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Original research article

Pulmonary rehabilitation in COPD: Assessment of breathlessness/dyspnea

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Abstract

COPD patient population is at increased risk for lung cancer and the mortality, so a low dose screening CT may be beneficial. Regular and high resolution computerized tomography not indicated in routine diagnosis or evaluation of COPD but allows better detection and quantification of emphysema than doe's traditional chest radiography, thickened airways indicative of bronchial thickening and in expiratory views, areas of air trapping indicate small airways obstruction and emphysema. The level of dyspnea was assessed using the modified Medical Research Council (mMRC) Breathlessness Scale. It consists of five statements describing the range of respiratory impairment in each patient. Within group comparison, there was statistical significant difference seen both in intervention (P value. 0005) and control group (P value.0005) compared to baseline, but more significant change was in intervention group i.e. breathlessness grading improved from 2.40 to 1.27 in cases, whereas it changed from 2.33 to 1.50 in control group.

Keywords: COPD, pulmonary rehabilitation, MMRC

Introduction

Symptoms of COPD Chronic and progressive dyspnea, cough with sputum production, wheezing and chest tightness Others-including fatigue, weight loss, anorexia, syncope, rib fractures, ankle swelling, depression, anxiety [1].

As COPD was initially considered as a disease characterized by dyspnea, a simple measure of grading was considered adequate like mMRC grading but now it is recognized by its impact beyond just dyspnoea hence a comprehensive assessment of symptoms is recommended like chronic respiratory questionnaire, SGRQ, CAT [2].

COPD patient population is at increased risk for lung cancer and the mortality, so a low dose screening CT may be beneficial. Regular and high resolution computerised tomography not indicated in routine diagnosis or evaluation of COPD but allows better detection and quantification of emphysema than does traditional chest radiography, thickened airways indicative of bronchial thickening and in expiratory views, areas of air trapping indicate small airways obstruction and emphysema [3].

In stable COPD patients, it typically reveals a predominance of macrophages and a few bacteria, and during exacerbation the most common organisms are haemophilus influenzae, Moraxella catarrhallis and streptococcus pneumonia [4].

Methodology

Sample size: A sample size of 60 patients (30 interventional and 30 control) were taken by using single proportion-absolute precision method.

Type of study: Prospective interventional study.

Inclusion criteria

- COPD Stage 2 to Stage 4 according to GOLD 2016 guidelines
- Either gender
- Age >40yrs
- Willing to give informed written consent

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Exclusion criteria

- Patients with persistent sepsis.
- Patients with unstable angina, recent myocardial infarction, Congestive cardiac failure.
- Haemoglobin < 10gm/dl.
- Patients with tuberculosis/lung cancer.
- H/O atopy.
- Cognitive impairment.
- Severe neurological disease.
- Disabling Arthritis.

Method of data collection

- Patients were recruited from department of Respiratory medicine admitted with acute exacerbation of COPD.
- Detailed clinical history and complete clinical examination was done.
- Appropriate investigations were done (Complete haemogram, Blood sugar, Electrolytes, Chest x ray, Arterial blood gas analysis, Sputum for gram stain and culture and sensitivity, ECG, PFT at time of discharge).
- 60 patients were recruited for the study on the basis of inclusion and exclusion criteria and randomized into two groups (Interventional and Control group).
- A written informed consent was obtained from the patient.
- Patients were treated according to GOLD (global initiative for chronic obstructive lung disease) 2016 guidelines. Interventional group received pulmonary rehabilitation in addition to usual care, two to three sessions daily of 20-30 minutes duration each session, from third day to tenth day/discharge whichever was latest. Pulmonary rehabilitation included education, psychological support, following exercises. Control group received only usual care.

Breathlessness/dyspnea: The level of dyspnea was assessed using the modified Medical Research Council (mMRC) Breathlessness Scale. It consists of five statements describing the range of respiratory impairment in each patient.

Results

Table 1: Cross Tabulation between Baseline MMRC Grading Breathlessness and Cases and Controls

MMRC PRE * Groups						P value
Crosstab						
			Groups		Total	
			Cases	Controls		
MMRC PRE	I	Count	1	1	2	0.867
		%	3.3%	3.3%	3.3%	
	II	Count	16	18	34	
		%	53.3%	60.0%	56.7%	
	III	Count	13	11	24	
		%	43.3%	36.7%	40.0%	
Total		Count	30	30	60	
		% within Groups	100.0%	100.0%	100.0%	

Table 2: Cross Tabulation between Post Intervention MMRC Grading Breathlessness and Cases and Controls

