



TO STUDY THE LONG TERM EFFECT OF MULTIPLE SESSIONS OF ACU-TENS ON DYSPNOEA IN COPD PATIENTS: AN EXPERIMENTAL STUDY

Dr. V. Kiran	MPT (Cardio) Professor In Physiotherapy, Apollo College Of Physiotherapy
Dr. R. Venkatesan	M.Sc, PhD, Associate Professor, Tnpesu, Chennai
Dr. Radhakrishnan	MPT. Professor, tagor College Of Physiotherapy

ABSTRACT

BACKGROUND :- Knowledge of factors contributing to Dyspnea is critical to the development and selection of therapeutic interventions to alleviate breathing discomfort, and the interest in doing so is high. Goal in this statement is to review the current understanding of the pathophysiologic mechanisms of Dyspnea, the tools used to assess this symptom and its impact on patients' lives, and therapeutic approaches that may be employed to ameliorate the discomfort. This approach assumes standard treatments for the underlying disease state have been exhausted.

SPECIFIC OBJECTIVE :- To find out whether the multiple sessions of Acu-TENS is effective in providing the long term effect on Dyspnea in COPD patient

DESIGN :- It is an experimental study design

STUDY SETTING :- Department of PHYSIOTHERAPY, Narayana Medical College Hospitals, Nellore.

PARTICIPANTS :- A total of 30 patients who are coming from pulmonology department

INTERVENTION :- All the 30 patients of Dyspnea were divided into two groups (15 in each group), group A and group B. The subjects of group A received traditional physiotherapy treatment (which includes training of relaxed postural re-education, controlled breathing, breathing retraining⁽²³⁾- exercise like pursed lip and diaphragmatic) and session of 45 minutes of Acu-TENS. The subjects of group B were treated with traditional physiotherapy treatment mentioned above. Data was taken on Day 0, 12th week and 14th week.

OUTCOME MEASURES :- Distance covered in 6 minute walk test, VAS Scale, Borg Scale

RESULTS :- There was a significant improvement in the functional capacity of the patient in Group A which was accessed by 6 MWT. Patient covered more distance in 6 MWT, and reduction on Borg scale and VAS scale. As already the short term effect of Acu-TENS was proved. The multiple sessions of Acu-TENS i.e 45 Minutes session once a week for 12 weeks has also showed improvement & helped in relieving dyspnea. A follow up of the treatment was taken on 14th week, which finally proved the long term effect of multiple sessions of Acu-TENS.

CONCLUSION:- Hence this study concludes that there is a significant reduction in dyspnea in pts with COPD who are under gone. multiple sessions of Acu-TENS 12 weeks is associated with reduction in dyspnea and therefore showed improvement in 6MWT and reduction of VAS scale and Borg scale. When two samples was conducted after 12th & 14th week using Borg scale. It was found that there is a significant reduction after 12th week with $p=0.000$, and its significance is maintained after 14th week in GP A compare GP B $p=000$

KEYWORDS :

INTRODUCTION:-

COPD, or chronic obstructive pulmonary disease, is a progressive disease that makes it hard to breathe. "Progressive" means the disease gets worse over time. COPD can cause coughing that produces large amounts of mucus (a slimy substance), wheezing, shortness of breath, chest tightness, and other symptoms. Cigarette smoking is the leading cause of COPD. Most people who have COPD smoke or used to smoke. Long-term exposure to other lung irritants, such as air pollution, chemical fumes, or dust, also may contribute to COPD.

The term "COPD" includes two major entities —emphysema (destructions of air sacs) and chronic obstructive bronchitis (affects bronchi and bronchioles) most people who have COPD have both conditions. The COPD develops slowly. Symptoms often worsen over time and can limit your ability to do routine activities. Severe COPD may prevent you from doing even basic activities like walking, cooking, or taking care of yourself. Us, the general term "COPD" is more accurate. COPD is a major cause of disability, and it's the fourth leading cause of death in the United States.

One of the most common symptoms of COPD is shortness of breath (Dyspnoea). People with COPD commonly describe this as: "My breathing requires effort," "I feel out of breath," or "I can't get enough air in". People with COPD typically first notice Dyspnoea during vigorous exercise when the demands on the lungs are greatest. Over the years, Dyspnoea tends to get gradually worse so that it can occur during milder, everyday activities such as housework. In the advanced stages of COPD, Dyspnoea can become so bad that it occurs during rest and is constantly present. Other symptoms of COPD are a

persistent cough, sputum or mucus production, wheezing, chest tightness, and tiredness.

