Journal of Preventive Medicine and Holistic Health 2023;9(1):15–18

Content available at: https://www.ipinnovative.com/open-access-journals

Journal of Preventive Medicine and Holistic Health

Journal homepage: https://www.jpmhh.org/

Original Research Article

Pulmonary Fibrosis in post COVID-19 follow up cases

Harshit Jain[1,*], Mustafa Singapurwala[1], Shivmohan Sarraf[1], Arti Julka[1]

[1] *Dept. of Respiratory Medicine, RD Gardi Medical College, Ujjain, Madhya Pradesh, India*

ARTICLE INFO

Article history:
Received 06-02-2023
Accepted 14-02-2023
Available online 07-06-2023

Keywords:
COVID-19
Pulmonary fibrosis
ARDS and Antifibrotic

ABSTRACT

Introduction: An outbreak of novel coronavirus CoV-19(SARS-CoV-2) was responsible for coronavirus disease-19(COVID-19) and was first reported in Hubei province, Wuhan, China, on November 17, 2019. It had rapidly spread globally with approximately 66.4 crore cases, 64.40 crore recoveries and 67.1 lakh deaths (200,000 death within first four month) till now. In India there were 4.46 crore cases of which 4.41 crore recovered and there were 5.30 lakh deaths till now (JHU CSSE COVID-19 Data).
Aims: Assessment of pulmonary fibrosis in post COVID-19 follow up cases.
Data Collection: The prospective observational study was carried out at R.D. Gardi Medical College, Ujjain in the Department of Respiratory Medicine. All post COVID-19 cases attending post covid care speciality clinic was included in the study with minimum 119 patients.
Result: In our study of 119 post covid follow up cases, post covid pulmonary fibrosis was seen in 67(56.3%) patients (fibrotic group) of which only in 3 patients had residual lung fibrosis while other improved.
Conclusion: The patients who had lung fibrosis were fewer than expected (<5%). These sequelae were mostly occurring in the elderly patients with comorbidities, longer hospital stay, severity of covid infection and smoking are the other risk factors for its development. Post Covid patients had various symptoms like weakness, cough, breathlessness etc which required symptomatic management.

1. Introduction

The World Health Organization (WHO) officially announced COVID-19 as a pandemic disease in March 2020.[1] This infectious disease is highly contagious and mainly spreads by coughing, talking within proximity, or sneezing.[2] A large proportion of infected COVID-19 cases had very mild symptoms - such as loss of taste or smell, fever, fatigue, and dry cough - or are completely asymptomatic. However, in about 14% of the cases, acute respiratory distress syndrome (ARDS) can develop which is a potentially fatal condition.[3] ARDS can especially develop in patients predisposed to certain risk factors, such as diabetes mellitus, old age, and hypertension etc.[4] COVID-19 is primarily considered a respiratory condition however it is a systemic disease as it can adversely affect various organs, including the cardiovascular, gastrointestinal, nervous, hematopoietic, and cardiovascular systems; This can be due to the angiotensin-converting enzyme 2 (ACE2)'s abundant presence in many organs of the body.[5]

After the COVID-19 outbreak, increasing number of patients worldwide who have survived COVID-19 continue to battle the symptoms of the illness, long after they have been clinically tested negative for the disease. They are called as long – haulers. As we battle through this pandemic, the challenging part is how to manage this COVID-19 sequelae which may vary from mild in terms of fatigue and body aches to severe forms requiring long term oxygen therapy and even lung transplantation due to lung fibrosis or significant cardiac abnormalities and stroke leading to

* *Corresponding author*.
E-mail address: harshitjain0896@gmail.com (H. Jain).

https://doi.org/10.18231/j.jpmhh.2023.005

impairment in quality of health.[6,7]

The severe lung involvement can lead to ARDS. The pathological correlate of ARDS is the diffuse alveolar damage (DAD) which is characterized by an initial (acute inflammatory) exudative phase with edema, hyaline membranes, and interstitial acute inflammation, followed by an organizing phase with loose organizing fibrosis mostly within alveolar septa, and type 2 pneumocyte hyperplasia. A potent third stage of ARDS may be the fibrotic stage.[8] Abnormal immune mechanism initiates and promote pulmonary fibrosis, possibly as a consequence of a cytokine storm. Dysregulation release of matrix metalloproteinases during the inflammatory phase of ARDS causes epithelial and endothelial injury. VEGF and cytokines such as IL-6 and TNF alpha are also implicated in fibrosis process.

