COMPARISON OF ACTIVE CYCLE BREATHINGTECHNIQUE AND BREATHING EXERCISES ON OXYGEN SATURATION AND PULMONARY FUNCTION TEST IN POST ICU COVID-19 PATIENTS

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Abstract

COVID-19 is a global pandemic disease in 2020. COVID-19 patients frequently spend long periods of time in ICU bed, which might result in post-ICU dyspnea, extreme fatigue, muscle rigidity, and neuropathic pain due to critical illness, and also decreased joint mobility, neck and shoulder pain, difficulty in standing, and impaired balance and gait, with subsequent limitations in daily activities. These lingering symptoms might last for months and take time to go away.

Method: The experiment was randomized and controlled. To create groups A and B, 48 individuals were selected by sample selection criteria. Evaluation of oxygen saturation and pulmonary function tests were taken using a pulse oximeter and spirometer. Group A performed breathing exercises and ACBT whereas Group B performed breathing exercises. The treatment took 15-30 minutes and consisted of one session per day; treatment was given 6 days a week for up to 2 weeks and examined by using SPSS 25.

Results: Pulse oximetry, and spirometer, results showed a statistically significant difference between the two groups. Oxygen saturation (SpO2), FEV1, FVC, and FEV1/FVC with a p- value of less than 0.05 was analyzed. The results showed that both groups were successful, although Group A improved more.

Conclusion: Breathing exercises combined with or without ACBT exercises improved oxygen saturation and pulmonary function test. However, based on their mean differences, breathing exercises with ACBT exercises were more beneficial in terms of SpO2, FEV1, FVC, and FEV1/FVC measures.

Indexed Terms_COVID-19 19, Respiratory physiotherapy, ACBT, Pulmonary function

I. Introduction:

COVID-19 is a global pandemic disease in 2019. COVID patients frequently spend long periods of time in ICU bed, which might result in post-ICU dyspnea, extreme fatigue, muscle rigidity, and neuropathic pain due to critical illness, and also decreased joint mobility, neck and shoulder pain, difficulty in standing, and impaired balance and gait, with subsequent limitations in daily activities.(1) The PCR test has been the gold standard test for diagnosing COVID-19 since authorized for use in February 2020. It's accurate and reliable.(2) The unique Corona virus has been spreading at an astonishing speed since its discovery in late 2019 in Wuhan, Hubei Province, China. With the imposed lockdown in many areas of the world, limits were set on important accommodations and services, preventing the population from accessing any of these amenities.(3) It is a cause of anguish, feeling worried, and anxiousness owing to false info advertised on the internet.(4) On media platforms, the rapid transmission of false information has a significant effect on mental health. With the present state of lockdown and social isolation, individuals' primary reliance is on the Internet, with social media reporting the most activity.(5) The epidemic has caused global economic and social devastation, including the worst recession since the 1930s.(6) Due to frantic purchasing, disturbed agriculture, and a lack of appropriate food supplies, there have been severe supply shortages. Pollution and greenhouse gas emissions have been reduced in the meanwhile. Many activities have been canceled or postponed as a cause of the termination of various scholastic institutions and public locations.(7) Misinformation has been widely disseminated, and political tensions have risen. Numerous problems have been addressed in reaction to this epidemic, including racial and regional discrimination, health equality, and how to combine public health imperatives with human rights.(8) The society of the twenty-first century, on the other hand, is considerably different from the society of a century ago in practically every manner. Behavioral treatments are still required to limit COVID-19 transmission.(9) However, the study's model studies do not indicate the linkages between variables or the amount to which factors impact the suppressed spread.(10) The significance of this study is that this is a novel technique to determine the comparison of the active cycle breathing techniques and breathing exercises on oxygen saturation and pulmonary function test in post ICU Covid-19 patients.

II. Materials & Methods:

This research was a randomized clinical trial (RCT). Prior to being included in the trial, all patients signed an informed consent agreement.