MMRC Post *Groups						P value
Crosstab						
			Groups		Total	
			Cases	Controls		
MMRC Post	I	Count	22	16	38	0.208
		%	73.3%	53.3%	63.3%	
	II	Count	8	13	21	
		%	26.7%	43.3%	35.0%	
	III	Count	0	1	1	
		%	0.0%	3.3%	1.7%	
Total		Count	30	30	60	
		% within Groups	100.0%	100.0%	100.0%	

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Table 3: Distribution of MMRC Grades of Breathlessness among Cases and Controls

MMRC	Pre		Post	
	Cases	Controls	Cases	Controls
I	3.3%	3.3%	73.3%	53.3%
II	53.3%	60.0%	26.7%	43.3%
III	43.3%	36.7%	0.0%	3.3%

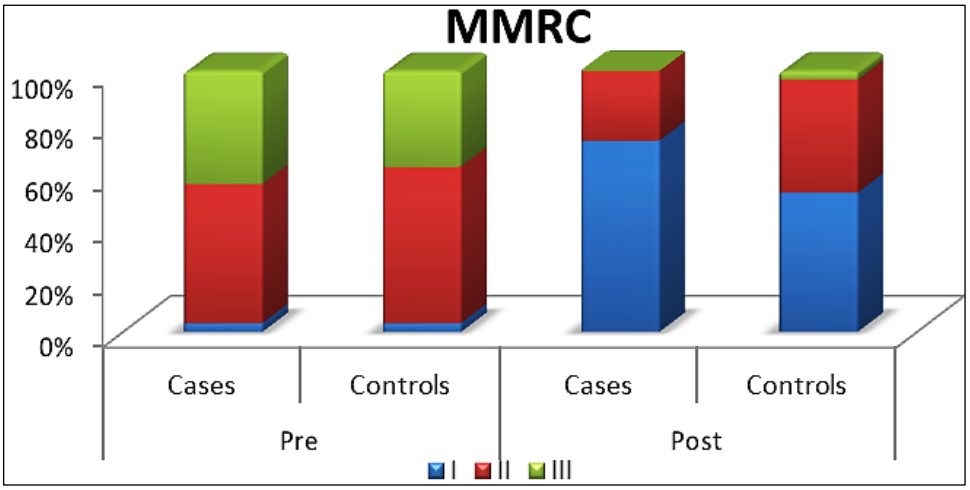

Fig 1: Bar Diagram Showing Pre and Post MMRC Grading among Cases and Controls in Percentage

Table 4: Group Statistics of Pre and Post Difference in MMRC Grading Breathlessness between Cases and Controls

Group Statistics						Z	P value
Groups		N	Mean	Std. Deviation	Std. Error Mean		
DIFFMMRC	Cases	30	1.13	.43417	.07927	- 2,688	.007
	Controls	30	0.83	.37905	.06920		

Table 5: Table Showing Pre and Post Difference of MMRC Grading Between Cases and Controls

mMRC grading	Cases	Controls
Pre	2.40	2.33
Post	1.27	1.50

Between two groups comparison, there was statistical significant difference (P .007)) seen in pre and post difference in breathlessness i.e. breathlessness improved more in intervention group compared to control group.

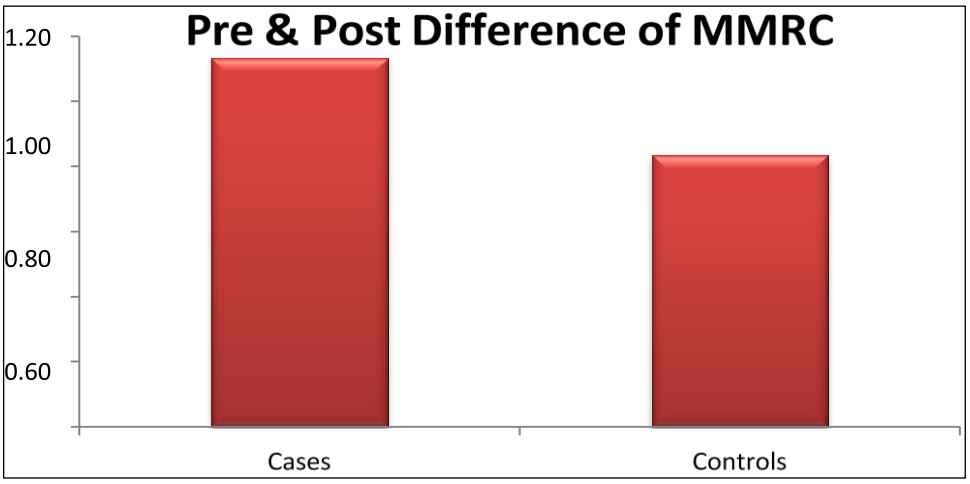

Fig 2: Bar Diagram Showing Pre and Post Difference of MMRC between Cases and Controls

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Table 6: Table Showing Statistics of Pre and Post MMRC Grading among Cases

