



## TO EVALUATE THE RESPIRATORY FUNCTIONS OF COVID-19 PNEUMONIA SURVIVORS THREE MONTHS AFTER RECOVERY AT TERTIARY CARE CENTRE.

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### ABSTRACT

**BACKGROUND:** In this study we provide a suggested structure for the respiratory follow up of patients with clinicoradiological confirmation of COVID 19 pneumonia three months after recovery.

**OBJECTIVES:** 1. To evaluate the respiratory function and functional disability of COVID – 19 Survivors 3 months after recovery..

**MATERIALS AND METHODS:** This was a retrospective study done on 70patients, who were attending the OPD/ IP of Thanjavur medical college three months after recovery from COVID PNEUMONIA. These patients were enrolled consecutively from August 2020 to January 2021 .Dats during admission had been collected from patient records. Spirometry, 6-minute walk distance, pulse oximetry ,CT chest scan, psychological assessment were performed 3 months after discharge. Statistical Analysis was done by SPSS trial version 20.

**RESULTS:** Among the 70 study populations , Age ranged from 24 to 74 years with mean age 56.9 years of age and SD-11.45, most of them were male (80%). Nearly 75% of the patients had spO<sub>2</sub> 80-90% during admission and after recovery nearly 95% of the patient had more than 90% spo<sub>2</sub>. On admission more than half of the patients had moderate CT severity score ,after recovery more than 70% of the patients had mild CT severity score .After recovery more than 70% of the patients does not require oxygen. On spirometry nearly 70% of the patients with the age group of 41-60 years of age had mild restrictions after recovery.

**CONCLUSION:** Three months after SARS CoV-2 infection shows significant improvement in functional and radiological abnormalities on careful monitoring. A systematic follow-up for survivors needs to be evaluated to optimise care for patients recovering from COVID-19.

### KEYWORDS : COVID19,SARS-CoV -2,RESPIRATORY FUNCTIONS, SPIROMETRY, RECOVERY

#### INTRODUCTION:

The first reports of a novel respiratory virus which was subsequently shown to be a coronavirus, severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2), emerged from Wuhan, China in December 2019.(1)

The clinical manifestations of SARS-Cov-2 infection vary, ranging from asymptomatic carriage to atypical pneumonia, a hyperinflammatory phenotype, respiratory failure and acute respiratory distress syndrome (ARDS).(2-5)

Between 20% and 60% of survivors of the global SARS outbreak caused by SARS-CoV and the Middle East Respiratory Syndrome coronavirus (MERS-CoV) experienced persistent physiological impairment and abnormal radiology consistent with pulmonary fibrosis.(15-17)

COVID-19, often leads to a wide range of sequelae that require adequate follow-up . COVID-19 pneumonia patients who have made a full recovery are appropriately reassured that their chest X-ray changes have resolved.

Patients presented with breathlessness, oxygen requirements, rehabilitation, symptom management and psychosocial needs are identified and treated accordingly.

#### Materials And Methods

This was a retrospective study done on 70 patients, who were attending the OPD/ IP of Thanjavur medical college after three months recovery from COVID PNEUMONIA. These patients were enrolled consecutively from August 2020 to January 2021 .Dats during admission had been collected from patient records.

#### Inclusion Criteria :

1. Age more than 12 years of both sexes.

2. COVID Pneumonia survivors after 3 months attending OP/IP at Thanjavur medical college.
3. Patients willing to give informed consent.

#### Exclusion Criteria :

1. Age less than 12years
2. Non complying patients who do not give consent to participate in the study.
3. Patient who are not hemodynamically stable .Statistical Analysis was done by SPSS trial version 20.

#### Dats Collected During Covid 19 Admission

- 1) SpO<sub>2</sub>
- 2) Pulse rate
- 3) Respiratory rate
- 4) CT Chest severity
- 5) Six minute walk test
- 6) Psychological assessment(Anxiety)

#### DATAS COLLECTED THREE MONTHS AFTER RECOVERY

- 1) SpO<sub>2</sub>
- 2) Pulse rate
- 3) Respiratory rate
- 4) CT Chest severity
- 5) Six minute walk test
- 6) Pulmonary function test
- 7) Psychological assessment

#### Analysis And Results:

This retrospective study on "To evaluate the respiratory functions of COVID-19 pneumonia survivors three months after recovery at Tertiary care centre.

