The Efficacy Of Online Physiotherapy Management In Improving Mental And Physical Health Among The Patients With Covid – 19.

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Abstract

SARS-CoV-2, a new strain of the bat-related coronavirus, causedsevere acute respiratory syndrome. Pain and fatigue, sleep disturbances, and concerns about their physical appearance, such as hair loss, weight loss, and resuming everyday life are all factors that contribute to their stress and anxiety. The study aimed to investigate the efficacy of virtual therapeutic exercises and controlled breathing exercises in patients with Covid– 19. The sample size ofthis study included 52 people, 26 men and 26 women, with an average age of 52.3 years (SD =10.4 years). The subjects were chosen based on the advice/prescription of a medicalofficer/pulmonologist. The study lasted for eight weeks. The HamiltonStress Anxiety scale was employed as a modified fitness assessment scale. The study was conducted at Symbiosis Medical College for Women in Pune. The statistical analyses were performed usingthe SPSS software version 20, with a 95% confidence interval. The efficacy of the therapeutic exercises was determinedusing a paired t-test. The significance level for each test was set top < 00.05. According to this study, online physiotherapy exercise improves mental and physical health among patients with Covid -19.

Keywords: Covid – 19 therapeutic exercises, Active exercises, Breathing exercises, Covid – 19 stress management, Deep breathing exercises.

I.   Introduction

A new origin of β-coronavirus, which is intimately linked to bats, caused severe acute respiratory syndrome (SARS- CoV-2) in humans, and that was named coronavirus disease (Covid - 19) [1]. According to the World Health Organization (WHO) report, the pandemic outbreak of Covid–19 affected 32,110,656 and caused 980,031 deaths worldwide as of September 2020 [2]. No adequate or promising antiviral drugs are available for Covid–19, and the drugs used in casualtiesare based on the results of in vitro studies and expert opinions [3]. The incubation period of Covid – 19 is 14 days, with varying clinical symptoms from asymptomatic with or without mild respiratory disease to symptomatic with and severe pneumonia [4]. Implementing prolonged shutdowns following the declaration of Covid – 19 as a globalpandemic, resulted in the loss of livelihoods and a severe decline in the global economy [5]. The global healthcare system facedinsufficiency in accommodating patients for ventilator support, discrepancies in medical staff and drugs totreat the patients, and partial or entire disruption in routine treatment of non–communicable diseases such as diabetes, hypertension, etc. cancer [6].

The clinical symptoms of Covid - 19 range in different stages; stage – 1 is characterized by fever, muscle pain, fatigue and upper respiratory tract infection; diarrhoea, vomiting or nausea are less frequent [7]. The onset of breathlessness and pneumonia defines stage – 2. Stage – 3 is characterized by severe adult respiratory distress syndrome (ARDS) due to vasculopathy and thrombosis of blood vessels in the lungs [8].Stage – 4 is characterized by recovery or death; mortality is associated with comorbidities, disease severity, respiratory failure and advanced age [9]. Stage – 1 may or may not require primary medical treatment, while stage – 2 requires medical treatment with or without hospitalization based on the severity of pneumonia [10]. Stage – 3 required compulsory hospitalization in the intensive care unit (ICU) with or without ventilator support based on pneumonia severity [11]. Patients in stage – 4 require compulsory mechanical ventilatorsupport, and studies have reported that the mortality rates of the patients in the ICU range from 50 – 65%; and around 30 – 40% of the patients recover from the disease andwere discharged with some residual features [12]. The mortality rateof patients under ventilator support was

around 90 – 95% [12].Due to their low pulmonary secretion load, patients with covid – 19 did not required any intensive or invasive airway clearance. [13]. Physiotherapists can provide rehabilitation and non-invasive treatment to improve the ventilation of the respiratory system [14]. Due to the Covid-19pandemic, medical centres and hospitals focus entirely on patients with Covid cases and other symptoms [15].

Studies reported that patients who have suffered from Covid -19 are experiencing long-term impairment and disability. Pain and fatigue, sleep disturbances, and worry about their physical appearance likehair fall, weight loss, and returning to everyday life elevate their stress and anxiety levels [16]. No prior research has been reported regarding the effects of online therapeutic exerciseson physical and mental health among patients with COVID-19. Therefore, the present study aimed to investigate the impact of virtual therapeutic exercises and controlled breathing techniques in enhancing patients' physical and mental health with Covid - 19.

II.   Methods

Study design
The present study is an interventional exercise study through a virtual platform. The sample consisted of 52 participants, 26 women and 26 men, with a mean age of 52.3 years (SD = 10.4 years). All volunteers were explained about the study, and their roles and consent were obtained. Only the patients prescribed physiotherapy treatment by a Medical officer/Pulmonologist were included. Prior the start of the intervention, each participant underwent a fitness assessment, the Hamilton stress anxiety test. The exercise intervention was provided through an online platform (Zoom) as a group activity for eight weeks.

Procedure
The participant's height (H.T.) and weight (W.T.), vital parameters such as Heart rate (H.R.), blood pressure (B.P.) and peripheral oxygen saturation (SpO2) were measured using a standard scale and devices. The American College of Sports Medicine (ACSM) fitness scale was modified according to the Covid – 19 patients to assess their fitness levels [17].

Assessment tools
ACSM was used to assess the participant's fitness level, while the Hamilton Stress and anxiety scale (HSAS) [18] was used to assess the subjects' mental health. The HSAS is a self-assessing subjective tool used to measure anxiety and stress levels. Before and after 8weeks of intervention, the changes were recorded. HSAS was used to assess stress and anxiety levels. The patient was asked to read the questionnaire and indicate how they felt. ACSM are a set of exercises designed to assess the fitness level of the subjects, including flexibility, muscular strength, and endurance.

