"EFFECTIVENESS OF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITY AND EXERCISE TOLERANCE IN COPD PATIENTS"

A Dissertation Submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI

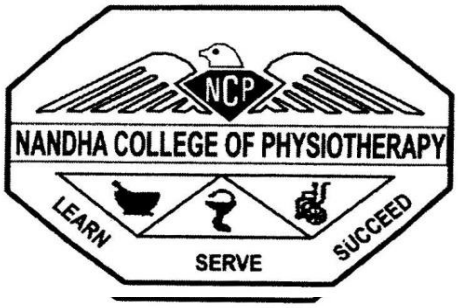
In partial fulfillment of the requirements for the award of the

MASTER OF PHYSIOTHERAPY DEGREE

(ADVANCED PHYSIOTHERAPY IN CARDIO RESPIRATORY)

Submitted by

Reg. No. 271730082



NANDHA COLLEGE OF PHYSIOTHERAPY

ERODE-638052

MAY-2019

NANDHA COLLEGE OF PHYSIOTHERAPY

ERODE - 638 052

The Dissertation entitled

"EFFECTIVENESS OF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITY AND EXERCISE TOLERANCE IN COPD PATIENTS"

Submitted by

Reg. No. 271730082

Under the guidance of

Prof. R.SARAVANAKUMAR, M.P.T (Cardio).,

A Dissertation submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI

Dissertation Evaluated on ——————————

Internal Examiner **External Examiner**

CERTIFICATE BY THE HEAD OF THE INSTITUTION

Prof. V.MANIVANNAN, M.P.T (Ortho),
Principal/HOD-Department of Orthopaedics,
Nandha College of Physiotherapy,
Erode - 638 052.

This is to certify that the dissertation entitled **"EFFECTIVENESS OF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITY AND EXERCISE TOLERANCE IN COPD PATIENTS"** is a bonafide compiled work, carried out by **Register No: 271730082,** Nandha College of Physiotherapy, Erode - 638 052 in partial fulfillment for the award of degree in Master of Physiotherapy as per the doctrines of requirements for the degree from **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI-32.** This work was guided and supervised by **Prof. R.SARAVANAKUMAR, M.P.T (Cardio).,**

I wish him a great success in him dissertation work.

DATE:

PLACE: **PRINCIPAL SIGNATURE**

CERTIFICATE BY THE GUIDE

Prof. R.SARAVANAKUMAR, M.P.T (Cardio).,
Vice Principal / Head of Department - Cardio-Respiratory
Nandha College of Physiotherapy,
Erode - 638 052.

This is to certify that the dissertation entitled**" EFFECTIVENESS OF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITY AND EXERCISE TOLERANCE IN COPD PATIENTS"** is a bonafide compiled work, carried out by **Register No: 271730082,** Nandha College of Physiotherapy, Erode - 638 052 in partial fulfillment for the award of degree in Master of Physiotherapy as per the doctrines of requirements for the degree from **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI-32**. This work was done under my personal guidance.

DATE:

PLACE: **GUIDE SIGNATURE**

DECLARATION

I hereby and present my project work entitled **"EFFECTIVENESS OF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITY AND EXERCISE TOLERANCE IN COPD PATIENTS"** is outcome of original research work was undertaken and carried out by me under the guidance **Prof. R.SARAVANAKUMAR, M.P.T (Cardio).,**

To the best of my knowledge this dissertation has not been formed in any other basis for the award of any other degree, diploma, associate ship, fellowship, previously from, any other medical university.

Reg.No.271730082

ACKNOWLEDGEMENT

First I would like to thank the **Lord Almighty**

Next I would like to extend my thanks to **my parents** and **brothers** who gave support, encouragement and inspiration.

I heartily thank our Principal, **Prof. V.MANIVANNAN,M.P.T(Ortho)**and our Vice Principal, guide and Project incharge **Prof. R.SARAVANAKUMAR, M.P.T(Cardio).,**for supporting me and giving me much valuable advice at right times throughout the academic period and especially during this research work, for all the guidance and support without which this project could not be completed.

Several special people have guided me and have contributed significantly to this effort. I thank my **faculty members** for their constant support and cheer all along in achieving the goal.

My hearty thanks to some Private Hospital Physiotherapists who gave me an opportunity to do my project work in their hospitals.

PREFACE

It was an immense pleasure for me to present this project work on **“EFFECTIVENESS OF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITY AND EXERCISE TOLERANCE IN COPD PATIENTS”**

I have done this work with my best level by referring many books, journals and websites .I believe this project will give basic knowledge in the field of YOGIC BREATHING PRACTICE and MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE.

And also, I believe that this project work will be very helpful for the physiotherapist to give treatment for IMPROVES DIAPHRAGMAIC MOBILITY, INSPIRATORY CAPACITYAND EXERCISE TOLERANCE IN COPD PATIENTS.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER-I

INTRODUCTION

CHAPTER-I

1.1 INTRODUCTION

Chronic obstructive pulmonary disease (COPD) causes chronic inflammation of the airways and destruction of the lung parenchyma, which lead to structural changes and dynamic collapse in the small airways.[1] Its most striking feature is expiratory airflow limitation (ie, the ability to perform a complete exhalation is impaired, causing air trapping and lung hyperinflation).[1] The hyperinflation causes the diaphragm muscle fibres, which usually lie vertically in the zone of apposition, to become more transversely oriented. This makes the diaphragm's contraction less effective at raising and expanding the lower rib cage, and may even lead to a decrease in the transverse diameter of the lower rib cage during inspiration. The diaphragm then undergoes a reduction in the number of sarcomeres to restore its pressure-generating capacity; however, as a consequence, diaphragmatic mobility is reduced. The reduction of diaphragmatic motion is a major risk factor for increased mortality in people with COPD.