Our medical college hospital during the pandemic became a dedicated Covid tertiary care centre (DCH) and patients who recovered were coming with various post covid symptoms so this study was carried out here to evaluate and manage these patients.

2. Materials and Methods

Study design- A prospective observational study was carried out in patient who are COVID cases (RTPCR positive/ RAT positive/CT scan of thorax suggestive of covid infection) and were recovered from COVID infection and come for follow up in post COVID care clinic of Respiratory Medicine at C.R. Gardi Hospital, Ujjain. Recruitment of the patient according to the inclusion and exclusion criteria. The patient and/or relatives had been explained about procedure and informed and written consent was taken from the patient and/or relatives.

2.1. Inclusion criteria

All COVID-19 cases (RTPCR positive/ RAT positive/CT scan of thorax suggestive of covid infection) and ready to give consent and to be a part of the study.

2.2. Exclusion criteria

Patient with known case of interstitial lung disease, pulmonary tuberculosis and previous illness that may cause lung fibrosis.

2.3. Method

According to the presence of fibrosis on follow-up CT after discharge, patients were classified into two groups and assigned as the "non-fibrotic group" (without evident fibrosis) and "fibrotic group" (with evident fibrosis). We compared between these two groups based on the recorded clinical data, patient demographic information (i.e., sex and age), length of stay (LOS) in the hospital, admission to the ICU, laboratory results (peak C-reactive protein [CRP] level, lowest lymphocyte level, D-dimer, administration of steroid), and CT features (CT severity score and CT consolidation/crazy-paving score). Significant statistical test had been applied.

3. Results

In our study of 119 patients, 29 (24.4%) were females and 90 (75.6%) were males of which, 15 (22.4%) females and 52 (77.6%) males in fibrotic group. Of total, 51(42.85%) patients were below 50yr of age and 68(57.1%) patients were above 50yr of age, while in fibrotic group, 20(29.85%) patients were below 50yr of age and 47(70.14%) patients were above 50yr of age (p=0.0240). Mean age of 54.9701(±12.5493) years was higher in patient with post covid lung fibrosis compared to non-fibrotic group (45.7885±14.5108) (p=0.0003).

Only 6(5.0%) patients were in home isolation and 113(95.0%) patients had been admitted in hospital during Covid (p=0.0043). The duration of hospital stay (days) was significantly higher in fibrotic group [17.1045±7.5741] compared to non-fibrotic group [12.3913±5.4792] (p=0.0004).

In fibrotic group, only 1(1.49%) patient was of mild Covid infection, 18(26.86%) were patients of moderate Covid infection and 48(71.64%) patients had severe Covid infection. On the evaluation it was found that in fibrotic group, only 1(1.49%) patient was on room air, 6(8.95%) patients were on nasal prong, 11(16.41%) patients were on face mask, 16(23.88%) patients were on NRBM, 3 (4.47%) patients were on HFNC and 30 (44.77%) patients were on BiPAP/NIV. So maximum patient in fibrotic group had received oxygen support during hospitalization.

In this study of 119 post covid patients, 109(91.6%) patients have received corticosteroids (p=0.0020), 48 (40.3%) patients had received Remdesivir (p<0.0001) and 5(4.2%) patients had also received Tocilizumab (p=0.0441) for their Covid management according to severity of lung damage.

In fibrotic group, 33(49.3%) patients had diabetes mellitus (p=0.0016), 29(43.3%) patients had hypertension (p=0.0011), 2(3.0%) patients had asthma and COPD (p=0.7139). 27 (40.3%) patients were smokers (p=0.0137) in fibrotic group.