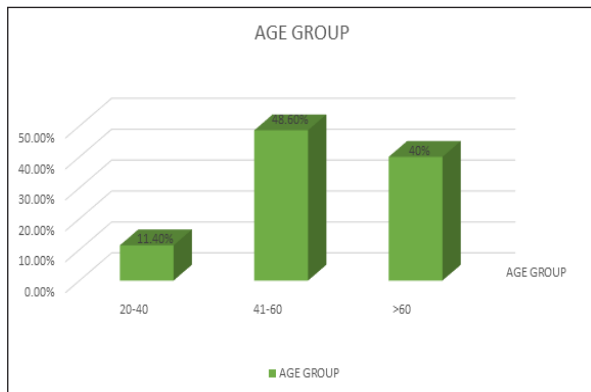
Retrospectively 70 covid positive patients were followed after three months of recovery, all of them had covid pneumonia with CT findings of bilateral multifocal peripheral ground

glass opacities during admission.

The following observations were made of the data collected from studies. Among the 70 study populations , Age ranged from 24 to 74 years with mean age 56.9 years of age and SD-11.45, most of them were male (80%).During admission nearly 75% of the patients had spo2 80-90% and after recovery nearly 95% of the patient had more than 90% spo2 . On admission more than half of the patients had moderate CT severity score and after recovery more than 70% of the patients had mild CT severity score .More than 70% of the patients after recovery does not require oxygen .PVALUE-0.307 (P value <0.05 significant ) p value derived from fisher exact test.

Nearly 70% of the patients with the age group of 41-60 years of age had mild restrictions on spirometry after recovery. More than 50% of the patients with age group of >60 years of age had moderate restriction. PVALUE-0.000 (P value <0.05 significant ) p value derived from fisher exact test.

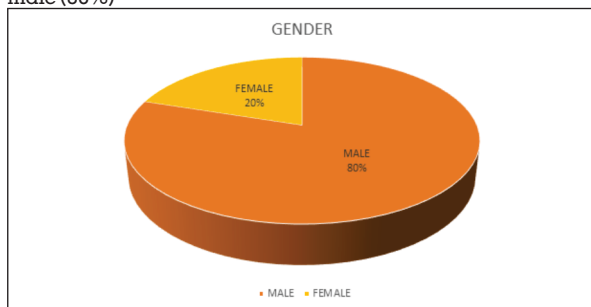
Among the study population , all the patients who had moderate CT severity score after treatment had moderate restrictions on spirometry .Anxiety and fatigueness on admission 100% and follow up 3 months after recovery showed significant improvement.



**Chart 1. Frequency Distribution Of Age Group**  
Among the study populations , Age ranged from 24 to 74 years with mean age 56.9 years of age and SD-11.45

**Gender**

Among the total study populations(70 ), most of them were male (80%)



**Chart 2. Frequency Distribution Of Gender Parameters On Admission And Follow Up 3 Months After Recovery**

**Table 1:frequency Distribution Of Parameters On Admission And Follow Up After Treatment**

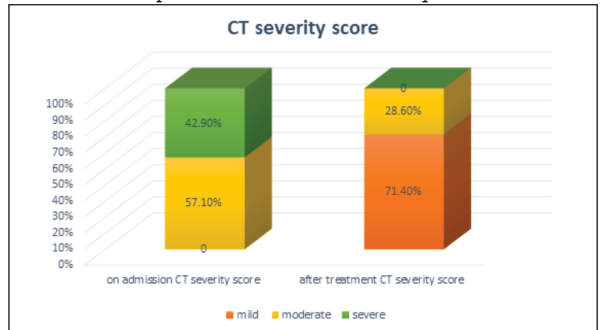
S.no	Parameters	On admission		After treatment	
		Freq,	percent	Freq,	percent
1.	<b>Spo2(%)</b>				
	70-80	10,	14.3%	0,	0
	81-90	52,	74.3%	4,	5.7%
	>90	8,	11.4%	66,	94.3%
2.	<b>Pulse rate(mins)</b>				

<90	8,	11.4%	48,	68.6%	
90-100	14,	20%	8,	11.4%	
>100	48,	68.6%	14,	20%	
3.	<b>Respiratory rate (mins)</b>				
	15-20	6	8.6%	62,	88.6%
	21-25	46,	65.7%	8,	11.4%
	>25	18	25.7%	0,	0

Among the study populations , nearly 75% of the patients . had spo2 80-90% during admission . after recovery nearly 95% of the patient had more than 90% spo2 .