Paired Samples Statistics						Z	P value
		Mean	N	Std. Deviation	Std. Error Mean		
Pair 1	MMRC Pre	2.40	30	.563	.103	- 5.058	.0005
	MMRC Post	1.27	30	.450	.082		

Table 7: Table Showing Statistics of Pre and Post MMRC Grading among Controls

Paired Samples Statistics						Z	P value
		Mean	N	Std. Deviation	Std. Error Mean		
Pair 1	MMRC Pre	2.33	30	.547	.100	- 5.000	.0005
	MMRC Post	1.50	30	.572	.104		

Within group comparison, there was statistical significant difference seen both in intervention (P .0005) and control group (P .0005) compared to baseline, but more significant change was in intervention group i.e. breathlessness grading improved from 2.40 to 1.27 in cases, whereas it changed from 2.33 to 1.50 in control group.

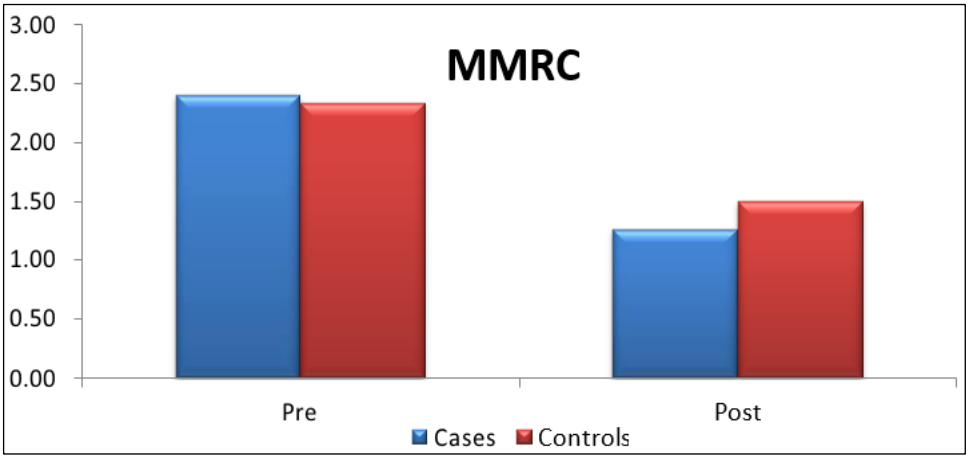

Fig 3: Bar Diagram Comparing Pre and Post MMRC Reduction (Improvement) among Cases and Controls

Discussion

Mir Shad Ali, Deepak Talwar and S.K. Jain in 2014, conducted a study on the effect of a short-term Pulmonary Rehabilitation on exercise capacity and quality of life in 30 patients hospitalised with acute exacerbation of COPD. In this study, 15 were in with usual care plus PR exercises in the form of 20 minutes, thrice-weekly for three weeks and control group patients were treated with only the usual care and parameters(6MWD,QoL, dyspnea and cardio pulmonary exercise test) were assessed at baseline and after 3 weeks. Results suggested that nine sessions of PR exercises produced statistically significant improvement in general well-being, forced expiratory volume in the first second (FEV1), 6MWT parameters, exercise capacity, dyspnea in patients with AECOPD [5] in above similar study, PR was started during hospitalization, continued at home for 3 weeks, and then parameters were assessed between two groups. In my study, parameters were assessed after 7 days or at time of discharge but PR was continued at home.

Puhan *et al*., in 2012 studied on early versus late pulmonary rehabilitation in COPD patients with acute exacerbations and concluded as early PR (within 2 weeks of acute exacerbation) may lead to fasten recovery of health related quality of life compared to late rehabilitation [6] Clini EM *et al*., in 2009 conducted a study on effects of early inpatient rehabilitation after acute exacerbation of COPD. It was a retrospective cohort study which included 1826 patients who received PR-15 sessions and patients were divided as per MRC grading breathlessness. Study concluded that early inpatient rehabilitation is feasible and provides clinically relevant change of exercise tolerance across all MRC grades in a large cohort of patients [7] and improvement in symptoms and exercise tolerance which were similar findings in my study.

Qiu Z *et al*., conducted a randomized control study in 2015 on 94 patients in China.

The PR program was performed from the second day of admission until discharge and concluded that it is safe and feasible to apply an early PR in patients with acute exacerbation of COPD [8].

The above study is exactly similar to my study which was done in China but the objective was to check for safety and feasibility of early PR in AECOPD and they found that early PR is safe and feasible. In my study also there were no complications/adverse events during pulmonary rehabilitation and hence found safe and feasible to start early PR in AECOPD.

Conclusion

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Between two groups comparison, there was statistical significant difference (P .007)) seen in pre and post difference in breathlessness i.e. breathlessness improved more in intervention group compared to control group.

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