EFFECTS OF CHEST PHYSIOTHERAPY IN HOSPITALIZED ELDERLY PATIENTS WITH COVID-19

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ABSTRACT

Late in December 2019, an unusual pneumonia outbreak was reported at the Huanan Seafood Wholesale Market in Wuhan, Hubei, China. COVID-19 patients' chest physiotherapy should be adapted to their particular phenotype.

Objective: To find out the effects of chest physiotherapy in hospitalized elderly patient with Covid-19.

Methodology: A randomized controlled trial was performed using a non-probability convenient sampling technique. The study was conducted in Jinnah Hospital Lahore, Pakistan recruiting 44 subjects according to sample selection criteria. Assessment of oxygen saturation, level of dyspnea, PaO2, FEV1, FVC and FEV1/FVC ratio were taken using pulse oximeter, Modified Borg's Dyspnea (MBS) scale, Blood gas test and spirometer. Group A received chest physiotherapy with breathing exercises and steam. Group B received breathing exercises and steam. Treatment lasted 15-30 minutes and consisted of one session per day. And treatment was given for 6 days a week for up to 2 weeks. Data was analyzed by using SPSS 22. The data collection tools include Pulse oximeter, The Modified Borg Dyspnea Scale (MBS), Spirometry and Blood gas test.

Results: There was a statistically significant change within both groups in the pulse oximetry, Modified Borg's Dyspnea (MBS), ABG test and spirometer with p- value of < 0.05 Both were effective but Group A showed more improvement.

Conclusion: Breathing exercises combined with or without chest physiotherapy improved oxygen saturation, dyspnea, PaO2, FEV1, FVC, and the FEV1/FVC ratio. However, based on their mean differences, chest physiotherapy with breathing exercise was more beneficial in terms of the indicated outcome measures.

Index Terms- COVID 19, Respiratory physiotherapy, Postural Drainage, Dyspnea, Deep breathing-exercise.

I- INTRODUCTION:

Late in December 2019, an unusual pneumonia outbreak was reported at the Huanan Seafood Wholesale Market in Wuhan, Hubei, China. This infection was associated with temperature, chronic cough, tiredness, and sporadic gastrointestinal problems. The initial epidemic, which infected over 66 percent of the employees, reportedly found in the market in December 2019. The trade was shut down on January 1, 2020, following the primary healthcare authority's issuing of an epidemiological warning on December 31, 2019.[(1)] Coronavirus diseases was the disease caused by this virus, and the World Health Organization (WHO) proclaimed a pandemic. Somewhere at beginning of the epidemic, occurrences of COVID-19 were primarily associated with older people. The number of cases among people 65 and older increased as the outbreak spread, and there was also a surge in symptoms between many minors under the age of 18 years.[(2)] Covid pandemic exists to serve as just a sobering reminder of the ongoing difficulty introduced by starting to emerge and resurging pathogenic organisms, as well as the implications of serves as a deterrent, immediate diagnosis, and energetic research to better address the fundamental biology of new organisms and our susceptibilities to them, as well as to develop improved safety precautionary steps.[(3)] In COVID-19 people, malnourishment is characterized by protracted ailments and a decline in food consumed spurred on by sickness, diarrhea, and lack of weight. One of most prevalent serious illnesses seen in COVID-19 sufferers are hyperglycemia, pulmonary disease, nephropathy, coronary heart disease, and Alzheimer.[(4)] Urine, feces, and saliva all contain the virus. Asymptomatic shedding, especially in youngsters, appears to be widespread and can spread illness.[(5)] COVID-19 results in reduced pulmonary compliance and significant alterations in lung function, as well as hypoxemia and cardiovascular consequences. These alterations necessitate physiotherapy as well as the administration of oxygen treatment and ventilator support (invasive and non-invasive) for these individuals.[(6)] Therapeutic posture, early mobilization, and breathing exercises were the most common types of that physio-therapy intervention in Covid. Early ambulation and release of patients appears to be aided by physiotherapy intervention.[(7)] COVID-19 patients' chest physiotherapy should be adapted to their particular phenotype. We advocate wearing appropriate personal protection equipment, limiting healthcare professionals in the setting and using a compartment with pressure gradient if one is there before beginning chest physiotherapy. For severely ill patients, frequent chest physical therapy techniques include craniotomy, humidifying, inhalational treatments, and lung biopsy.[(8)] In-hospital Pulmonary rehabilitation in the acute and subacute phases, which included patient education,

respiratory care, exercise training [9], walking programme with supplemental oxygen, energy conservation, and psychological support [10] , played an important role in the recovery of covid-19 patients from the ICU to discharge by assisting in the weaning of supplemental oxygen [11], improving lung and functional capacity, and thus facilitating recovery.[12]

