

COMBINE EFFECTS OF POSTURAL DRAINAGE AND STEAM ON OXYGEN SATURATION, DYSPNEA AND SPUTUM PROFILE IN POST COVID-19 PATIENTS

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ABSTRACT:

COVID-19 expression appears to be non-specific; no specific symptom can lead to a suspicion of a case without any evidence of exposure. As a result of significant lung injury, COVID 19 often causes pneumonia and even acute respiratory distress syndrome.

Objective: To determine the combine effects of postural drainage and steam on oxygen saturation, dyspnea and sputum profile in post COVID-19 patients.

Method: A randomized controlled trial was performed. 48 subjects were recruited according to sample selection criteria and were assigned to Group A and B. Assessment of oxygen saturation, level of dyspnea, and sputum profile was taken using pulse oximeter, Modified Borg's Dyspnea (MBS) scale and Cough and Sputum Assessment Questionnaire (CASA-Q). Group A received treatment with breathing exercises and postural drainage. Group B received breathing exercises, steam and postural drainage. Total 6 sessions were given to each patient in 2 weeks with 3 sessions per week. Both groups were reassessed after 2 weeks of treatment. Data was analyzed by using SPSS 22.

Results: There was a statistically significant change within both groups in the oxygen saturation, Modified Borg's Dyspnea (MBS) scale and Cough and Sputum Assessment Questionnaire (CASA-Q) with p- value of < 0.05 Both were effective but using postural drainage with showed more improvement. Pre-treatment Mean±SD of Pulse oximetry in postural drainage technique is 79.58±3.90 while in postural drainage with steam is 79.41±4.79. Post-treatment Mean±SD of Pulse oximeter in postural drainage technique is 85.71±2.85 while in both postural drainage with steam is 91.87±2.40.

Conclusion: Postural drainage technique with or without steam were useful in improving oxygen saturation, level of dyspnea and sputum profile among Covid-19 patients. However, postural drainage with steam was more effective in terms of mentioned outcome measures based on their mean differences.

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

I. INTRODUCTION:

In December 2019, adults in Wuhan, the capital of Hubei province and a major transportation hub in China, began presenting to local emergency facilities with severe pneumonia of unknown origin. A large number of the underlying cases had a common entry to the Huanan discount fish market, which also traded live animals.(1) Because of the increasing prevalence of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) all over Europe and North America, researchers now have access to a large amount of clinical data.(2) The Covid-19 outbreak needs to serve as a reminder of the ongoing threat posed by starting to emerge and re-emerging bacterial agents, and also the significance of serves as a deterrent, swift diagnostic test, and thorough research to better realize the basic science of living organisms and our vulnerabilities to them, along with create improved countermeasures.(3) The onset of symptoms can last anywhere from between one fourteen days (3 to 7 days is usual). The number of leucocytes and lymphocytes in the peripheral blood has not decreased much at this point (normal or slightly lower). The infections now spread throughout the body, primarily affecting the lungs, GIT, and heart.(4) SARS-CoV-2 is believed to disseminate primarily through respiratory droplets, which have been formed whenever a patient coughs, coughing or sneezing, talks, or sings.(5) In 73 percent of the nations studied, transmission reduced as mobility decreased, but in 80 percent of the countries, we discovered evidence of decoupling of transmission and mobility after severe control measures was relaxed.(6) Physiotherapy is an important component of medical treatment, whether that be in critical care, hospitalization departments, follow-ups, or at residence.(7) Traditional home treatments for recurrent colds and upper respiratory tract illnesses include steam inhalation.(8) Steaming inhalation, breathing workouts, and postural drainage postures are all recommended and coached as part of the treatment plan; steam inhalation therapy is usually recommended as primary care in acute respiratory disorders.(9)

This study will help patient, physiotherapist and health worker to evaluate for better treatment, early diagnosis and prevention of covid-19. This study

will help in defining a better strategy for the rehabilitation of Covid-19 patients. Comparing the effects of Postural drainage with or without steam therapy will help to find a more effective and efficient technique to enhance oxygen saturation, reduce dyspnea and to improve sputum profile of Covid patients. The aim of the research is to see how postural drainage and steam affect oxygen saturation, dyspnea, and sputum profile in COVID-19 patients.

II. Materials and 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. The study area was Jinnah hospital Lahore Pakistan. Sample size was calculated by epi-tool. In this study, 48 participants were selected as per criterion for inclusion and exclusion. 24 participants were in group-1 and 24 participants in group-2.

Both male and female, age 18-40 years with post COVID-19 compromised pulmonary functions and weak respiratory muscles. Patients having impaired Breathing and willing to participate in research were included. EXCLUSION CRITERIA was patients on ventilator and with history of cardiovascular diseases or surgical procedure involving the nose, throat, diaphragm, lungs, or stomach.

Breathing exercises are the common treatment for both 1 and 2 group.

Group 1, 24 Participants received postural drainage technique only. A treatment in which the patient assumes one or more positions that allow secretions from the bronchial airway to flow more freely is known as postural drainage. These procedures rely on gravity to push secretions toward the trachea, where they can be coughed up more easily. Percussion (or clapping) and vibration are two techniques for externally influencing the thorax. Treatment lasted 15-30 minutes and consisted of three sessions. And three sessions per week applied on alternate day for up to 2 weeks. Pre-interventional readings were taken at baseline & post interventional readings at 2nd week.

