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EFFECTIVENESS OF VIRTUAL PHYSIOTHERAPY REHABILITATION ON FUNCTIONAL CAPACITY AND QUALITY OF LIFE IN SUBJECTS RECOVERED FROM COVID-19 IN INDIA

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ABSTRACT

Background: Coronavirus diseases (COVID- 19) is an infectious diseases caused by a newly discovered coronavirus. When a person has COVID-19, certain body functions slow down and may lead to reduced functional capacity, affect quality of life.

Purpose of the study: To evaluate the effectiveness of virtual physiotherapy rehabilitation on functional capacity and quality of life in subjects recovered from COVID-19.

Methodology: Samples of 60 subjects with post COVID-19 were included in this study. Subjects were conveniently divided into two groups with 30 subjects in each group. Group A was given virtual physiotherapy rehabilitation and Group B was given Walking with deep breathing exercise for 3 days in a week for three weeks. The duration of this study was of 6 months. The outcome measures used were 6 Minute Walk Test and QOL scale through which the subjects were assessed pre and post intervention period.

Statistical analysis & Results: The mean difference in Group A was 8.1833 and Group B was 2.2000 according to 6 MWT. And the mean according to QOL scale in Group A was 1.666 and Group B was .7000.This shows there is statistical difference in 6 MWT and QOL

scale scores between Group A and Group B.

Conclusion: This study concluded that both the treatment was effective but virtual physiotherapy rehabilitation was more effective physical therapy regimens in improving FC and QOL compared to the only walking with deep breathing exercise.

Keywords: Virtual physiotherapy Rehabilitation, Functional Capacity, Quality of life, COVID-19

INTRODUCTION

Coronavirus illnesses (COVID-19) are infectious disorders caused by a recently discovered coronavirus, according to the WHO **[1]**.

The long-term problems that COVID-19 survivors face after going home from the hospital are unknown at this time, however there is some emergency data. A 7-week follow-up research in Italy indicated that 53% of those surveyed reported weariness, 43% reported dyspnea, and 27% reported joint pain **[2]**.

According to epidemiological data, the most of the patients were between the ages of 20 to 60years, with a greater frequency of infection among men and a mean period from commencement to diagnosis of five days.

Many peoples who have been affected by these disorders may now be vulnerable to long-term damage and disability. Although the amount of this impairment and disability is uncertain, early research indicates that these patients will require rehabilitation at all stages of their disease - acute, post-acute, and long-term **[3]**.

Patients are frequently in a lying down for long periods of time, which can result in post-ICU dysphasia, lack of muscle strength, myopathy, and neuropathy as a result of critical illness, as well as decreased joint mobility, pain in neck and shoulder, problem in standing, and impairment in balance and gait, which can limit daily activities of patients.

For these individuals, a step-by-step concept of a comprehensive multimodal and interdisciplinary virtual Rehabilitation is required, with the extreme of the infection's disability, activity limitation, and participation issues being differentiated. The goals of virtual Rehabilitation in COVID-19 are quite similar to those of PR in other pulmonary disorders, improvements in persistent functional physical limitations, performance, endurance, and disability caused by additional organ problems **[4]**. Finally, the participation-oriented aims are the restoration of ability to perform at work and in everyday social life. However, it is known about how well these virtual Rehabilitation goals may be met in post-COVID-19 individuals, especially when

compared to patients with pulmonary disorders who are typically referred to virtual Rehabilitation.

Patients have recovered from acute COVID-19 pneumonia will require medical assistance to characterize and evaluate the disease's repercussions. As it was in the beginning, follow-up is now the new problem for ICUs. Indeed, it's unclear whether COVID-19 will cause long-term lung and/or physical harm, and if so, how severe it will be. In alterations of lung tissue such as ground-glass opacities, vascular thickening, bronchiectasis, pleural effusion, crazy paving pattern, and irregular solid nodules progress in more than 80% of patients. The breathing ability and exchange gases are still limited.

Breathing exercise can restore the normal respiratory pattern, increase respiratory muscle function, improve lung ventilation, reduce dyspnea, and improve lung function, primarily through a range of respiratory exercise and therapy procedures. Exercise can improve respiratory muscle strength and endurance, which can help reduce respiratory muscle fatigue; breathing exercise is a beneficial rehabilitation exercise. Respiratory training is now commonly used in the treatment of a various respiratory illnesses **[5]**.