The deterioration in airflow limitation with COPD progresses slowly, so most people who present with symptoms of COPD are elderly. Thus, in addition to the parenchymal abnormalities, musculoskeletal changes inherent to the ageing process contribute to worsening symptoms in these people. These musculoskeletal changes include increased chest wall stiffness due to the calcification of the costal cartilages and costovertebral joints. Those changes hinder rib cage expansion, increase the work of breathing and reduce functional capacity.

Given the interdependent relationship between the respiratory and musculoskeletal systems, various manual techniques have been proposed for the treatment of COPD symptoms. A common goal is increasing the mobility of the thoracic structures involved in respiratory mechanics. The Manual Diaphragm Release Technique is an intervention intended to directly stretch the diaphragmatic muscle fibres, which is described in detail in textbooks. Although this technique is widely used in clinical practice in some regions, it is believed that, to date, there are no quantitative studies or clinical trials evaluating the effects of this technique. The present study aimed to evaluate the effects of the Manual Diaphragm Release Technique on respiratory function of people with COPD.

According to **Aliverti and colleagues**, in healthy people, accurate continuous measurements of abdominal volume variations allow estimation of instantaneous diaphragm displacement during quiet breathing, accounting for 89% of the variability of diaphragm displacement in the zone of apposition, whereas rib cage displacement accounts for less than 1%. More recently, **Priori and colleagues** showed similar results in people with COPD, where change in Vab accounted on average for 76% of diaphragmatic displacement in the zone of apposition during quiet breathing in the seated position. Spirometry is the gold standard diagnostic test to confirm fixed airflow limitation in individuals with dyspnoea, chronic cough or sputum production, and risk factors for COPD (1). Spirometric diagnosis of COPD at any stage is an essential step to ensure an accurate diagnosis and to guide therapy.

Yoga aims through its practices to liberate a human being form the conflicts of duality (body-mind) and from the influences of the Gunas– the qualities of universal energy that are present in every human being.

Medical science tries to achieve an optimum physical and mental health of the individual and mental health of the individual through preventive, curative and pro motivemeans.
However, for a long time medical professionals have laid much emphasis on the curative aspect and only relatively recently the preventive aspect is also being emphasized where as in yogic practice the stress is mainly on the pro motive aspect, although some yogic methods are prescribed for curative purposes as well.

It is now almost a proved fact based on various investigations that a prolonged continuous yogic practice relieve respiratory ailments like Bronchial Asthma, chronicBronchitis, Bronchiectasis, and Ventilatory functions are much improved in them.

1.2 OPERATIONAL DEFINITIONS:

COPD:

Chronic obstructive pulmonary disease, is a condition characterized by airflow obstruction that is usually progressive, not fully reversible and does not change markedly over several months.

Vital capacity (VC):

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

Forced expiratory volume in first second (FEV_1):

The volume of gas expired during the first second of a forced vital capacity maneuver, measured in liter by second.

Maximum voluntary Ventilation (MVV):

The maximum amount of air that can be moved in and out in one minute, measured in liter by minute.

Pranayama:

Yoga breathing exercises, called “pranayama” in Sanskrit, are an important part of developing a yoga practice. According to the Yoga Sutras, the ancient yoga text compiled by the sage Patanjali, pranayama is one of the classical Eight Limbs of Yoga. In addition to deepening your yoga practice, learning ways to calm and invigorate the body through breathing will greatly Benefit your life off the mat.

1.3 NEED FOR THE STUDY

The need for study is to evaluate the effectiveness of manual diaphragmatic release technique along with yogic breathing practice on improving diaphragm mobility, inspiratory capacity and exercise tolerance in copd patients.

1.4 AIM AND OBJECTIVES OF THE STUDY

- To analyse the effectiveness of manual diaphragm release technique
- To analyse the effectiveness of Ancient yogic breathing practice.
- To improving diaphragm mobility, inspiratory capacity and exercise tolerance in copd patients

1.5 ASSUMPTION:

The study has been conducted assuming manual diaphragm release technique will improve diaphragmatic mobility, inspiratory capacity and exercise tolerance in copd patients

1.6 PROJECTED OUTCOME:

Based on review of literature, it is expected that there will be significant improvement in diaphramatic mobility, inspiratory capacity and exercise capacity and exercise tolerance in copd patients after treating with Manual Diaphragmatic Release Technique and yogic breathing practice.

1.7 HYPOTHESIS:

1.7(a) NULL HYPOTHESIS:

There is no significant improvement in EFFECTIVENESSOF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITYAND EXERCISE TOLERANCE IN COPD PATIENTS

1.7(b) ALTERNATE HYPOTHESIS:

There is a significant improvement in EFFECTIVENESSOF MANUAL DIAPHRAGMATIC RELEASE TECHNIQUE ALONG WITH YOGIC BREATHING PRACTICE ON IMPROVING DIAPHRAGM MOBILITY, INSPIRATORY CAPACITYAND EXERCISE TOLERANCE IN COPD PATIENTS

1.8 VARIABLES OF THE STUDY:

1.8(a) INDEPENDENT VARIABLE:

- Manual Diaphragm Release Technique.
- Yogic breathing practice.

1.8(b) DEPENDENT VARIABLES:

- Diaphragmatic Excursion.
- FVC, FEV_1, MVV.
- RPE.

CHAPTER-II

REVIEW OF LITERATURE

CHAPTER-II

REVIEW OF LITERATURE

Hakked CS (June2017)

Yogic breathing practices improve lung functions of competitive young swimmers

The findings suggest that Yogic Breathing Practice helps to enhance respiratory endurance in competitive swimmers.

OzmenT (May 2017)

Effect of respiratory muscle training on pulmonary function and aerobic endurance in soccer players.

