IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 2 Ver. I (February. 2017), PP 60-63
www.iosrjournals.org

To Compare The Effect of Conventional Huffing with Therapist Made Huffing Device on Sputum Volume In Subjects With Acute Exacerbation of COPD

Dr.Sneha Ghuman[1],Dr. Varoon Jaiswal[2,] Deepika Burman[2], Dr. Snehal Ghodey[3]
[1,2,3](Physiotherapy Department MAEER'S PHYSIOTHERAPY COLLEGE, INDIA)

Abstract:*Chronic obstructive pulmonary disease (COPD), is a lung disease characterised by chronic obstruction of lung airflow that interferes with normal breathing and is not fully reversible. COPD causes coughing that produce large amounts of mucus, wheezing, shortness of breath, chest tightness, and other symptoms.[1] Secretions produced in the respiratory tract are cleared by mucociliary transport, cephalad airflow bias, and cough. There is need to find an alternate cost effective, easy technique for secretion removal. [4]An intervention like huff training could help better in clearance of airways. Clinically it is observed that its is difficult for persons with airflow obstruction to do the act of Huff to clear the secretions. So there is need to device an instrument which will facilitate the huff technique & is inexpensive. The therapist- made huffing device made from the PVC pipe & perforated balloon will help loosening and removal of secretions as the perforated balloon tied at the other end of pipe will act as a visual feedback & also a mild resistance against active exhalation. Forced expiration against resistance has demonstrated better sputum production.*

Procedure: *Institutional ethical commiteepermision was taken before starting the study.Two groups were made, group A(Experimental group) and group B(Control group) comprising of 10 subjects each. All the subjects were explained about the study and a informed written consent was taken from them. Subjects were randomly allocated. Group A was given Huff through the therapist made huffing device whereas group B was given conventional Huff & 24 hours sputum expectoration was collected in the calliberated sputum mug & it was measured at the end of 24 hours .*

Results:*Amount of sputum was statistically analysed using Mann Whitney's Test.*

Conclusion: *The study concludes that HUFF given through the therapist made device was more effective than the traditional HUFF in clearance of airway secretions in subjects with Acute Exacerbation of Chronic Obstructive Pulmonary Disease.*

Keywords:*COPD, Therapist- made device, Amount of sputum*

I. Introduction

Chronic obstructive pulmonary disease (COPD), is a progressive disease that makes it hard to breathe. The disease gets worse over time.[2] Cigarette smoking is the leading cause of COPD.[1] Long-term exposure to other lung irritants-such as air pollution, chemical fumes, or dust-also may contribute to COPD[3]Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality across the globe. According to World Health Organization estimates, 65 million people have moderate to severe COPD.[2]

Emphysema, chronic bronchitis& bronchial asthma are the common conditions that make up COPD. [1]Chronic Bronchitis: a condition in which chronic productive cough is present for atleast 3months per year for atleast two consecutive years.[1]

Emphysema: a condition characterized by abnormal, permanent enlargement of air spaces beyond the terminal bronchioles, accompanied by the destruction of the walls of the air spaces without fibrosis.[1]Acute exacerbation of COPD also known as acute exacerbations of chronic bronchitis (AECB) is a sudden worsening of COPD . Some of the more common symptoms of advancing COPD and acute exacerbation include:1. Ongoing cough.2.Cough that is accompanied by excessive mucus production, often referred to as a "smoker's cough".3.Chest tightness.4.Shortness of breath which is made worse with physical activity. 5.Wheezing inability to catch breath or speak.6.Confusion or excessive sleepiness.6.Rapid heartbeat. 7.Blue or grey fingernails or lips. 8.Increase in mucus production. 9.Change in colour of mucus to tan, yellow, green, or bloody. 10.Fever.

Some of the initial Treatment may include one or more of bronchodilator oxygen therapy ,systemic glucocorticosteroids (oral or inhaler).

Chest physiotherapy is an important aspect & plays a pivotal role in both obstructive and restrictive conditions. Secretions produced in the respiratory tract are cleared by mucociliary transport, cephalad airflow bias, and cough.

In COPD, increased secretion viscosity and volume, dyskinesia of the cilia, and ineffective cough combine to reduce secretion clearance, leading to increased risk of infection.[6] In obstructive lung disease these

conditions are further complicated by early collapse of airways, due to airway compression, which traps both gas and secretions. Techniques have been developed to optimize expiratory flow and promote airway clearance. Researchers have suggested that standard chest physical therapy with active cycle of breathing and forced expiratory technique is more effective than chest physical therapy alone. Evidence-based reviews has suggested that, though successful adoption of techniques such as autogenic drainage may require greater control and training, patients with long-term secretion management problems should be taught as many of these techniques as they can master for adoption in their therapeutic routines.[8]

In the normal lung, secretions protect the airway from inhaled irritants, in a blanket that is constantly in motion. Mucociliary activity, normal breathing cycles, and cough are the primary mechanisms of removing secretions from the lung. In disease, increased secretion viscosity and volume, dyskinesia of the cilia, and ineffective cough combine to reduce the ability to clear secretions, and may increase exacerbations and infections.[10] A variety of breathing maneuvers have been developed, refined, and used to assist patients in mobilizing secretions from the lower respiratory tract. However, though the rationale may be sound, there is a paucity of evidence supporting such strategies. ACBT improves pulmonary function and airway clearance similar to conventional CPT. The therapist made huffing device made from the PVC pipe will help for loosening and removal of secretions as the balloon tied at the other end of pipe will act as a resistance against active exhalation and also produce a backflow which will assist in clearance of airway secretions. There is a need to find an alternate inexpensive, easy technique for lung clearance.

