EFFECT OF DIAPHRAGMATIC FACILITATION TECHNIQUES WITH CHEST AND SHOULDER MOBILIZATION EXERCISES ON COPD

A Dissertation Submitted In Partial Fulfillment

Of The Requirements For The Degree Of

MASTER OF PHYSIOTHERAPY

With Specialization In

ADVANCED PHYSIOTHERAPY IN CARDIO RESPIRATORY

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Submitted to

THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY
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COLLEGE OF PHYSIOTHERAPY

Department of Post Graduate Studies
Komarapalayam - 638 183

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CERTIFICATE

This is to certify that the Research work entitled **"EFFECT OF DIAPHRAGMATIC FACILITATION TECHNIQUES WITH CHEST AND SHOULDER MOBILIZATION EXERCISES ON COPD"** was carried out at JKK Munirajah Medical Research Foundation College of Physiotherapy, Komarapalayam, affiliated to The Tamilnadu Dr.M.G.R Medical university, Chennai-32, towards partial fulfillment for the award of Degree of **"Master of Physiotherapy"** course with **"Advanced Physiotherapy in Cardio Respiratory"** as specialization. This work was done under the supervision and guidance of Assistant Professor **Mrs. R.SHARMILA, M.P.T., (Cardio) MIAP**

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INTRODUCTION

Over the years, the pattern of diseases have been changed both within individual countries and throughout the world. Some disease have been eradicated (or) reduced in severity. Many acute respiratory conditions can become chronic, particularly when aggravated by environmental factors such as cigarette smoking (or) air pollution and leeds to severe respiratory illness.

Several abbreviations can be found in the literature for a pulmonary disorder characterized by increased airway resistance, particularly noticeable by a prolonged forced expiration. COPD is the preferred medical terminology for a group of diseases that share a common feature like difficulty in expelling air form the lungs, reduced exercise intolerance, pulmonary hyperinflation, cough and wheezing. COPD is the most common pulmonary dysfunction today and is a growing cause of disability and mortality. COPD is the third leading cause of death.

Patients usually response to their respiratory impairment by abstaining from activities which result in physical deconditioning, increased impairment and further abstention, exertional dyspnoea, promotes increased levels of anxiety, depression and fear of exertion leading to further inactivity. This results in even greater intolerance of exercise and further loss of functional capacity ultimately causing dyspnoea during minimal activities or at rest.

The alteration in medical technology and improved health care have in some instances increased the demands on the physiotherapy.

Treatment of COPD usually focuses on measures to reduce the severity of airway obstruction using different therapeutic approaches including medical, psychological, physical and educational aspects. Various aspects of physical therapy are being practiced since 1935. this study used both Diaphragmatic facilitation with chest and shoulder mobilization in COPD by evaluating its effectiveness with pulmonary function test and scalene palpation. Pulmonary function test helps in the evaluation of the mechanical function of the lungs when the patient performs the test the actual result will be compared with the predicted value scalene palpation is the latest method to find out the respiratory pattern by means of new method of evaluation.

AIM & OBJECTIVES

The aim of this study is to find out the combined effects of disphragmatic facilitation techniques with chest and shoulder mobilization exercises on COPD.

OBJECTIVES

The study has following objectives.

i. To determine the combined effect of diaphragmatic facilitation techniques with chest and shoulder mobilization exercises on COPD.
ii. To determine the combined effects of diaphragmatic facilitation techniques with chest and shoulder mobilization on
    a. Pulmonary function
    b. Assessment of breathing pattern by scalene palpation.

HYPOTHESIS

- The null hypothesis states that there was no significant improvement in pulmonary function test due to diaphragmatic facilitation techniques with chest and shoulder mobilization exercises in COPD.
- The alternate hypothesis states that there was significant improvement in pulmonary function test due to diaphragmatic facilitation techniques with chest and shoulder mobilization exercises in COPD.

DEFINITION OF TERMS.

Forced Vital Capacity (FVC)

→ The maximum amount of air that can be exhaled following a maximal inspiratory effort measured in litres.

Forced expiratory Volume in 1 seconds (FEV1)

→ The volume of gas expired during the 1st second of an forced vital capacity (measured in litres/sec).

REVIEW OF LITERATURE

Bierman CW, et al., (1988)

Conducted an experimental studies in which 30 subjects with exercises induced bronchospasm were selected to evaluate the effectiveness of Diaphragmatic breathing exercises. Experimental groups were received bronchodilator with Diaphragmatic breathing exercises and control group were received only bronchodilator therapy for a period of 2 weeks. The result of the study showed a marked increases in pulmonary functions in experimental group compared to control group.

Pearlman. DS., (1989)

Conducted a study in which 20 COPD patients were selected and divided into two groups. The experimental group were received active chest and shoulder exercises for the period of 30 minutes with 5 minutes interval in every 10 minutes for 1 month at frequency of 5 days per week. The control group were recived regular treatment for a period of one month. The results shows a marked increased in FVC, FEV1, MVV compared to control group.

Morley M lertzman, et.al., (1990)

He conducted an experimental study in which 20 emphysematous patients were selected and trained with intensive diaphragmatic breathing exercise for a period of 12 weeks. The result of this study showed a significant improvement in vital capacity and reduction of respiratory rate and use of accessory muscles.

Richard Casaburi, et.al., (1993)

Conducted an experimental study in which 15 patient of chronic bronchitis received a pulmonary rehabilitation programme include diaphragmatic breathing and thoracic expansion exercises for a period of 4 months. The result of the study showed a significant improvement in FEV1 and FVC. Therefore this study concluded that pulmonary rehabilitation programme is essential for COPD patients.