Had stated that that a five week of RMT increased MIP, but FVC, FEV1, MVV, MEP and aerobic endurance did not improve in soccer players. The RMT in addition to Soccer training may improve MIP but not the tolerance to high intensity exercise

Beutler E (Apr2017)

Effect of Regular Yoga Practice on Respiratory Regulation and Exercise Performance

Yoga alters spontaneous respiratory regulation and reduces hypoxic and hypercapnic ventilatory responses. YOGA show an increased endurance capacity compared to match non-yogic individuals with similar physical activity levels.

SmithPD (Apr2017)

Development of a falls reduction yoga program for older adults-A pilot study

This project suggests an evidence-based yoga program designed to improve core strength and balance is feasible and acceptable to participants. Future research will include a randomized trial to assess impact on falls risk.

Yang ZY (Apr2016)

Yoga for asthma

We found moderate-quality evidence that yoga probably leads to small improvements in quality of life and symptoms in people with asthma. There is more uncertainty about potential adverse effects of yoga and its impact on lung function and medication usage. RCTs with a large sample size and high methodological and reporting quality are needed to confirm the effects of yoga for asthma.

Yadav A (Jan 2015)

Effect of yoga regimen on lung functions including diffusion capacity in coronary artery disease patients

Yoga regimen was found to improve lung functions and diffusion capacity in CAD patients besides improving cardiovascular functions. Thus, it can be used as a complimentary or adjunct therapy along with the conventional medicine for their treatment and rehabilitation.

KarthikPS (Dec2014)

Effect of pranayama and surya namaskar on pulmonary functions in medical students.

Yoga training improves the strength of expiratory as well as inspiratory muscles. Yoga practice can be advocated to improve pulmonary functions in healthy individuals and hence to Prevent respiratory diseases in future.

MooventhanA (Jul 2014)

Effect of Bhramari pranayama and OM chanting on pulmonary function in healthy individuals

Bhramari pranayama and OM chanting are effective in improving pulmonary function in healthy individuals.

VedalaSR (Jul 2014)

Pulmonary functions in yogic and sedentary population

Regular Yoga practice increases the vital capacity, timed vital capacity, maximum voluntary ventilation, breath holding time and maximal inspiratory and expiratory pressures.

Belletti, 2013

Cross-sectional study of management of 1,517 patients with COPD in US primary care centres with retrospective chart review of medical records. 27% of patients underwent spirometry in previous year. 25% were having comorbid conditions appropriately managed. 32% had appropriate measures in place for risk reduction. 3% of patients met all three guidelines components for (I) spirometry; (II) management of comorbid conditions; and (III) risk reduction measures

Soni R (Jul 2012)

Effect of yoga training on diffusion capacity in chronic obstructive pulmonary disease patients

Yoga techniques are suited for promoting relaxation, psycho-emotional stability and exercise tolerance. It was concluded that yogic breathing exercises improve diffusion capacity. They are beneficial to COPD patients and they can be used as an adjunct therapy with the conventional medical therapy.

SinghS (Jan 2012)

Effect of yoga practices on pulmonary function tests including transfer factor of lung for carbon monoxide (TLCO) in asthma patients

Pranayama & yoga breathing and stretching postures are used to increase respiratory stamina, relax the chest muscles, expand the lungs, raise energy levels, and calm the body. Quality of life also increased significantly.

Ray US (Jun2011)

Hatha yoga practices: energy expenditure, respiratory changes and intensity of exercise.

Yogic practices are low intensity exercises with in lactate threshold, physical performance improvement is possible owing to both better economy of breathing by B Mand also by improvement in cardiovascular reserve. Other factors such as psycho-physiological and better relaxation may contribute to it.

KyuSikKim et al (2011)

Diaphragmatic mobility correlates with airway obstruction, ventilator capacity and pulmonary hyperinflation. These findings support a possibility that the reduction in diaphragm mobility relates to hypercapnia in COPD patients. Further studies are required to better understand the diaphragm mobility on hypercapnia in patients with COPD.

Ulrik, 2010

Cross-sectional surveys of 124 GPs in Denmark at baseline and 12 months after completion of an educational program. The management of 1,716 and 1,342 patients with COPD was assessed in the first and second surveys, respectively. The educational program consisted of individual meetings with specialists, expert symposia, individual review of audit data, and included GPs and their staff. Significant improvements were observed in recording of disease severity, smoking status, BMI, dyspnoea severity, and FEV_1/FVC ratio. Significant increases were observed in smoking cessation counseling, teaching of correct inhaler technique, promoting exercise, and pulmonary rehabilitation referrals

UpadhyayDhungel K (Mar2008)

Effect of alternate nostril breathing exercise on cardio respiratory functions

Pranayama (breathing exercise), one of the yogic techniques can produce different physiological responses in healthy individuals. The responses of Alternate Nostril Breathing (ANB) the Nadisudhi Pranayama on some cardio-respiratory functions were investigated in healthy young adults. Results indicate that regular practice of ANB (Nadisudhi) increases parasympathetic activity.

12.Kelly O'Brienet al(2008)

Results of this systematic review update suggest that targeted inspiratory resistive, threshold or normocapneic hyperventilation IMT significantly increases inspiratory muscle strength and endurance, improves outcomes of exercise capacity, one measure of quality of life and decreases dyspnea for adults with stable COPD.

.**ElAINEPAULIN etal(2008)**

The results of this study suggest that the reduction in diaphragm mobility in COPD patients is mainly due to air trapping and is not influenced by respiratory muscle strength or pulmonary hyperinflation.

DeGodoy DV (Mar2006)

Yoga versus aerobic activity: effects on spirometry results and maximal inspiratory pressure.

Neither yoga nor aerobic exercise provided a statistically significant improvement in maximal inspiratory pressure after three months. However, the absolute variation in maximal inspiratory pressure was greater among those practicing yoga.

Ray US (Dec2001)

Aerobic capacity & perceived exertion after practice of Hatha yogic exercises.

The practice of Hatha yogic exercises along with games helps to improve aerobic capacity like the practice of conventional exercises (PT) along with games. The yoga group performed better than the PT group in terms of lower PE after exhaustive exercise.

