e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(7); 685-691

Original Research Article

Evaluation of Pulmonary Functions in Recovered Patient's of COVID-19 Pneumonitis: A Prospective Study

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Received: 20-03-2023 / Revised: 21-04-2023 / Accepted: 25-05-2023

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Conflict of interest: Nil

Abstract

Introduction: Every year, respiratory illnesses claim the lives of almost 7 million individuals around the world. Many viruses are to blame for these epidemics. One of the infections is COVID-19, a developing infection brought on by the coronavirus 2 virus that causes acute respiratory syndrome (SARS-CoV-2).

Aim and Objectives: To assess the pulmonary functions in COVID-19pneumonitis recovered patients.

Methodology: With approval from the institutional ethical committee and review board and written informed patient consent, the study was carried out at the Department of Respiratory Medicine, Pacific Institute of Medical Sciences, Umarda, Udaipur.

Result: COVID-19 pneumonitis patients were categorised by onset of symptoms as mild(19.44%), moderate(48.14%) & severe(32.40%). CT scan severity score was found as mild(1-8), moderate(9-15) & severe (>15) considered as (45.37%), (48.14%) & (06.48%) COVID-19 pneumonitis patients respectively. Pulmonary function examination, it was found that FEV1(L), FVC(L), FVC(% Predicted), FEV1/FVC (%), TLC and DLCO were statistically significant between Severe and non-severe COVID-19 Pneumonitis patients respectively. ($p<0.05$).

Conclusion: Even though the pulmonary dysfunction brought on by the SARS-CoV-2 infection got better over time, the affected patients didn't fully recover after being released. Several COVID-19 patients experienced pulmonary dysfunction and abnormal lung CT results after recovering, with imaging abnormalities happening more frequently in severe individuals.

Keywords: COVID-19, Pulmonary function test, Recovered COVID-19 patients.

Introduction

Every year, respiratory illnesses claim the lives of almost 7 million individuals around the world.[1] Several virus types are at blame for these epidemics.[2] One of the infections described above is COVID-19, a developing infection brought on by the coronavirus 2 virus that causes acute respiratory syndrome (SARS-CoV-2).[3,4] In March 2020, the World Health Organization (WHO) classified the SARS-CoV-2 epidemic as a pandemic.[3,5] Several studies have shown that the main mechanisms of transmission include respiratory droplets and person-to-person contact, despite the fact that research on the disease's transmission routes is still ongoing.[3,6]These airborne respiratory droplets can spread to other people through talking, sneezing, coughing, and breathing·[7] Fever, weakness, coughing, and diarrhoea are the most typical signs of SARS CoV-2. More than half of the patients say they have respiratory problems. A few of them additionally suffer from acute respiratory distress syndrome. On the other hand, this disease frequently causes severe respiratory system involvement and has left patients with serious problems.[6] Although most COVID-19 patients only experience minor symptoms, 19% of patients go on to experience organ failure, pneumonia, and other serious complications include shortness of breath and infectious shock. The most crucial organs in respiratory illnesses, especially COVID-19, which is impacted by contaminants and infectious diseases, are the lungs.[8] The loss of the air sac epithelium, the development of hyaline membranes, bleeding and capillary damage, increased fibrosis of the air sac wall, which

ultimately results in fibrosis and raised pulmonary blood pressure, are the most severe impacts.[8] These clinical signs and findings worry even individuals who have recovered and been released. After being discharged, some patients may still experience lung issues for several weeks or even years. As a result, after recovery, changes in lung function must be evaluated and tracked.

In recent years, pulmonologists have relied heavily on spirometry as one of their primary and most versatile techniques for patient screening and pulmonary function testing (PFT).[9] Spirometry tests essential pulmonary function parameters such forced vital capacity (FVC), forced expiratory volume (FEV1), and FEV1/FVC, among others. Furthermore, the primary patterns of lung ventilation function, including normal, obstructive, restrictive, and mixed patterns, can be distinguished by carefully evaluating the values and ratios acquired in spirometric and plethysmographic tests.

The current investigation examined the pulmonary function of individuals with COVID-19 since PFT is crucial for assessing lung health and detecting disorders such asthma, chronic obstructive pulmonary disease (COPD), and chronic respiratory failure. The metrics of carbon monoxide diffusion capacity (DLCO), residual volume (RV), total lung capacity (TLC), RV/TLC, and oxygen saturation % were examined in addition to the spirometry indices listed above.