Non- probability convenient sampling approach was accustomed to recruit the individuals for the study

and after that randomization process was done by sealed envelope to divide the subjects into Group-A and Group-B. According to the inclusion requirements, the research was performed in Lahore at Jinnah Hospital. The sample size was calculated using EPITOOL(11) The total sample size was 48 and 24 Participants in each group. Evaluation of oxygen saturation and pulmonary function tests were taken using a pulse oximeter and spirometer. Group A performed breathing exercises and ACBT whereas Group B performed breathing exercises. The treatment took 15-30 minutes and consisted of one session per day; treatment was given 6 days a week for up to 2 weeks and examined by using SPSS 25. INCLUSION CRITERIA was Adult population with age limit 18 -50 and all patients positive with confirmed COVID-19 by polymerase chain reaction (PCR) test and chest computed tomography scan (CT-scan).(12)

Group A: There were 24 participants in Group A received ACBT and Breathing exercises. The 3 steps of the ACBT integrate several breathing strategies to aid in clearing mucus from the lungs. Your airways are relaxed thanks to the first phase. The second stage helps you eliminate mucus and get air behind it. The third stage aids in expelling mucus from your lungs. It has a breathing control feature that facilitates airway relaxation. With minimal effort, breathe in through your nose and out through your mouth. Breathe normally and gently, relaxing your shoulders and upper chest as you do so, chest expansion is breathing deeply, huffing is also called the forced expiration technique for five to ten minutes. One session each day of treatment lasted 15 to 30 minutes. And for up to two weeks, therapy was provided six days each week. Readings were obtained at baseline and again after the intervention in the second week.

Group B: There were 24 participants in Group B performed breathing exercises. For five to ten minutes, (breath by lying down on a chair with your knees bent and your neck, shoulders, and head at ease. Put a hand on your belly. Breathe in slowly through your nose. As you exhale, contract your muscles.(13) For a total of five minutes, emphasize the exhale more than the inhale). One session each day of treatment lasted 15 to 30 minutes. And for up to two weeks, therapy was provided six days each week. Readings were obtained at baseline and again after the intervention in the second week.

III. RESULTS

SPSS version 21 was used to interpret the data. The feature frequency %, mean, and standard deviation were utilized to show categorical and demographic data. The level of significance accepted as P<.05. Numeric variables were defined as mean ± standard deviation. The data's normality was evaluated using the Shapiro-Wilk test of normality and uniformity. If Value of the Shapiro-Wilk Test >0.05, the data would be normal and parametric tests of analysis would be used. A significant difference was defined as one with a p-value < 0.05.

The following tests were used: Differences between pre- and post-treatment values: within the same group, analyzed by using the paired t-test Differences between the groups: between the groups, analyzed by using independent samples t-test.

The CONSORT diagram (figure 1) shows the progress of participants at each stage of the study. 90 participants were assessed according to the eligibility criteria. Baseline values of demographic data variables like age, gender, weight, height and BMI of participants across both groups were comparable on basis of mean± std. deviation.

There are a total of 48 patients, 24 of them were given ACBT along with breathing exercises whereas the other 24 patients were given with breathing exercises whose age in between 18 to 50. As the total participants were 48, 16 males and 08 females participated in Group A while 14 males and 10 females have participated in Group B. An independent sample t-test was used to compare the SpO2 values between the two groups A and B as shown in Table 4.4. The findings demonstrated that there was a statistically significantdifference (p is less than 0.05) between the two groups. Increased more in the group receiving ACBT and breathing exercises and achieved 92.45 mean of 3.47 SD vs without ACBT achieved a mean of 82.77 and SD is 2.93. Post-treatment FEV1 achieved 2.85 mean and 0.47 SD on average when ACBT and breathing exercises, compared to 2.08 means and 0.36 SD of breathing exercises. FVC improved more in the group receiving ACBT and breathing exercises (mean and SD is 2.47 and 0.23 respectively) than in the group B breathing exercises (mean and SD is 1.84 and 0.15 respectively). In ACBT and breathing exercises group, the FEV1/FVC ratio improved more than as compared breathing exercises, with mean values of 70.72 mean, 2.33 SD and 64.68 mean and 2.61 SD. Using a paired sample t-test, compared the SpO2, FEV1 & FEV1/FVC levels within each treatment group. Table 2 shows the comparison graph of the results. The results revealed statistically significant variance in both groups (p-value less than 0.05), with the group receiving ACBT and breathing exercises showing the greatest difference.