Yadav RK (Oct 2001)

Effect of yogic practice on pulmonary functions in young females.

The beneficial effects of yoga training .The present study was undertaken to assess the effects of yogic practice on some pulmonary functions. The observations were recorded by MEDSPIROR, in the form of FVC, FEV-1 and PEFR on day-1, after 6 weeks and 12 weeks of their yogic practice. There was significant increase in FVC, FEV-1 and PEFR at the end of 12 weeks.

CHAPTER III

MATERIALS AND METHODOLOGY

CHAPTER- III

MATERIALS AND METHODOLOGY

3.1 MATERIALS

Couch.

Pillow.

Spirometer/Incentive spirometry.

Stethoscope.

Sphygmomanometer.

Cardio respiratory assessment chart.

Nose clip.

Recoding sheet.

3.2 METHODOLOGY

3.2.1 STUDY DESIGN

Cross Sectional Quasi Experimental Study design.

3.2.2 SAMPLE SIZE

Sample size is 15 Patients

3.2.3 SAMPLING METHOD.

The subjects will be selected by simple random sampling method.

3.2.4 STUDY DURATION

One Year

3.2.5 TREATMENT DURATION

45 minutes of each session 4 sessions per week for 6 weeks.

3.2.6 STUDY SETUP:

- Out Patient Department, Nandha College of Physiotherapy, Erode.
- Government Head Quarters Hospital, Erode.
- Sudha Institute of Medical Science, Erode

3.2.7 CRITERIA FOR SAMPLE SELECTION.

3.2.8 A) INCLUSION CRITERIA:

1) Age group of 30 to 50 years.
2) Both sex.
3) Subjects who have given written consent.
4) Ex-smokers
5) Clinically stable patients (no exacerbation in the previous 6 weeks)
6) Forced expiratory volume in one second (FEV1) < than 80% predicted
7) FEV1/FVC $\leq$ 0.7, post bronchodilator

3.2.8 B) EXCLUSION CRITERIA:

1. Subjects suffering from significant cardiovascular disorders.
2. Subjects suffering from familial Bronchial asthma.
3. Chronic smokers, smoking at least 20 cigarettes per day for not less than 10 years.
4. Severely Obese individuals.
5. Individuals with significant spinal and skeletal deformities.
6. Cardiopulmonary diseases
7. BMI > 30.0 kg/m2
8. History of thoracic surgery
9. Denial to participate

3.2.9 PARAMETERS

- Diaphragmatic Excursion.
- Spiro meter (FVC,FEV_1,MVV)
- RPE (Modified Borg Scale).

3.2.10 PROCEDURE:

- A group of 15subjects were taken into the according to simple random sampling technique.
- Fifteen Subjects were assigned in a single experimental group.
- Instructions were given to the patients about the purpose of the study.
- All the subjects requested to attain the all the treatment session
- Initial assessment was taken which include
    1. Forced Vital capacity (FVC)
    2. Forced Expiratory Volume in first second (FEV1)
    4. Maximum Voluntary Ventilation.
    5. Rate of Perceived Exertion (RPE).
    6. Diaphragmatic Excursion.
- The session starts up with following technique.
    - Manual diaphragmatic release technique.
    - Yogic Breathing practice.
- Exercise techniques last for both group was 45 minutes per session and 4 sessions/ week for 6 weeks.
- Assessment of outcome measure was performed again at the end of 6th week.
- The data were collected and analyzed. Then the final results were obtained.

3.2.11 TECHNIQUES:

Manual diaphragmatic Release Technique:

The participant lay supine with relaxed limbs. Positioned at the head of the participant, the therapist made manual contact with the pisiform, hypothenar region and the last three fingers bilaterally to the underside of the seventh to tenth rib costal cartilages, with the therapists forearms aligned toward the participant's shoulders. In the inspiratory phase, the therapist gently pulled the points of contact with both hands in the direction of the end slightly laterally, accompanying the elevation of the ribs. During exhalation the therapist deepened contact towards the inner costal margin, maintaining resistance. In the subsequent respiratory circles, the therapists progressively increase the deep of contact inside the costal margin. Maneuver was performed in two sets of 10 deep breaths, with a 1- minute interval between them. 2 sets x 10 breaths (1 min interval).

Other Name: Manual Diaphragm Stretching Technique

Fig.1 MDRT

YOGIC BREATHING PRACTICE

Bhramari Pranayama- Humming Bee Breathing

Fig.2 Bhramari Pranayama- Humming Bee Breathing

PROCEDURE

- Situp straight in a quiet, well ventilated corner with patient eyes closed Keep a gentle smile on patient face.
- Keep patient eyes closed for some time. Observe the sensations in the body and the quietness within Place patient index fingers on their ears. There is a cartilage between patient cheek and ear. Place patient index fingers on the cartilage.
- Take a deep breath in and as you breathe out, gently press the cartilage. You can keep the cartilage pressed or press it in and out with patient fingers, while making a loud humming sound like a bee.
- Patient can also make a low-pitched sound but it is a good idea to make a high-pitched one for better results. Breathe in again and continue the same pattern 3-4 times.

Ujjayi Pranayama

Ujjayi stretches the breath, warms it before entering into the lungs and helps to build heat in the body. Through this heat internal Agni (fire) is stoked and powerful healing process is unlocked.