In this study, we want to review the PFT results and patterns of lung involvement in patients with COVID-19 pneumonia due to the paucity of data on pulmonary function in patients with COVID-19 pneumonia throughout recovery.

Material & Methods

Study Design

With the proper approval from the institutional ethical committee and review board, as well as written informed patient agreement, this observational prospective study was carried out at the Department of Respiratory Medicine, Pacific Institute of Medical Sciences, Umarda, Udaipur. We included patients in the trial who were older than 18 years old had COVID-19 pneumonitis recoveries. Patients with RT-PCR positive cases without lung involvement on HRCT thorax, RT-PCR negative cases with or without (Corona virus Disease Reporting and Data system) CORADS 1, 2, and 3, and cases of COVID-19 infection who passed away while receiving medical care were excluded from the study.

Data Collection

We aimed to gather information on the patient's age, sex as well as their clinical symptoms, test results, and other relevant data. We have also gathered information on any prior treatment the patient may have had for a co-morbid disease. Each patient underwent a chest CT scan in accordance with industry standards for COVID-19 pneumonia. When a patient experiences their first symptom or a test results in a positive result, that day is considered the disease's beginning date. Using nasal and/or pharyngeal swab specimens that had been obtained in accordance with standard methodology, the RT-PCR assay was conducted. If either patient had ongoing respiratory symptoms or pulmonary function testing showed restrictive abnormalities or diminished DLCO three months following hospital discharge, a follow-up HRCT Thorax was performed.

Case definitions and Case Identification

COVID-19 confirmed cases were patients who tested positive for the virus by RT-PCR. Individuals who failed the RT-PCR test for COVID-19 were regarded as likely COVID-19 patients. According to ICMR, all patients were divided into three categories: mild (mild clinical symptoms without pneumonia), moderate (symptoms and pneumonia with no need for additional oxygen), and severe (radiological pneumonia, meeting any of the following criteria: respiratory rate >30 breaths/min, severe respiratory distress, oxygen saturation 90% on room air).

Picture Analysis and Quantification

A skilled radiologist required to examine each chest computed tomography (CT) image and make a final judgement on a view console. According to the CORADS grading system, HRCT Thorax has been documented when COVID-19 pneumonitis is suspected. The COVID-19 pneumonia risk ranges from extremely low risk (CORADS 1) to very high risk (CORADS 5). Nonetheless, patients who fell into the CORADS 4/5 category were included in the criterion.

The number of lung lobes affected served as the primary analytic criterion. The presence of GGO, consolidation, interstitial thickening, fibrosis, and air trapping were quantitatively analysed using a CT severity scoring system, which previously was used to identify idiopathic pulmonary fibrosis brought on by SARS and ranged from 0 to 25 points. Each of the 5 lung lobes in both lungs was scored from 0 to 5, with 0 representing normal performance, 1 representing GGO that involved less than 5% of the lobe, 2 representing GGO that involved up to 25%, 3 representing GGO that involved 25–49%, 4 representing GGO that involved 50–75%, and 5 representing GGO that involved more than 75%. In the statistical analysis, segmental scores were summed to provide a total score. If the final score was less than 8, it was deemed a mild case, if 9-15 then considered as moderate and if >15 then severe.

Pulmonary Function Testing

During follow-up at the end of three months, pulmonary function tests were performed on all patients. The lung function tests were carried out in our institute's pulmonary function lab. In accordance with ATS recommendations, body plethysmography was used for pulmonary function tests and DLCO. A single breath test was used to assess the following parameters: total lung capacity (TLC), residual volume (RV), forced vital capacity (FVC), forced expiratory capacity at the first second of expiration (FEV1), and lung diffusion capacity for carbon monoxide (DLCO). Moreover, the haemoglobin value was collected to adjust the DLCO. The percentages of the expected normal values were used to express all pulmonary function. The definition of a diffusion deficiency was DLCO 80% of the projected value.

Statistical Analysis

The sample size was calculated based on previously published study done by Zhao et al. Assuming a population proportion of 25% and 40% in our study population for presence of abnormalities on pulmonary function test and with 90 percent power and alpha error of 5%, the sample size was estimated to be 97 for the study. As it was follow up study, we expect about 10% to back out, so we had recruiting 108 patients for the study.

