

# Effect of Circuit Training on Fatigue in Pulmonary Rehabilitation in Post-COVID Survivors.

Trupti Patil \*<sup>1</sup>, Poonam Patil <sup>2</sup>.

<sup>1</sup> Intern, Krishna Institute of Medical Sciences “Deemed to be” University, Karad, Maharashtra, India.

<sup>2</sup> Assistant professor of Cardiopulmonary Sciences, Krishna Institute of Medical Sciences “Deemed to be” University, Karad, Maharashtra, India.

## ABSTRACT

**Background:** The patient recovered from Coronavirus infection and developed post-Coronavirus complications. Coronavirus will cause a month-long period of clinical symptoms, including fatigue, post-exercise discomfort, and breathlessness. A post-COVID-19 syndrome is a name given to this disorder. Fatigue is the main persistent symptom after covid infection.

**Aims:** To study the effect of circuit training on fatigue in pulmonary rehabilitation in post-covid survivors.

**Methods and Material:** forty subjects post-covid survivors between the age group of 20-50 years, were selected for the study. They were bounded in a single group. The pre and post-treatment outcome measure was the fatigue assessment scale, borg scale, and 6-minute walk distance test used. The circuit training program was given to the subject which included warm-up exercises, specific exercises, strengthening exercises, and cool-down exercises for four weeks.

**Statistical analysis used:** Statistical analysis was done by using INSTAT software, version 3.06 with paired *t* test.

**Results:** In a conducted study, Fatigue assessment score, Borg score, and 6 min walk distance test showed statistically significant difference between pre- and post-treatment values.

**Conclusions:** This study concludes that circuit training program had significantly improved clinically and statistically fatigue in post-covid survivors.

**KEYWORDS:** Circuit Training Program, Fatigue, Post-Covid Survivors, Pulmonary Rehabilitation.

**Address for correspondence:** Dr. Poonam Patil, Assistant Professor, Department of Cardiopulmonary Sciences, Faculty of Physiotherapy, KIMS “Deemed To Be University”, Karad, Maharashtra, India. Pin 415110 Phone number-8806111153 **E-Mail:** [dr.ppatil8388@gmail.com](mailto:dr.ppatil8388@gmail.com)

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## INTRODUCTION

A severe respiratory illness Covid 2 (SARS-CoV-2) is the bacterium responsible for the Covid sickness (Coronavirus) pandemic in 2019, which has resulted in widespread medical catastrophes and stressed health-care resources. As the number of people recovering from COVID-19 rises, it's more important than ever to gain a grasp of the medical difficulties that

surround them. Coronavirus is now thought to be a multi-organ infection with a variety of symptoms. Similar to the post-intense viral circumstances described in survivors of earlier deadly Covid outbreaks, there are increasing reports of long-term effects following intense COVID-19 infection [1]. The patient recovered from Coronavirus infection and developed post-Coronavirus complications. Coronavirus

will cause a month-long period of clinical symptoms, including fatigue, post-exercise discomfort, breathlessness, migraine, and a number of other neurocognitive conditions. A post-COVID-19 syndrome is the name given to this disorder [2].

Fatigue is characterized as a multi relaxed, complex sensation in which we can incorporate physiological, mental, and situational parts. Fatigue influences functional limits which have been found in patients with a chronic disorder [3]. Patients recovering from COVID-19 frequently experience a feeling of tiredness and exhaustion both physically and mentally.

Those are who admitted in intensive care unit(ICU) due to severe COVID-19 are at high risk of developing ICU-acquired weakness as well as disuse syndrome [4,5].

During illness, the patient will probably have lost some weight and muscle strength, and joints may be stiff. It is estimated that the patient will have lost 2% of muscle mass each day during the illness [6].

Overpowering proof exists that practice that produces short-middle-and long-term medical advantages that prevent, delay, moderate, and, even reverse a large number of metabolic, respiratory, cardiovascular, and Musculoskeletal have benefited from participants in aerobic exercise [7-10].

**Pulmonary rehabilitation:** Pulmonary rehabilitation designed to improve the physical and psychological condition of people the long-term adherence to health-enhancing behaviors [11]. Pulmonary rehabilitation is use by associative team to correct the physical fitness, reduce symptoms and improve health care costs of patients with chronic respiratory complaints. Exercise training effects of decreased heart rate, respiratory rate, oxygen consumption, and carbon dioxide production it also increased maximal aerobic capacity [12]. benefits of pulmonary rehabilitation are improved functional capacity, reduced dyspnea and fatigue, and improve health-specific quality of life. The program usually consist of exercise training, education and psychosocial/behavioural components [13].