Exercise at home utilizing a variety of safe, basic, and easy-to-implement routines is ideal for avoiding the airborne coronavirus while also maintaining fitness levels. Strengthening exercises, balance and control activities, flexibility exercises, or a combination of these are examples of such forms of exercise **[6]**.

The short-term goal for patients with mild-moderate respiratory disease is to gradually improve physical and psychological condition using a series of general mobility exercise guidelines and to restore pre-hospital exercise performance.

This concept is referred to the delivered a rehabilitation services over the internet using communication technology. A broader definition encompasses services such as consultation, home care, monitoring, counseling, and patient self-care that are given in a various of settings such as the home, community, health care, and the workplace.

The main goal of this study is to compare the effectiveness of a personalized telerehabilitation intervention for improving FC and QoL in patients diagnosed with COVID-19 after discharge from the hospital to a programme of health education and care in a rehabilitation centre.

Tele therapy is an alternate strategy that can better fulfill the demands of patients with airway and lung impairments, particularly in terms of ease of access and elimination of travel, as well as preventing the spread of COVID-19 by avoiding

human-to-human contact in the case of COVID-19.

The purpose of virtual rehabilitation is to help patients not only improve their physical and mental health, but also return to their families and society more quickly **[7-19]**.

Aims

The aim of the study is to determine the effectiveness of virtual physiotherapy rehabilitation on functional capacity and quality of life in subject recovered from COVID-19.

Objective

1. To determine the effect of virtual physiotherapy rehabilitation to improve functional capacity in subject recovered from COVID-19.
2. To determine the effect of virtual physiotherapy rehabilitation on quality of life in subject recovered from COVID-19.

Methodology: An Experimental study design with samples of 60 subjects of age group with post COVID-19 were included in this study. Subjects were conveniently divided into two groups with 30 subjects in each group. Group A was given virtual physiotherapy rehabilitation and Group B was given Walking with deep breathing exercise for 3 days in a week for three weeks. The duration of this study was of 6 months. The outcome measures used were 6 Minute Walk Test and QOL(COVID-19) scale through which the subjects were assessed pre and post intervention period and final result was analyzed. Inclusion criteria included Age between 20-60 years, willing to fill informed consent, both gender were included, Patient who are able to understand and follow simple verbal instruction

Exclusion criteria: Pregnant women, subjects with complete hearing loss, mentally and physically challenged, completely blind and deaf, the participants receiving any cardiopulmonary fitness training. History of cardiac and chronic pulmonary diseases, thoracic surgery and abdominal surgery.

Group A (Intervention group) – Virtual Physiotherapy Rehabilitation.

Total treatment: 30 min

TREATMENT PROTCOL (GROUP A)

Warm up			
Sr.no	**Exercise**	**Repetitions**	**Duration**
1	**Ankle toe movement**	**20 (reps)**	**3 session/week for 6 weeks**
2	**Ankle rotation**	**20(reps)**	
3	**Wrist rotation**	**20(reps)**	
4	**Arm circle**	**20(reps)**	
5	**Trunk rotation**	**20(reps)**	
Treatment protocol			
Sr. No	**Exercise**	**Repetitions**	**Duration**
1	**Diaphragmatic breathing**	**5 (reps)**	**3 session /week for 6 weeks**

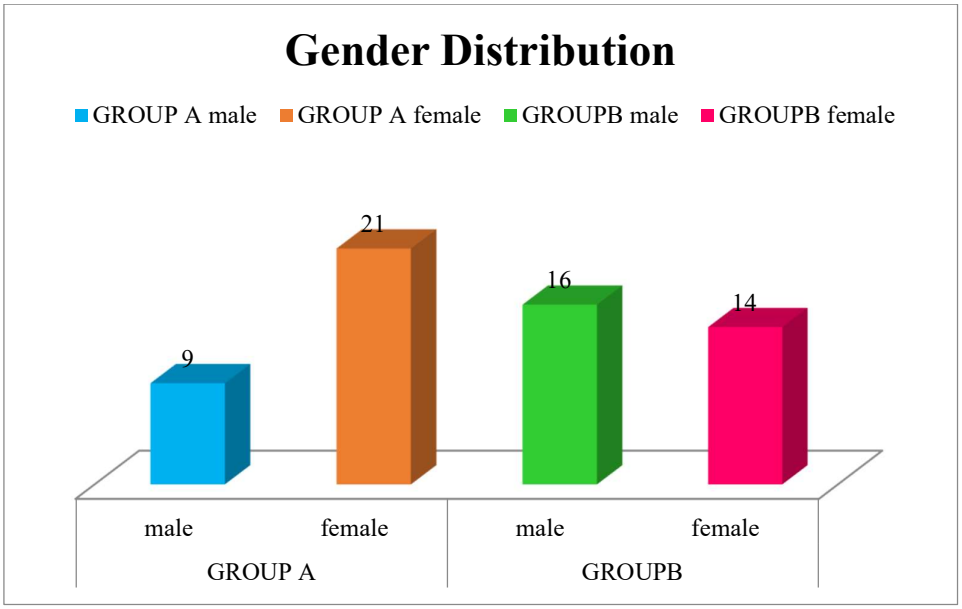
2	Chest mobility exercise	5 (reps)	
3	General mobility exercise	5(reps)	
4	Rest (pursed lip breathing)		
Cool down			
Sr.no	Exercise	Repetitions	Duration
1	Stretching	3	3 session /week for 6 weeks
2	Relaxation position	-	