Observation & Results

In the present study, it was found that 33 (30.56%) of COVID-19 Pneumonitis were in less than 51 years age group followed by 69 (63.89%) of patients in 50-70 years age group. Moreover, the youngest patients of COVID-19 Pneumonitis was 28 years old, while elderly was 76 years with mean age of 55.30 ± 11.00 years.In which 65 (60.18%) of male COVID-19 Pneumonitis were predominantly higher then female COVID-19 Pneumonitis 33 (30.55%). Moreover, the male: female ratio was found 1.96:1. In these patients Co-Morbidities found such as HTN was immensely in 45 (41.66%) then DM patients as 27 (25%) and CVD 17 (15.74%) of patients.These COVID-19 Pneumonitis patients presented with complaints of Fever which was vastly higher in 82 (75.92%) then Cough as 79 (73.14%) and Dyspnoea 73 (67.59%) of patients. These patients were categorised on the basis of symptoms as Mild 21(19.44%), Moderate 52 (48.14%) and severe 35 (32.40%) patients respectively. Then further patients were differentiated with CORADS Score-4 in 21 (19.44%) patients and Score-5 in 87 (80.55%) patients. In addition, CT scan severity was found as Mild (1-8), Moderate (9-15), and Severe (>15) considered as 49 (45.37%), 52 (48.14%) and 07 (06.48%) COVID-19 Pneumonitis patients respectively. (Table 1)

In this study, it was found that Absolute lymphocyte count, BUN, CRP and Lactate dehydrogenase were found statistically significant between Severe and non-severe COVID-19 Pneumonitis patients ($p<0.05$) while others parameters insignificant.(Table 2)

In the present study, Hospital course distribution have found that mean O2 Mask (days), ICU Stay (days), Hospital Stay (days) were found as 8.68 ± 5.72 days, 4.56 ± 2.82 days, 9.92 ± 4.60 days which was statistically significant in between the two groups of NonSevere and Severe Patients ($p<0.0001$). (Table 2)

In the present study, due to pulmonary function examination, it was found that FEV1(L) (2.81 ± 0.45 vs 2.39 ± 0.40) , FVC(L)(3.17 ± 0.46 vs 2.84 ± 0.61), FVC(% Predicted) (91.56 ± 8.30 vs 81.42 ± 7.68), FEV1/FVC (%) (85.24 ± 6.0vs 81.54 ± 5.66), TLC (89.72 ± 6.22 vs80.11 ± 4.76) and DLCO (84.63 ± 4.84 vs 67.11 ± 6.61) were statistically significant between Severe and non-severe COVID-19 Pneumonitis patients respectively ($p<0.05$). (Table 3)

In the present study, due to post CT scan examination during follow up it was found that Ground-glass opacity (GGO) was the most common radiological feature, found in52 (48.14%) patients with statistically significant between Severe and non-severe COVID-19 patients. i.e. (39.42% vs 65.71%;p=0.0114). Radiological findings suggestive of Pulmonary Fibrosis 33 (30.55%), Consolidation 16 (14.81%), Crazy Paving 29 (26.85%) and Bronchiectasis were found in 37 (34.25%) patients respectively with statistically insignificant ($p>0.05$).(Table 3)

Table 1: Basic Information And Symptoms

		No of patients (n=108)
Age (yrs)	<50	33 (30.56%)
	50-70	69(63.89%)
	>70%	6(5.55%)
Mean age (yrs)	55.30 ± 11.00	
Gender	Male	65 (60.18%)
	Female	33 (30.55%)
Co-Morbidities	HTN	45 (41.66%)
	DM	27 (25%)
	CVD	17 (15.74%)

	CKD CLD COPD CVA	11 (10.18%) 9 (8.33%) 6 (5.55%) 5 (4.62%)
Complaint	Fever Cough Dyspnoea Sputum Chest Pain Fatigue Sore Throat Bodyache Anosmia Ageusia Abdominal Pain	82 (75.92%) 79 (73.14%) 73 (67.59%) 24 (22.22%) 21 (19.44%) 16 (14.81%) 16 (14.81%) 14 (12.96%) 12 (11.11%) 12 (11.11%) 7 (6.48%)
Category	Mild Moderate Severe	21 (19.44%) 52 (48.14%) 35 (32.40%)
CT scan CORADS Score CT Scan severity score	 Score 4 Score 5 Mild (1-8) Moderate (9-15) Severe (>15)	 21 (19.44%) 87 (80.55%) 49 (45.37%) 52 (48.14%) 07 (06.48%)

