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An Immediate Effect of Conventional Physiotherapy versus ACBT with Autogenic Drainage on Dyspnoea and Cough in Patient with COPD - A Randomized Control Trial

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Abstract: ***COPD is a preventable and treatable disease with some significant extrapulmonary effects that may contribute to the severity in patients. It has become one of the leading causes of fatality worldwide. The ACBT corrects breathing pattern and it strengthen respiratory muscles with airway clearance, these all in a combination improves respiratory functions in COPD patients. Autogenic drainage is found to less likely cause oxygen desaturation than postural drainage and percussion.***
Aim: To evaluate the immediate effect of Conventional Physiotherapy versus ACBT with Autogenic Drainage (AD) on dyspnoea and cough in patient with COPD.
Procedure: An experimental comparative study design which included 20 patients with COPD aged between 40 – 70 years. Patients were randomly allocated in 2 groups, either Conventional Physiotherapy (Control) or ACBT with AD (Experimental) group. The patients in control group received Deep Breathing Exercises followed by Active Range of Motion of both upper extremities and Huffing and Coughing. Whereas the experimental group received the activities were Active cycle breathing technique, Autogenic drainage and Active Range of Motion for both upper extremities. To evaluate immediate effect of therapies on dyspnoea Modified Borg Dyspnoea (RPE) Scale was used and cough was taken in a container to measure prior and after the treatment protocols. Paired sample t-test was used to compare pre and post treatment data in both the groups and independent sample t-test was used to compare the variables between the groups
Results: Both the groups showed significant improvement in reducing the dyspnoea, whereas only ACBT with AD shown better effects on production of Cough. No significant difference was found between the groups in reducing the breathlessness
Conclusion: Finally, it can be concluded that ACBT and AD were individually more effective technique than conventional physiotherapy in improving cough production and dyspnoea. Whereas there is no significant difference found in comparing both the groups.
Keywords: ACBT, Autogenic Drainage, Conventional Physiotherapy, COPD, Cough, Dyspnoea.

I. INTRODUCTION

The Chronic Obstructive Pulmonary Disorder (COPD), is a preventable and treatable disease with some significant extrapulmonary effects that may contribute to the severity in patients. The COPD is characterized by airflow limitation which is not completely reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to associated with an abnormal inflammatory response of the lungs to noxious particles or gases[1]. As air pollution increases the COPD has become one of the leading causes of fatality worldwide[2]. Several physiotherapy techniques have been introduced for the treatment of COPD which helps in chest clearance and improve breathing. This may include chest mobilisation techniques, postural drainage, mechanical vibrator, massage techniques, etc. One of these techniques is ACBT and Autogenic drainage (AD).

Active Cycle Breathing Techniques (ACBT) is a cycle of techniques consisting of breathing control, lower thoracic expansion exercises and the forced expiration technique modifiable for every patient. ACBT is one of the methods in pulmonary rehabilitation that has been adapted for asthmatic patients[3]. ACBT assists the bronchial clearance by enhancing mucociliary clearance while reducing adverse effects such as hypoxaemia or increased airflow obstruction[4]. The ACBT corrects breathing pattern and it strengthen respiratory muscles with airway clearance, these all in a combination improves respiratory functions in COPD patients[5].

Autogenic drainage {AD} is technique which helps in airway clearance that is widely used as chest physiotherapeutic measure. It is characterized by breathing control, where patient himself adjusts the rate, depth and location of respiration within the thoracic cavity for clearance of chest secretions independently[6].

AD is a system of breathing techniques in which the patient has to breathe at different lung volumes to mobilize the secretions from periphery of the lung field to the central airways from where it can be coughed/huffed out[7]. Autogenic drainage is found to less likely cause oxygen desaturation than postural drainage and percussion[8]. Peak expiratory flow is a person's maximum speed of expiration with maximal force starting from the level of maximal lung inflation[9].