Patients with chronic pulmonary disease are often limited in their activities by respiratory discomfort. Reductions in functional status, quality of life, and disability are frequently consequences of this symptom. Diseases producing chronic dyspnoea may leave the patient with significant breathlessness despite maximal therapy. Having identified these factors, appropriate additional treatment strategies might be devised. Pulmonary rehabilitation programs have been shown to relieve dyspnoea, reduce hospitalizations, and improve quality of life. Having identified these factors, appropriate additional treatment strategies might be devised. Pulmonary rehabilitation programs have been shown to relieve dyspnoea, reduce hospitalizations, and improve quality of life.

DEFINITION

Dyspnoea is the term generally applied to sensations experienced by individuals who complain of unpleasant or uncomfortable respiratory sensations. Many definitions of dyspnoea have been offered, including: "difficult, labored, uncomfortable breathing", an "awareness of respiratory distress", "the sensation of feeling breathless or experiencing air hunger" and "an uncomfortable sensation of breathing". These definitions have sometimes mixed the true symptom (what patient's say they are feeling) with physical signs (what the physician observes about the patient, e.g., "exhibits labored breathing"). In the final analysis, a symptom can only be described by the person who experiences it. In this context, recent investigations of the perception of breathlessness suggest that there are multiple types of dyspnoea

Dyspnoea is a term used to characterize a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity. The experience derives from interactions among multiple physiological, psychological, social, and environmental factors, and may induce secondary physiological and behavioral responses.

Standard spirometry and lung volume measurements may be useful in the assessment of the dyspnic patient. Measurement of gas diffusion can be useful because a decreased diffusing capacity is associated with arterial desaturation during exercise. Medical Research Council (MRC) Scale in which patients are asked to indicate the level of activity that produces dyspnoea. The Oxygen Cost Diagram (OCD) is a scale designed to rate activities on a continuum according to the number of calories expended in the performance of the activity. Mahler developed the Baseline dyspnoea Index (BDI) to measure breathlessness at a single point in time. The formal measurement of dyspnoea during incremental exercise to symptom-limited capacity is becoming increasingly popular in the explanatory assessment of dyspnoea. Ventilatory capacity is measured prior to exercise, ventilation is measured during exercise, and these are related to the intensity of dyspnoea rated using either the Borg Scale or Visual Analogue Scale in 1970.

TREATMENT OF DYSPNOEA

Supplemental oxygen during exercise, Oxygen therapy, Pharmacologic therapy, Ventilator settings, Nutrition, Inspiratory muscle training and education. An alternative treatment for dyspnoea is Acu-TENS. It is a low frequency, high intensity type of tens. This stimulates the high threshold A-delta and C fibers which lead to the release of Endogenous Opioids. This kind of stimulation is often applied to acupuncture points. Some patients may not be able to access an acupuncturist because of geographic restrictions or poor performance status. In addition, some patients may not tolerate needle insertions. For these patients, Transcutaneous nerve stimulator (TENS) has the advantage of easy administration by patients or staff with minimal basic training. Recently acupuncture-like TENS devices have been developed to mimic the treatment of acupuncture using low-frequency (e.g. 4 Hz), high-intensity stimulation (Pomeranz and Niznik, 1987). The goal is to recruit the high threshold type III afferent nerve fibers that are potent releasers of endorphins. As drugs free measures are however may be just as effective in treating anxiety, depression and therefore dyspnoea in COPD and is safer for the patients.^[15]

Chronic obstructive pulmonary disease (COPD)

refers to chronic bronchitis and emphysema, a pair of two commonly co-existing diseases of the lungs in which the airways become narrowed. This leads to a limitation of the flow of air to and from the lungs causing shortness of breath. COPD is caused by noxious particles or gas, most commonly from tobacco smoking, which triggers an abnormal inflammatory response in the lung. The inflammatory response in the larger airways is known as chronic bronchitis, which is diagnosed clinically when people regularly cough up sputum. In the alveoli, the inflammatory response causes destruction of the tissues of the lung, a process known as emphysema. The natural course of COPD is characterized by occasional sudden worsening of symptoms called acute exacerbations, most of which are caused by infections or air pollution.^[27]

Worldwide, COPD ranked as the sixth leading cause of death in 1990. It is projected to be the fourth leading cause of death worldwide by 2030 due to an increase in smoking rates and demographic changes in many countries. COPD is the 4th leading cause of death in the U.S., estimates suggesting out of

16 million Americans-14 million have CB and other 2 million have emphysema. In 2000, COPD caused 726,000 hospitalizations. In this regard COPD is a problem that is a frequent challenge for respiratory clinicians.