Table 2: Biochemical Parameters and Hospital Course

Baseline	No of patients (n=108)	Non-Severe Patients (n=73)	Severe Patients (n=35)	P value
Hb (gm/dL)	13.11 ± 2.07	13.32 ± 2.02	12.65 ± 2.13	0.1159
HT	38.48 ± 7.81	39.15 ± 7.33	37.03 ± 8.70	0.1888
TC (/mm3)	7.05 ± 2.76	7.97 ± 4.02	6.63 ± 1.84	0.0633
ALC (/mm3)	1372.7 ± 313.8	1510.9 ± 270.2	1117.2 ± 213.51	<0.001
Platelet Count (/mcL)	220.9 ± 89.31	224.91 ± 91.99	202.08 ± 83.74	0.2171
Serum Bilirubin (µmol/L)	1.01 ± 0.51	1.01 ± 0.50	1.02 ± 0.54	0.9247
SGOT (U/L)	57.63 ± 33.06	56.60 ± 37.12	59.75 ± 23.20	0.6463
SGPT (U/L)	45.01 ± 28.97	42.63 ± 30.08	49.96 ± 26.41	0.2209
Alkaline Phosphatase (IU/L)	83.10 ± 38.841	85.24 ± 38.84	78.55 ± 37.95	0.4006
S. Protein (mg/dL)	7.12 ± 1.46	7.28 ± 0.97	6.79 ± 2.23	0.1138
S. Albumin (mg/dL)	3.84 ± 0.59	3.86 ± 0.61	3.79 ± 0.53	0.5622
Serum Creatinine (mg/dL)	1.59 ± 1.53	1.52 ± 1.31	1.67 ± 2.05	0.6463
BUN (mmol/L)	36.08 ± 21.48	27.65 ± 16.14	39.78 ± 22.64	0.0019
PT INR (Sec)	1.23 ± 0.15	1.23 ± 0.11	1.22 ± 0.22	0.7529
APTT	32.93 ± 7.66	32.45 ± 6.49	32.56 ± 6.70	0.9351
Na + (mEq/L)	139.46 ± 6.26	140.98 ± 5.12	139.32 ± 7.27	0.1737
K+ (mEq/L)	4.15 ± 0.70	4.18 ± 0.68	4.08 ± 0.75	0.4907
CRP (mg/dL)	20.13 ± 12.19	10.9 ± 7.75	28.05 ± 9.42	<0.0001
LDH (IU/L)	166.3 ± 48.37	151.07 ± 21.33	266.87 ± 59.54	<0.0001
O2 Mask (days)	8.68 ± 5.72	4.30 ± 1.59	13.57 ± 4.57	<0.0001
ICU Stay (days)	4.56 ± 2.82	2.13 ± 0.99	6.08 ± 2.51	<0.0001
Hospital Stay (days)	9.92 ± 4.60	7.38 ± 1.57	15.22 ± 4.31	<0.0001

Table 3: Spirometry Test and CT Scan After 3 months of Covid -19 Pneumonititis

Baseline	No of patients (n=108)	Non-Severe Patients (n=73)	Severe Patients (n=35)	P value
FEV1(L)	2.68 ± 0.48	2.81 ± 0.45	2.39 ± 0.40	<0.0001
FVC(L)	3.06 ± 0.53	3.17 ± 0.46	2.84 ± 0.61	0.0023
FEV1(% Predicted)	86.48 ± 8.11	87.20 ± 8.15	84.97 ± 7.93	0.1823
FVC(% Predicted)	88.27 ± 9.37	91.56 ± 8.30	81.42 ± 7.68	<0.0001

FEV1/FVC (%)	84.04 ± 6.12	85.24 ± 6.01	81.54 ± 5.66	0.0029
PEFR	98.45 ± 8.22	99.32 ± 7.73	96.4 ± 8.19	0.0743
FEF (25-75%)	89.95 ± 8.77	90.73 ± 8.02	88.31± 10.07	0.1804
TLC	86.61 ± 7.32	89.72 ± 6.22	80.11 ± 4.76	<0.0001
RV	89.82 ± 10.07	90.83 ± 10.6	87.71 ± 8.62	0.1324
DLCO	78.95 ± 9.87	84.63 ± 4.84	67.11 ± 6.61	<0.0001
CT SCAN FINDINGS				
Normal	13 (12.03%)	7 (9.58%)	2 (5.71%)	0.4952
GGO	52 (48.14%)	29 (39.42%)	23 (65.71%)	0.0114
Consolidation	16 (14.81%)	11 (15.06%)	9 (25.71%)	0.1825
Crazy Paving	29 (26.85%)	18 (24.65%)	11 (31.42%)	0.4575
Pulmonary Fibrosis	33 (30.55%)	18 (24.65%)	15 (42.85%)	0.0546
Bronchiectasis	37 (34.25%)	21 (28.76%)	16 (45.71%)	0.0823