Short-term breathing exercise improves particular respiratory parameters in COVID-19 individuals with moderate to severe disease. An overwhelmed healthcare system may benefit from using breathing exercises as a non-invasive, economical lung approach is designed.[13]Aeration alterations measured with LUS did not represent improved oxygenation. All RPT procedures should be meticulously planned, with protection against exposure must have been supplied by protective equipment, and LUS was set up to monitor aeration variations just at hospital.[14] The strength exercise and breathing exercise groups significantly improved their thresholds of depletion, breathing difficulties, perceptions dedication, and physical shape, with the respiration workout showcasing the greatest benefits for both dyspnea and aerobic capacity.[15] Methods of respiratory intervention encompass ventilation monitoring, lung expanding movements, airway obstruction cleaning procedures, and pulmonary function training exercise. For establishing sustainable, it is advised to indulge in bed mobility activity, active frame exercises, cycling ergometer, pre-gait work outs, and mobility .[16] The pulse oximeter was used to evaluate oxygen saturation and heart rate, while oxygen flow meter and the gas analyzer were used to determine ABG analysis values. The Generalized Anxiety Disorder (GAD) scale was used to assess anxiety (GAD-7). The COVID-19 patients' oxygen saturation and anxiety levels are dramatically improved by the respiratory exercise programme. [17]

II- METHADOLOGY:

This study was Randomized Controlled trial. The Jinnah Hospital in Lahore, Pakistan, was the site of the study's execution.Sample size of 44 is measured by using epi-tool software with 0.80 power of study with 0.05 margin of error and 95% confidence interval by maintaining a 10percent dropout rate.(56)

The participants in the study were chosen using a non-probability convenient sampling technique. Following completion of a written informed consent form that was written in both English and Urdu, participants were randomly assigned to one of two test groups that used the sealed envelope approach. data collection tools were pulse oximeter, the modified Borg dyspnea scale (MBS), spirometry and blood gas test. Breathing exercises and steam are the common treatment for both A and B group. (Steam was given for 5-10 mints).Group A, 22 Participants received chest physiotherapy, breathing exercise and steam. A treatment in which Percussion: Five minutes of manual percussion was performed clapping the chest wall over the lungs using cupped hands while doing the action. Chest vibrations: Five minutes were spent vibrating the lungs so over entire lung, from distal towards proximal and from laterally towards middle. Manual hyperinflation: A three-second inspiration, two seconds of continuous inspiration, a quick release of the valve to ensure a brief expiration during which the bag was kept compressed made up the waveform. Passive and unhindered expiration helped the flow of exhalation. Five to ten minutes of steam were provided. There was one treatment session per day that lasted 15 to 30 minutes. And for up to two weeks, six days a week of treatment was provided. At baseline and the second week after the intervention, pre-interventional readings were taken. Group B, 22 Participants received breathing exercise with steam. Steam was given for 5-10 minutes. Breathing exercise (Lie down in the seat, with knees bowed; keeping your skull, neck, and shoulders and arms at ease. Placed a hand on one's belly. Breathe in slowly and deeply. As user exhale, contract your muscles. For such a total of 5 mins, emphasize the exhale more than the inhale). Treatment lasted 15-30 minutes and consisted of one session per day. And treatment was given for 6 days a week for up to 2 weeks. Pre-interventional readings were taken at baseline & post interventional readings at 2nd week**.** The Ethical consideration occupies a key element in the research. The integrity of each patient was respected. Before conducting any experimental procedure, a written well informed regarding the usefulness of research was provided to the participants. Moreover, after the data collection, the information regarding the participants was kept confidential. The questionnaires were kept in key and lock and individual identifiers were removed and placed with a number. A Windows programme called SPSS, version 22, was used to analyze the data that use the statistical threshold of 0.05. Shapiro-Wilk test was performed to examine the data's normality. The use of parametric tests and the fact that the p value was larger than 0.05 indicated that the data was normally distribute. The comparison of two populations at various periods was done using a parametric test. The difference between each group was measured using a paired sample t-test. Independent sample t-test was used.