In our study 119 post Covid follow up patient had various symptoms persisting as 101(84.9%)weakness, 44 (37.0 %) cough, 21 (17.6 %) expectoration, 12(10.1%) fever, 64(53.8%) breathlessness, 14(11.8%) chest pain, 12(10.1%) joint pain, 31 (26.3%) insomnia, 10(8.4%) sore throat, 1(7.1%) abdominal pain, 2(14.3%) constipation, 1(7.1%) dry mouth, 1(7.1%) gum weakness, 1(7.1%) headache, 3(21.4%) haemoptysis, 1(7.1%) neuropathy, 2(14.3%) running nose, 1(7.1%) skin rash and 1(7.1%) vertigo. These symptoms were more severe in fibrotic group compare to non-fibrotic group.

In our study of 119 post covid follow up patients, only 67(56.3%) patients had bilateral infiltrate and reticular shadows on chest X-ray (p<0.0001) and these patients also had interstitial fibrosis, intra and inter septal thickening on HRCT thorax (p<0.0001). On follow up of these 67 patients of pulmonary fibrosis, only 3(4.47%) patients had residual fibrosis and in rest the fibrosis resolved between 2-5 months. We found that in our study, wCRP (<5) was significantly higher in [96.6418±242.1744] the fibrotic group compared to non-fibrotic group [25.2423±60.9711] (p=0.0403) also D-Dimer (<500) values were significantly higher in fibrotic group [1260.1940±992.9654] compared to non-fibrotic group [312.8846±695.9704] (p<0.0001).

It was found that in our study of 119 patient, 45 (37.8%) patients had been given anti-coagulants in post Covid follow up (p<0.0001. In the present study out of the 119 patients, all of the 67(56.3%) patients who had developed post Covid lung fibrosis had also received Pirfenidone(anti-fibrotic) to prevent lung fibrosis. Out of these 67 patients, 51 patients had been given anti-fibrotic for 2 to 3 months, 13 patients had received it for 4 to 5 months and only 3 patients had developed residual fibrosis for which anti fibrotics were continued(p<0.0001).

4. Discussion

The clinical manifestations of COVID-19 can range from mild symptoms to severe illness that lead to permanent lung damage or even mortality.[9] Most of mild and moderate cases were completely recovered as seen in non-fibrotic group of our study but only few of severe cases with acute respiratory distress syndrome (ARDS) continued to remain hypoxemic despite receiving adequate medical treatment, developed post-COVID pulmonary fibrosis was one of the important sequalae.[10] Many theories were discussed as a potential cause of post-COVID pulmonary fibrosis; older age, severity of illness, prolonged ICU stay, mechanical ventilation, history of smoking, comorbidities are the risk factors for its developments.[11] But later on, it was found to be in most cases to be broncho vascular bundle distortion, fibrotic strips, architectural distortion, subpleural curvilinear atelectasis which resolved over time.[12] As in our study, out 67 patients of pulmonary fibrosis, only 3 patients had developed residual fibrosis while other improved.[13] This may be due to as they had received anti-inflammatory drugs like steroids, Tocilizumab etc and anti-fibrotics in covid.[14] Also, patients presented with various symptoms in post-covid phase.[15]