Discussion

Globally, COVID-19 is spreading, and the situation is still quite bad in several nations and regions. The majority of patients still have diverse pulmonary abnormalities upon discharge despite an increase in the proportion of COVID-19 patients who have healed due to the hysteresis of imaging symptoms. As a result, doctors and radiologists are highly concerned about the dynamic changes and outcomes of COVID-19 residual lesions. In the present study, it was found that mean age COVID-19 patients was 55.30 ± 11.00 which was similar to others study.[10-14] The findings of our study also show that the chance of developing a severe illness steadily rises with age beginning at roughly the age of 40 and that people with underlying medical conditions including cancer, diabetes, chronic respiratory disease, and cardiovascular disease are more likely to do so.

In the present study, it was found that (60.18%) of male COVID-19 Pneumonitis were predominantly higher then female COVID-19 Pneumonitis (30.55%) which was comparable to other studies like in Liu N et al study 58% were males and 42% were females.[15]

In the present study, COVID-19 Pneumonitis patients with Co-Morbidities found such as HTN was immensely in (41.66%) then DM patients as (25%) and CVD (15.74%) of patients were comparable to other studies as HTN (31.68%, 55.75%, 23.07%), DM (15.84%, 30.97%, 9.61%) and CVD (6.93%, 16.81%, 5.76%) by Yu C et al, Guler SA et al and Zhong L et al respectively.[16,17,18]

In the present study, COVID-19 Pneumonitis patients presented withcomplaints of Fever was vastly higher in (75.92%), Cough (73.14%) and Dyspnoea (67.59%) which was comparable with Polese J et al as in his study Fever(83%), Cough(80%) and Dyspnea(78%) were the main presenting complaints.[19] However, the study by Anastasio F et al[20] have found that 211 (69.9%) patients with persisting COVID-19 symptoms were referred during the outpatient clinical follow-up. The most common symptoms at evaluation included exertional dyspnea (42.7%), weakness (29.8%), joint and muscular pain (13.7%), thoracic pain (11.9%), anosmia and ageusia (10.3%), and depression (8.2%). The study by Wu Q et al[21] showed that fatigue (24.07%) and dyspena (18.51%) were the main presenting complaints as compared to our study.

The study by Karoli R et al have found that Lymphocyte count (109/L) (1.2 vs 0.9), HS CRP (24 mg/L vs 128 mg/L), ALT (55 IU/L vs 354 IU/L), Ferritin (123 ng/mL vs 602 ng/mL) and D Dimer (102 ng/ml vs 495 ng/ml) were statistically significant between moderate and severe group ($p<0.0001$).22The study by Zhou F et al also showed that Severe patients had significantly higher levels of haemoglobin ($p = 0.013$), ALT ($p = 0.011$), triglycerides ($p = 0.049$), and fasting blood sugar ($p = 0.033$) when compared to the non-severe cases.[23]

In the present study, it was found that Absolute lymphocyte count (1510.9 ± 270.2 /mm3 vs 1117.2 ± 213.51 /mm3), BUN (27.65 ± 16.14 mmol/L vs 39.78 ± 22.64 mmol/L), CRP (10.9 ± 7.75 mg/dL vs 28.05 ± 9.42 mg/dL) and Lactate dehydrogenase (151.07 ± 21.33 IU/L vs 266.87 ± 59.54 IU/L) were found statistically significant between Severe and non-severe COVID-19 Pneumonitis patients ($p<0.05$) while others parameters insignificant.

In the present study, due to pulmonary function examination, it was found that FEV1(L) (2.81 ± 0.45 vs 2.39 ± 0.40), FVC(L) (3.17 ± 0.46 vs 2.84 ± 0.61), FVC (% Predicted) (91.56 ± 8.30 vs 81.42 ± 7.68), FEV1/FVC (%) (85.24 ± 6.01 vs 81.54 ± 5.66), TLC (89.72 ± 6.22 vs 80.11 ± 4.76) and DLCO (84.63 ± 4.84 vs 67.11 ± 6.61) were statistically significant between Severe and non-severe COVID-19 Pneumonitis patients respectively ($p<0.05$).