GROUP B: - 20-30 Min walking with deep breathing exercise.

RESULT:

Distribution by Gender in Group A and Group B.

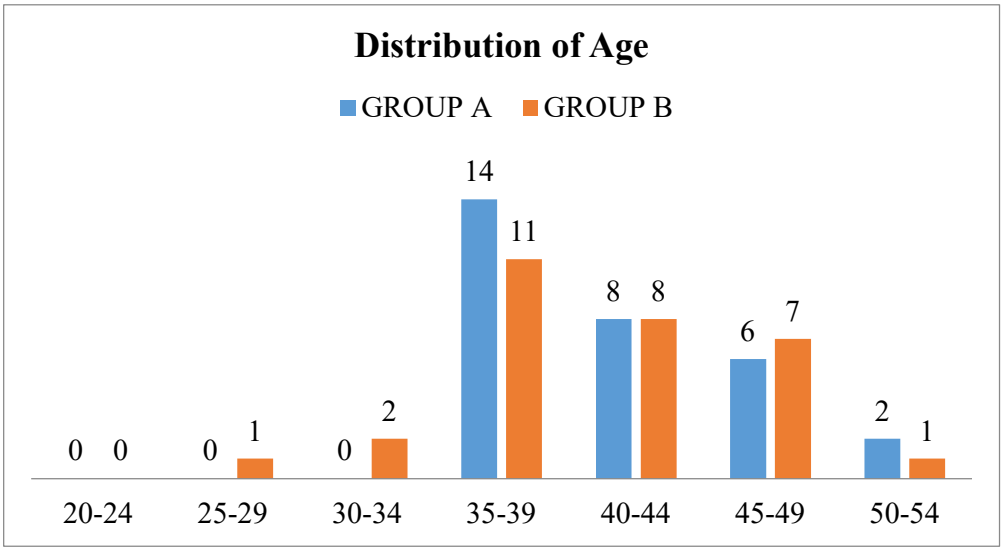
GENDER	GROUP A	GROUP B	TOTAL
Male	9	16	25
Female	21	14	35
	30	30	N=60



Graph 1: Distribution by Gender in Group A and Group B

Table: 2 Distribution by age in Group A and Group B

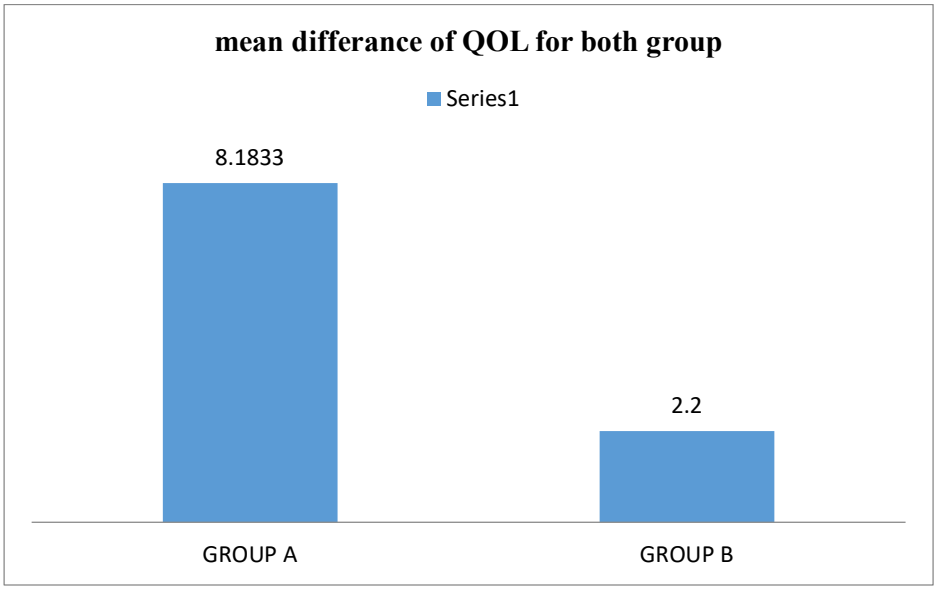
AGE GROUP	GROUP A	GROUP B	TOTAL
20-24	0	0	0
25-29	0	1	1
30-34	0	2	2
35-39	14	11	25
40-44	08	8	16
45-49	6	7	13
50-54	2	1	3



