



## EFFECT OF SHOULDER GIRDLE STRENGTHENING AS AN ADJUNCT TO CONVENTIONAL TREATMENT IN COPD PATIENTS.

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### ABSTRACT

**Background:** The purpose of this study was to assess the effectiveness of shoulder girdle strengthening as an adjunct to conventional treatment in COPD patients.

**Method:** 40 subjects of COPD were included in this study. Following the data collection, the subjects were allotted into 2 groups, Group A – Conventional treatment and Group B – Conventional treatment along with shoulder girdle strengthening. Before and After the treatment protocol subjects were assessed by MMT, Shape of Chest, Respiratory Rate, Incentive Spirometer, PEFR. These outcome measures were analysed.

**Result:** Statistical analysis was performed using paired t-test and unpaired t-test. Intra group comparison (within group) was analysed statistically using paired t-test for MMT, Shape of Chest, Respiratory rate, Incentive Spirometer, PEFR. This shows there is significant effect in Group A similarly there is extremely significant difference in Group B. But in intergroup comparison (between groups) was analysed statistically using unpaired t-test. This shows that pre intervention there was no significant difference in MMT, shape of chest, incentive spirometer, PEFR. While on comparing post interventional values, the results between two groups using unpaired t-test revealed that there was statistically significant difference seen in MMT, incentive spirometer. But there was no statistically significant difference seen in respiratory rate, PEFR.

**Conclusion:** From this study, it can be concluded that there was extremely significant improvement in subjects who underwent conventional treatment and shoulder girdle strengthening statistically and clinically. Overall there was significant difference found between the groups. Hence this study accepts the alternate hypothesis ( $H_1$ )

**KEYWORDS :** chronic obstructive pulmonary disease

### Introduction

Chronic obstructive pulmonary disease (COPD) is a major health burden worldwide and is estimated to be the third leading cause of death in 2020. It is a progressive inflammatory, preventable and treatable disease state characterized by airflow limitation usually progressive and is associated with an abnormal inflammatory response of the lungs to noxious particles or gases, primarily caused by cigarette smoking.<sup>(1)</sup> It is an ill-defined term applied to patients who have combination of chronic bronchitis and emphysema which usually occurs together<sup>(2)</sup>. COPD is second most common lung disorder after pulmonary tuberculosis in India.<sup>(1)</sup> According to the population in India 11% of males and 8% of females are diagnosed with COPD. Patients with normal or relatively normal lungs may develop respiratory failure when there is failure of the pump mechanism which draws air in and out of lungs<sup>(3)</sup>. Diagnosis of COPD is done in patients with symptoms of cough, sputum production and dyspnoea or history of exposure to risk factors. Diagnosis requires spirometer, pulmonary function test and imaging. Pulmonary assessment is also done. After the confirmation medications are given.

A scapular stabilization exercise program performed for 4-week result in improvement of upper limb functions<sup>(7)</sup>. As the scapular muscles are the accessory muscles of respiration so this patients with COPD are more prone for using accessory muscles of respiration due to weak primary respiratory muscles. Strengthening these accessory muscles with primary muscles to prevent respiratory complication. This study aims to find the effect of scapular muscle strengthening on COPD patients.

### MATERIALS AND METHODOLOGY

An experimental study was conducted at physiotherapy department of Krishna College of physiotherapy. A total 40 patients were equally divided into two groups using convenient sampling with random allocation (Group A and Group B). Group A was given conventional treatment and Group B was given conventional treatment with shoulder girdle strengthening. Patients were selected according to inclusion and exclusion criteria. Written informed consent was

taken and whole study was explained to them. Inclusion criteria were as follows: 1) both male and female participants willing to participate in study. 2) Patient with age group 40-80 years. 3) Patients with diagnosis of respiratory conditions. 4) Patients with breathlessness grade 2. 5) Patients with reduced air entry. Exclusion criteria were as follows: 1) Patients with intercostal drainage (ICD). 2) Patients undergone with recent lung surgery - pneumonectomy. 3) Patients with large emphysematous bullae. 4) Patients with tension pneumothorax.

### Group A: Conventional treatment for COPD

#### Treatment given:

- breathing exercises
- chest mobility exercises
- active cycle breathing technique
- chest physiotherapy
- inspiratory muscle exercise

**Group B:** Conventional treatment with Shoulder girdle muscle strengthening

### Exercises-

**Along with GROUP A treatment with these exercises will also be included:**

- Free exercises of shoulder
- Shoulder wheel exercises
- Rhomboids stretch
- Scapular protraction retraction
- Wall push up
- Shoulder shrug

### • STATISTICAL ANALYSIS

The data was entered into Microsoft Excel 2016. The data was analysed using instant software. Descriptive statistics were used to analyse baseline data for demographic data. Pre and Post treatment protocol was analysed using paired t test and unpaired t test.