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A. Objective Of The Study

1) To evaluate the immediate effect of ACBT with Autogenic drainage (AD) in COPD patients on dyspnoea and cough.
2) To evaluate the immediate effect of Conventional Physiotherapy (CPT) in COPD patients on dyspnoea and cough.
3) To compare the immediate effect of ACBT with AD to Conventional Physiotherapy on dyspnoea and cough in patients in COPD patients.

B. Aim of The Study

To find out the immediate effect of Conventional Physiotherapy versus ACBT with Autogenic Drainage on dyspnoea and cough in patient with COPD.

C. Materials And Methods

This was an experimental comparative study design which included 20 patients with COPD. The participants were selected after they met exclusion and inclusion criteria. The study was carried out at the Lala Lajpat Rai (Hallet) Hospital, Kanpur after the approval from H.O.D Medicine Ward. The inclusion criteria[10,11,12] was the following.

1) Male and female patients with mild to moderate COPD (according to Gold Criteria)
2) Age group 40 - 70 years.

The exclusion criteria were also been included for the study to rule out subjects where the therapy cannot be taken place. These were:

a) Musculoskeletal disorders
b) Any recent chest injuries
c) Lung infections

D. Materials and Equipments

1) Modified Borg Dyspnoea Scale
2) Container for sputum collection
3) Consent form

E. Procedure

Patients who met the inclusion and exclusion criteria were randomly divided into 2 groups by convenient random sampling. The treatment protocol and the study were explained to the patients. An informed consent was taken from the participants prior to the treatment. Outcome measures were recorded before and after the treatment.

The Group 1 was Control group which received conventional physiotherapy. The patient was kept in relaxed sitting position[10,13]. In this position patient performed Deep Breathing Exercises with 10 repetitions followed by 10 repetitions Active Range of Motion of both upper extremities[14]. The exercises also included 5 repetitions of Huffing and Coughing[13].

The Group2 was assigned as experimental group which received ACBT and AD. The participants of the group were kept in relaxed sitting position without any stress and strain.

The activities they performed were 10 repetitions of Active cycle breathing technique[10], 10 repetitions of Autogenic drainage and 10 repetitions of Active Range of Motion for both upper extremities[15].

Prior to the treatment the patients have been measured for breathlessness with the help of Modified Borg Dyspnoea (RPE) Scale[16,17]. Cough was also taken in a jar to measure how much a patient can cough out sputum which was measured in ml[18,19]. The similar tests were repeated after the treatment to check the immediate effect of the treatment protocols.

F. Statistical Data Analysis

Data were analysed using SPSS 21 version (SPSS Inc., Chicago, IL, USA). Mean and standard deviation of all the variables were measured.

The level of significance was set at 95% confidence interval ($p < 0.05$). Paired sample t-test was used to compare pre and post treatment data in both the groups and independent sample t-test was used to compare the variables between the groups.

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II. RESULT

A total of 29 patients were assessed and 20 patients who fulfilled the inclusion criteria were randomly allocated to either group. Two participants from Group 1 left the study out due to personal reasons and two participants from Group 2 withdrew because they could not comply with the treatment and assessment schedule for which 4 new patients were treated for the analysis of 20 participants.
The result of the study showed that control group and experimental group both are effective in reducing dyspnoea. ACBT with AD were highly significant in reducing dyspnoea with t value of 5.6 and p value of 0.00. The control group of conventional therapy also observed significant in reducing dyspnoea with the t value of 3.97 and p value of .003. The data of the control group and experimental group are given in Table 1 and Table 2, respectively.

