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Research Article

**EFFECTS OF PULMONARY TELE-REHABILITATION IN  
HOME CONFINED PATIENTS WITH COVID-19**

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**Article Received:** July 2020**Accepted:** August 2020**Published:** September 2020**Abstract:**

**Background:** Corona virus was first identified in mid-1960 and consisted of seven classes. Human corona virus first appeared in December, 2019 in China then this outbreak affected most of the world on its peak till April, 2020. It is known to be highly contagious droplet infection. The incubation period of this virus is average 5 days and then it reacts or stays for 14 days in human body. This is an upper respiratory tract infection which later involves lungs. People go through different symptoms including hyperthermia, non-productive cough, myalgia, body pain, fatigue, headache and diarrhea.

**Aims & Objectives:** The main aim of our study is to analyze the therapeutic effects of pulmonary rehabilitation that will be provided by Tele-communication in patients with COVID-19 who will be home-confined and having mild to moderate symptoms, we will be maintaining the social distancing and following SOPs to prevent exposure.

**Methodology:** From the preliminary survey that we conducted through Google form we came to know that; respiratory complication is the most prevalent among the patients with COVID-19. For interventional purpose We will select a sample size forty (40) patients, who will meet the inclusion and exclusion criteria of our research. They will be further divided into two groups Group A and Group B, which will be allocated through Computer generative randomization, experimental group and control group respectively.

**Statistical analysis:** In this study we will use SPSS version 20.

**Keywords:** COVID-19, Respiratory Complications, Physical Therapy, Pulmonary Rehabilitation, Tele rehabilitation.

**Results:** Pulmonary Tele-Rehabilitation shows significant results in home-confined COVID-19 patients. **Conclusion:** It is concluded that the most prevalent complication in COVID-19 patients, which is respiratory complication can have a significant effect of pulmonary Tele-Rehabilitation in home-confined patients with mild to moderate symptoms.

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**INTRODUCTION:**

Corona virus is one of the most important pathogens for the respiratory system of the human being. Passed out broken corona viruses (CoV), which were historically described for being a major public health hazards, include extreme acute respiratory syndrome-CoV and Middle East respiratory syndrome-MERS (Rothan et al., 2020) The transmission of COVID-19 is referred to occur due to close proximity of human to human or via exposure to respiratory droplets of an infected person. This disease was later on linked with severe acute respiratory stress syndrome abbreviating as "SARS-CoV-2 [1]. Respiratory complications are known to be hallmark of Covid-19 involving dyspnea, dry cough, respiratory secretions, reduced chest movements and respiratory compromise [2]. The symptoms which trouble former Covid-19 sufferers daily include breathing and sleeping problems through changes in mood, anxiety or depression. 90% of those surveyed listed breathing difficulties as their symptom, with 64% claiming they are now suffering from severe exhaustion. Each 22 per cent were classified as important issues with sleep, cough, and changes in mood, anxiety or depression. Covid-19 is categorized into three classes; Mild, Moderate & Critical disease. The mild cases recruited mild cases of pneumonia and the moderate illness has a protocol of SOB, oxygen saturation equals to or below 93% & respiratory rate below 31 per min. In severe cases, there is sepsis and respiratory compromise [3]. A broad spectrum of Scientists and health care professionals around the globe have attempted extraordinary efforts to figure out the exact pathogenesis and multi-disciplinary therapeutic approaches to treat this pandemic [4]. Physical therapy is a rehabilitative branch which plays an optimal role in maintenance and enhancing patient's potential functional state. It involves multiple manual and electronic interventions to optimize pt.'s wellbeing [5]. Pulmonary Tele-rehabilitation has been proved effective in the home confined patients with COVID-19. Tele-rehabilitation deployed increase the accessibility as in pandemic situation we can't interact patients directly [6]. Sustained respiratory physiotherapy treatment improves pulmonary volume and lung capacity. It prevents loss of lung and chest wall compliance. It improves and maintains strength of respiratory muscles and helps in achieving correct mucus clearance, maintains an effective cough and avoid pulmonary clearance. Respiratory Rehabilitation program requires avoiding fatigue and reducing negative impact of depressed patient. Postural control techniques, includes vertical bed, Raising Head which improve ventilation. Slow and deep breathing techniques, the chest expansion in which rapid

movement should be avoided. The frequency will be 12-15 per minute [7].