Saucis. (1994)

Conducted an experimental study in which 30 clinically stabled COPD patients were selected and treated with slowly progressed aerobic exercise along with Diaphragmatic breathing exercises. Pre and post tests of pulmonary function were analyzed and compared. The result of this study showed a significant improvement in pulmonary function (FEV, FVC and MVV) following 8 weeks.

RA.Gosselink. et.al., (1995)

He conducted an experimental study in seven chronic obstructive pulmonary disease patient were selected and treated with chest and shoulder mobility exercises for a period of three weeks. The result of this study showed that there was significant improvement in FEV1, FVC and mechanical efficiency of breathing. Therefore the study established the short term effects of chest and shoulder mobility exercises in the management of COPD patients.

Khanam AA., (1996)

Conducted an experimental study in which 26 patients diagnosed bronchial asthma were selected and trained with only diaphragmatic breathing for a period of 7 days. The automic function test (Parasympathetic and sympathetic activity) and PET were measured. The result showed decreased in sympathetic activity but no change in parasympathetic activity. The result of PFT showed significant improvement in FVC, FEV1 and PEFR.

Rik Gosseling et.al., (1998)

Conducted an experimental study in which 46 COPD patients were selected and trained with controlled diaphragmatic breathing exercises. One year follow up study showed a significant improvement in pattern of breathing and exercise capacity and showed reduction of dyspnoea.

Joshi KN et.al., 91998)

Conducted an experimental study on pulmonary function with 36 male and 35 female COPD patient. They were trained with diaphragmatic breathing and chest mobility exercises for the course of 6 weeks. The result of this study showed significant improvement in pulmonary functions such as FVC, MVV, FEV1 and PEFR.

Ritz.,(2000)

Conducted an experimental study in which 50 bronchial asthma subjects were trained progressive relaxation and diaphragmatic breathing exercises for a period of 6 months. The potential beneficial and detremintal effects of these techniques on lung function (PEFR, FVC, FEV1) with respect to emotional process were measured. The result revealed that relaxation training and diaphragmatic breathing exercise could significantly contribute to the standard treatment for adult asthma patient.

Cahalin LP et al., (2000)

Conducted an experimental study to find out the effect of diaphragmatic breathing in COPD patient. In his study he selected 60 moderate to severe COPD patient and he trained diaphragmatic breathing exercise for a period of 6 months. He found a significant improvement in FEV1 and FVC using pulmonary function test. He also noticed that there is reduction is using of accessory muscles after the training period.

Gigliotti.F, et. al., (2001)

Conducted an experimental study in which 30 COPD patients were taught Diaphragmatic facilitation technique with chest and shoulder mobility training for a period of 3 months. The result of this study shows highly significant improvement in pulmonary function and in reduction of dyspnoea. Therefore the result establish the short term effect of diaphragmatic facilitation technique with exercise training on COPD patients.

Hideaki Senjyu, Shigeki Yokoyama, et. al., (2002)

Condutcted an experimental study in which 20 COPD patients were selected. They have been treated with diaphragmatic facilitation techniques for three months. The objective of the study was to quantify the reliability of scalene palpation for assessing breathing pattern and to find out the effect of diaphragmatic facilitation techniques on COPD. The result of this study showed that there was a significant reduction in scalene activities and improvement in breathing pattern. The study also concluded that diaphragmatic facilitation techniques improved the mechanical efficiency of lungs.

Virendra Singh, et. al., (2003)

He conducted an comparative study in which 40 COPD patient were selected and divided into two groups. The patient under experimental group received rehabilitation programme such as breathing exercise, pursed lip breathing along with aerobic exercise (walking) for a period of 30 minutes duration twice daily for four weeks under supervision. The control group were received only aerobic exercises. The result of the study showed a significant improvement in quality of life and exercise tolerance but without improvement in FEV1 in experimental group.

MATERIALS AND METHODOLOGY

MATERIALS

- Computerized spirometer and its accessories
- Nose clips
- Mouth pieces
- Pillows
- Couch
- Chairs.

METHODOLOGY

Study Design

The experimental study design with pre and post test.

Study setting

The study has been conducted in JKK Sampoorani Ammal Charitable Trust hospital, Komarapalayam with consultation of concern authority.

Sampling

Fifteen male subjects will be selected by using purposive random sampling after due consideration of inclusion and exclusion criteria from Government hospital, Erode.

INCLUSION CRITERIA

- COPD only
- Only male
- Age group 35-45 years

EXCLUSION CHITERIA

- Cardiac patients
- Previous surgeries of chest
- Any congenital deformities in chest and spine.
- Shoulder and shoulder girdle deformity
- Female subjects
- Neurologic impairment
- Active or exhausted psychiatric patients.