Graph 2: Distribution by Age in Group A and Group B

Table 3: Comparison of mean difference VO2 MAX for both Group (p<0.001)

	Mean	± SD	Z-value	p-value	Test
GROUP A	8.1833	8.4845	3.432	0.001	Mann-Whitney test
GROUP B	2.2000	1.6747			



Graph 3: Comparison of mean difference VO2 MAX for both Group

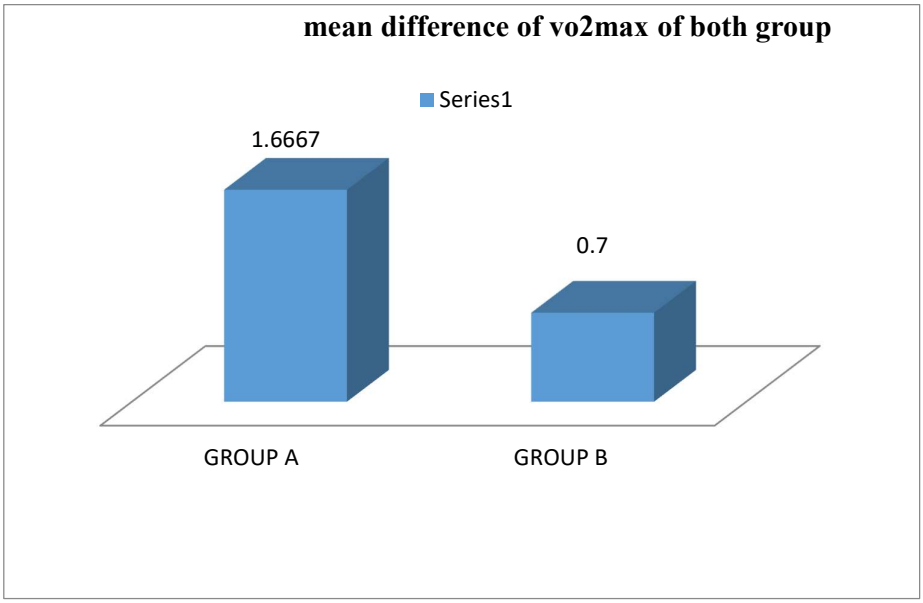
Table 3 shows the inter group comparison of mean difference ODI for both group of intervention. mean difference of VO2max of group A 8.1833 with the SD 8.4845, when it was compared with the mean difference of VO2max of group B 2.2000 after six weeks of intervention with the SD 1.6749; obtained "Z" value was 3.432. This finding had showed that there was significant difference in mean difference of

vo2max in both group.

Table 4 shows the inter group comparison of mean difference QoL for both group of intervention. mean difference of QOL of group A 1.666 with the SD .7581, when it was compared with the mean difference of QOL of group B .7000 after six weeks of intervention with the SD .70221; obtained "Z" value was 4.307. This finding had showed that there was significant difference in mean difference of QOL in both groups. ($p<0.0001$).