Coughing and huffing have been shown to be effective airway clearance techniques and some authors have reported that a huff requires less energy than a series of coughs commencing and finishing at the same lung volume.[14]

An intervention like HUFF training could help better to come out of exacerbation early, and also symptom control even after the patient is out of exacerbation than the conventional techniques.Very few studies are conducted to find out the effective technique for lung clearance other than conventional method and the conventional devices available are very costly. Hence this study was conducted to have a effective lung clearance with the help of low cost effective therapist made device.

[1]The aim of the study was to compare the effect of traditional huffing and huffing through therapist-made huffing device in subjects with acute exacerbation of COPD.And the objective was to find the effect of huffing through therapist-made huffing device on sputum volume in subjects with acute exacerbation of COPD. And to compare between traditional huffing and huffing through therapist-made huffing device.

II. Materials and method:

It was a Experimental study, type of sampling was Simple random sampling . Study setting was rural hospital.

Sample size:20 (10 in each group)

Inclusion Criteria: 1. Patients with Acute exacerbations of COPD.**2.**Patients having productive cough.**3**Patients willing to participate for the project.

Exclusion Criteria: 1.Cardiac Conditions Simulating COPD Any other restrictive respiratory conditions with similar symptoms.2.Patients with neurogical conditions.3.Patients who are not co-operative. 4. Not willing to participate.

Materials Used:1.Therapist made huffing device with perforated balloon3.Callibrated Sputum Mug 4.Stethescope 5.Pen and paper

The huffing device was designed by Dr.Varoon C Jaiswal (PT) .The huffing device was made up of a PVC pipe, of 1 inch (2.5cms) diameter and a perforated balloon was attached to one end and from the other end the subject in sitting position was asked to blow into the pipe so as the balloon rises , the rising of balloon

gave a visual feedback to the subjects.Two groups were made, group A and group B comprising of 10 subjects each.All the subjects were explained about the survey and a informed written consent was taken from them. Subjects were randomly allocated into each group, Group A was the Experimental group whereas group B was the Control group. Group A was given Huff through the therapist made huffing device whereas group B was given Traditional Huff .Subject was asked to blow into the pipe for 1 minute as many times as he can (should stop if they experience breathlessness or any severe discomfort).Subject was told to repeat this for around 4-5 times every 2-3 hours and this has to be done around 15-20 times for 24 hours. In both the groups subject was asked to dispose the Sputum in the provided calibrated sputum mug and the amounts of secretions in the sputum beaker was collected after 24hrs.Also the grade of breathlessness was measured by VAS scale for breathlessness was taken pre and post.

III. Results And Statistical Analysis

The statistical analysis was done using GraphPadInstat.

20 subjects completed the study . Out of which 10 were in control group who received Traditional HUFF and 10 were in the experimental group who received HUFF with the therapist made huffing device.

Amount of sputum collected over a period of 24hours in Experimental and Control group was statistically analysed using Mann Whitney's Test. VAS pre and post over a period of 24hours in the Experimental group was statisticallyanalysed using the Wilcoxin's Matched Paired Test. VAS pre and post over 24hours in the Control group was statistically analysed using the Wilcoxin's Matched Paired Test.

Post VAS in the Experimental and Control group over a period of 24 hours was statistically analysed using the Mann Whitney's Test .

The mean difference of VAS in Experimental and Control group over a period of 24 hours was statistically analysed using Mann Whitney's

Tables: Amount of Sputum collected in Experimental and Control group:

Table1	Experimental Group	Control Group	P Value	U Value
Mean	92	35	0.0002	99
Sd	26.583	10.801		

considered extremely significant.

Post VAS in Experimental and Control Group

Table2	Experimental Group	Control Group	P Value	U Value
Mean	1.18	1.74	0.1121	71.5
Sd	0.6779	0.7792		

considered not significant.

Mean difference of VAS in Experimental and Control group

TABLE3	Experimental group	Control group	P value	U value
Mean	2.47	0.86	0.0010	94
SD	0.9546	0.4033		

considered very significant.

IV. Discussion

The study was designed to find out the effect of huffing through the therapist made huffing device on the clearance of airway secretions. The study was done on 20 subjects amongst which 10 subjects were included into experimental group whereas 10 subjects were included in the control group randomly. The subjects in the experimental group were given HUFF through the therapist made huffing device whereas the subjects in the control group were given Traditional HUFF .i.e .without the therapist made huffing device. In both the groups the protocol was given and the sputum was collected over a period of 24hours, also dyspnea was measured pre and post the treatment protocol in both the groups.

