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"Impact of coronavirus disease 2019 on functional capacity in post COVID-19 patients"

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ABSTRACT*: *Background: *The global spread of the 2019 coronavirus disease (COVID-19) has had a significant negative impact on healthcare systems. The primary worry with COVID-19 is lung and respiratory system involvement, which can cause dyspnoea, low blood oxygen saturation, and respiratory failure, necessitating mechanical ventilation, especially in people with comorbid conditions like diabetes mellitus, obesity, ischemic heart disease, cancer, post-surgery, and chronic obstructive pulmonary disease (COPD) The goal was to ascertain how the corona virus disease of 2019 affected patients who had recovered from COVID-19's pulmonary function and chest expansion.* ***Material and method:*** *A total of 51 post covid patients taken in that male (33) and female (18), from surrounding areas of Surat were taken for the study as per inclusion and exclusion criteria. The outcomes measure functional capacity was measured by 6-minute walk test.* ***Result:*** *Total 51 subjects were included in study. Data Analysis was done by Microsoft excel 2007.The result was presented as mean and standard deviation using narrative text, graph and table. The gender wise and age wise the chest expansion and functional capacity was measured. The mean functional capacity of post-covid patients was 440.3 (SD = 66.85) in men and 435 (SD = 85.87) in women, with a reference value of 526(SD=88.73) in men and 470.61(SD=71.4) in women. As a result of this finding, we can conclude that the functional capacity of post-covid patients is reduced in both male and female patients.* ***Conclusion:*** *Based on the findings of this study, we can conclude that the impact of corona virus disease 2019 on functional capacity has been reduced in post-covid-19 patients. There will be relevant considerations for COVID-19 survivors' multidisciplinary care.*

Key words*: Post Covid-19 patients, Functional capacity, SARS-Cov-2*

INTRODUCTION

Coronavirus disease-19 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a global pandemic, posing a serious health risk worldwide. A two-wave pattern of reported cases has been observed in several countries, with a first wave in spring and a second wave in late summer and autumn. [1].

The World Health Organization (WHO) estimates that there will be more than 47 million confirmed severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) cases worldwide by 5 November 2020, with the number of new cases increasing on a daily basis. [3]. The main concern in COVID-19 is the involvement of the lungs and respiratory system, which can cause dyspnoea, low

blood oxygen saturation, and respiratory failure, necessitating mechanical ventilation, especially in those with comorbid conditions like diabetes, obesity, ischemic heart disease, cancer, post-surgery, and chronic obstructive pulmonary disease. (COPD).[4]
Despite the high mortality rate, the vast majority of SARS-CoV-2 patients survive the acute phase. The long-term health consequences of this corona virus disease (COVID-19) are unknown, but many patients are likely to experience long-term morbidity. [5].

The respiratory system is subjected to major involvement during corona virus disease 2019 (COVID-19), due additionally to the hyperactive host immune response and inflammatory organ injury, but there is no evidence about organ dysfunction in the mid- and long-term. From previous experience with corona virus lung involvement of severe acute respiratory syndrome (SARS) and Middle-East respiratory syndrome (MERS), radio logical abnormalities, impairment of pulmonary function and reduced exercise capacity improve over time, but may persist in some for months or even years [1]. Evidence about pulmonary function tests after discharge among COVID-19 patients is currently limited to few retrospective studies with small samples showing, in severe COVID-19, a reduction of forced vital capacity (FVC), diffusing capacity (transfer factor) of the lung for carbon monoxide (DLCO), total lung capacity (TLC), 6-min walk distance (6MWD) and impairment in respiratory muscle strength with need for respiratory rehabilitation. [1-2]

Recent evidence suggest that the lungs are the organ most affected by Covid 19 with different pathophysiological events that include diffuse alveolar epithelium destruction, hyaline membrane formation, capillary damage and bleeding, alveolar septal fibrous proliferation, and pulmonary Consolidation. A characteristic of Covid 19 is the extensive injury to alveolar epithelial cell and Endothelial cells with secondary fibro proliferation, indicating a potential for chronic vascular and alveolar re modelling leading to lung fibrosis and / or pulmonary hypertension. These findings generate concerns regarding the assessment of lung injury of discharge patients.[4]
Different types of functional respiratory evaluations can be carried out objectively, the most commonly used are 6-minute walk test for functional capacity. However, other tests that complement lung function tests, such as the evaluation of respiratory muscles or airway resistance, can help to improve the study of the properties of the lung and allow us to determine the consequences of acute or chronic respiratory disease objectively. These findings generate concerns regarding the assessment of lung injury for discharged patients.[3]

The 6MWT was chosen because it is easier to administer, better tolerated, and better reflects activities of daily living than other walk tests. Most important of which is to measure outcomes before and after treatment in people with moderate to severe heart and lung disease. The 6MWT can also be used to measure functional status and for epidemiologic purposes. A short 6-minute walk distance (6MWD) fairly accurately predicts morbidity and mortality from heart or lung disease.[5] 6min walk test (6MWT) is a simple standardized measure of the distance walked during a defined period of time which assesses the sub maximal level of functional capacity. Since most activities of daily living are performed at sub maximal level of exertion, the 6MWT may reflect the functional exercise level for daily physical activities. [4] Many factors can influence the distance walked: sources of variability in test conduct, training effect, technician experience, subject encouragement, medication, supplemental oxygen, other activities on day of testing, deconditioning and the effect of musculoskeletal conditions.[4] There are currently a large number of post-COVID-19 patients who should be followed up on in order to identify respiratory problems and functional capacity of the individual. This information can help to diagnose and decide the treatment of certain lung disorders. Corona virus disease's long-term health consequences may be numerous, but have yet to be thoroughly researched. This study helps to determine the impact of coronavirus disease 2019 on pulmonary function in patients who have recovered from COVID-19.