### Results:

40 subjects of COPD meeting the inclusion criteria were included in this study. Following the data collection, the subjects were allotted into 2 groups, Group A – Conventional treatment and Group B – Conventional treatment along with shoulder girdle strengthening. During 4 week of protocol, 20 subject (13 males and 7 female) were in group A, aquatic exercises with conventional treatment and other 20 subjects (12 males and 8 female) were in group B, conventional treatment with shoulder girdle strengthening were given. The descriptive analysis of the study is summarized in table 1. age distribution 2. comparison of MMT 3. Comparison of Shape of chest 4. Comparison of Respiratory rate 5. Comparison of Incentive spirometer 6 comparison of PEFR

Groups	Mean Age (Yrs.)
Group (A)	65.75
Group (B)	61.5

**Table no. 1-Age distribution**

**Table no. 2-Comparison of shape of chest Scores**

	SHAPE OF CHEST						Paired t test P values	
	PRE			POST				
	AX	NI	XI	AX	NI	XI		
GROUP A	31.25 ± 2.31	31.15 ± 3.11	28.7 ± 2.05	31.3 ± 2.27	31.15 ± 3.11	28.75 ± 2.04	0.3299 0.0828 0.3299	
	GROUP B	31.4 ± 3.16	31.5 ± 3.06	29.3 ± 2.75	31.4 ± 3.16	31.55 ± 3.06	29.35 ± 2.75	0.0298 0.3299 0.3299
		Unpaired t test P VALUE	0.8652	0.7224	0.4398	0.6350	0.7957	0.4397

	MMT								
	PRE				POST				
	T	SA	R	LS	T	SA	R	LS	
GROUP A	3.55 ± 0.51	3.05 ± 0.39	2.95 ± 0.22	2.95 ± 0.22	3.8 ± 0.41	3.3 ± 0.47	3.05 ± 0.22	3 ± 0.32	0.0210
									0.0210 0.1625 0.3299
GROUP B	3.65 ± 0.45	3.15 ± 0.36	3.15 ± 0.36	4.4 ± 0.50	3.85 ± 0.48	3.65 ± 0.48	3.6 ± 0.50		<0.0001 <0.0001 0.0003 0.0009
Unpaired t test P VALUE	0.5309	0.4110	0.0439	0.0439	0.0002	0.0008	<0.0001	<0.0001	

**Table no. 3- Comparison of MMT Scores**

	INCENTIVE SPIROMETER		Paired t test P value
	PRE	POST	
GROUP A	770 ± 126.07	860 ± 123.12	<0.0001
GROUP B	715 ± 130.89	985 ± 164.09	<0.0001
Unpaired t test P VALUE	0.1839	0.0058	

**Table No. 4- Comparison of incentive spirometer**

	RESPIRATORY RATE		Paired t test p value
	PRE	POST	

GROUP A	19.17 ± 1.55	18.5 ± 1.10	<0.0001
GROUP B	22.05 ± 1.60	19.8 ± 1.32	<0.0001
Unpaired t test P VALUE	<0.0001	0.0017	

**Table no 5-Comparison of respiratory rate**

**Table no.6- PEFR**

	PEAK EXPIRATORY FLOW RATE		Paired t test p value
	PRE	POST	
GROUP A	131.75 ± 23.29	141 ± 19.02	0.0015
GROUP B	121.25 ± 23.33	151.25 ± 20.05	<0.0001
Unpaired t test P VALUE	0.1626	0.1056	

Inter Group comparison (between Groups) was analysed statistically using unpaired t test for MMT, shape of chest scale, respiratory rate, incentive spirometer, peak expiratory flow rate. This showed that pre intervention there was no statistically significant difference seen for MMT scores of Trapezius with (P= 0.5309). Serratus anterior with (P= 0.4110) Rhomboids with (P= 0.0439). Levator scapulae with (P= 0.0439), Shape of chest was not significant at all 3 levels- Axillary level with (P = 0.8652), Nipple level with (P= 0.7224) and at Xiphysternal level with (P= 0.4398). Respiratory rate was extremely significant with (P < 0.0001) and incentive spirometer was not significant with (P= 0.1839) and even PEFR was also not significant with (P= 0.1626) the results between the two Groups using unpaired t test revealed on post intervention that there was extremely significant difference of MMT scores of Trapezius with (P < 0.0002), Serratus Anterior with (P < 0.0008), Rhomboids with (P < 0.0001), Levator Scapulae with (P < 0.0001). Shape of chest was not significant at all 3 levels- Axillary level with (P = 0.6356), Nipple level with (P = 0.7957) and at Xiphysternal level with (P = 0.4397). Respiratory rate was considered very significant with (P = 0.0017), incentive spirometer was considered very significant with (P = 0.0058) and PEFR was considered not significant with (P < 0.1056)

## DISCUSSION

The purpose of present study was to find out the effect of Shoulder girdle muscles strengthening as an adjunct to conventional treatment in COPD patients. The feasible training program aims to improve the activity - oriented outcome measure.