PARAMETERS

The following parameters will be taken

i. Scalene palpation and its grading by new evaluation scale

Grade	Judgment of Breathing Pattern
1.	Scalene contraction only
2.	First the scalene contractions and then the anterior abdominal walls movement outward
3.	The scalene contraction and the abdominal wall movement at occur the same time
4.	First the anterior abdominal wall move outward and then the scalene contracts
5.	Outward movement of abdominal wall only

- Upper chest breathing is denoted by grades 1 and 2
- Upper chest and diaphragmatic breathing by grades 3
- Diaphragmatic breathing by grades 4 and 5

ii. Pulmonary Function test

- Forced vital capacity (FVC) measured in litres
- Forced expiratory volume in one seconds (FEV1)

PROCEDURE

The total 15 subjects were selected from the total population who were diagnosed as COPD and admitted in Erode GH. The pre test values were revealed with spiro-bank, a computerized spirometer and scalene palpation with new evaluation method with proper instructions. After three months of prescribed training the post test was conducted. The pre and post test values were computed for comparison. The difference between pre vs post values are compared to determine the effect of diaphragmatic facilitation with chest and should mobilization exercises on COPD patients.

TRAINING PROGRAM

Diaphragmatic facilitation techniques for 15 minutes.

1) Relaxation technique
    a. Repatterning techniques
    b. Relaxed pursed lip breathing
2) Exhalation, hold and inhalation.
3) Sniffing
4) Diaphragmatic scoop technique
5) Lateral costal facilitation technique
6) Upper chest inhibiting technique.

Chest and shoulder mobilization techniques for 15 minutes.

Therefore the training programme constitute of diaphragmatic facilitation technique with chest and should mobilization exercises for the duration of 30 minutes twice a day.

Chest and shoulder Mobilization exercises.

i. Wand (t-bar0 exercises.
    a) Shoulder flexion and return
    b) Shoulder horizontal abduction and return
    c) Shoulder internal and external rotation
ii. Mobilization of upper chest and stretch the pectoralis muscles by hands clasped behind the head.
iii. Shoulder shrugging
iv. Shoulder bracing.

STATISTICAL TOOL

The paired t-test was used to compare the pre vs post test values of pulmonary functions in response to Diaphragmatic facilitation technique with chest and shoulder mobilization technique.

Formula: Paired 't' test:

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between pre test Vs post test values

$\bar{d}$ = mean difference

n = total number of subjects

s = standard deviation.

DATA PRESENTATION

TABLE – 1

Sl. No.	FVC in Lts.		FEV1 in lts/Sec	
	pre	Post	Pre	Post
01	2.00	2.49	2.00	2.24
02	3.17	3.81	3.17	3.61
03	2.03	2.93	1.79	2.93
04	2.84	2.91	2.84	2.91
05	2.18	2.62	1.86	2.49
06	1.57	2.98	1.56	2.98
07	2.89	3.09	2.50	3.09
08	2.10	2.33	1.93	2.31
09	3.72	3.99	3.23	3.99
10	2.83	3.04	2.83	2.83
11	1.00	2.93	1.00	2.93
12	2.75	3.12	2.75	3.01
13	2.04	2.66	2.04	1.14
14	2.83	2.86	2.67	2.41
15	2.63	3.00	2.63	3.00

The Pre and Post test values of scalene palpation in grades.

Table II

SL. No.	Scalene Palpation in Grades	
	Pre	Post
01	2	4
02	3	5
03	2	4
04	3	3
05	2	3
06	1	3
07	3	4
08	2	3
09	4	5
10	3	5
11	1	3
12	3	5
13	2	3
14	3	3
15	2	5

DATA ANALYSIS AND INTERPRETATION

The chapter deals with the analysis and interpretation of datas collected from pre and post test values of COPD patients to compare the pulmonary functions. The collected data were analyzed and tabulated in the following section.

Table III: Represents the mean, mean difference, standard deviation and paired t-value of FVC between pre and post test.

S.No	FVC	Improvement			Paired 't' value
		Mean	M.D	S.D.	
01.	Pre	2.44	0.54	0.52	4.02
02	Post	2.98			

Table III shows the means value, mean difference, standard deviation and paired 't' value of FVC between pre and post test. The calculated paired t-test value between pre and post test was 4.02. the calculated paired t-values was greater than the tabulated t-value which was statistically significant.

Therefore the study was accepting the alternate hypothesis and rejected the null hypothesis.

