submaximal heart rates obtained during the YMCA's submaximal bicycle test. *ource:* Reprinted from The Y's Way to Physical Fitness (3rd Ed. Champaign, Il, Human Kinetics Publisher, 1989), with ermission of the YMCA of the U.S.A., 101 N. Wacker Drive, Chicago, IL 60606.

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