Intervention
The rehabilitation program consists of 8 weeks of physical fitness exercises, breathing techniques and mindfulness training. The specifics of the exercise prescription are mentioned in (Table 1).

General fitness exercises	
Warm-up	Standing low step kicks, mild to Moderate aerobics (8 – 10 min/session)
Stretching	All the major upper and lower limb muscles (8 – 10 min/session)
Cardiovascular training	Mild to moderate walking (15 – 20min/session) METs (1.3 – 2.7)
Core and abdominal exercises	Pelvic strengthening (bridging) – 30sec x 3 sets/session
Muscle strengthening	Supported squats, shoulder lateral, front and rear exercises, modified pushups, standing calf raises, 15 – 20 reps, 3 – 4 sets, tempo 3:2:4, 30sec – 60sec rest.
Controlled breathing training	
The patient was instructed to take a deep breath in through the nose for four counts, hold the breathed air for six counts, and breathe out forcefully for eight counts through the mouth, followed by a huffing technique.	

Table 1. Exercise intervention (heart rate and O₂ saturation were monitored throughout during exercise program (mets: metabolic equivalents, reps: repetitions, sec: second, min: minute)

III. Results

SPSS version 20 software was used to observe the statistical evaluation. Descriptive statistics calculated mean and standard deviations (S.D.) as shown in Table 2. The effectiveness of the intervention was observed using the paired t-test. All the tests were performed and executed at a 95% confidence interval, and the significance level was $p < 0.05$. As a result of the intervention for physical and mental health provided for Covid – 19 patients, significant improvement among the participants were observed and was tabulated in Table 3 respectively.

Age mean(SD)	Weight mean(SD)	Height mean(SD)
52.3(8.3)	66.9(6.4)	167.3(4.2)

Table 2. Characteristics of subjects, S.D. – standard deviation

Sn	Parameter	Mean(SD)		n = 52, 95% C.I	
		Pre - Assessment	Post - Assessment	t	$p -$
1	Flexibility	−2.1(4.2)	3.3 (4.4)	10.12	<0.001*
2	Muscle endurance	22.53 (5.17)	29.13 (5.42)	10.52	<0.001*
3	Muscle strength	52.32 (11.98)	60.29 (9.26)	11.42	<0.001*
4	Cardiovascular endurance	12.28 (2.12)	10.92 (1.18)	11.24	<0.001*
5	Hamilton Stress and Anxiety Assessment Scale	24.21 (4.2)	11.18 (3.8)	10.84	<0.001*
6	Oxygen saturation level	91.2 (4.6)	98.3 (3.8)	11.6	<0.001*

Table 3. Evaluation of physical and mental health parameters in covid – 19 patients before and after an intervention. CI – confidence interval

IV. Discussion

The key findings of this first virtual therapeutic exercises study on the COVID-19 patients are summarized. The structured therapeutic and breathing exercises program effectively improved fitness levels and caused a significant reduction in anxiety level among 52 participants in 8 weeks. Gigliotti F 2003 [19] stated that regular breathing exercises for a minimum of 4 weeks will be effective in improving the respiratory gaseous exchange by increasing the flexibility of the ribcage, boosting the efficiency of respiratory muscle activity and decreasing the stress levels and blood pressure. In the present study regular physical exercises and controlled breathing were implemented among the patients recovering from Covid – 19, which showed a remarkable improvement in the fitness and O₂ saturation level as shown in table 3. When compared the present study with the study of Gigliotti F 8 weeks of consistent physical and breathing exercises brought about a significant positive changes thus we agreed with Gigliotti F study.

The National Institute for Health and Care Excellence (NICE) [20] has recommended the graded physical and breathing exercises for the patients recovering from Covid – 19 to manage the post – viral complications such as fatigue and myalgia. In the present study, graded physical and breathing exercises were implemented and positive changes had been observed in the muscle endurance, strength and flexibility as shown in table 3. Sivakumar G 2011 [21] performed deep breathing exercise among 50 heart failure patients for 30 days and observed a positive changes from 92.3%±0.4 to 93.7%±0.4 (19). Similarly in the present study controlled breathing

given for eight weeks among the patients recovering from Covid – 19, indicated an increase in the O_2 saturation from 91.2(4.6) to 98.3(3.8) as shown in table 3.

Active exercise indicates cardiac rehabilitation to improve respiratory perfusion and ventilation. Active and deep breathing exercises are proven to improve pulmonary function and reduce stress levels [22]. Regular physical activity improves the strength and endurance of the muscles and improves the pulmonary ventilation by increasing the circulation to the heart. The study also recommends that regular physical exercises and aerobic training with proper breathing patterns will improve the physical and mental status of the patients with Covid – 19.

V.   CONCLUSION

The digital healthcare system plays a significant role during and after the Covid 19 pandemic. The future medical industry mainly depends on the digital healthcare system to provide community healthcare. Patients with non-communicable diseases and those undergoing regular treatment or medical advice can be consulted online. Only emergency cases or patients in need of advanced medical attention or invasive procedures can be consulted in person with the health specialist. The present study recommends that the digital healthcare system provide the most efficient healthcare and avoid cross infections by visiting the hospitals for regular treatments.

Lack of fitness and the weakness of the respiratory muscles are significant contributors for the increased mortalities in Covid – 19 patients. This study reports that physical exercises and controlled breathing techniques yeilded the best results among the patients recovering from Covid - 19. This is the first study to plan and execute the exercises through an online (zoom) platform. To improve the fitness level and reduce stress levels, a combination of modified fitness exercises and breathing exercises must be prescribed and executed.

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