Chart I: Represents the mean value of FVC between pre and post training section

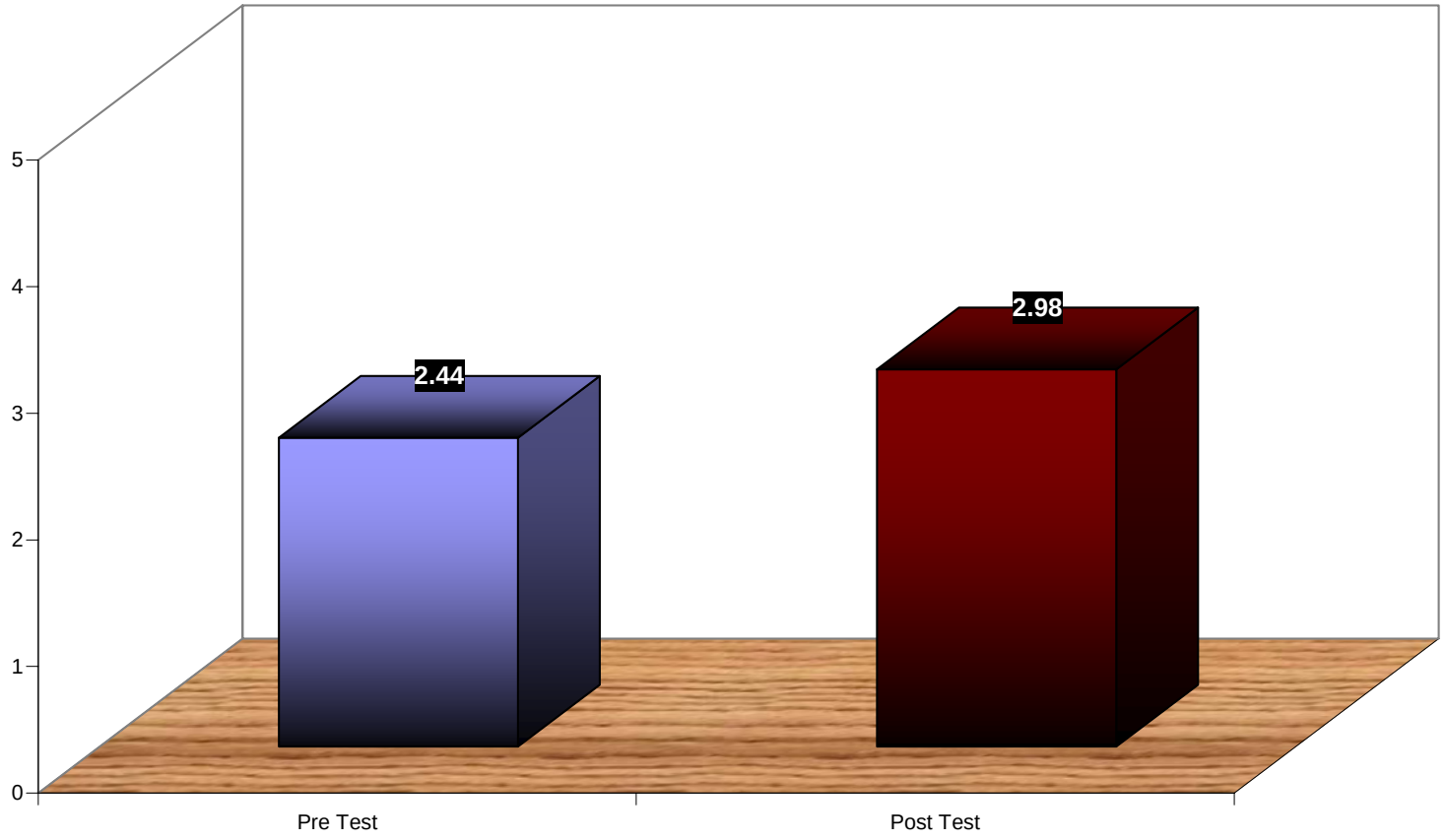


Table IV : Represents the mean, mean difference, standard deviation and paired t-value of FEV1 between pre and post test.

S.No	FEV1	Improvement			Paired 't' value
		Mean	M.D	S.D.	
01.	Pre	2.32	0.47	0.68	5.67
02	Post	2.79			

Table IV shows the mean, mean difference, standard deviation and paired t-value of FEV1 between pre and post test. The calculated paired t-value between pre and post test was 2.67. The calculated t-value was greater then the tabulated t-value which was statistically significant.

Therefore the study was accepting the alternate hypothesis and rejecting the null hypothesis.

Chart II: Represents the mean value of FEV1 between pre and post training section