**Circuit training program:** Circuit training can be defined as a combination of resistance-based aerobic activities with a short duration to complete each station [14]. The circuit training program that utilizes endurance exercises is improving in working on cardiopulmonary parameters by working on the most extreme oxygen consumption. greatest pneumonic ventilation, functional capacity [15].

Therefore the purpose and objective of the present study was to find the effect of circuit training for improve fatigue level, physical activity and to improve exercise tolerance.

## METHODOLOGY

This was a study to find the effect of circuit training on fatigue in pulmonary rehabilitation in post-covid survivors. The study was done in Karad area. The participants were selected according to the inclusion and exclusion criteria. A total 40 subjects were taken as mentioned in the inclusion criteria. The sample size was obtained from Karad. The inclusion criteria were subjects with the age group between 20 and 50 years and subjects who have recovered from covid infection. The exclusion criteria were subjects with any co-morbidity, any previous history of cardiopulmonary surgery, any orthopaedic, psychiatric and neurological condition. Demographic data of the subjects were taken. Prior consent and patient information form was taken. The aim and procedure were explained to the subjects in their preferred language before data collection. Pre and post- assessment was done by fatigue assessment scale, Borg scale for fatigue level measured asking questionnaire. 6 min walk distance test use for assess the patient exercise tolerance. Participants received circuit training program for 5 times/ week. The effect of treatment was noted using outcome measure. The study duration was 4 week. The experimental results were statistically analysed.

**Circuit training program protocol:** Exercises are warm-up period for 10 min and includes free neck exercises, free arm and leg exercises; Specific exercises program for 15 min and includes walking on spot, brisk walking, slow jogging; Strengthening exercise program for

15 min and includes upper extremity and lower extremity exercises with resistance band; Cool-down period for 10 min and includes walking on spot in rhythm, shoulder shrug, shoulder circumduction, marching in sitting, ankle movement in circumduction, stretching exercises for upper and lower extremity.

**Outcome Measure:**

**Fatigue Assessment Scale (FAS):** The FAS is a 10-item evaluating symptoms of chronic fatigue. The FAS is self-report, paper-and-pencil measure requiring approximately 2 min for administration. Each item of the FAS is Answered utilizing a five point. Liker-type scale going from 1 (never) to 5 (consistently).

**Borg Scale:** The borg scale is a tool for measuring an individual’s effort and exertion, breathlessness and fatigue during physical walk.

**6 minute walk distance test:** The 6 min walk distance test is sub-maximal exercise test used to assess aerobic capacity and endurance. The distance covered throughout a period of 6 minute is utilized as result by which to look changes in performance capacity.

**Statistical analysis:** The paired t-test and one sample test were used for analysis of data. Statistical analysis of recorded data was done using the software INSTAT version 3.06

**Table 1:** Result of Age and Gender wise distribution.

Age and Gender wise distribution			
Age Group	Subject	Gender	
20-30 years	5	1	4
31-40 years	15	6	9
41-50 years	20	11	9

**Interpretation:** Table 1 represents three age groups, i.e., 20-30 years which consist of 5 subjects (male -1 and female – 4), age group 31-40 years which consist of 15 subjects (male- 6 and female-9) and in age group 41-50 years which consist of 20 subjects (male- 11 and female- 9).

**Table 2:** Result of Fatigue Assessment scale.

Fatigue Assessment Score				
	Pre	Post	P Value	Interference
Mean±SD	44.800±3.204	23.950±1.839	<0.0001	Extremely significant

**Interpretation:** In the present study, pre-interventional mean and standard deviation

of fatigue assessment score was 44.800±3.204, whereas post-interventional mean and SD was 23.950±1.839. It concluded that interference was considered extremely significant.

**Table 3:** Result of Borg Scale.

Borg Score				
	Pre	Post	P Value	Interference
Mean±SD	16.600±1.516	8.425±1.670	<0.0001	Extremely significant

**Interpretation:** In the present study. Pre-interventional mean and SD of Borg score was 16.600±1.516, whereas post-interventional mean and SD was 8.425±1.670. It concluded that interference was considered extremely significant.