**METHODOLOGY:**

**Study design:** A quantitative study was conducted by Randomized Control design, which was done through quasi randomization. Two groups were selected which were classified as Group A Experimental (treatment) and Group B Control group (active).

**Study setting:** Study population was COVID-19 patients with respiratory complications, those who were home-confined; subjects were selected from the main cities of Punjab (Faisalabad, Lahore) that were diagnosed with lab test.

**Sample size:** We selected forty participants (n=40) participants from the preliminary survey that we conducted to find out the most prevalent complication that is respiratory in a COVID-19 patient. Sample size of 40 patients was used for evaluating the effects of pulmonary Tele-rehabilitation. According to (Yanet al., 2020) evaluate the clinical efficacy, sample size was 40 for COVID patients and to check the Clinical trials for Tele-Rehabilitation on COVID patients the minimum size according to (Yanet al., 2020)

**Duration:** Data collection and analysis was done in 4 months, in first month we have prepared synopsis and literature review in the next month we conducted a preliminary research and found the most prevalent complication among COVID-19 patients with in the 10 days, after that we selected subjects and divided them and gave intervention for 3 weeks. Patients in treatment groups received intervention 3 times a week and the total duration was 3 weeks. In the end of July, we conducted follow-up and analyzed the data by applying statistics.

**Sampling technique:** Simple Random Sampling was used and Quasi Randomization was used to allocate the participants in the experimental and control group.

**Data Collection method:**

We conducted a preliminary research to evaluate 'The most prevalent complication in patients with COVID-19' through google forms. A cross-sectional questionnaire comprised of close ended questions was developed through literature review. This google form questionnaire was shared on public pages and in different social media groups, and asked to fill by current positive patients with COVID-19 in result of which we received 100 responses. After evaluating the responses provided by Google form, we came to know that 'Respiratory Complications' were the Most Prevalent Complication among the COVID-19

patients. After that we selected a sample of forty patients (n=40) with the inclusion and exclusion criteria mentioned above, those who fulfilled the criteria were further divided into two groups A and B allocated through Computer Generated Randomization. The 20 patients were included in experimental (Treatment) group and labeled as group A while other 20 patients were included in active control group and labeled as group B. Before starting pulmonary rehabilitation sessions, we assessed all the patients in group A and B through Modified Borg Scale and Leicester Cough Questionnaire. We also made a checklist of these measuring instruments and communicated them through WhatsApp services on voice calls and asked their questions and submitted their pre-assessment at the date and the post-assessment was done after the three weeks Zoom sessions had been completed. Before starting pulmonary rehabilitation sessions, we assessed all the patients in group A and B through Modified Borg Scale and Leicester Cough Questionnaire.

Pulmonary rehabilitation provided through zoom sessions to Group A and Pulmonary Rehabilitation Boucher as a baseline in both groups. We also made a checklist of these measuring instruments and communicated them through WhatsApp services on voice calls and asked their questions and submitted their pre-assessment at the date and the post-assessment was done after the three weeks Zoom sessions had been completed. The Duration of Rehabilitation session was three weeks, which included the alternate days (3 days per week). For Treatment group, before starting breathing exercises we evaluated them through Pre-Exercise questionnaire. A summary of events which had followed the last days of the beginning of the physical activity must also be asked. Therefore, it was important to test for the existence of exposure threats, including travel abroad and/or contact with individuals suspected of the virus. This also referred to areas where there had been no public transmission. Considering that there were no limits on Tele communication instruction. But these requirements

should be consistent with the patient place of residence's stated health condition. This was not important if the place of residence is associated with group contagious. The Pre-Exercise Screening Questionnaire (PESQ) aimed to recognize symptoms of COVID-19 easily, so as to assess the readiness of a person to exercise physically. The chance of aggravation of respiratory symptoms when beginning exercise is minimized. The PESQ included seven questions to answer with a yes or no. Point 1 was a sore throat assessment. Point 2 tested the development of cough and sputum. Point 3 tested tiredness. Item 4 tested breathability or breathing trouble.