III- RESULTS:

Among total 44 patients, 22 in Chest physiotherapy with breathing exercise and 22 in breathing exercise group. In group A, the patients mean age were 67.41 years and in group B, mean age were 67.36 years.

In this study total patient were 44, in which 14 males and 08 females were obtain the Chest physiotherapy with breathing exercise while 13 males and 09 females were obtaining breathing exercise. Both groups were similar in oxygen saturation, MBS

scale, PaO_2, FEV_1, FVC and FEV1/FVC ratio at baseline treatment values with p-value>0.05. Pre-treatment Mean±SD of Pulse oximetry in Chest physiotherapy with breathing exercise is 79.14±4.90 while in breathing exercise is 79.45±4.01. Pre-treatment mean value of MBS Scale in postural drainage technique is 7.36±0.95 while in breathing exercise are 6.95±1.17. Pre-treatment Mean±SD PaO_2 in Chest physiotherapy with breathing exercise are 68.09±3.79 while in breathing exercise are 67.14±3.46. Pre-treatment Mean±SD FEV_1 in Chest physiotherapy with breathing exercise are 1.88±0.50 while in breathing exercise is 1.68±0.37. Pre-treatment Mean±SD FVC in Chest physiotherapy with breathing exercise are 1.63±0.33 while in breathing exercise is 1.47±0.18. Pre-treatment Mean±SD FEV1/FVC ratio in Chest physiotherapy with breathing exercise are 60.77±2.04 while in breathing exercise is 59.95±2.53. Independent sample t-test was applied to compare pre-treatment and post-treatment SpO_2 value between two groups. The results showed that there was statistically significant difference between two groups with $p < 0.05$. Pre-treatment Mean±SD of SpO_2 in Chest physiotherapy with breathing exercise is 79.14±4.90 while in breathing exercise is 79.45±4.01. Post-treatment Mean±SD of SpO_2 in Chest physiotherapy with breathing exercise is 91.73±2.45 while in breathing exercise is 85.77±2.96.

Independent sample t-test was applied to compare pre-treatment and post-treatment MBS value between two groups. The results showed that there was statistically significant difference between two groups with $p < 0.05$. Pre-treatment mean value of MBS Scale in postural drainage technique is 7.36±0.95 while in breathing exercise are 6.95±1.17. Post-treatment mean value of MBS Scale in postural drainage technique is 2.68±0.84 while in breathing exercise are 5.00±0.87.

Table 7: Between group comparison of forced expiratory volume at 1 second (FEV_1):

FEV_1(liters)	**Chest physiotherapy with breathing exercise (Mean±S.D) (n=22)**	**Breathing exercise (Mean ± S.D) (n=22)**	**P-value**
Pre-treatment	1.88±0.50	1.68±0.37	0.142
Post treatment	2.85±0.47	2.08±0.36	0.000

Independent sample t-test was applied to compare pre-treatment and post-treatment FEV_1 between two groups. The results showed that there was statistically significant difference between two groups with $p < 0.05$. Pre-treatment Mean±SD FEV1 in Chest physiotherapy with breathing exercise are 1.88±0.50 while in breathing exercise is 1.68±0.37. Post-treatment Mean±SD FEV1 in Chest physiotherapy with breathing exercise are 2.85±0.47 while in breathing exercise is 2.08±0.36.