Table 1. Dyspnoea scale for Conventional Physiotherapy (Group -1)

	Mean ± SD	t-value	p value
Pre-treatment	5.90 ± 1.72	3.973	.003
Post-treatment	4.80 ± 1.31		
p-value <0.05 or .001 (significant or highly significant respectively) p-value >0.05 (non-significant) NS: Non-significant			

Table 2. Dyspnoea scale for ACBT & AD (Group-2)

	Mean ± SD	t-value	p value
Pre-treatment	5.80 ± 1.47	5.667	.000
Post-treatment	4.10 ± 1.19		
p-value <0.05 or .001 (significant or highly significant respectively) p-value >0.05 (non-significant) NS: Non-significant			

Another variable was the collection of sputum prior and after the therapy to analyse the immediate effect on excretion of sputum through coughing. After analysing the data, it has been observed that experimental group was significant in increasing the sputum excretion whereas the control group was not found significant. The t value of the group 1 was 1.507 with p value of .16, hence it is non-significant in producing sputum in cough. The evaluation of sputum production through cough was shown significant in group 2 with the t value of 3.349 and p value of .009. The data of the control group and experimental group are given in Table 3 and Table 4, respectively.

Table 3. Shows Sputum Collection in Conventional Physiotherapy group (Group -1)

	Mean ± SD	t-value	p value
Pre-treatment	1.52 ± 1.53	1.507	.166 [NS]
Post-treatment	2.75 ± 1.38		
p-value <0.05 or .001 (significant or highly significant respectively) p-value >0.05 (non-significant) NS: Non-significant			

Table 4. Shows Sputum Collection in ACBT & AD group (Group -2)

	Mean ± SD	t-value	p value
Pre-treatment	1.25 ± 1.55	3.349	.009
Post-treatment	4.72 ± 1.60		
p-value <0.05 or .001 (significant or highly significant respectively) p-value >0.05 (non-significant) NS: Non-significant			

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While comparing the both the groups through independent sample t test, it has been found that both the groups were found non-significant with each other for dyspnoea and cough production both. The t value for dyspnoea was found to be 1.244 with t value of .229, which means it is not significant. While observing the data of cough, the t value was .000 and p value was 1.00, which is also insignificant. The values of comparative analysis between the groups are shown in Table 5.

Table 5. Comparative Analysis of Group 1 and Group 2

Group1- Group2	t-value	p-value
Dyspnea	-1.244	.229^{NS}
Cough	.000	1.00 ^{NS}
p-value <0.05 or .001 (significant or highly significant respectively) p-value >0.05 (non-significant) NS: Non-significant		

III. DISCUSSION

According to this study, after analysis it has been found that ACBT and AD was effective in reducing dyspnoea and producing cough. Whereas it was found that conventional physiotherapy was only effective in reducing dyspnoea. While comparing both the treatment protocols it was observed that both are equally effective in reducing breathlessness in COPD patients.

Ms Rabia Basri et.al in 2017 in their study concluded that, active chest physiotherapy technique along with medical treatment is more effective in acute exacerbation of COPD than medical treatment alone. The present study also supports that Chest Physiotherapy techniques are effective in reducing dyspnoea.

Ganesh BR, Nishant Singh in 2018 also concluded that chest wall mobilization has significant effect on peak expiratory flow rate, chest expansion and dyspnoea in COPD patients with restrictive impairment. This also supports the result of present study.

Several existing studies also support this study that ACBT and AD is effective in acutely clearing secretions in patients with acute exacerbation of COPD[20, 21,22].

IV. CONCLUSION

Both the groups were found to be effective in reducing dyspnoea where ACBD with AD was found more effective than Conventional Physiotherapy. Results of the study also revealed that ACBT with AD was effective immediately in producing more sputum than Conventional Therapy.

The evaluation of the effects of therapies between the group revealed that both are similar in reducing the breathlessness.

Finally, the conclusion can be stated that ACBT and AD were individually more effective technique than conventional physiotherapy in improving cough production and dyspnoea. Whereas there is no significant difference found in comparing both the groups.

V. LIMITATION OF STUDY

The data was collected for only mild to moderate acute exacerbation of COPD so the result cannot be generalised for severe phase of the disease.

The study was designed to evaluate the immediate effectiveness of treatment protocols, whereas if the study will consider long term effects of these may alter the results.