IV. Discussion:

This study's main objective was to examine the

effects of ACBT and breathing exercises on oxygen saturation and spirometry results in hospitalized post-ICU COVID-19 patients. A randomized controlled experiment was chosen to be carried out. Based on the sample selection criteria, Groups A and B were randomly allocated to 48 individuals. Oxygen saturation and pulmonary function test ratio were measured using a pulse oximeter and spirometer. Group A received ACBT and Breathing Exercises. Group B received breathing exercises. The therapy was administered once daily for 15 to 30 minutes. Up to two weeks of treatment were given, six days a week. Both groups were assessed once more after the two-week treatment period. The data were analyzed with SPSS 25. With a p-value of less than 0.05, the spirometer and pulse oximetry showed a statistically significant difference in both groups. Both were advantageous, but ACBT combined with breathing exercises produced higher results. When used with or without ACBT, the breathing exercise approach was successful in reducing dyspnea, SpO2, FEV1, FVC, and the FEV1 /FVC ratio in hospitalized post-ICU COVID-19 patients. In terms of the recommended mean measures, ACBT with breathing exercises, however, was more effective based on their mean differences. Kai Liu in 2018 was conducted research on respiratory rehabilitation. These findings supported that respiratory rehabilitation can improve respiratory function, quality of life and anxiety in older COVID-19 patients but has only a little impact on depression.(14) The results of this study are in agreement of current study as use of ACBT technique is more beneficial to improve respiratory function, quality of life and anxiety in older COVID-19 patients. It provides better control on oxygen saturation and dyspnea. Abdullahi. Ibrahim in 2019 conducted research on effectiveness of ACBT during different stages of COVID-19.(15) According to these findings, ACBT improve COVID-19 patients' quality of life and respiratory performance. Data on its effectiveness during the acute stage are still lacking. Contrarily, ACBT is a customized approach depending on the patient's unique symptoms. This evidence supports current study that the use of ACBT exercises with breathing exercises is helpful to improve respiratory performance. Tomris Duymaz in 2021 conducted research on effects of ACBT on patients having bariatric surgery. The findings of this article were the effects of ACBT on patients having bariatric surgery in terms of their pulmonary functions, degrees of dyspnea, functional capacity, and quality of life.(16) The results show that in patients who underwent bariatric surgery, postoperative CP with ACBT improved respiratory functions, regulated arterial blood gases, increased oxygen saturation, functional capacity, and quality of life, and lowered dyspnea levels. This study is also in support of current study as it describes the effectiveness of ACBT exercises as an intervention for respiratory functions, regulated arterial blood gases, increased oxygen saturation, functional capacity, and quality of life, and lowered dyspnea levels.

V. Conclusion:

The study came to the conclusion that both breathing exercises with and without ACBT were beneficial in raising SPO2, FEV1, FVC, and the FEV1/FVC ratio as well as oxygen saturation. However, based on their mean differences, ACBT with breathing exercises was more beneficial in terms of the indicated end measures.

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None.
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TABLE: between group analysis of SpO_2 & FEV_1:

		ACBT and Breathing Exercises	Breathing Exercises
SpO2	Mean	92.45	82.77
	SD	3.47	2.93
	P-Value	0.01	0.02

		ACBT and Breathing Exercises	Breathing Exercises
FEV1	Mean	2.85	2.08
	SD	0.47	0.36
	P-Value	0.00	0.01