The signs and symptoms of COPD include: An ongoing cough or a cough that produces large amounts of mucus (often called "smoker's cough"), Shortness of breath, especially with physical activity, Wheezing, Chest tightness.

NEED OF THE STUDY

According to Campbell and Howell "The perception of breathlessness results from a perceived mismatch between the ventilation demand and the ventilation achieved". The study was performed to find long term effect of Acu-tens, an alternative treatment for dyspnoea, which is the first symptom of COPD. Acu-Tens stimulates the high threshold A delta and C fibers which leads to the release of Endogenous Opioids, which is a pharmacological treatment for Dyspnoea. Others are sympathomimetics, expectorants, anti-inflammatory and corticosteroids but have side effects like mood alterations, weight gain, osteoporosis, and hyperglycemia and impaired wound healing.

Statement of the Problem

In many cases dyspnoea still remains an incapacitating symptom after traditional medical treatment. At this phase treatment should focus on symptom rather than on disease. This includes education, exercise, and ventilatory muscle training and O₂ therapy. Strategies are categorized into targeted mechanisms that include the following- Reducing the sense of effort and improving respiratory muscle function, Decrease respiratory drive to breathe, Altering central perception, Instituting exercise training that may target all proposed mechanisms

AIM OF THE STUDY: -

To learn long term effect of multiple sessions of Acu-TENS on Dys*-pnoea in COPD Patients.

OBJECTIVE OF THE STUDY:-

To find out whether the multiple sessions of Acu-Tens is effective in providing the long-term effect on dyspnoea in COPD patient

HYPOTHESIS

ALTERNATIVE HYPOTHESIS: There may be long-term effect of multiple sessions of Acu-TENS on dyspnoea in COPD patients.

NULL HYPOTHESIS: There may not be long-term effect of multiple sessions of Acu-TENS on dyspnoea in COPD patients.

Research Approach:- To find out the statement of a problem for the long term effect of Acu-TENS in patients of dyspnoea in COPD.

STUDY DESIGN:- It is an experimental study design. A sample of 30 subjects was included in the study with a pre test and a post study design.

SAMPLE DESIGN:- All the 30 subjects of dyspnoea of grade II and III with age group 40-60 years were taken.

POPULATION:- All the 30 subjects of dyspnoea of grade II and III with age group 40-60 years were taken on the --basis of convenient sampling.

SETTING OF SAMPLING:- All the 30 subjects were recruited from pulmonology department, government general hospital

SAMPLING METHOD:- All the subjects will be taken by

convenient sampling method based on initial baseline data and all the subjects were referred by consultant pulmonologist after diagnosis.

INCLUSION CRITERIA:-Patients between 40-60 years – ambulatory and dyspnoea grades III and IV, both the genders, written informed consent from patients, Patients who can understand instruction, Bronchodilators not less than 6 hours prior to treatment, patient is asked not to smoke during the treatment

EXCLUSION CRITERIA:- Ischemic heart diseases, Cardiac pacemaker, Diabetes mellitus, Poor perception and cognitive function, Orthopaedic abnormality (thoracic spine), Pregnancy ,Psychological disorder, pneumothorax, haemothorax and pyopneumothorax., Sickel cell disease, Oxygen supplement, Pectus carniatum ,Skin conditions.

Material and Apparatus:-Pen, pencil and paper , TENS machine, Electrodes ,Plastic Film ,Couch, Alcohol ,Swab ,Adhesive tape



Pen, pencil, paper, adhesive tape, scissors and stopwatch. Gel, cotton, TENS machine and electrodes & patient receives TENS Time and Duration of the study: All the 30 patients of Dyspnoea were divided into two groups (15 in each group), group A and group B. The subjects of group A received traditional physiotherapy treatment (which includes training of relaxed postural re-education, controlled breathing, breathing retraining exercise like pursed lip and diaphragmatic) and session of 45 minutes of Acu-TENS .The subjects of group B were treated with traditional physiotherapy treatment mentioned above. Data was taken on Day 0, 12th week and 14th week.

