Research Article

Cardiopulmonary Endurance in Post COVID-19 Patients

Asi Pavani Reddy[1] and Nagarjuna Narayanasetti[2]*

[1]*BPT Intern, GEMS College of Physiotherapy, Ragolu, Srikakulam, Andhra Pradesh, India*

[2]*Associate Professor, GEMS College of Physiotherapy, Ragolu, Srikakulam, Andhra Pradesh, India*

***Corresponding Author:** Nagarjuna Narayanasetti, Associate Professor, GEMS College of Physiotherapy, Ragolu, Srikakulam, Andhra Pradesh, India.*

ORCID ID: 0000-0002-1379-6402

Abstract

Long periods of free-movement Restrictions may negatively affect Cardio-Pulmonary fitness and health. As, the COVID-19 virus primarily affects Respiratory system, and also associated with cardiovascular disease, can induce the following complications like thrombosis, myocardities, Interstitial pulmonary fibrosis, diffuse alveolar damage and persistent decline in lung function, as the lung capacity decreases it may results in decrease in Cardio Pulmonary endurance. The Present study investigated changes after the COVID-19 confinement in total distance covered in 6 minutes by patients and correlation between 6 minutes walk test vs. oxygen saturation; Results suggest that the Mean ± SD of age is 43.4 ± 10.8years. Male: Female 1:0.5.Mean ± SD of total distance walked in 6 minutes by patients is 443.5 ± 55 compared with Hypothetical mean (normative value) is 571 ± 90.Correlation between Total distance walked in 6 minutes vs. oxygen saturation is r = 0.055.

Conclusions: The Results indicate that there is a change in Cardio-Pulmonary Endurance in Post COVID-19 Patients, There is no correlation between 6 minute walk distance vs. oxygen saturation.

Keywords: COVID-19; SARS-COV2; Oxygen Saturation; 6 Minute Walk Test

Abbreviations

WHO: World Health Organization; COVID-19: Corona Virus Disease 2019, SARS-COV2: Severe Acute Respiratory Syndrome Corona Virus 2; ARDS: Acute Respiratory Distress Syndrome; RT-PCR: Reverse Transcription Polymerase Chain Reaction; Spo2: Oxygen Saturation; 6MWT: Six Minute Walk Test

Introduction

The outbreak of the novel severe Respiratory syndrome corona virus (SARS-COV-2) infection has presented a Global Public-health emergency. although predominantly, a pandemic of the acute respiratory disease (COVID-19) results in Multiorgan damage that impairs Cardio-Pulmonary Function and reduces Cardio Respiratory Fitness [1].

The Clinical Presentation of COVID-19 Patients is varied and can include the following symptoms fever, cough, breathlessness, fatigue and anosmia, Most infected people develop a mild to moderate form of disease and Recover without Hospitalization [2]. age and presence of one or more Co-morbities such as obesity or diabetes have an important part in the development and severity of the disease [1].

systematic inflammation associated with the SARS-COV-2 virus can induce Cardio-vascular and pulmonary sequelae such as thrombosis, myocardities, diffuse alveolar damage or interstitial Pulmonary Fibrosis that appear to persist after the diagnosis of COVID-19 [3,4].

As, the COVID-19 virus primarily affects the Respiratory system, Many studies showed that decreased diffuse capacity, and persistent decline in lung function, as the lung capacity decreases, In COVID-19, decrease lung function is associated with decrease ventilation and oxygen intake especially [5]. During intense activity is associated with increased Incidence of Cardiovascular disease and Death [6]. This study shows the cardio-Pulmonary Endurance in Post-COVID-19 Patients by Performing 6 Minute walk test.

Therefore, the Aim of the study was to Evaluate Cardio-Pulmonary Changes after the COVID-19 Confinement.

Methods

Design and study population

An Observational Study to Evaluate Cardio-Pulmonary Endurance was conducted by using a sample of 40 subjects were recruited from the GEMS College of Physiotherapy, subjects aged between 20 and 60 years and meeting the inclusion criteria were included in the study. Study Permission was taken from GEMS and Hospital and GEMS College of Physiotherapy to conduct Study.

Post COVID-19 Patients were identified from Hospital records and Reference. Identified Subjects were approached and study objective and procedure was explained. Informed consent was taken from the subjects who are willing to participate in the Study and subjects were explained about the Examination they were going to be perform. They were requested for their Persistence and co-operation doing the study.

6 Minute walk distance and oxygen saturation

Six minute walk test is used as a tool for the Measurement of functional status of the patients. The 6 Minute walk test should be Performed Preferably indoors, on flat, straight, hard surfaced corridors usually at least 30m long.

Before 6minute walk test, ensure that you have obtained a Medical history for the patient and have taken into account of any Precautions or contraindications to exercise testing.