Reviewing various studies it was analysed that conservative management and rehabilitation were the routine guidelines for treating subjects with COPD. This study was undertaken considering all the mentioned points and the sole aim of this study was to evaluate the effect of Shoulder girdle muscles strengthening in COPD subjects. Based on different studies, the subjects were asked to perform breathing exercises and strengthening exercises and were then asked to continue with the same exercises as a home programme.

Advantages of Shoulder girdle muscles strengthening exercises in COPD subjects:

Exercise during COPD helps to strengthen the heart and lungs and improve the ability of body to use oxygen. Strengthening exercise of upper body helps to increase the strength of respiratory muscles and won't use the accessory muscles of respiration.

In this study, 50 subjects had participated who were diagnosed with COPD. Out of which 10 patients did not come for the follow up. Out of 40 involved patients 25 were males and 15 were females. The mean age of subjects included in Group A was 63.86 and Group B was 53.13. Study place was Krishna Hospital, Karad.

Patients were evaluated and were divided into two groups by convenient sampling with random allocation. Group A included 20 subjects and were given conventional treatment which includes chest physiotherapy breathing exercises and ACBT. The subjects were given the routine physiotherapy rehabilitation for a period of 4 days in a week. Group B included 20 subjects and were given Shoulder girdle muscles strengthening with conventional treatment in COPD patients.

Pre-treatment outcome measures were manual muscle testing, shape of chest, respiratory rate, incentive spirometer, peak expiratory flow rate. The specific treatment protocol was followed as per the Group for 4 days in 1 weeks and the post treatment outcome using MMT, shape of chest scale, respiratory rate, incentive spirometer, peak expiratory flow rate and were documented accordingly.

Intra Group comparison (within Group) was analysed statistically using paired t test for MMT, shape of chest scale, respiratory rate, incentive spirometer, peak expiratory flow rate scores. This showed that in Group A there was significant difference of MMT scores of Trapezius and Serratus Anterior and no significant difference of muscles Rhomboids with and Levator Scapulae. Shape of chest was not significant at all 3 levels- Axillary level, Nipple level and at Xiphysternal level. Respiratory rate, incentive spirometer was also extremely significant and even PEFR was also very significant. Similarly, in Group B there was extremely significant difference of MMT scores of Trapezius, Serratus Anterior, Rhomboids and Levator Scapulae. Shape of chest at Axillary level was considered significant and was considered not significant at both Nipple level and Xiphysternal level. Respiratory rate was considered very significant, incentive spirometer and PEFR was also extremely significant.

Inter Group comparison (between Groups) was analysed statistically using unpaired t test showing that pre intervention there was no statistically significant difference seen for MMT scores of all the 4 muscles, Shape of chest was not significant at all 3 levels- Axillary. Respiratory rate was extremely significant and incentive spirometer was not significant and even PEFR was also not significant the results between the two Groups using unpaired t test revealed on post intervention that there was extremely significant difference of MMT scores of all 4 muscles. Shape of chest was not significant at all 3 levels. Respiratory rate was considered very significant, incentive spirometer was considered very significant and PEFR was considered not significant.

In this study, an attempt was made to analyse the effect of Shoulder girdle muscles strengthening as an adjunct to conventional treatment in COPD patients. Patients were asked to perform exercises of shoulder. Strengthening exercises were taught to the patients and there was improvement seen in functional status of the subjects who had COPD.

- Improvement of the subjects:
- The subjects could perform the basic exercises quite better the next session.
- The subjects could perform exercises independently
- The breathing pattern of patients were improved
- Reduction in fatigability
- Shoulder girdle muscles are strengthen

This study was done to investigate to improve to strengthen the primary muscles so that patients won't use accessory muscles. Its post treatment evaluation was conducted in a standardized manner using MMT, shape of chest, respiratory rate, incentive spirometer, PEFR. The result shows extremely significant improvement with combination of conventional treatment with Shoulder girdle muscles strengthening in patients with COPD as compared to conventional physiotherapy treatment alone.

In conclusion, the result of current study shows that combination of Shoulder girdle muscles strengthening with conventional

physiotherapy treatment has extremely significant effect over conventional physiotherapy treatment alone in management of COPD subjects, both statistically and clinically. We expect that shoulder strengthening exercise with our conventional treatment gives better results in the COPD patients. Further studies can be done in order to determine the long term effects of this program and evaluate this COPD rehabilitation regimen.

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