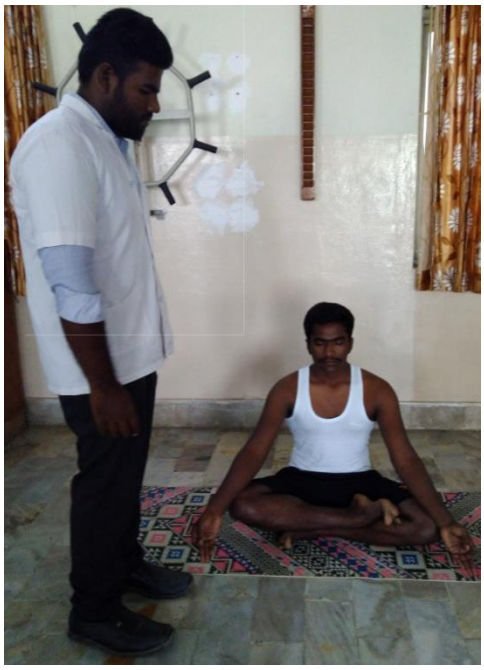


Fig.3 Ujjayi Pranayama

PROCEDURE

- Sit in any meditative pose like Padmasana with eye closed and try to keep your spine erect.
- Take a long, deep breath slowly from both the nostril.
- While breath in trying to contract the throat and feel the touch of air in your throat.
- As air touches the throat a peculiar sound is produced.
- Enable the breath to be light and relaxed as you slightly contract the rear of your throat,
- Now breath out by closing your right nostril and exhale from the left nostril. Try to produce the sound 'HHHHHAAAA' while exhaling.

Ujjayi Pranayama Benefits and Cures

- Miraculous remedy for thyroid problems.
- Snoring problem is cured.
- Good for heart, asthma, tonsil, cold and cough.
- All throat problems are cured.

AnulomaVilomaPranayama

Fig.4 AnulomaVilomaPranayama

Fig.5 AnulomaVilomaPranayama

- The meaning of Viloma is "against the grain."Anuloma is opposite to Viloma.
- It is very helpful in respiratory related diseases like Asthama.AnulomVilomPranayama is the best way to balancing the Tridosas in our body.

PROCEDURE

- Anuloma Viloma Pranayama is very easy to do, first of all, close your eyes and sit in Padmasana and rest hands on their knees.
- Close the right nostril with the right thumb. Inhale slowly through the left nostril, inhale the oxygen as much as you can, this will fill lungs with air.
- Remove thumb from right nostril, just exhale.
- When you exhale use your middle finger to close your left nostril then inhale with our right nostril and remove thumb from the right nostril then exhale. Repeat this process for 5 minutes.
- Be focused and concentrate on your breathing.
- Along with Ancient Breathing Techniques Mudras give more effectiveness (It will be enclosed in Appendix)

3.12 STATISTICAL TOOLS

The statistical tools used in the study are paired t-test and unpaired t-test.

PAIRED't' - TEST

The paired t-test was used to find out the statistical significance between pre and post t-test values of increasing weight before and after treatment for Group A and Group B.

Formula for paired t-test

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

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

d = difference between the pretest and post test

$\bar{d}$ = Mean difference

n = Total number of subjects

Sd = Standard deviation

CHAPTER-IV

DATA PRESENTATION AND ANALYSIS

CHAPTER - IV

DATA PRESENTATION AND ANALYSIS

MEAN DIFFERENCE AND STANDARD DEVIATION VALUES

The table shows the values of Mean and Standard Deviation values of the parameters that were used to assess the pulmonary function.

Table 4.1 Data Presentation

S.NO	PARAMETERS	MEAN DIFFERENCE	STANDARD DEVIATION VALUES
1	Diaphragmatic excursion	0.54	0.1638
2	RPE	2	0.377
3	FVC	0.52	0.14
4	FEV_1	0.77	0.24
5	MVV	22.25	5.04

Statistical analysis:

Statistical analysis will be done using the paired ‘t’ test this chapter deals with the analysis and interpretation of data’s collected from the group to know their effectiveness in improving the pulmonary function on improving diaphragm mobility, inspiratory capacity and exercise tolerance in copd patients from collected data were analyzed and tabulated below.

Table 4.2 Statistical analysis

S.NO	PARAMETERS	PARIED ‘t’ VALUES	TABLE VALUES
1	Diaphragmatic excursion	12.758	**2.15**
2	RPE	10.88	
3	VC	14.3	
4	FEV_1	12.4	
5	MVV	17.08482	