Protocol:

All the 30 subjects were assigned in two groups and will be selected by convenient sampling method on the basis of inclusion criteria. All the 30 patients of dyspnoea were divided into two groups (15 in each group), group A and group B. The subjects of group A received traditional physiotherapy treatment (which includes training of relaxed postural re-education, controlled breathing exercise like pursed lip and diaphragmatic) and session of 45 minutes of Acu-TENS twice a week .The subjects of group B were treated with traditional physiotherapy treatment mentioned above.

Procedure: All the 30 patients were divided into two groups and the treatment was given according to the mentioned protocol.

Acu-TENS:-15 patients with grade II and III with age group ranging from 40-60 years received a session of 45 minutes of Acu-TENS once a week for 12 weeks.

Description: The experimental group received 45 minutes of Acu-TENS at bilateral points Ex-B1, located at 0.5 “cun” lateral to spinous process of 7th cervical vertebra, where 1 cum is the distance between the medial creases of the IP joint of an individual's middle finger.Ex-B1 was chosen since it is the point most commonly reported in the Chinese literature for management of shortness of breath. Each point was cleaned to reduce resistance to passage of current. A non-conducting plastic film 50x50 mm2 was punctured in the middle creating a pore. This film was then placed over participant's skin with

pore directly over acu-point. Bilateral electrodes were attached to TENS machine. Stimulation was at a frequency of 4 Hz and pulse width 200 msec. They also received traditional physiotherapy treatment.⁽²⁵⁾

Traditional physiotherapy treatment:- It includes postural re education in high side lying, forward lean sitting on table, back word lean stranding, forward lean standing. Breathing Control along with pursed lip breathing and diaphragmatic breathing exercise.

Data Collection Process:-

Baseline assessment was done on the basis of primary performance and recording of all outcome measures was carried out on the following scales on day zero.

TOOLS: - Distance covered in 6 minute walk test, VAS Scale, Borg Scale

RESULT OF THE STUDY:-

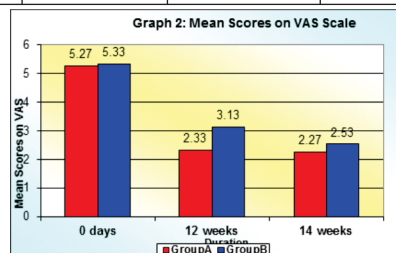
It has been recorded from the study that use of multiple sessions of Acu-TENS produces significant improvement in relieving dyspnoea in COPD patients. It is found out that use of traditional physiotherapy treatment applied by therapist in patients with COPD is beneficial. Also it has been proved that the short term effect of Acu-TENS reduces dyspnoea. But result shows that group A is more beneficial than group B. Also the study proves the long term effect of multiple sessions of Acu-TENS. Hence experimental hypothesis is accepted and the null hypothesis is rejected.

ANALYSIS AND INTERPRETATION:

All analysis were obtained using SPSS window version 10. Demographic data of patient including sex, age, disease duration, vas, Borg scale, distance covered in 6MWD were descriptive summarized. Statistical techniques used for analysis were independent t test and paired t test. Which is applicable, to compare between two groups and duration difference at significant level

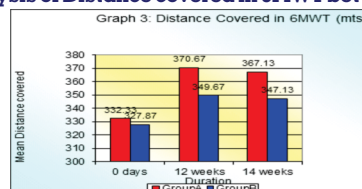
Data Analysis of VAS between Group A & Group B

DAYS	GP A (N=15) M+ SD	GP B (N=15) M+SD	t VALUE	P
DAY 0	5.27+ .46	5.33+ .62	-.366	.739
12 th Week	2.33+ .49	3.13+ .52	-4.361	.146
14 th Week	2.27+ .46	2.53+ .52	-1.497	.000



The result of the present study demonstrated that there is a significant reduction in dyspnoea. When two samples was conducted after 12th & 14th week using VAS scale. It was found that there is a significant reduction after 12th week with p =0.146, and highly significant after 14th week in GP A compared to GP B p=.000