As the sample size was small, future study therefore needed to have larger sample size with more tools to consider diversity in functional abilities of COPD patients.

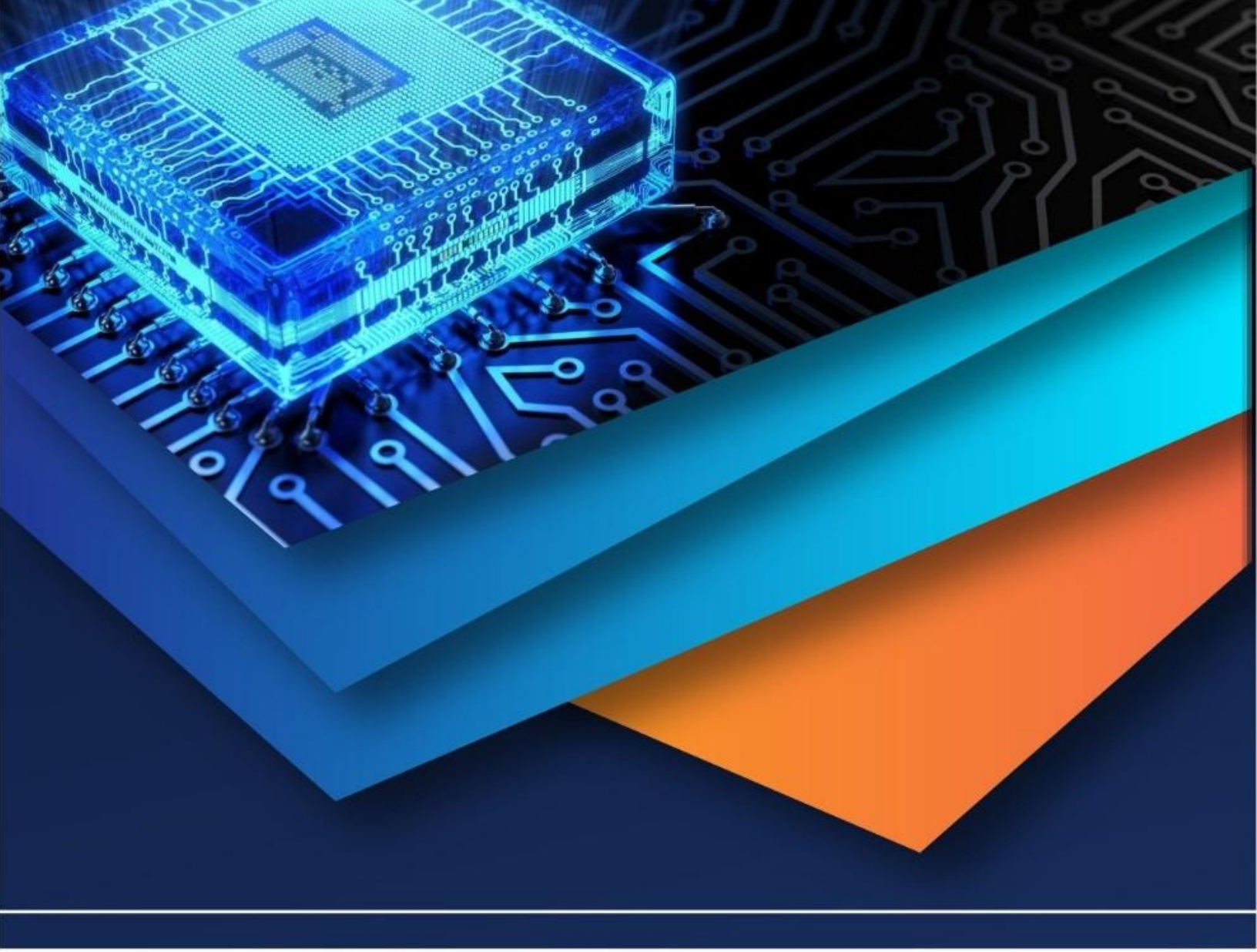
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