Group B, 24 Participants received postural drainage technique with steam. Postural drainage is a procedure in which the patient assumes one or more positions that allow secretions from the bronchial airway to flow more easily. Gravity is used in these techniques to drive secretions toward the trachea, where they can be coughed up more easily. Percussion (or clapping) and vibration are two methods for manipulating the thorax from the outside. Steam was given for 5-10 minutes. Treatment lasted 15-30 minutes and consisted of

three sessions. And 3 sessions /week applied on different day for up to 2 weeks. Pre-interventional readings were taken at baseline & post interventional readings at 2nd week.

Pulse oximeter for oxygen saturation,(10) Modified Borg Dyspnea Scale (MBS) for level of dyspnea(11) and CASA-Q for cough and sputum intensity (12) were used as a data collection tools.

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 $P < 0.05$. Numeric variables were defined as mean \pm 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. Total 48 patients, 24 were in postural drainage group and 24 in postural drainage with steam group. In group 1, the patients mean age were 33.83 years and in group 2, mean age were 31.25 years. 14 males and 10 females were getting the only postural drainage technique while 15 males and 9 females were receiving the steam with postural drainage technique. Groups were homogenous at baseline and not statistically significant in all the parameters including oxygen saturation, MBS scale and QASA-Q with p value > 0.05 (table 1). After the analysis, it was found that within group analysis showed a statistically significant ($p < 0.001$) improvement in the entire outcome measures including oxygen saturation, MBS scale and QASA-Q over a period of 2 weeks in both groups. (Table 2)

Table 1: Baseline measurement of outcome variables:

Variable	Postural Drainage	Postural Drainage with Steam	P value
mean \pm SD		mean \pm SD	
Oxygen saturation	79.58 \pm 3.90	79.41 \pm 4.79	0.895
MBS scale	6.92 \pm 1.14	7.33 \pm 0.92	0.170
QASA-Q	39.87 \pm 8.14	38.17 \pm 7.65	0.458

Table 2: Between group comparison of Oxygen saturation, MBS scale and QASA-Q among the groups

Variable	Postural Drainage (Mean±S.D)		Postural Drainage with Steam (Mean ± S.D)		p-Value
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	
Oxygen saturation	79.58±3.90	85.71±2.85	79.41±4.79	91.87±2.40	0.00
MBS scale	6.92±1.14	4.75±0.94	7.33±0.92	2.62±0.82	0.00
QASA-Q	39.87±8.14	48.92±9.30	38.17±7.65	57.91±8.98	0.00

The between-groups analysis showed statistically significant differences in oxygen saturation, MBS scale and QASA-Q with p-values of 0.00, 0.00 and 0.00 respectively. (Table 2). The results of this study state that postural drainage with steam is more effective than only postural drainage in terms of outcome measures.

IV. Discussion:

This study aimed primarily to evaluate the combine effects of postural drainage and steam on oxygen saturation, dyspnea and sputum profile in post COVID-19 patients. Results indicated significant improvement in both groups receiving intervention regarding all outcome measures. However, mean change in values of postural drainage with steam was more effective as compared to postural drainage.

The new coronavirus disease (COVID-19) outbreak caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is afflicting an increasing number of people throughout the world. Treating COVID-19 patients by enhancing absolute neutrophil and preventing disease might well be advantageous.(13) Sara Fereydownnia discusses a study that compared the effects of MFRT and respiratory physiotherapy to respiratory physical rehabilitation alone on improving cardiorespiratory parameters in COVID patients. The study found evidence that both programmes could enhance ease of breathing and sense of dyspnea, even though adding MFR techniques to a respiratory physiotherapy command did not lead to greater cardiorespiratory function in individuals with COVID-19.(14) Another study that examined the effects of posture evacuation and depth breathing workouts on oxygen saturation, triflo volume, and pulmonary function tests in people with chronic

obstructive pulmonary disease. Improved oxygen saturation, triflo volume, and pulmonary function tests were found to benefit through postural discharge and vigorous breathing activities.(15) This study also says that postural drainage plus deep breathing exercise improves the oxygen saturation in corona patients. Taniya Singh did a study to see how active cycle breathing technique combined with postural drainage compares to autogenic drainage. The study found no statistically significant difference between the two samples as compared.(16) In a study of eight individuals with chronic bronchitis, the consequences of postural drainage, exercising, as well as coughing affecting mucus evacuation were studied by Oldenburg. These findings had therapeutic implications, emphasizing the necessity of cough control while assessing these approaches' therapeutic effects.(17) Another study looked upon whether performing repeated maximal inspiratory vital capacity movements against a fixed resistance enhanced effective short-term sputum clearance in adults with cystic fibrosis (CF). In conclusion, standardized physiotherapy was less effective than short-term resistive inspiratory maneuvers treatment in clearing sputum and inflammatory mediators.(18) Current study report that postural drainage using deep breathing exercises improve the level of dyspnea and sputum production.

V. Conclusion:

The study concluded that postural drainage technique with or without steam were useful in improving oxygen saturation, level of dyspnea and sputum profile among Covid-19 patients. However, postural drainage with steam was more effective in terms of mentioned outcome measures based on their mean differences.

Conflict of Interest

There was no conflict of interest.

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Data availability

Data will be provided on the demand by corresponding author.

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