5. Conclusion

Covid pandemic has gradually spread around the world with lots of mortality. Based on limited data from our study of 119 patients, the evaluation of long-term consequences of acute COVID-19 has shown that these had post covid sequelae like pulmonary fibrosis were seen in 67(56.3%) patients of which only in 3(4.47%) patient residual lung fibrosis was developed. Post covid HRCT findings showed interstitial fibrosis, intra and inter septal thickening which were later found to be actually broncho vascular bundle distortion, fibrotic strips, architectural distortion, subpleural curvilinear atelectasis. So, the patients who had lung fibrosis were fewer than expected (<5%) as this could be due to the use of anti-inflammatory medication and the use of anti-fibrotics. These sequelae were mostly occurring in the elderly patients with comorbidities, having longer duration of hospital stay, severity of covid infection and smoking are the other risk factors for its development. Post Covid patients had various symptoms like weakness, cough, breathlessness, ghabarahat, joint pain, palpitation, brain fogging etc which required symptomatic management.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Abdullah HM, Hama-Ali HH, Ahmed SN, Ali KM, Karadakhy KA, Mahmood SO. Severe refractory COVID-19 patients responding to convalescent plasma; A case series. *Ann Med Surg*. 2020;56(1):125–7.
2. Salih RQ, Salih GA, Abdulla BA, Ahmed AD, Mohammed HR, Kakamad FH. False-positive HIV in a patient with SARS-CoV-2 infection; a case report. *Ann Med Surg*. 2021;71(1):1–3.
3. Kakamad FH, Mahmood SO, Rahim HM, Abdulla BA, Abdullah HO, Othman S. Post covid-19 invasive pulmonary Aspergillosis: a case report. *Int J Surg Case Rep*. 2021;82(1):1–3.
4. Ahmad SA, Kakamad FH, Mohamad HS, Salih BK, Mohammed SH, Abdulla BA. Post COVID-19 cerebral venous sinus thrombosis; A case report. *Ann Med Surg*. 2021;72(1):1–3.
5. Baram A, Kakamad FH, Abdullah HM, Mohammed-Saeed DH, Hussein DA, Mohammed SH. Large vessel thrombosis in patient with COVID-19, a case series. *Ann Med Surg*. 2020;60(1):526–30.
6. Carfì A, Bernabei R, Landi F. For the Gemelli against COVID-19 post-acute care study group. Persistent symptoms in patients after acute COVID-19. *J Am Med Assoc*. 2020;324(6):603–5.
7. Sorveglianza integrata COVID-19: i principali dati nazionali; 2020. Available from: https://www.epicentro.iss.it/coronavirus/sars-cov-2-sorveglianza-dati.
8. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA*. 2020;323(11):1061–9.
9. Ali RM, Ghonimy MB. Post-COVID-19 pneumonia lung fibrosis: a worrisome sequelae in surviving patients. *Egypt J Radiol Nuclear Med*. 2021;52(1):1–8.
10. Udwadia ZF, Koul PA, Richeldi L. Post-COVID lung fibrosis: The tsunami that will follow the earthquake. *Lung India*. 2021;38:41–8.
11. Yasin R. Predicting lung fibrosis in post-COVID-19 patients after discharge with follow-up chest CT findings. *Egypt J Radiol Nuclear Med*. 2021;52:118.
12. Amin BJ, Kakamad FH, Ahmed GS, Ahmed SF, Abdulla BA, Mikael TM. Post COVID-19 pulmonary fibrosis; a meta-analysis study. *Ann Med Surg*. 2022;77:103590. doi:10.1016/j.amsu.2022.103590.
13. Kumar N, Gupta A, Vardhan H, Daga MK. PostCOVID-19 Pulmonary Fibrosis: An Update. *J Adv Res Med*. 2021;8(2):16–26.

14. Mohammadi A, Balan I, Yadav S, Matos WF, Kharawala A, Gaddam M. Post-COVID-19 Pulmonary Fibrosis. *Cureus*. 2022;14(3). doi:I 10.7759/cureus.22770.
15. Salamanna F, Veronesi F, Martini L, Landini MP, Fini M. Post-COVID-19 Syndrome: The Persistent Symptoms at the Post-viral Stage of the Disease. A Systematic Review of the Current Data. *Front Med*. 2021;8:653516. doi:10.3389/fmed.2021.653516.

Author biography

Harshit Jain, Junior Resident

Mustafa Singapurwala, Associate Professor

Shivmohan Sarraf, Junior Resident

Arti Julka, Professor and HOD

Cite this article: Jain H, Singapurwala M, Sarraf S, Julka A. Pulmonary Fibrosis in post COVID-19 follow up cases. *J Prev Med Holistic Health* 2023;9(1):15-18.