The item 5 and 6 was about fever, refer to each person who was diagnosed and or suspected of a new. Item 7 was linked to all contacts [8]. After this pre-exercise screening, we initiated our rehabilitation protocol which included following; For Breathing Retraining, we asked patients that when you breathe in your belly should move outward while you breathe in your belly moves towards yourself. Do this one time in a day with 10 numbers of repetitions on alternative days for 3 weeks. For Nasal Breathing, we asked them to avoid mouth breathing as it aggravates the respiratory complications. We instructed them to perform nasal breathing by taking deep breath in and out through nose. Do this one time in a day with 10 repetitions on alternative days for 3 weeks. For Active cycle breathing technique, that would clear their airway and remove any obstruction. Perform this once a day with 10 repetitions on alternative days for 3 weeks. For Hydrotherapy we asked them to take hot water steam it would lose thick secretions in the airway for 15 minutes on alternative days for 3 weeks. For Deep breathing exercise, we guided them to Take deep breath in from nose and exhale through mouth once a day with 10 repetitions on alternative days for 3 weeks. For Walk, aside from fever, COVID-19 symptoms include cough, difficulty breathing, and fatigue. To maintain the endurance, perform walk for 20-30 minutes and increase gradually, perform once a day on alternative days for 3 weeks. In addition to that we provided brochure as baseline in both groups.

# Exercises for home-confined pts with Covid-19

patients with respiratory complications should follow this treatment plan.

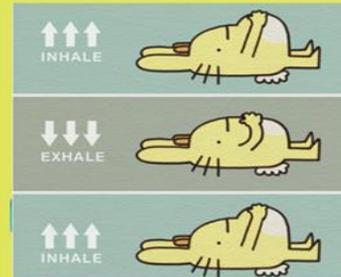
## Take water steam

Take hot water steam it will loosen thick secretions in the airway. for 15 minutes on alternative days for 3 weeks.



## Breathing Retraining

when you breath in your belly should move outward while you breath in your belly moves towards yourself. once time a day with 10 repetitions on alternative days for 3 weeks.



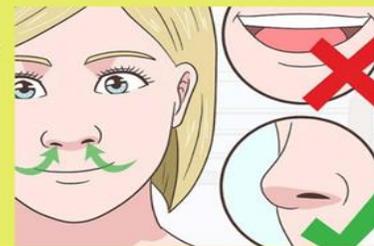
## Check your temperature.

Check your temperature before doing exercises, if >38 C Don't perform exercise.



## Nose Breathing

Avoid mouth breathing as it agravates the respiratory complications.. Perform nose breathing by taking deep breath in and out through nose. once time a day with 10 repetitions on alternative days for 3 weeks.



## Walk

Aside from fever, COVID-19 symptoms include cough, difficulty breathing, and fatigue. To maintain the endurance perform walk for 20-30 minutes and increase gradually, perform once a day on alternative days for 3 weeks.



## Active Cycle Breathing Technique

It will clear your airway and remove obstruction. Perform this once a day with 10 repetitions on alternative days for 3 weeks.



## Deep breathing exercise

Take deep breath in from nose and exhale through mouth.. once a day with 10 repetitions on alternative days for 3 weeks.



**Table: 1** Statistical analysis of Leicester Cough Questionnaire. Comparison of Measurement of Cough and QOL in experimental and control group through LCQ.

Group	Assessment	Mean	SD	P-value
GROUP A	LCQ treatment before	5.29	0.332	0.000
	LCQ treatment after	6.48	0.116	
GROUP B	LCQ treatment before	4.57	0.312	0.04
	LCQ treatment after	5.15	0.389	

\* = Significant (P<0.05); \*\* = Highly significant (P<0.01) ,SD = Standard deviation

**Interpretation:**

The Table shows that Mean of Leicester Cough Questionnaire in Group A increases. The Value of P<0.01 which shows there is significant decrease in the cough and increase in QOL after getting the treatment. Mean Value of LCQ before treatment was 5.29±0.332 and after is 6.48±0.116 in group A. LCQ before treatment was 4.57±0.312 after is 5.15±0.389 in group B. Results showing that there is difference value of MEAN ±S. D in group A and B.

**Table: 2** Statistical analysis of Modified Borg Scale. Comparison of Measurement of Dyspnea in experimental and control group through LCQ.