DATA PRESENTATION

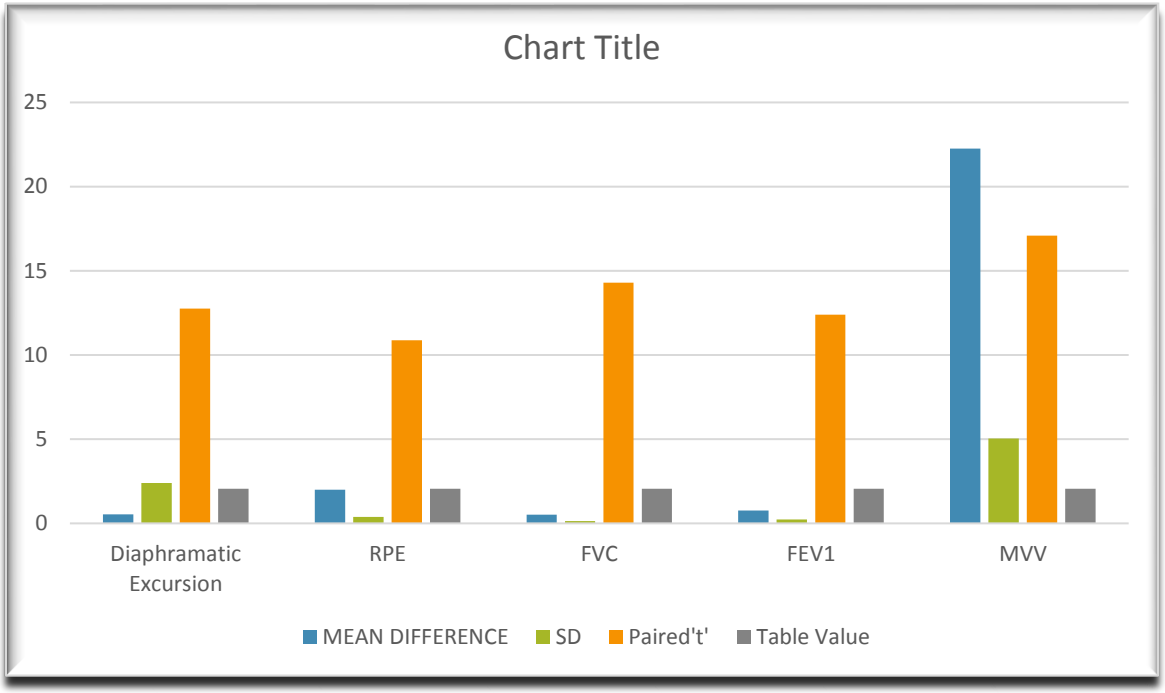


Fig 4.1 GRAPHICAL REPRESENTATION

CHAPTER-V

RESULTS AND DISCUSSION

CHAPTER - V

RESULTS AND DISCUSSION

5.1 Results:

The study sample comprised of 15 patients in a group. The mean age of the subject 30-50 years.

The Pre and Post test values were assessed by vital capacity, forced expiration volume at 1st second and maximum voluntary ventilation is measured through Spirometer. The mean difference for VC is 0.52, FEV_1 is 0.7, MVV is 22.25 respectively. The standard deviation values for VC is 0.14, FEV_1 is 0.24, MVV is 5.04 respectively. The Paired't' test values foe VC is 14.3, FEV_1 is 12.4, MVV is 17.08 respectively.

Obtained paired 't' values are more significant when compare with the table value 2.15

The Results obtained from statistical analysis indicates that there was an improvement in pulmonary function in participants.

The increase in pulmonary function was seen in all subjects received ventilatory exercises irrespective of the techniques Manual Diaphragmatic Release Technique and Yogic breathing practice.

By analyzing the mean values, the result showed the subjects who received Manual Diaphragmatic Release Technique along with Yogic breathing practice are found to be more effective in improving diaphragm mobility, inspiratory capacity and exercise tolerance in copd patients.

By analyzing the values of S.D the results showed a significant increase in the subjects received MRDT and Yogic breathing practice.

The Paired t' test results showed that MRDT and Yogic breathing practice is more reliable than in improving diaphragm mobility, inspiratory capacity and exercise tolerance in copd patients.

5.2 Discussion:

The Purpose of the study was to find out the effectiveness of MDRT with Yogic breathing practice in improving the pulmonary function in COPD patients.

A total of 15 subjects with age group of 30 – 50 yrs were selected for the study. MDRT with Yogic breathing practice was given.

The pulmonary function was assessed by diaphragmatic excursion, RPE, spirometer to quantify the effectiveness of the treatment.

The reports provided were documented and then subjected to statistical analysis. The results of statistical analysis revealed that MDRT with Yogic breathing practice is more effective and reliable in improving the diaphragm mobility, inspiratory capacity and exercise tolerance in copd patients.

5.3 LIMITATIONS

- This study is a small sample study confined to a small number of subjects which limits generalization.
- The study is conducted over a shorter period of time. The duration of the study was One year.

5.4 RECOMMENDATIONS

- Similar comparative study can be done on a larger group.
- The study can be entitled to a longer period of time.
- Further studies can be conducted over other respiratory conditions
- The study can be conducted for different age.

CHAPTER-VI

CONCLUSION

CHAPTER-VI

CONCLUSION

The aim of the study was to improve the ventilatory function in manual diaphragmatic release technique and Ancient Breathing Techniques. The group consists of 15 subjects who were assigned by convenient sampling technique. The total study duration was one year. The paired ‘t’test was used to compare pre Vs post treatment scores.

Based on the statistical analysis there was significant difference in the treatment efficacy in Modern manual diaphragmatic release technique and Ancient breathing technique (yogic breathing practice). We here accepting the alternate hypothesis which states that there was significant difference in effects obtained by the treatment in Modern manual diaphragmatic release technique and Ancient breathing technique (yogic breathing practice).

So it was concluded that, Modern manual diaphragmatic release technique and Yogic breathing technique (yogic breathing practice) gives more effect in improving diaphragm mobility, inspiratory capacity and exercise tolerance in copd patients.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. **Barbara A Webber,** Physiotherapy for Respiratory and Cardiac Problems S Saunders, 1986.

2. **Carolyn Kisner, Lynn Allen, Colby,** Therapeutic Exercise, F A Davis Company, 1996.

3. **Carolyn M Hicks,** Research For Physiotherapist – Project Design And Analysis, Churchill Livingston,1995, 2nd Edition.

4. **ChandiCharan Chatterjee,** Human Physiology – Vol:II, Medical Allied Agency,India,10th Edition.

5. **Donna Frown Felter,** Elisabeth Dean, Principles and Practice of Cardiopulmonary Physical Therapy, USA, Mosby, 1996, 3rd Edition.

6. **JonneWatchie,** Cardiopulmonary Physical Therapy, A Clinical Manual, W B Saunders,1986

7. **Joshi LN,** Effects Of Forced Breathing In Ventilatory Function Of Lung, Journal For Post Graduate Medicine, Vol 44, Sep 1998,Pg 67-69.

8. **Kothari CR**, Research Methodology- Methods and Techniques, New Delhi, Wishwa Prakash, 1998, 21st Edition.

9. **Scott Irwin, John Stephen Tecklin;** Cardiopulmonary Physical Therapy, Mosby, 1995, 3rd Edition.

10. **Susan B O'Sullivan,** Thomas J Schmitz, Physical Rehabilitation Assessment and Treatment, J.P.Bros, 1994, 3rd Edition.

11. **Britton M;** The burden of COPD in the U.K.: results from the Confronting COPD survey.;Respir Med 2003 Mar;97 Suppl C:S71-9.[abstract]

12. **Jafary ZA, Faridi IA and Qureshi HJ.** Effects of airborne dust on lung function of the exposed subjects. Pak journal of physiology 2007;3(1):30-34.