**Table 4:** Result of 6 minute walk distance test.

6 minute walk distance				
	Pre	Post	P Value	Interference
Mean±SD	330.00±39.807	550.00±46.847	<0.0001	Extremely significant

**Interpretation:** In the present study. Pre-interventional mean and SD of 6MWD test was 330.00±39.807, whereas post-interventional mean and SD was 550.00±46.847. It concluded that interference was considered extremely Significant.

**DISCUSSION**

As the number of people recovering from COVID-19 rises, it’s more important than ever to gain a grasp of the medical difficulties that surround them. Coronavirus is now thought to be a multi-organ infection with a variety of symptoms. Similar to the post-intense viral circumstances described in survivors of earlier deadly Covid outbreaks, there are increasing reports of long-term effects following intense COVID-19 infection [1]. The patient recovered from Coronavirus infection and developed post-Coronavirus complications. Coronavirus will cause a month-long period of clinical symptoms, including fatigue, post-exercise discomfort, breathlessness, migraine, and a number of other neurocognitive conditions. A post-COVID-19 syndrome is the name given to this disorder. Fatigue is characterized as a multi relaxed, complex sensation in which we can incorporate physiological, mental, and situational parts.

This research was undertaken with the aim to study the effect of circuit training on fatigue

in pulmonary rehabilitation in post-covid survivors.

The study was carried out and the result was by Fatigue assessment scale, Borg scale, 6 min walk distance test.

The study was carried out in Karad area. Subject with a sample of 40 were selected for inclusion and exclusion criteria. Participants fulfilling inclusion criteria were recruited in the study with a sample of 40. A total of 40 earlier assent and data structure were taken. The aim and methodology were explained to the participants in their preferred language before data collection.

pre- and pos-assessment was done by fatigue assessment scale, Borg scale for fatigue level, and 6 min walk distance for exercise tolerance.

Participants received circuit training exercises for 50 min for 3 times/week for 4 weeks of protocol.

In a previous study [16], the 6 min walk distance test outcome showed no statistically significant difference among groups, but it was found to be substantially lower. However, the results from the present study were significantly different from the previous study. Accordingly, the patients in this study have increased and statistically significant in 6 min walk distance test after post-intervention.

The exercise training improves the cardiovascular endurance and fitness, that increase the circulation of oxygen in the body which improve functional capacity and helps in the daily living activities. The circuit training is effective to improve cardiovascular endurance and maintenance of functional quality of life [17]. This research was undertaken with the aim to study the effect of circuit training on fatigue in pulmonary rehabilitation in post-covid survivors.

This study included total 40 participants 18 male and 22 female participant who had completed 6 weeks after the COVID-19 infection. This study is conducted in single group with the age group from 20-50 years. The pre outcome measure was fatigue assessment scale, Borg scale and 6 minute walk distance test. Fatigue assessment score and borgscore was measure by asking the

questions to the participants, and 6 minute walk distance test was measure by asking the participant to walk briskly for 6 minutes. The circuit training program was explained and demonstrated to the participants which was included warm-up exercise, specific exercises, strengthening exercise, and cool-down exercises. Post treatment outcome measure were performed using fatigue assessment scale, borg scale and 6 minute walk distance test. Statistical analysis was done using paired 't' test and one sample test.

In the study, the pre-intervention Fatigue assessment score was  $44.800 \pm 3.204$ , whereas post intervention the score was  $23.950 \pm 1.839$ . In fatigue assessment score statistically extremely significant difference and decreasing fatigue level score after post-intervention with  $p < 0.0001$  with  $t=35.694$  with 76 degrees of freedom. In the study, pre-intervention Borg score was  $16.600 \pm 1.516$  and post-intervention borg score was  $8.425 \pm 1.670$ . In borg score statistically extremely significant difference and decreasing borg score after post-intervention with ( $p < 0.0001$ ) with  $t=21.521$  with 78 degree of freedom.

In the study, Pre-intervention 6 min walk distance was  $330.00 \pm 39.807$  whereas post-intervention 6 min walk distance was  $550.50 \pm 46.847$ . In 6 min walk distance extremely significant defference and increasing 6 min walk distance after post-intervention with  $p < 0.0001$  with  $t= 22.685$  with 78 degrees of freedom.

## CONCLUSION

In the review, the fatigue level is decreases, and 6 minute walk distance is increases after the intervention. Consequently, the above study concludes that circuit training programs in pulmonary rehabilitation had significantly improved clinically and statistically fatigue in post-covid survivors.

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**Ethical Clearance:** Study approved by Instotitutional Ethics Committee of Krishna Institute Of Medical Sciences, Karad

**Conflicts of interest:** None

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