**Ct Severity Score On Admission And Follow Up 3 Months After Recovery**

Among study populations ,more than half of the patients had moderate CT severity score on admission.after recovery more than 70% of the patients had mild CT severity score .



**Chart 3. frequency Distribution Of Ct Severity Score On Admission And Follow Up After Treatment**

**Oxygen Requirement On Admission And Follow Up 3 Months After Recovery**

**Table 2.frequency Distribution Of Oxygen Requirement On Admission And Follow Up After Treatment**

S.no	Oxygen requirement	On admission		After treatment	
		Freq,	percent	Freq,	percent
1.	BIPAP/CPAP	38,	54.2%	0,	0
2.	HFNO	10,	14.3%	0,	0
3.	Nasal O2	22,	31.4%	4,	5.7%
4.	Intermittent nasal O2	0,	0	16 ,	22.9%
5.	Not required	0,	0	50,	71.4%

Among study populations , more than 70% of the patients after recovery does not require oxygen.

**Six Minute Walk Distance And Spo2 Fall On Admission And Follow Up 3 Months After Recovery**

**Table 3.frequency Distribution Of Six Minute Walk Distance On Admission And Follow Up After Treatment**

S.no	Variables	On admission		After treatment	
		Freq	percent	Freq	percent
1.	<b>Six minute walk distance (meters)</b>				
	Not able to perform	30,	42.9%	0,	0
	Not done	26,	37.1%	0,	0
	< 50 m	14,	20%	0,	0
	200-400 m	0,	0	36,	51.4%
	401-600 m	0,	0	24,	34.3%
	> 600 m	0,	0	10,	14.3%
2.	<b>SPO2(%) fall after 6MWD</b>				
	75-80	10,	14.3%	0,	0
	81-85	4,	5.7%	28,	40%
	86-90	0,	0	38,	54.3%
	>90	0,	0	4,	5.7%

**Anxiety And Fatigueness On Admission And Follow Up 3**

**Months After Recovery**

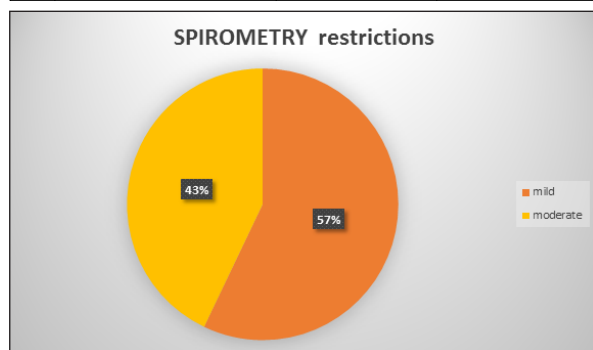
**Table 4. Frequency Distribution Of Anxiety And Fatiguenss On Admission And Follow Up After Treatment**

S.no	Anxiety and fatiguenss	On admission		After treatment	
		Freq	percent	Freq	percent
1.	Present	70,	100%	18,	25.7%
2.	Absent	0,	0	52,	74.3%

**Spirometry After Recovery**

**Table 5. Frequency Distribution Of Spirometry After Recovery**

S.no	Spirometry	Frequency (35)	Percent (%)
1.	Mild restrictions	40	57.1%
2.	Moderate restrictions	30	42.9%
3.	Severe restrictions	0	0



**Chart 4. Frequency Distribution Of Spirometry Restrictions After Recovery**

PVALUE-0.307 (P value <0.05 significant ) p value derived from fisher exact test.