Table 8: Between group comparison of Forced Vital Capacity (FVC):

FVC(liters)	**Chest physiotherapy with breathing exercise (Mean±S.D) (n=22)**	**Breathing exercise (Mean ± S.D) (n=22)**	**P-value**
Pre-treatment	1.63±0.33	1.47±0.18	0.050
Post treatment	2.47±0.23	1.84±0.15	0.000

Independent sample t-test was applied to compare pre-treatment and post-treatment FVC between two groups. The results showed that there was statistically significant difference between two groups with $p < 0.05$. FVC improved to greater extent in Chest physiotherapy with breathing exercise group with means value 2.47±0.23 as compared to breathing exercise with mean 1.84±0.15. The comparison of pulse oximeter within each treatment group using paired sample t-test. The results showed statistically important variation for both groups (p-value less than 0.05) with greater difference seen in group Chest physiotherapy with breathing exercise. In this table, in Chest physiotherapy with breathing exercise pre-treatment Mean±SD of pulse oximeter is 79.14±4.90 while in post-treatment is 91.73±2.45. In breathing exercise, pre-treatment Mean±SD of pulse oximeter is 79.45±4.01 while in post-treatment is 85.77±2.96.

Table 12: Within group comparison of Forced Expiratory Volume at 1 second (FEV_1):

FEV_1 (liters)	**Chest physiotherapy with breathing exercise (Mean±SD) (n=22)**	**Breathing exercise (Mean ± S.D) (n=22)**
Pre-treatment	1.88±0.50	1.68±0.37
Post treatment	2.85±0.47	2.08±0.36
p-value	0.00	0.00

This table presented the comparison FEV_1 within each treatment group using paired sample t-test. The results showed statistically important variation for both groups (p-value less than 0.05) with greater

difference seen in group Chest physiotherapy with breathing exercise. In this table, in Chest physiotherapy with breathing exercise pre-treatment Mean±SD of FEV_1 is 1.88±0.50 while in post-treatment is 2.85±0.47. In breathing exercise, pre-treatment Mean±SD of FEV_1 is 1.68±0.37 while in post-treatment is 2.08±0.36.

Table 13: Within group comparison of Forced Vital Capacity (FVC):

FVC (liters)	Chest physiotherapy with breathing exercise (Mean±SD) (n=22)	Breathing exercise (Mean ± S.D) (n=22)
Pre-treatment	1.63±0.33	1.47±0.18
Post treatment	2.47±0.23	1.84±0.15
p-value	0.00	0.00

This table presented the comparison of FVC within each treatment group using paired sample t-test. The results showed statistically important variation for both groups (p-value less than 0.05) with greater difference seen in group Chest physiotherapy with breathing exercise. In this table, in Chest physiotherapy with breathing exercise pre-treatment Mean±SD of FVC is 1.63±0.33 while in post-treatment is 2.47±0.23. In breathing exercise, pre-treatment Mean±SD of FVC is 1.47±0.18 while in post-treatment is 1.84±0.15.

The comparison of FEV1/FVC ratio within each treatment group using paired sample t-test. The results showed statistically important variation for both groups (p-value less than 0.05) with greater difference seen in group Chest physiotherapy with breathing exercise. In this table, in Chest physiotherapy with breathing exercise pre-treatment Mean±SD of FEV1/FVC ratio is 60.77±2.04 while in post-treatment is 70.72±2.33. In breathing exercise, pre-treatment Mean±SD of FEV1/FVC ratio is 59.95±2.53 while in post-treatment is 64.68±2.61.

IV- DISCUSSION:

The primary goal of this research was to see how combined effects of chest physiotherapy and breathing exercise affected oxygen saturation, dyspnea, blood gas test, and spirometry values in COVID-19 patients who were hospitalized. It was decided to conduct a randomized controlled experiment. 44 participants were randomly assigned to Groups A and B based on sample selection criteria. Pulse oximeter, Modified Borg's Dyspnea (MBS) scale, blood gas test, and spirometer were used to measure oxygen saturation, level of dyspnea, PaO2, FEV1, FVC, and FEV1/FVC ratio. The pulse oximetry, Modified Borg's Dyspnea (MBS) scale, blood gas test, and spirometer all revealed a statistically significant difference in both groups with a p-value of 0.05. Both were beneficial, however chest physiotherapy with breathing exercise showed better improvement. In hospitalized Covid-19 patients, breathing exercise technique with or without chest physiotherapy was effective in improving oxygen saturation, dyspnea, and PaO2, FEV1, FVC, and FEV1/FVC ratio. However, based on their mean differences, chest physiotherapy with breathing exercises was more beneficial in terms of the indicated mean measures.