Table 4: Comparison of mean difference QOL for both Group ($p<0.001$)

	Mean	± SD	z value	p value	Test
Group A	1.666	.75810			Mann-whitney
Group B	.7000	.70221	4.307	0.001	test



Graph 4: Comparison of mean difference QOL for both Group

RESULT

We took 60 post COVID-19 patients both male and female of mean age 20-50 years. Group A consists of 30 patients, there pre-treatment mean according to 6 MWT was 118.0267 and post treatment mean was 126.210 and according to QOL scale pre-treatment mean was 3.7667 and post treatment was 2.100. This shows there is significant difference in pre and post intervention score in both 6 MWT and QOL scale within Group A with $p<0.005$. While in Group B which consists of 30 patients the mean according to 6 MWT was 131.473 and post treatment mean was 133.673 and according to QOL scale the pre-treatment mean was 3.233 and post treatment mean was 2.5333 which shows there is significant difference in pre and post intervention score in both 6 MWT and

QOL scale within Group B with p<0.005. The mean difference in Group A was 8.1833 and Group B was 2.2000 according to 6 MWT. And the mean according to QOL scale in Group A was 1.666 and Group B was 7000. This shows there is statistical difference in 6 MWT and QOL scale scores between Group A and Group B.

DISCUSSION

The results of the study extend supporting the effectiveness of virtual physiotherapy rehabilitation regimens focusing on FC and QoL in enhancing both measured and self-rated physical performance and functioning. As the goal of the study was to test the efficacy of the interventions at the functional improvements titled "effectiveness of virtual physiotherapy rehabilitation on FC and QoL in subjects recovered from covid-19 in Parul Sevashram Hospital Vadodara."

The outcome measures used were 6 MWT which is a sub-maximal exercise test used to assess functional capacity. The outcome by which to compare changes in performance capacity is the distance covered during a period of 6 minutes. It assesses an individual's functional capability and gives vital information on all systems involved in physical activity, including the pulmonary and cardiovascular systems. During the duration of study there were several problems faced by us in order to complete the study. As the patients were inactive for longer duration of time it was difficult for us to convince them to participate in six week protocol therefore it took us one and a half to counsel them and explain the benefits of the treatment. Also the patients were irregular regarding the treatment session and would fail to attend consecutive virtual physiotherapy rehabilitation session but as they started experiencing change in their body they attended the sessions regularly.

Also there were significant changes in the group A intervention group Patients of COVID-19 may affect the patient's respiratory function. However, this study found that functional capacities were significantly improved after 6 weeks of virtual physiotherapy rehabilitation. **Table 1**, describes about the gender distribution of Group A and Group B amongst the two groups consisting of 30 pts each, of which age ranged between 20-50 years.

In group A the total number of patient is 30 in which male is 9 and the female is 21 and in Group B total number of 30 patient in which male is 16 and female is 14.

Table 3 shows the intra group comparison of VO2max for pre-test and after six weeks of intervention. Pre-test mean of VO2max is 118.0267 when it was compared with the mean of VO2max is 126.21 after six weeks of intervention. This finding had showed

that there was significant difference in VO2max in pre and post-test, which indicates increases in functional capacity.

Table 4 shows the intra group comparison of QOL for group A Pre-test mean of QOL is 3.7667, when it was compared with the mean of QOL 2.100 after six weeks of intervention. This finding had showed that there was significant difference in QOL in pre and post-test.

In the intra group comparison of QOL for group B pre-test mean of QOL is 3.2333, when it was compared with the mean of QOL is 2.5333 after six weeks of intervention. This finding had showed that there was significant difference in QOL in pre and post-test. ($p<0.0001$)

The mean difference in Group A was 1.6667 and Group B was 0.700 according to 6 MWT. And the mean according to QOL scale in Group A was 8.1833 and Group B was 2.2000 .This shows there is statistical difference in 6 MWT and QOL scale scores between Group A and Group B.

Our findings suggest that virtual physiotherapy rehabilitation had a positive impact over the ADLs which was due a marked improvement in VO_2Max capacity as well the RPE. The change was immediately evident after the six weeks protocol. It was seen that the group undergoing virtual physiotherapy rehabilitation had found changes in their FC compared to that of pre intervention state. Also group B had found changes in FC compared to pre intervention but the virtual physiotherapy rehabilitation is more beneficial that walking with deep breathing exercise.

CONCLUSION

This study concluded that both treatments was effective but virtual physiotherapy rehabilitation was more effective physical therapy regimens in improving FC and QOL in post COVID 19 patients compared to the only walking with deep breathing exercise.

Further Recommendation A multi centric study can be conducted by including participants from different geographical areas. The study can be performed by recruiting more patients for better result.

Conflict Of Interest: None

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