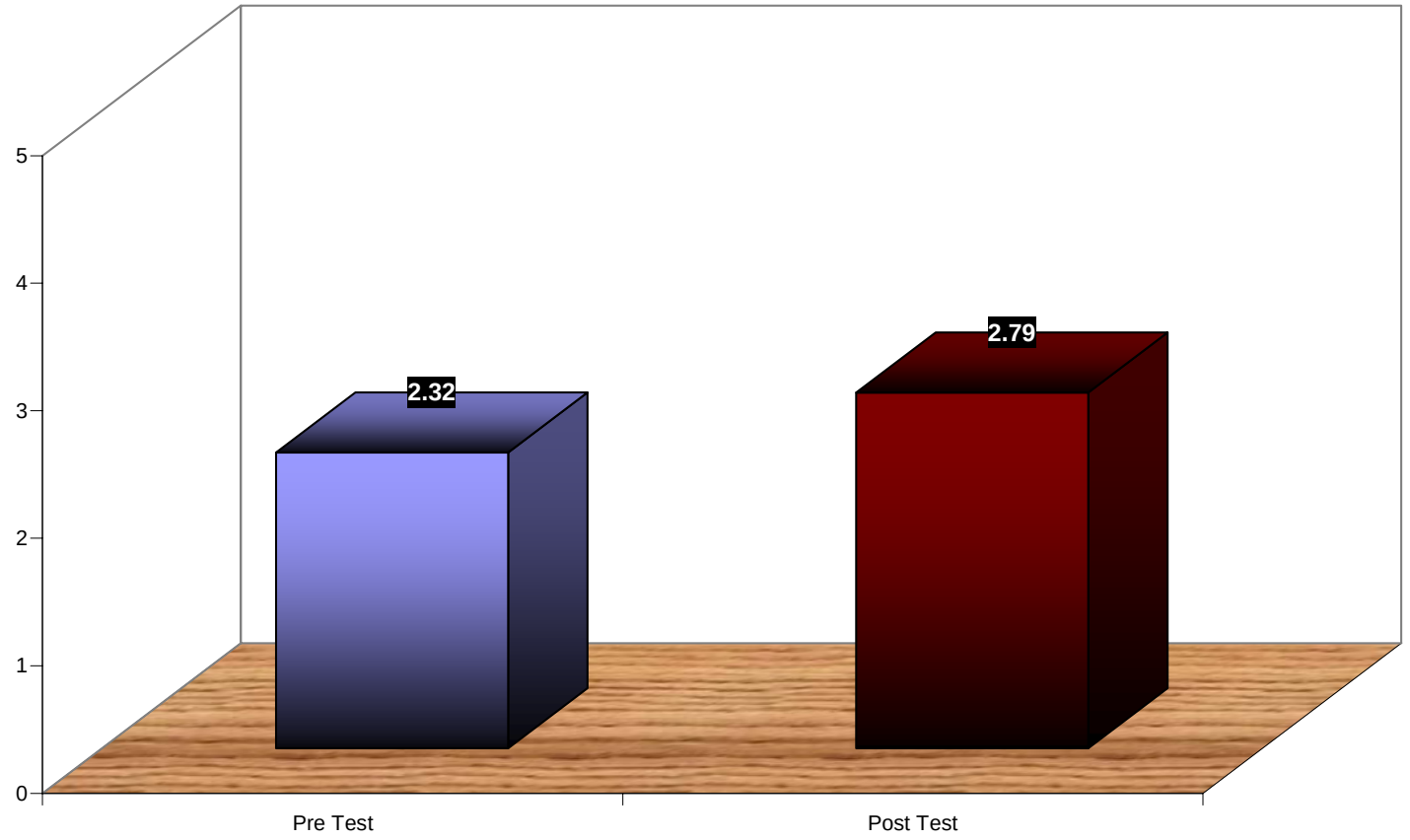


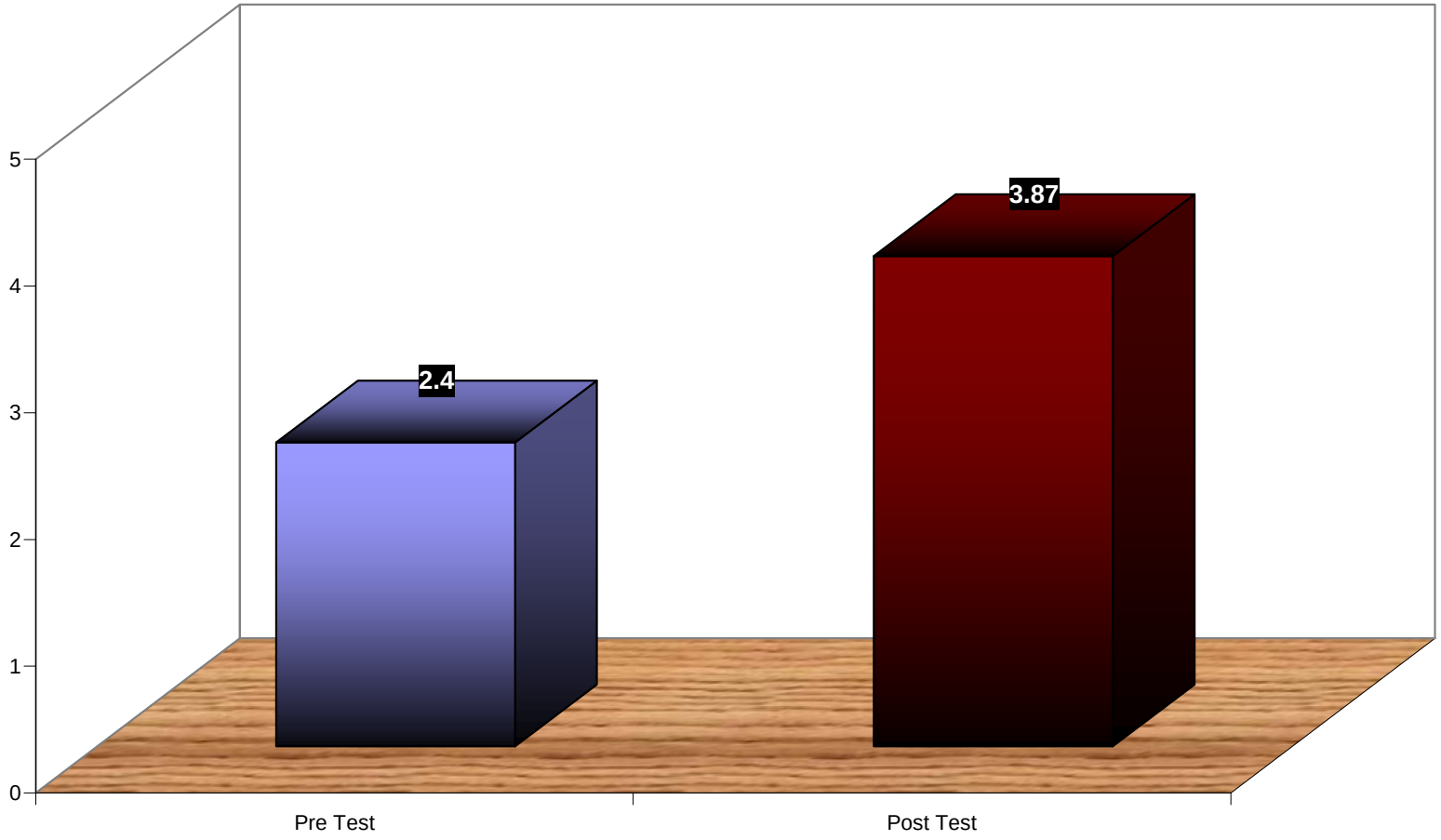
Table V : Represents the means, mean difference, Standard deviation and paired t-value of scalene palpation between pre and post test.