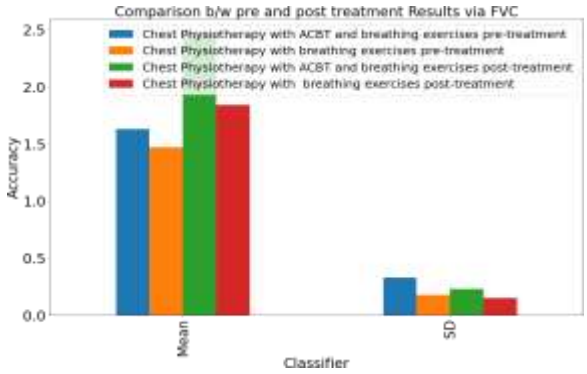
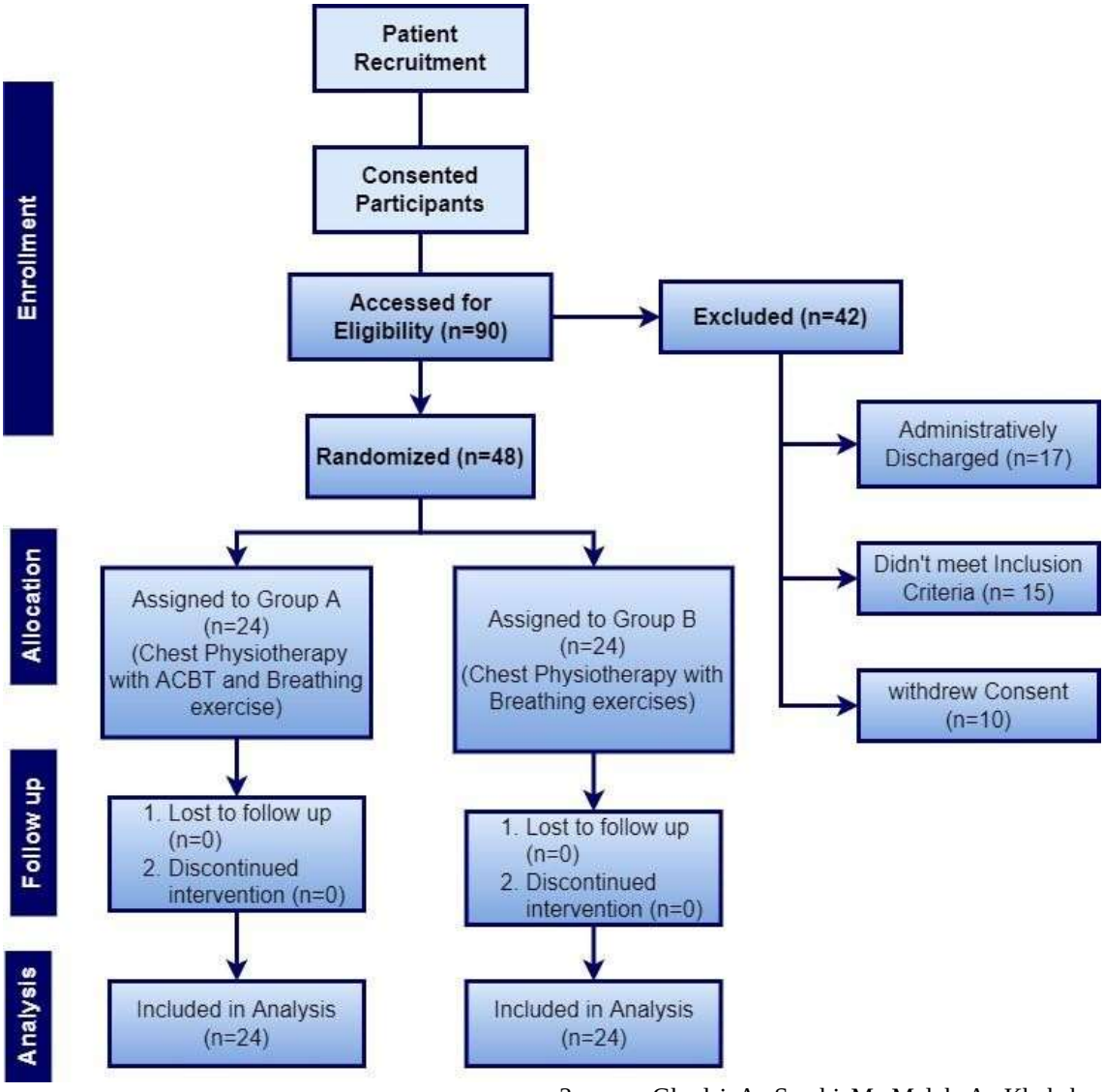


FIGURE 1: Comparison between FVC:

Figure 1: consort flow diagram



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