13. **Mariammal T.** Work related respiratory symptoms and pulmonary function tests observed among construction and sanitary workers of Thoothkudi. International Journal of pharmTech Research 2012;4(3):1266-1273.

14. **Bijlani RL.**Theyogicpractices: Asanas, pranayama and kriyas.In:BijlaniRL, editor.Understanding Medical Physiology. 3rdEd. New Delhi, India: JaypeeBrothers Medical Publishers; 2004.

15. **deCoster M, PollarisA**.Osteopatıa Visceal.2nd ed. Madrid, Spain: Paidotribo; 2005:38.

16. American Thoracic Society/European Respiratory Society. ATS/ERS Statement on Respiratory Muscle Testing.Am J RespirCrit Care Med.2002;166:518–624.

17. **Pereira C, Sato T, Rodrigues S.** New reference values for forced spirometry in whiteadults in Brazil.J Bras Pneumol.2007;33:397–406.

18. **Licciardone JC, Russo DP**. Blinding protocols, treatment credibility, and expectancy: methodologic issues in clinical trials of osteopathic manipulative treatment. J Am Osteopath Assoc.2006;106:457–463.

19. **Testa A, Soldati G, Giannuzzi R, Berardi S, Portale G, Silveri N.** Ultrasound m-mode assessment of diaphragmatic kinetics by anterior transverse scanning in healthy subjects. Ultrasound Med Biol.2011;37:44–52.

20. **American Thoracic Society. ATS Statement**: Guidelines for the Six-Minute Walk Test.Am J Respir Crit Care Med.2002;166:111–117.

21. **Aliverti A, Pedotti A**. Opto-electronic plethysmography. Monaldi Arch Chest Dis. 2003;59:12–16.

22. **Cala SJ, Kenyon CM, Ferrigno G, Carnevali P, Aliverti A, Pedotti A, et al**. Chest wall and lung volume estimation by optical reflectance motion analysis. JAppl Physiol. 1996;81:2680–2689.

23. **Heneghan NR, Adab P, Balanos GM, Jordan RE.** Manual therapy for chronic obstructive airways disease: A systematic review of current evidence .Man Ther.

24. .**Aliverti A, Ghidoli G, Dellaca RL, Pedotti A, Macklem PT**. Chest wall kinematic determinants of diaphragm length by optoelectronic plethysmography and ultra- sonography. JAppl Physiol.2003;94:621–630.

APPENDICES

APPENDICES

APPENDIX – I

PHYSICAL THERAPY ASSESSMENT CHART

Name:

Age:

Sex:

Occupation:

P.M.R:

Weight:

Date:

Chief complaints:

Associated problems:

Surgical notes/ Physical observation (if any):

Medical history:

Past history:

Present history:

Drug history:

Family history:

Social history:

Vital signs:

Temp: **PR:** **RR:** **BP:**

Pain assessment:

Location:

Nature:

Aggravating factors:

Relieving factors:

Others if any:

Inflammatory signs:

Tenderness:

Warmth:

Redness:

Others if any:

Physical built:

CARDIO THORACIC ASSESSMENT

External appliances:

Chest deformities:

Clubbing:

Cyanosis:

Edema:

- **pitting / non-pitting:**
- **Area:**

Cough:

- **Type:**
- **Frequency:**

Sputum:

- **Quantity:**
- **Color:**
- **Consistency:**
- **Odour:**

Wheeze:

Chest pain:

- **Character:**
- **Location:**
- **Duration:**
- **Behavior:**

Peripheral pulses:

Respiration:

- **Type:**
- **Depth:**
- **Pattern:**

Vocal fremitus:

Percussion note:

- **Hyper- resonant/ normal/ dull/ stony-dull**

Auscultation:

- **Air entry:**
- **Breath sounds:**
- **Added sounds:**
- **Heart sounds:**

Thoracic expansion:

- **Axilla –**
- **Nipple –**
- **Xiphoid –**
- **Range of motion(of relevant joints):**

Special tests(if any):

Functional assessments:

Investigations:

Clinical diagnosis:

Treatment plan:

APPENDIX - II

ASSESSMENT CHART

Name: Age: Sex:

Clinical diagnosis:

S.No	Prameters	Pre test	Post test
1	Diaphragmatic Excursion		
2	Rate of Perceived Exertion(RPE)		
3	Vital capacity (VC)		
4	Forced Expiratory Volume in first second ($FEV_{1)}$		
5	Maximum Voluntary Ventilation (MVV)		

APPENDIX - III

Borg's Rate of Perceived Exertion (RPE) Scale

	Perceived exertion	Breathlessness	Discomfort / Pain	Fatigue
0	Nothing at all	Nothing at all	Nothing at all	Nothing at all
0.5	Very very weak	Very very light	Very very weak	Very very light
1	very weak	Very light	very weak	Very light
2	Weak	Light	weak	light
3	Moderate	Moderate	Moderate	Moderate
4	Somewhat Strong	Somewhat hard	Somewhat hard	Somewhat hard
5	Strong	Hard	Strong	Very heavy
7	Very Strong	Very heavy	Very Strong	Very very Hard
10	Very very strong maximal	Very very hard maximal	Very very strong	Maximal

APPENDIX -IV

DIAPHRAGMATIC EXCURSION

Evaluation of diaphragm excursion

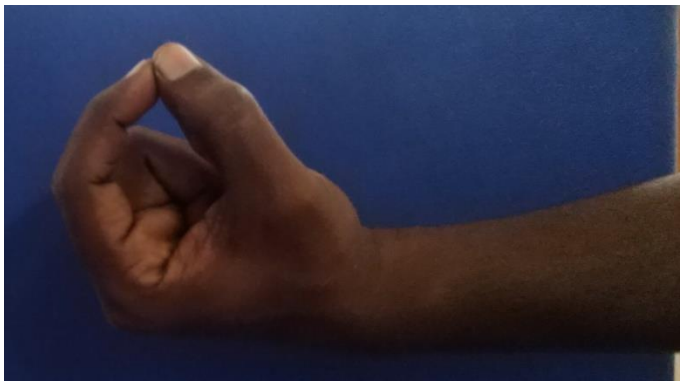
Evaluation of thoracic expansion allows the therapist to observe a “base line” level by which to measure progress or decline in a patients condition.