Among the study population , nearly 70% of the patients with the age group of 41-60 years of age had mild restrictions after recovery. More than 50% of the patients with age group of >60 years of age had moderate restrictions

PVALUE-1.000 (P value <0.05 significant ) p value derived from fisher exact test.

Among the study population , more than 50% of the male and female patients had mild restrictions after recovery.

**Comparing Ct Severity Score Versus Spirometry Restrictions After Recovery**

**Table.6 Comparing Ct Severity Score Versus Spirometry Restrictions After Recovery**

S .no	CT severity score	spirometry after recovery				Total
		MILD		MODERATE		
After recovery						P value-0.000
1	Mild	40,	80%	10,	20%	50, 100%
2	Moderate	0,	0	20,	100%	20, 100%
3	Severe	0,	0	0,	0	0, 0

PVALUE-0.000 (P value <0.05 significant ) p value derived from fisher exact test.

Among the study population(70) , all the patients who had moderate CT severity score after treatment had moderate spirometry restrictions .

**DISCUSSION :**

Only few studies were conducted for assessment of respiratory function and pulmonary sequelae throughout the world and in our country. In this 3-month follow-up study of

patients surviving hospital admission for COVID-19, approximately all participants had improvement in pulmonary function and psychological status. CT abnormalities after 3 months to be more common in participants admitted to ICU.

The favourable spirometry in recovered patients observed in this study were accompanied by a low prevalence of reduced peripheral oxygen levels . Our study results indicate that development of chronic respiratory failure is not common in COVID-19 survivors.

David et al. analyzed 97 patients who recovered from SARS and found that after 1-year, abnormal CT findings and DLCO abnormalities were still present [6]. A follow-up study of H7N9 demonstrated that lesions persisted in patients up to 64-month after illness onset, with restrictive ventilation dysfunction and dyspnea [7]. In our study, we found that most of the COVID-19 patients had abnormalities on chest CT recovered 3 months after discharge.

Hence we should overtake responsibility for longer follow-up time survey to detect persistent lung damage and long-term pulmonary dysfunction.(8) and few reports have described the sequelae of COVID-19 survivors [9,10,11], and this study to investigate the changes in both pulmonary function, CT chest,psychological assessment. In our studies, we presented the results of lung function tests, CT chest in these patients with COVID-19 3 months after their hospital discharge.

It is necessary to follow up these patients, for detection and appropriate management of any persistent or emerging long-term sequelae in the radiological and physiological domains.(8)

Patients with COVID-19 are known to have fever, cough, headache, loss of smell and deterioration of GI system in general [12]. Even with such a huge mortality rate, a large number of the COVID19 patients still be able to recover from this deadly situation.

Follow-up checks and investigating reinfection possibilities of COVID-19 recovered patients are highly beneficial. Previously, many patients recovered from SARS in the early rehabilitation phase complained of limitation in general physical function and/or shortness of breath [13]. Although patients who have recovered from COVID-19 have been noted to manifest radiological, functional and psychological abnormalities to varying degrees, they felt performing household tasks or general work was moderately or severely impaired, and it is important to follow up these patients.(8).

At point of discharge, patients should be considered for early referral to rehabilitation services and for psychosocial support where appropriate.(14)

If the CXR has not cleared satisfactorily and/or the patient has ongoing respiratory symptoms, consider; a) Full pulmonary function testing b) Walk test with assessment of oxygen saturation c) Echocardiogram d) Sputum sample if expectorating for microbiological analysis e) Assess need for referral to rehabilitation services if not already done f) A new diagnosis of Pulmonary Embolism (PE) or post-PE complications if diagnosed during acute illness(14).

**LIMITATIONS** However, there were several limitations in this study. ,firstly only 70 patients with confirmed SARS-CoV-2 infection were enrolled in this study. Larger sample size would be more ideal for the study. Secondly, the patients included in this study were non-critical without any comorbidities.

**CONCLUSION:**

Three months after SARS CoV-2 infection shows significant

improvement in functional and radiological abnormalities on careful monitoring. A systematic follow-up needs to be evaluated to optimise care for patients recovering from COVID-19. It is necessary to follow up the COVID 19 patients to appropriately manage any persistent or emerging long term sequelae

**Conflicts Of Interest:** nil

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