On the basis of the above statistical result there were improved results seen in the experimental group than the control group in terms of sputum as well as the level of dyspnea.Studies have shown that in patients with acute exacerbation of COPD if the airways clearance is done first and mucus is cleared up it helps the patient come out of the exacerbation and also it helps for the prognosis of the patients and make them asymptomatic. So it was very important to find out the ways for clearance of airway secretions, and also it should be easily available and patient friendly and hence this study was done. At the same time it was equally important to find out such technique in which patients can perform the clearance techniques by themselves without the help of the therapist or when the therapist is not there.

In patients with Chronic Obstructive Pulmonary Diseases and chronic Bronchitis often produce a large amount of mucus. If the mucus is allowed to collect in the airways, breathing may become difficult and infection may occur. During the period of exacerbations the sputum becomes both more copious and more vicious and thus more difficult to expectorate.

Huffing is a technique that helps move mucus from the lungs.It moves the sputum from the smaller airways to larger airways.It involves taking a deep breath in, holding it and exhaling. Breathing in and holding it enables air to get behind the mucus and separates it from the lung wall so it can be blown out. As huffing causes less dynamic compression in lungs and does not causes large airway collapse so hence it can be used easily in patients with COPD.But sometimes it becomes difficult for Therapist to teach huffing to the patients,so with our device it was easier to teach huffing to the patients and also the sputum expectorated through our therapist made huffing device was more than the traditional huff.

The huffing given through the therapist made device must have proved more effective than the huffing given without the therapist made device because when the patient is given huff through the device it gives patient a visual feedback of the inflating balloon as they blow into the pipe, hence therapist informing patient the correct huffing technique.Also this device is therapist and patient friendly.i.e. when once the patient is taught the correct technique of doing it the patient can perform it by himself even when the therapist is not present.

V. Conclusion

The study concludes that HUFF given through the therapist made device was more effective than the traditional HUFF in clearance of airway secretions in subjects with Acute Exacerbation of Chronic Obstructive Pulmonary Disease.

Clinical significance:

We can use this device for airway clearance to patients who are in Acute Exacerbation of COPD so that they can come out of this exacerbation and become symptom free.

Limitations

Female's were not included in the study**.** Drugs during protocol period**.** No check was kept whether the patient has followed the protocol properly.

References

[1]. API Textbook of Medicine; SidharthN.Shaha.
[2]. Physiotherapy practice in management of patients with broncheciactasis and chronic obstructive pulmonary disease. Alfred Hospital, University of Melbourne, School of Physiotherapy
[3]. Advances in airway clearence technologies for COPD Medscape multispecialty 2013;7(6)673-685.
[4]. Chronic respiratory disease April 2006 3; 83-91. Falk P, Eriksen A-M, Kølliker K, Andersen J B. Relievingdyspnea with an inexpensive and simple method in patients with severe chronic airflow limitation; Eur J Respir Dis 1985;66:181-6
[5]. Airway clearance techniques for bronchiectasis Annemarie L Lee1,2,3 Angela Burge Anne E Holland School of Physiotherapy, The University of Melbourne, Carlton, Australia
[6]. Chest physiotherapy in chronic obstructive pulmonary disease : forced expiratory technique combined with either postural drainage or positive expiratory pressure L Olseni, B Midgren, Y Hörnblad, P Wollmer - Respiratory medicine, 1994 – Elsevier
[7]. Efficacy of physical therapy methods in airway clearance patients with chronic obstructive pulmonary disease Nowobilski1,2, Tomasz Włoch1,2, Maciej Płaszewski3, Andrzej Szczeklik1
[8]. Pulmonary rehabilitation -1999.American Thoracic Society.Am J RespirCrit Care Med.1999;159(5 Pt 1):1666-1682.
[9]. Sleigh MA.Ciliary function in transport of mucus. Eur J Respir Dis 1983;128(Pt 1):287-292
[10]. Hie T ,Pas BG,RothRD,Jensen WM Huff coughing and airway patency Respir care 1979;24(8):710-713
[11]. Thompson B,ThompsonHT,Forced expiratory exercises in asthama and their effect on FEV1,NZ J Physiothera 1963;3:19-21
[12]. Partridge C,PryorJ,WebberB.Characteristics of the forced expiratory technique Physiotherapy 1989;75:193-194
[13]. Van WeindenCM,VisserA,Hop W, SterkPJ,Beckers S, deJongsteJC.Effects of flutter and PEP mask physiotherapy on symptoms and lung function in children with cystic fibrosis . EurRespir J 1998;12(1):143-147
[14]. Pontifex E Williams MT, Lunn R Parsons D. The effects of huffing and directed coughing on energy expenditure in young asymptomatic subjects Aust J Physiothera 2002,48(3):209-213
[15]. Holland AE,Button BM. Is there a role of airway clearance techniques in Chronic Obstructive Pulmonary Disease and ChronRespir Dis 2006;3(2):83-91