S.No	Scalene Gradings	Improvement			Paired 't' value
		Mean	M.D	S.D.	
01.	Pre	2.40	1.5	0.7	8.4
02	Post	3.87			

Table V shows the mean, mean difference, standard deviation and paired t-value of Scalene palpation between pre and post test. The calculated paired t-value between pre and post test was 8.4. The calculated t-value was greater than the tabulated t-value which was statistically significant.

Therefore the study was accepting hypothesis and rejecting the null hypothesis.

Chart III: Mean Value of Scalene Gradings between pre post training section.



DISCUSSION.

The purpose of this study was to find out the effect of Diaphragmatic facilitation technique with chest and shoulder mobilization exercises on pulmonary functions test.

Hideaki Senjyu, et.al., (2002) introduced a new method of assessing the pattern of breathing using scalene palpation which has been proved in his study a reliable parameter and more clinical relevance than conventional evaluation of pattern of breathing.

Cherniak Crape, et.al., (1992) introduced the modified pulmonary function test for assessing the mechanical functions of ling and it was also proved as an more reliable technique for evaluating the pulmonary functions both in normal and diseased patients.

Based on above study results, the pulmonary function test for FEV1, and FVC in liters and scalene palpation for breathing pattern were choosed as parameters in this study.

Hideaki Senjyu, Shigeki Yokoyama, et.al., (2002) conducted an experimental study in which 20 COPD patients were selected. They have been treated with diaphragmatic facilitation techniques for three months. The objective of the study was to quantify the reliability of scalene palpation for assessing breathing pattern and to find out the effect of diaphragmatic

facilitation techniques on COPD. The result of this study showed that there was a significant reduction in scalene activities and improvement in breathing patterns. The study also concluded that diaphragmatic facilitation techniques improved the mechanical efficiency of lungs.

Gosselink.R.A., et.al., (1995) conducted an experimental study in seven chronic obstructive pulmonary disease patients and treated with chest and shoulder mobility exercises for a period of three weeks. The result of this study showed that there was significant improvement in FEV1 and FVC in liters.

Analysis and interpretation of present study results showed an improvement in FVC, FEV1 in liters and reduction in Scalene activities between pre and post training sessions. The study results of Hideaki Senjyu, Shigeki Yokoyama et.al., (2002) and R.A.Gosselink (1995) supported the present study. Therefore the present study was accepting the alternate hypothesis and rejecting null hypothesis.

Reason for improvement.

Donna Frown Felter (1996) stated the Diaphragmatic facilitation technique reduces the respiration rate and facilitate the correct use of diaphragm. It also reduces the accessory muscle activity and there by improvement the pulmonary function in COPD patient. It also stated that chest and shoulder mobilization exercises facilitate the opening of individual rib segment and thereby improve the ventilation in COPD patient.

Carolyn Kisner (1996) stated that diaphragmatic breathing exercise improve the efficiency of ventilation, decrease the work of breathing, increase the work of diaphragm and thereby improve the gas exchange and oxygenation.

Carolyn Kisner (1996) stated that the chest wall and shoulder mobility exercise along with deep breathing exercise promotes stretching of the inspiratory muscle which will improve the ventilation.

The reason for significant improvement by diaphragmatic facilitation technique on pulmonary functions are

Relaxation of upper chest and shoulder by Jacobson progressive relaxation exercise which reduce the use of accessory muscles it is achieved by the concept “maximal contraction will promote the maximal muscle relaxation”.

Pursed lip breathing creates an obstruction to air flow at the mouth and decreases the flow of the exhaled air and increased airway pressure, decreasing the trasmural pressure gradient and maintaining patency or collapsible airways during exhalation. This process helps to reduce air trapping.

Pursed lip breathing also decreases respiratory rate and increases tidal volume. Improving the alveolar ventilation will decrease PaCo2 and increase PaO2.

Diaphragmatic scoop technique with controlled diaphragmatic exercise will facilitate the diaphragm upper chest inhibition technique by more pressure decreases the upper chest breathing and improved the diaphragmatic breathing.

Training of the arm and shoulder muscles in COPD patient reduces the increased metabolic demand and ventilation associated with arm elevation and reduces dyspnoea. Accessory muscles of inspiration are often shortened by overuse in COPD patients. These muscles may benefit from exercises to stretch them to their more normal lengths. Commonly shortened muscles include the sternocleidomastoids, external intercostalis, upper trapezil, pectoralis major and monor, lattismusdorsi, serrtus anterior and hip flexors.

Hyperinflation in COPD causes more mechanical disadvantage, for diaphragm than other inspiratory muscles and it goes for contracted position with decrease blood flow and malnutrition. Both mechanical and nutritional factors leads to increase fatigue of diaphragm, decrease tidal volume, increase respiratory rate and increase PaCo2.

Therefore the Diaphragmatic facilitation techniques reduces the dead space ventilation and increase the airflow through narrowed airways, thus increasing the flow work of breathing. This method also reduces the effective ventilatory pressure generated by the ribcage inspiratory muscles rather than by the diaphragm. With significant contribution by expiration. It also equalizes pleural and bronchial pressures thus preventing collapse of smaller bronchi and decreasing air trapping. It also may improve exercise performance by relaxing accessory muscles and improving breathing efficiency.