The study by Huang Y et al. have found only TLC (88.72 ± 16.20vs 96.22 ± 10.35) was statistically significant between Severe and non-severe COVID-19 Pneumonitis patients respectively ($p=0.048$).[11] Another study by Karoli R et al. have found that

FVC (% Predicted) (87± 16 vs 76± 15), FEV1/FVC (%) (80±15 vs 72± 14), TLC (92±18 vs 77±12) and DLCO (80 ±16 vs 62± 11) were statistically significant between Moderate and severe COVID-19 Pneumonitis patients respectively ($p<0.05$)[13]Further, the study by Eksombatchai D et al. have found that the mean value of FVC was lower in the severe pneumonia group when compared to the moderate symptom and non-severe pneumonia groups in both pre-bronchodilator (84.4% vs 98.1% and 100.4% respectively, $p = 0.022$) and post-bronchodilator (84.0% vs 98.4% and 100.3% respectively, $p = 0.013$). The FEV1/FVC values in the groups with mild symptoms and severe pneumonia were statistically substantially lower than those in the group with non-severe pneumonia (82.6% and 82.9% vs 86.6%, $p = 0.019$) and post-bronchodilator (83.7% and 82.9% vs 87.8%, $p = 0.007$).[24] Unadjusted analysis with FVC% anticipated was 9% (95% CI 1.5-16.4%) lower and TLC% predicted was 16% (95% CI 8.3-23.6%) lower after severe/critical COVID-19 than after mild/moderate COVID-19, according to a study by Guler SA et al.[17] TLC remained statistically significant lower in the severe/critical illness group (14.6% pred, 95% CI 6.3-22.8% pred; p0.001) after adjusting for age, sex, and BMI, although FVC lost significance (5.6% pred, 95% CI 2.6-13.8% pred; p=0.18). In both the unadjusted analysis (DLCO was substantially greater after mild/moderate COVID-19; 22.1% pred, 95% CI 14.4-29.8% pred; p=0.001) and the adjusted analysis (20.9% pred, 95% CI 12.4-29.4% pred; p=0.01) for the aforementioned confounders.

In present study, due to CT examination, Ground-glass opacity (GGO) was the most common radiological feature, found in (48.14%) patients with statistically significant between Severe and non-severe COVID-19 patients. i.e. (39.42% vs 65.71%;p=0.0114). Radiological findings suggestive of Pulmonary Fibrosis (30.55%), Consolidation (14.81%), Crazy Paving (26.85%) and Bronchiectasis were found in (34.25%) patients respectively with statistically insignificant($p>0.05$). In the Zhong L et al. investigation, the CT examination revealed that 42.42% of the moderate group and 10.53% of the severe group had reverted to normal, with a statistically significant difference (P 0.05) between the two groups. Ground-glass opacity (91.67%), which was localised or spread in numerous lobes and segments, had low density, lacked homogeneity, and had hazy borders, was the primary symptom of the remaining lesions on chest CT imaging. After pulmonary lesion dissipation, fibrous strip shadow was more prevalent (52.78%), appearing as strips of different lengths and densities, some of which adhered to and pulled on the pleura. Consolidation was uncommon in residual pulmonary lesions (13.89%) and manifested as nodular and patchy high-density shadows that were significantly smaller or dissipated when compared to previous examinations.[18]

High-resolution chest CT scans of nine patients (18.8%) with lung disease in both lungs, zero patients with lung involvement in only the left lung, and two patients (4.2%) with lung involvement in only the right lung were detected, according to a study by Wu Q et al. Affected areas included the right upper lobe in four patients (8.3%), the right middle lobe in six patients (12.5%), the right lower lobe in ten patients (20.8%), the left upper lobe in five patients (10.4%), and the left lower lobe in nine patients (18.8%). High-resolution CT scans of these patients frequently revealed ground-glass opacities (20.8%), linear opacities (14.6%), and pleural thickening (10.4%), particularly in the severe group when compared to the non-severe group($p<0.05$).[21]

Conclusion

Even though the pulmonary dysfunction brought on by the SARS-CoV-2 infection got better over time, the affected patients didn't fully recover after being released. Several COVID-19 patients experienced pulmonary dysfunction and abnormal lung CT results after recovering, with imaging abnormalities happening more frequently in severe individuals. According to these findings, COVID-19 patients may suffer from long-lasting lung damage after a viral infection and should be closely watched.

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