MATERIALS AND METHODS

Data for this observational cross-sectional study was gathered from various colleges, OPD, and locations in and around the Surat area. Participants in our study were post-covid patients, and 50 samples were collected conveniently. The following inclusion criteria were used to include participants in the study:
The participants ranged in age from 20 to 40, and each had a COVID-19 history spanning more than a year. There are both male and female included. never smoked, Ability to provide informed consent, knowledge of the local language, and a patient with a COVID-19 history dating back more than a year. Patients who agreed to participate in the study and who have not received PT management for their functional capacity were included. (The confirmation of COVID-19 will be validated using RTPCR report.) Using these standards, the participants were disqualified. recent abdominal and thoracic surgeries, having ophthalmic surgery on the chest, abdomen, middle ear, sinuses, eyes, or brain, recently suffered a myocardial infarction, history of thoracic, cerebral, and abdominal aneurysms history of pneumothorax, pulmonary embolism, and pulmonary hypertension Experience with late-term pregnancies. Outcome measures used for the study was functional capacity outcome measures: The 6-minute walk test is used to determine functional capacity. We first obtained approval from the principal, director, or HOD of each college. The subject was informed of the study's goal. Using inclusion and exclusion criteria, a sample of 50 people was chosen; they were willing to participate, and their informed consent was also obtained. Functional capacity was measured after the chest expansion measurement. We used an oximeter to measure parameters like pulse and SPO2 for functional capacity, and a sphygmomanometer to measure blood pressure. On the day of the test, the subjects received an orientation. In a cardio lab, each subject was instructed to walk as far as they could over 30 metres during a 6-minute period. According to the American Thoracic Society, the course was designated by two traffic cones, and the lab floor was marked every three metres. Up until the subject excursion, encouragement was given every minute. The following data were collected: pulse, SPO2, and blood pressure before and after the walk test. The period of study was the month of March-April 2022.Data analysis was done by SPSS software and excel database 2007. The result is presented as mean and standard deviation using narrative text, graph and table.

Result:

Total 51 subjects were included in study. Out of which 33 (65%) were males and 18(35%) were females. The status of patient was also calculated it was denoted by Hospitalized and Non-hospitalized. the mean functional capacity of post-covid patients was 440.3 (SD = 66.85) in men and 435 (SD = 85.87) in women, with a reference value of 526(SD=88.73) in men and 470.61(SD=71.4) in women. There were 4 Hospitalized male subjects and 47 non-hospitalized female subjects. The mean of Covid-19 affecting duration was 11.39 months. In female mean was 11.38 (SD=3.32), in male mean was 11.39, (SD=2.97).

Gender wise mean functional capacity of study subject

No.	Gender	Mean	Std EV
1	Male (n=33)	440.3	±66.85
2	Female (n=18)	435	±85.879

Age wise mean functional capacity

No.	Age	Mean	Std Dev.
1	20-25	432.468	±68.71
2	26-30	438.5	±65.94
3	31-35	464	±109.55
4	36-40	399	±95.23
5	41-45	464.27	±62

[Table no. 4.1.8]

Discussion

Despite significant efforts, the mechanism, clinical characteristics, prognosis, and effective treatment of COVID 19 have not been adequately elaborated in the year since it first emerged globally. The Experts from all over the world are working to learn more about the short- and long-term health effects of COVID-19.

The purpose of this study was to determine the impact of Corona Virus Disease 2019 on functional capacity and chest expansion in post-Covid-19 patients. The outcome measures functional capacity as measured by a 6-minute walk test.

In the post-acute COVID-19 Chinese study, the median 6-min walking distance was lower than normal reference values in approximately one-quarter of patients at 6 months5—a prevalence similar to that in SARS and MERS survivors9.

In our study, functional capacity was assessed using 6-minute walk tests. Our study included 51 post-Covid patients, We had observed that the mean functional capacity of post-covid patients was 440.3 (SD = 66.85) in men and 435 (SD = 85.87) in women, with a reference value of 526(SD=88.73) in men and 470.61(SD=71.4) in women. As a result of this finding, we can conclude that the functional capacity of post-covid patients is reduced in both male and female patients. However, female functional capacity was lower than male functional capacity.

In this study, covid patients with a duration of more than six months were included, and there were four male post-covid patients and 47 female post-covid patients. Hospitalised and non-hospitalised subjects were present, with four female hospitalised and 47 non-hospitalised males. Series articles on SARS survivors showed the impaired lung function existed till 1 year [10, 11].

Longer follow-up on COVID-19 patients should be made to observe the characteristic and change tendency of lung function and exercise tolerance.

Based on these findings, patients with covid 19 experience a wide range of functional limitations over time.

Conclusion

Based on the findings of this study, we can conclude that the impact of corona virus disease 2019 on functional capacity has been reduced in post-covid-19 patients. There will be relevant considerations for COVID-19 survivors' multidisciplinary care.

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