Manzur Kader explains about a study that looked into the impact of short-term respiratory rehabilitation (i.e., breathing exercises) on respiratory recovery in COVID-19 patients who were not in the ICU. Pre / post research using a quasi-experimental methodology was used in this study. The experiment included 173 patients with moderate to severe COVID-19. 94 patients in the intervention category underwent breathing techniques that comprised breathing controlling, diaphragm inhaling, or chest expansion exercises, along with puffing (forced expiration approach) and cough. All of the subjects receiving the usual corona medication. The findings showed that even short-term breathing exercise improves various respiratory parameters in COVID-19 individuals with moderate to severe disease.(47) This study also says that breathing exercises improves the oxygen saturation, level of dyspnea and lung function in corona patients. [18]

The influence of MFRT combined with pulmonary physio over pulmonary therapy alone and on enhancing cardio - respiratory parameters in COVID-19 patients was evaluated in a trial, according to Sara Fereydounnia. This single-blind, prospective randomized method of research included fifty individuals with COVID. Respiratory comfort, pulse rate, systolic and diastolic arterial pressures, and baseline measurements had all been taken until the first and third therapy visits. At the beginning and conclusion of the course of therapy, breathlessness, subjective weariness, and 6-minute walks were all measured. Although programme did not result in improved cardiorespiratory function among COVID-19 patients, the study did reveal that both programmes might enhance breathing ease and dyspnea perception.[19] The current study validates the prior report's conclusion that COVID-19 sufferers' degree of breathlessness can indeed be decreased with physiotherapy (chest physiotherapy coupled with breathing exercises).

Denise Battaglini discovered that a variety of well-proven physiotherapy approaches can be employed safely in just this subgroup of patients to reduce atelectasis and improve outcomes, despite the fact that there is no indication of the value of therapy in

patients in the particular circumstance of COVID-19. [20] Current study report that chest physiotherapy with breathing exercises improves the level of dyspnea, PaO2 and spirometry values among covid-19 patients.

An assessment of the effectiveness of interventions of chest physical treatment in people with corona by Auwal Abdullah was published. According to the analysis, lung physio may enhance COVID patients' quality of life and respiratory functioning, particularly following discharge. Apart from some expert advice based on anecdotal evidence, data on its efficacy is still missing. On the other hand, it is a personalized treatment based on the patient's specific symptoms. [21]

According to Eli Fort, conventional chest physiotherapy, and also traditional chest physiotherapy combined with transcutaneous new electric diaphragm stimuli, both prevent respiratory function decline within a week of Roux-en-Y gastric bypass surgery, and transcutaneous electrically driven deep breathing stimulus increases exhalation muscular endurance. [22]

Kai Liu examined the effects of either a six weeks pulmonary rehab program on participants with COPD's motility, psychological functioning, life quality, and respiration. The results indicate that respiration training can enhance aged Covid clients' standard of living, stress, and aerobic power, but it has next to no effect upon their depressive episodes. [23]

Tomris & Duymaz looked explored how chest physiotherapy (CP) affected pulmonary functions, dyspnea levels, functional ability, and quality of life in individuals undergoing bariatric surgery. According to the findings, postoperative CP enhanced respiratory functions, controlled arterial blood gases, raised oxygen saturation, functional ability, and quality of life, and decreased dyspnea levels in patients who had bariatric surgery. [24, 25]

Recommendations: This study can help patient, physiotherapist and health worker to evaluate for better treatment, early diagnosis and prevention of covid-19. This study can help in defining a better strategy for the rehabilitation of Covid-19 patients.

V- CONCLUSION:

The study showed that both chest physical therapy and breathing exercises were effective in reducing dyspnea and raising oxygen saturation, PaO2, FEV1, FVC & FEV1/FVC ratio. However, chest physiotherapy with breathing exercise was even more effective based on the mean differences between the specified outcome measures.

Conflict of Interest

There was no conflict of interest.

Financial Statement

No fundings were given by any authorities; it was a project thesis of doctor of physical therapy.

Data availability

Data will be provided on the demand by corresponding author

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