SUMMARY

The purpose of this study was to find out to combined effect of Diaphragmatic facilitation technique with chest and shoulder mobilization exercises on COPD. The total 15 subjects of age group 35 to 45 years diagnosed as COPD from GH were randomly selected for this study and they were taught to do Diaphragmatic facilitation technique with chest and shoulder mobilization exercise for the period of 3 months. Before and after 3 months of training programme, the pre and post test values of FVC, FEV1 in liters were measured with computerized spirometer and scalene activities were palpated and graded with New method of evaluation by Hideaki Senjyu, Shigeki Yokoyama et.al., (2002).

The paired t-test was used to compare the difference between pre and post test values of above mentioned parameters.

The pre test mean value of FVC, FEV1 were 2.44, 2.32; the post test mean value of FVC, FEV1 were 2.98, 2.79 and the mean difference between pre and post test of FVC, FEV1 were 0.54, 0.47 respectively. The paired t-value of FVC, FEV1 were 4.02, 5.67 which were greater than the tabulated t-value 2.77, 2.57 at0.05 level. This showed that that there was statistically significant improvement in pulmonary functions in post test results.

The pre test mean value of scalene palpation was 2.40; the post test mean value of scalene palpation was 3.87; the mean difference between pre and post test was 1.5. The paired t-value for scalene palpation was 8.4 was greater than the tabulated t-value 2.30. This showed that there was statistically significant reduction in scalene activities and improvement in breathing pattern in response to intervention.

CONCLUSION

The increased incidence of chronic illness challenges the Physiotherapist to treat the COPD. The proper assessment and clinical decision making is foremost important skill for selecting appropriate treatment technique and to gain early recovery in COPD. Diaphragmatic facilitation technique with chest and shoulder mobilization exercises improves the lung function and exercise tolerance on patient with COPD and should be regard as mainstay of pulmonary rehabilitation.

This study concludes that the diaphragmatic facilitation technique with chest and shoulder mobilization exercises are the effective treatment techniques for COPD patients. The study also concludes that the pulmonary function test and scalene palpation are useful methods for assessing effects of above treatment techniques.

RECOMMENTATION

Similar study can be conducted with same variables of pulmonary functions on other respiratory conditions.

Further studies may be done to compare the progressive diaphragmatic facilitation technique with chest and shoulder mobilization technique on COPD.

Further work may include randomized trails evaluating the benefits of differing rehabilitation strategies in patients with various level of diseases severity.

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APPENDIX

DIAPHRAGMATIC FACILITATION TEXHNIQUES

- ☞ Relaxation technique
- ☞ Relaxed pursed-lip breathing
- ☞ Sniffing
- ☞ Diaphragmatic scoop technique
- ☞ Lateral costal breathing
- ☞ Upper chest inhibition technique

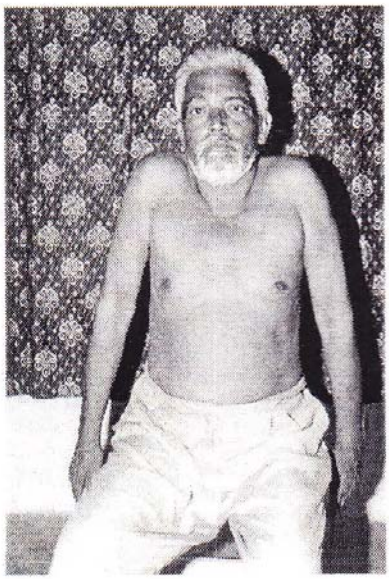
POSITION OF PATIENT

Sitting back comfortably supported (or) (Supported supine) semi fowler's sitting with a bend in the knees to achieve a relative posterior pelvic tilt and relax the abdominal muscles. Instruction is given to concentrate the normal pattern of breathing.

TECHNIQUES

1.Relaxation techniques

Upper chest and shoulder:



Phase 1

The patient was instructed to tense up their neck and shoulder by shrugging their shoulder up and to tilt that head forward, chin towards their breast bone. Now the patient was instructed to hold it for 5 seconds.

After this the patient was instructed to relax by allowing their shoulder to dropdown and neck to loose and limp.

Phase 2

Now once again they were asked to tense up their neck and shoulder and hold if for 5 seconds.

After this they were again instructed to relax. Finally they were asked whether they feel the tension was drained out.

2. Repatterning techniques.

Relaxed pursed – lip breathing

Phase 1

Place the patient comfortably. Instruct the patients about the benefit of this technique and explain the abdominal muscle contraction is undesirable.

Place the therapist hand over the abdominal muscle to detect activity during expiration. Direct the patient to inhale slowly.

Instruct the patient to purse the lips before exhalation and the exhalation is through pursed lip and refrain from abdominal muscle contraction.

Instruction is given to stop exhaling when abdominal muscle activity is detected.

Phase 2

Instruct the patient to progress the intensity of the exercise by substituting the patients hand for physiotherapist hand.

3. Sniffing.

Position of Patient:

Choosing a gravity eliminated position such as semi-fowler's sitting with posteriorly tilted pelvis of flexion.

Phase 1

Instruct the patient to place his hands on their stomach for increased proprioceptive feedback and the relative extension, adduction and internal rotation position of shoulder. After instruction during exhalation tell the patient to sniff for 3 times. Note the abdominal rise.

Phase 2

Progression is by training the patient to "now sniff in twice". See the greater diaphragmatic excursion and less upper chest excursion this help in slower respiratory rate, and diaphragmatic pattern with relaxed shoulders.