The Participants should rest for at least 10 minutes before beginning the 6 Minute walk test. Instruct the Participants to dress comfortably, wear appropriate foot wear. Explain about the test procedure to the Participants, once the participant has understood the instructions. He/she is ready to begin the test. And record the oxygen saturation levels.

During the test, oxygen saturation levels to be recorded before and after the test. The walking course must be marked for every 5 minutes with coloured tape and it is advisable to place cones in the turn rounds. The Participants were instructed to walk from 1 end of the corridor to other as fast as they can for 6 minutes. The supervisor is always present giving encourament to the patient with standard phrases such as "you are doing well "at the end of the test supervisor records the oxygen saturation levels and, 6 minute walk distance covered by the Participants [7,8].

Statistical analysis

Data was analysed by Microsoft excel and graph pad prism software 3.1. Data was summarized by Mean ± SD for continuous normal data. All p values < 0.005, were considered as statistically significant. The correlation between total distance in 6 minutes vs. oxygen saturation was done by Karl Pearson correlation test. The correlation between total distance in 6 minute vs. oxygen saturation r = 0.055, p value = 0.781, that implies there is no significant correlation between total distance walked in 6 minutes vs. oxygen saturation.

Results

Age (years)	No. Of subjects	% of subjects
20 -30	6	15.0%
30-40	10	25.0%
40-50	13	32.5%
50-60	11	27.5%
TOTAL	40	100%

Table 1
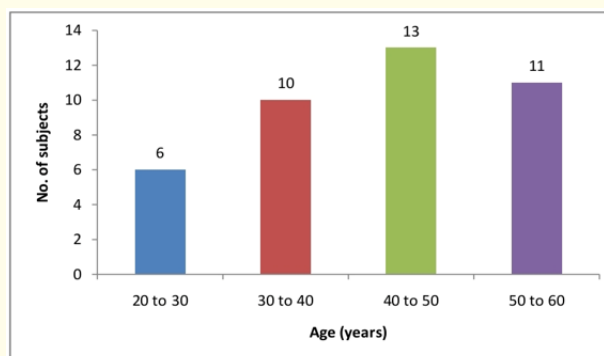
Graph 1: The graph for the age distribution of all subjects.

| Gender	No. Of subjects	% of subjects
Female	14	35%
Male	26	65%
Total	40	100%

Table 2: The Gender distribution of all subjects.
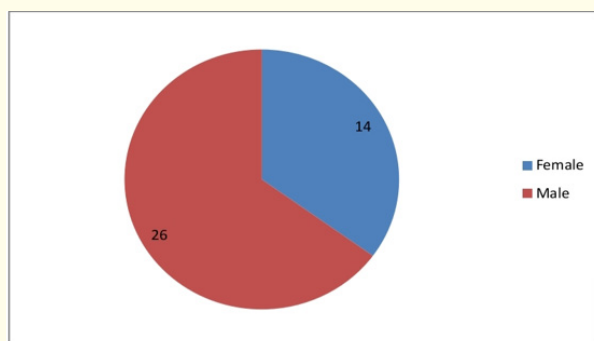
Graph 2: The pie diagram for the gender distribution of all subjects.

Total distance in 6min (Mtrs)	No. of subjects	% of subjects
300-350	3	7.5%
350-400	3	7.5%
400-450	15	37.5%
450-500	13	32.5%
500-550	6	15.0%

| Group	Mean	SD	(One sample t test) t Value	p Value
Total distance in 6min	443.55	55.591	50.339 with 78 degree of freedom	<0.0001 (Extremely significant)
Hypothetical Mean	571	0		

Table 3: The total distance in 6min distribution of all subjects.
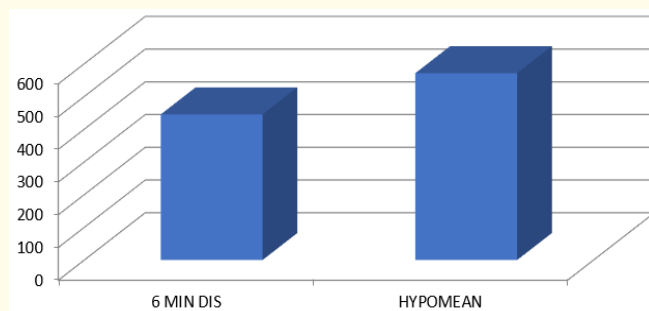
Graph 3: The graph for the total distance in 6 minutes compared with Hypothetical mean distributions of all subjects.