The hyperinflation associated with COPD produces an increase in anteroposterior diameter with the progressive loss of diaphragmatic excursion..

Normal quiet breathing mostly performed by the diaphragm., with equal and upward motion of the lower rib cage .palpation of anterior chest wall with thump over the costal margins and thump tip meeting at the xiphoid gives the most accurate assessment of the extend of diaphragmatic activity. Another method is to use measuring tape at the level xiphoid in supine position with relaxed accessory muscles.

Normal chest wall excursion is 3.25”in(8.5 cm) in a young adult between20 to 30 years of age. The extend of movement is an important part of diaphragmatic excursion.

Chinmaya Mudra

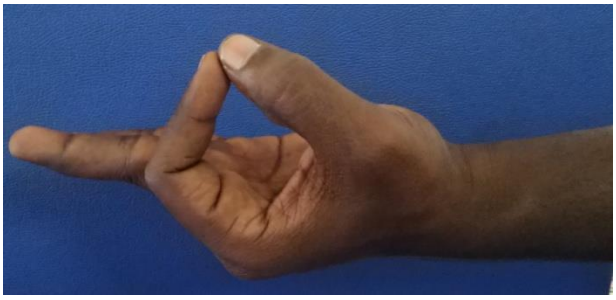


- In this mudra, the thumb and forefinger form a ring and the three remaining fingers are curled into the palms of the hands.
- Again, the hands are placed on the thighs with palms facing upwards and deep comfortable Ujjayi breaths are taken.
- Once more, observe the flow of breath and its effect.

Benefits of Chinmaya Mudra

- Improves flow of energy in the body
- Stimulates digestion

Chin Mudra



- Hold the thumb and index finger together lightly while extending the remaining three fingers.
- The thumb and index finger need only touch together, without exerting any pressure.
- Keep the three extended fingers as straight as possible.
- The hands can then be placed on the thighs, facing upwards.
- Now, observe the flow of breath and its effect.

Benefits ofChinMudra

- Better retention and concentration power
- Improves sleep pattern
- Increases energy in the body
- Alleviates lower backache

AdiMudra

- InAdi Mudra, the thumb is placed at the base of the small finger and the remaining fingers curl over the thumb, forming a light fist.
- The palms are again placed facing upwards on the thighs and the breathing repeated.

Benefits of Adi Mudra

- Improves the flow of oxygen to the head
- Increases capacity of the lungs
- Relaxes the nervous system
- Helps reduces noring

APPENDIX-V

TABULATION

DIAPHRAMATIC EXCURSION

S.No	Pre Test	Post Test
1	1	1.5
2	2	2.5
3	0	0.7
4	0	0.8
5	2	2.4
6	1	1.6
7	0	0.6
8	1	1.4
9	2	2.4
10	2	2.5
11	0.8	1.6
12	1.2	1.9
13	1.4	2
14	0.5	1.2
15	1	1.7

Mean Difference= 0.54

S.D = 0.1638

Paired 't' value = 12.758

RATE OF PERCEIVED EXERTION

S.No	Pre Test	Post Test
1	1	0.5
2	0.5	0.5
3	0.5	0.5
4	2	1
5	1.5	1
6	1	0.5
7	1	1
8	1.5	1
9	1	1
10	2	1.5
11	1.5	1.5
12	1.5	1
13	1	1
14	2	1.5
15	2	1

Mean = 2

S.D = 0.377

Paired 't' value = 10.88

S.No	VC		FEV_1		MVV	
	PRE	POST	PRE	POST	PRE	POST
1	2.18	2.62	1.89	2.58	66.9	81.6
2	2.14	2.54	1.30	2.10	54.4	75.7
3	1.42	1.83	1.41	2.25	48.6	69.9
4	2.34	2.82	1.76	2.50	51.2	82.4
5	1.54	2.26	1.37	2.65	68.4	91.2
6	2.89	3.25	2.80	3.63	113.5	124.4
7	2.41	2.94	3.29	3.92	48.8	71.8
8	1.23	1.66	1.62	2.42	62.1	79.3
9	1.89	2.83	1.59	2.57	66.1	94.2
10	2.22	2.71	1.39	2.64	73.4	96.5
11	1.54	2.06	1.44	2.02	61.3	84.5
12	1.78	2.22	2.16	2.78	76.2	98.1
13	1.36	1.98	1.58	2.13	55.5	79.3
14	2.12	2.56	2.63	3.05	64.4	89.3
15	2.06	2.61	1.32	1.91	72.3	98.6

VITAL CAPACITY

Mean = 0.52

SD = 0.14

Paired‘t’ test = 14.3

FEV_1

Mean = 0.77

SD = 0.24

Paired ‘t’ test = 12.4

MVV

Mean = 22.25

SD = 5.04

Paired ‘t’ test = 17.0848

INFORMED CONSENT FORM

STATEMENT OF PARTICIPANT

I…….have been explained in details about the procedure to be carried to be carried out in the study.

I have been given opportunity to discuss and ask questions with the responsible physiotherapist regarding the study.

I have understood that there is no harm to my health by health participating in the study period.

I will undergo any other training methods during this study.

I agree to participate voluntarily in the study described in this form.

Name of the subject signature

Date signature

Name of the witness signature

Date (if necessary)

Name of the investigator signature

Date