4. Diaphragmatic Scoop technique.

Phase 1

After positing proper instruction is given about the technique. Place the therapist hand over the patient abdomen at the level of umbilicus. Ask the patient to feel his own breathing, do not invade the patients breathing pattern. After the normal rate at the end of the patients exhalation. Give a slow stretch and “Scoop” your hand up under the anterior thorax.

After achieving some success patients hand can be placed on the abdomen with the therapist hand on top. Reinforce the breathing pattern then remove the therapist hand and allow the patient to do independently.

Phase 2:

Progression is given by sitting, standing and walking.

5. Lateral Costal Breathing.

Phase 1

The patient is in sitting place the therapist hands along the lateral aspect of the lower ribs to fix the patient attention. While the patient breathes out place a firm downward pressure into the ribs with the palms of therapist hand.

Phase 2

With proper instruction the patient may then be taught to perform the maneuver independently by placing his hands over the ribs.

6. Upper Chest inhibition technique.

Phase 1

Instruct the patient to take diaphragmatic scoop technique.

Slowly bring other hand over the upper chest at the level of sternal angle leave it for a couple of respiratory cycles without applying any pressure and ask the patient to feel upper chest movement.

Phase 2

After assessing this movement now on the patients next inspiratory effect give resistances to the expansion of the upper chest this gentle pressure will cause postural inhibition to the movement of the upper chest.

Shoulder and chest Mobilization exercises.

- Wand (t-bar) exercises.
  - → Shoulder flexion and return
  - → Shoulder horizontal abduction and return

→ Shoulder internal and external rotation.

- Mobilization of upper chest and stretch the pectoralis muscles by hands clasped behind the head.
- Shoulder shrugging.
- Shoulder bracing.

Wand T-bar exercises.

Position of the patient

Sitting in the end couch (or) in the chair with back support.

PROCEDURE

The patient was instructed to avoid substitute motions and how to grasp the wand by both hands.

1. Shoulder flexion and return

Phase 1

After grasping the wand with the hands a shoulder with apart. The patient is asked to lift the want forward and upward through the available range with the elbows kept in extension with a deeps inspiration hold if for 5 seconds.

Phase 2

Now instruct the patient to bring the wand downward with elbows maintained in extension followed by expiration.

2. Shoulder horizontal abduction and return

Phase 1

The patient is asked to lift the want to 90 degrees flexion by keeping the elbows in extension and pulls the wand backward with a deep inspiration hold if for 5 seconds.

Phase 2

Now instruct the patient to bring the wand forward keeping the elbows in extension followed by expiration.

3. Shoulder internal and external rotation.

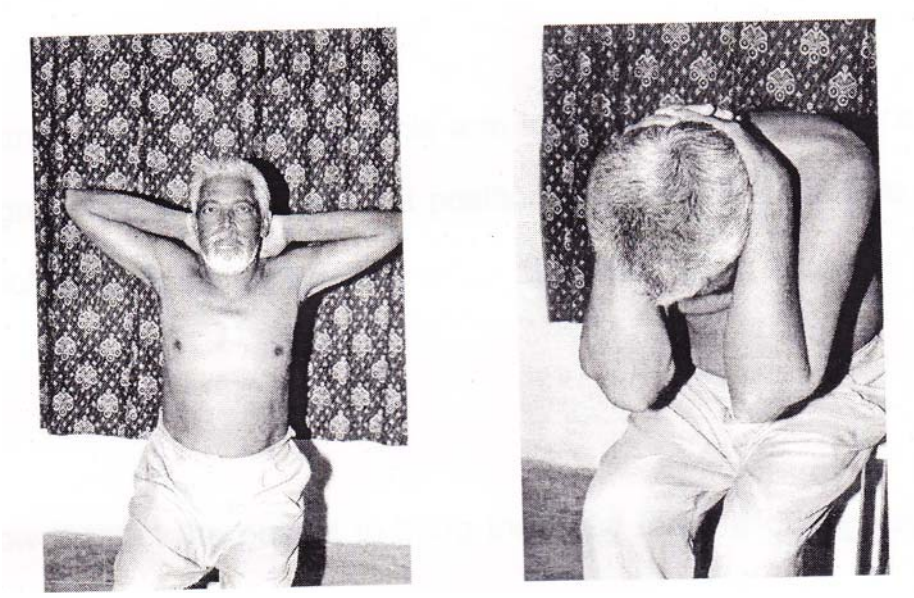
Phase 1

Instruct the patient to keep his arms at sides and the elbows are flexed 90 degrees, and rotate the arm externally by moving the wand upward with a deep inspiration and hold it for 5 seconds.

Phase 2

Now instruct the patient to bring down the arm downwards internally with an expiration

4. Mobilization of Upperchest and Pectoralis muscles stretching.



Phase 1

Instruct the patient to clasped his hand behind the head, and asked him to horizontally abduct the arms during a deep inspiration and hold it for 5 seconds.

Phase 2

Now instruct the patient to bring the elbows together and bend forward during expiration.

5. Shoulder bracing exercise

Phase 1

Instruct the patient to bring his arm in 90 degree abduction and elbow in 90 degree flexion in a horizontal position and ask the patient to bring the hands backward during a deep inspiration and hold it for 5 seconds.

Phase 2

Now instruct the patient to bring the hand forward during expiration in same position.

6. Shoulder shrugging exercise

Phase 1

Instruct the patient to elevated his shoulder with shoulder in adduction and elbow in 90 degree flexion in horizontal position and ask the patient to take deep inspiration hold it for 5 seconds.

Phase 2

Now instruct the patient to bring his shoulder downward with expiration in same position.