Group	Assessment	Mean	SD	P-value
GROUP A	MBS before treatment	1.85	0.587	0.001
	MBS after treatment	1.05	0.560	
GROUP B	MBS before treatment	3.10	0.718	0.05
	MBS after treatment	2.55	0.605	

\* = Significant (P<0.05); \*\* = Highly significant (P<0.01), SD = Standard deviation

**Interpretation:**

The Table shows that Mean of Modified Borg Scale in Group A decrease. The Value of P<0.01 which shows there is significant decrease in the dyspnea after getting the treatment. Mean Value of MBS before treatment was 1.85±0.587 and after is 1.05±0.560 in group A. MBS before treatment was 3.10±0.718 after is 2.55±0.605 in group B. Results showing that there is difference value of MEAN ±S. D in group A and B.

**Table: 3 Within group comparison in Leicester Cough Questionnaire and Modified Borg Scale.**

	Experimental Group		Control Group		P-value
	Pre-Mean	Post-Mean	Pre-Mean	Post-Mean	
<b>Leicester Cough Questionnaire</b>	5.29	6.48	4.75	5.15	0.000
<b>Modified Borg Scale</b>	1.85	1.05	3.10	2.55	0.001

\* = Significant (P<0.05); \*\* = Highly significant (P<0.01)

### Interpretation:

The Pre-Mean of (LCQ) was 5.27 and post 6.48 in Group A and pre mean was 4.75 post mean was 5.15 in Group B. The reading of Modified Borg Scale reading, Pre-Mean was 1.85 and post-Mean was 1.05 in Group A and Pre-Mean was 3.10 and post-Mean was 2.55. The p value calculated through independent sample t test (< 0.05)

### DISCUSSION:

Our research aimed at evaluating the efficacy of telecommunications pulmonary rehabilitation among COVID-19 patients. Our new feature was the fact that we performed a Preliminary survey in patients with diagnosed COVID-19 on the most prevalent complication. Another Specification in our study was that we selected mild to moderate cases, the patients who were home confined and Stable having mild to moderate symptoms. Our Strategy and Data collection & assessment tool was different from previous researches. The Validity and Reliability of these measuring tools and their Clinical trial on COVID-19 is evident. As far as the region is concerned, we selected the Main cities of Punjab (Lahore and Faisalabad) & federal city (Islamabad). Our Study also fulfilled the Criteria of following SOP and we decided to choose Tele-Communication as our Rehabilitation medium, because of its cost-effectiveness and Chances of minimized the exposure.

This Research also made patients aware & educated them about their current condition and preventive strategies to cope with complications even after recovery from COVID-19. A cross-sectional questionnaire comprised of close ended questions was developed through literature review. This Google form questionnaire was shared on public pages and in different social media groups, and asked to fill by current positive patients with COVID-19 in result of which we received 100 responses. After evaluating the responses provided by Google form, we came to know that 'Respiratory Complications' was the Most Prevalent Complication among the COVID-19 patients. After that we selected a sample of forty patients (n=40) with the inclusion and exclusion

criteria mentioned above, those who fulfilled the criteria were further divided into two groups A and B allocated through Quasi Randomization. The 20 patients were included in experimental (Treatment) group with even numbers of serial number and labeled as group A while other 20 patients were included in active control group with odd serial numbers and labeled as group B. Before starting pulmonary rehabilitation sessions, we assessed all the patients in group A and B through Modified Borg Scale and Leicester Cough Questionnaire. We also made a checklist of these measuring instruments and communicated them through WhatsApp services on voice calls and asked their questions and submitted their pre-assessment at the date and the post-assessment was done after the three weeks Zoom sessions had been completed. The Duration of Rehabilitation session was three weeks, which included the alternate days (3 days per week).

### CONCLUSION:

It is concluded from this study that the most prevalent complication in patient with COVID-19 was Respiratory Complication. However, maintaining the social distancing and minimizing the chances of exposure; followed All the SOP's, this experimental study revealed that the Pulmonary Rehabilitation via Tele-Communication had significant effects on Group A Patients and significant effects on group B with COVID-19 having mild to moderate symptoms and being home confined. Pulmonary Tele-Rehabilitation not only reduced dysnea and cough, but also improved the quality of life.

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