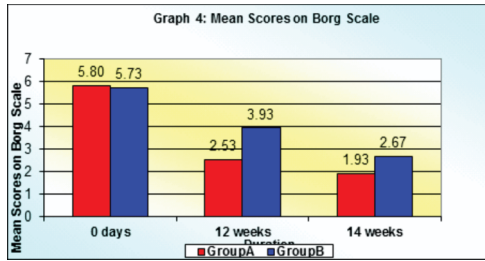
Data Analysis of Distance covered in 6MWT between A&B



The result of the present study demonstrated that there is a significant reduction in dyspnoea. When two samples was conducted after 12th & 14th week using distance covered in 6MWD. It was found that there is a significant reduction after 12th week with p =0.000, and its significance is maintained after 14th week in GP A compare GPB p=.000

Data analysis of Borg scale between group A&B

DAYS	GP A (N=15)M+SD	GP B (N=15) M+SD	t VALUE	P
DAY 0	5.80+ .68	5.73+ .70	.265	.739
12th Week	2.53+ .74	3.93+.59	-5.700	.000
14th Week	1.93+.26	2.67+.49	-5.145	.000



The result of the present study demonstrated that there is a significant reduction in dyspnoea. When two samples was conducted after 12th & 14th week using Borg scale. It was found that there is a significant reduction after 12th week with p =0.000, and its significance is maintained after 14th week in Group-A compare Group- B p=000.

DISCUSSION

The study was designed to find out the effectiveness of the long term effect of multiple sessions of Acu-TENS on dyspnoea in COPD patients.

30 patients with COPD were taken. Subjects were divided into groups. A & B. Each group consist of 15 patients.

Group A received traditional physiotherapy treatment along with Acu-TENS [for 45 min]. Group B controlled group received traditional physiotherapy treatment.

Although there is improvement in the Group B with the Traditional PT but the Group A has shown marked improvement in relieving dyspnoea by stimulating the AS filers which in turn act by the endorphin mechanism.

Pain was measured by using VAS scale which is simple and frequently used method for assessing variation of intensity of pain-

- VAS scales are 5.27 and 5.33 for group A and group B subjects respectively for pre test. The value are found to be decrease on post test on 12th week that are 2.33 and 3.13 and on 14th week that are 2.27 and 2.53 for group A group B respectively. It is found to be statistically group A is more significant (p=.000).
- Distance covered in 6MWT are 332.33 and 327.87 for group A group B subjects respectively for pre test and the values are found to be increased on post test on 12th week that are 370.67 and 349.67 and on 14th week are 367.13 and 347.13 for group A group B respectively. It is found to be statistically group A is more significant (p=.000).
- Mean score on Borg scale 5.80 & 5.73 for group A and group B subjects respectively for pre test and the value are found to be decreased on post test on 12th week that are 2.53 and 3.93 and on 14th week that are 1.93 & 2.67 for group A and group B respectively. It is found to be statistically group A is more significant(p=.000)

CONCLUSION:-

One of the most common symptoms of COPD is shortness of breath (Dyspnoea). People with COPD commonly describe this as: "My breathing requires effort," "I feel out of breath," or "I can't get enough air in". For these patients, a transcutaneous nerve stimulator (TENS) has the advantage of easy administration by patients or staff with minimal basic training. Recently acupuncture-like TENS (Acu-TENS) devices have been developed to mimic the treatment of acupuncture using low-frequency (e.g. 4 Hz), high-intensity stimulation (Pomeranz and Niznik, 1987).

There was a significant improvement in the functional capacity of the patient in Group A which was accessed by 6 MWT. Patient covered more distance in 6 MWT, and reduction on Borg scale and VAS scale. As already the short term effect of Acu-TENS was proved. The multiple sessions of Acu-TENS twice a week for 12 weeks has also showed improvement & helped in relieving dyspnoea. A follow up of the treatment was taken on 14th week, which finally proved the long term effect of multiple sessions of Acu-TENS.

Limitations:-

Body mass index of the patients was not noticed, Functional capacity of the male varies to that of female.

Suggestion:-

Further studies, should be done on all the patients of dyspnoea in COPD fulfilling the inclusion criteria and studies should also include the recording of BMI and studies on male and females can be carried out separately.

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