	N	r-value	p-value
Total Distance in 6min Vs Oxygen saturation	40	0.055	0.781

Table 4: The correlation between total distance in 6 minutes vs oxygen saturation in all subjects.
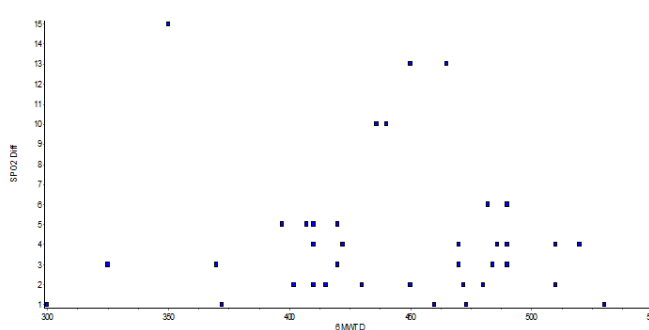
Graph 4: The scattered diagram for the correlation between total distance in 6mins vs oxygen saturation.

A total of 40 Participants were included and examined for eligibility criteria .All the participants were met the inclusion criteria are included and taken into the study and there is no drop-outs in the study.

The participants of the study were predominantly males (26 subjects) the Mean age of the participants was 43.4 ± 10.8 years.

The minimum and maximum age is 23 and 60 years. The Mean ±

SD is 43.4 ± 10.8,the age group 20 and 30 years is 6 (15%),the age group 30-40 years is 10 (25%).and the age group 40-50 years is 13 (32.55%).the group 50-60 years is 11 (27.5%).

The minimum and maximum of total distance in 6 minutes is 300and 550.The Mean ± SD of total distance in 6 minutes is 443 ± 55.5.The total distance in 6 minute group 300-350 is 3 (7.5%), the total distance in 6 minute group 400-450 is 15 (37.5%), the total distance in 6 minute group 450-500 is 13 (32.5%).the total distance in 6 minute group 500-550 is 6 (15%).The correlation between total distance in 6 minutes vs. oxygen saturation is r = 0.055.

Discussion

The study was conducted to investigate the CARDIO-PULMONARY ENDURANCE in COVID-19 patients and correlation of 6 minute walk distance with oxygen saturation in Post COVID- Patients.

An observational study, in this study 40 patients who met the inclusion criteria were included.

As COVID-19 virus primarily affects the respiratory system, previous study shows decreased diffusion capacity and persistent decline in the lung function. As the lung function decreases after COVID, Rapid decline in lung function was associated with a greater incidence of heart failure and other cardiovascular disease.

The study supported by Ruben lopez-Bueno., *et al.* (2021) [9]. Showed that there is a changes after COVID-19 confinement in maximal oxygen intake (v_{o2}max) levels in a sample of 89 Spanish school children aged 12 and 14 years at baseline (49.8%) girls. The 20m shuttle run test served to estimate $_{vo2}$ max before and after the COVID-19 confinement. Paired T test estimated an overall difference of -0.5ml kg minute(SD-0.3) (P = 0.12), where as the highest significant reduction were observed for girls aged 14 years (-1.5mmkg minute) SD (0.6) p = <0.05,boys aged 14 years showed a slight increase (0.4mlkg minute) (SD = 0.5) (p = o.44), where as boys aged 12 years presented an imported decrease (-12 mlkgs minute) (SD-0.7) (p = 0.14).All the examined sub groups showed lower levels in relation to a normal v_{o2} rate development ,results indicate that COVID-19 confinement might delay the normal development of v_{o2} max.

- **AGE:** Table 1 graph 1 shows the Mean ± SD of age is 43.4 ± 10.8 years, the age group 20-30years is 6 (15%), the age group30-40yearsis 10 (25%), the age group 40-50 years is 13(32.5%), the age group 50-60 years is 11(27.5%).
- **GENDER:** Table 2 graph 2 shows that female and male is 14(35%) and 26 (65%). present study found Male: Female is 1:0.5.
- **6 MIN walk distance test:** Table 3 graph 3 shows that minimum and maximum of total distance in 6 mins is 300 and 500.
- **Correlation between 6 min walk test and oxygen saturation:** Table 4 graph 4 shows that correlation between total distance in 6 mins vs. sp_{o2} is r = 0.055 that means there is no significant correlation between total distance in 6 min vs. sp_{o2}.

Strengths, Recommendations and Limitations of the study

The strengths of the current study comprise the different aged men and women with the available data on several life style-related factors assessed by standardised methods and another strength is the highly corresponding results obtained using either the sex-and age-matched controls or all eligible controls in the analyses. Another, Strength is that most of the eligible subjects chose to participate in the measurements.

Limitations of the include study are the limited sample size (40) and study population was limited to those who are able to attend the GEMS; this excluded the patient who could not attend the test due to financial, transport, work or other reasons. Another Limitation is the Patients with Co-morbidity could not be measured objectively.

Long follow up of patients is recommended in further studies/ recommendations to see long term effects of COVID-19 on Cardio-pulmonary endurance. And uses of different measures for measuring distance and vitals during 6 min walk distance test are recommended.

Conclusion

The Results indicate that there is a change in Cardio-Pulmonary Endurance in Post COVID-19 Patients, there is no correlation between 6 minute walk distance vs. oxygen saturation.

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