ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 07 | July - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY ON PREVALENCE OF POST - COVID LUNG SEQUELAE AND CLINICO-RADIOLOGICAL PROFILE OF POST- COVID PATIENTS IN TMC & DR BRAM TEACHING HOSPITAL

Medicine

Anamika Das	Post Graduate Trainee, Dept of Medicine, TMC & DR BRAM Teaching Hospital.
Soma Saha	Associate professor, Dept of Medicine, TMC & DR BRAM Teaching Hospital.
Dipankar Prakash Bhaumik	Associate professor, Dept of Medicine, TMC & DR BRAM Teaching Hospital.
Chandini Reang	Assistant Professor, Dept of Radiology, TMC & DR BRAM Teaching Hospital.

ABSTRACT

Background: Post-COVID lung sequelae can present with a range of symptoms, such as shortness of breath, cough, fatigue, joint pain and chest pain. This adds to the burden of the disease and thus needs a descriptive analysis in a region-specific manner in India. **Methodology:** Patients were assessed based on the clinical manifestation by the physician as well as by the use of preformed questionnaire, pulse oximetry and chest CT scan. **Results:** The majority (63.8%) of study patients experienced shortness of breath (SOB), followed by cough and fever, while Ground-glass opacity (GGO), followed by fibrotic band and consolidation, predominated in clinico-radiological imaging. However, statistical test didn't show any significant association of the risk factor with radiological finding, perhaps due to a smaller sample size. **Conclusion:** Monitoring post-COVID 19 lung sequalae in bigger cohorts over extended period of time will be important for further scientific development.

KEYWORDS

Post- COVID lung sequelae, clinic-radiological profile, COVID complications, North East

INTRODUCTION

Coronavirus had been a hazard to world health. The 2019 novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) was a fatal disease clinically from an asymptomatic state to acute respiratory distress syndrome and multi organ dysfunction[1]. Infection with COVID-19 was linked to significant short-term morbidity, and in most cases, fatality.

The majority of persons who contract COVID-19 fully recover, but in accordance with the most recent research, 10–20% of patients also go on to experience a range of mid- and long-term repercussions after they are recovered of their initial disease[2]. Complications following COVID-19 have had a significant long-term impact on populations and healthcare systems. This is due to the extremely high number of former COVID-19 patients, incidences of pulmonary sequelae are anticipated to rapidly increase significantly[3]. Post-COVID lung sequelae can present with a range of symptoms, such as shortness of breath, cough, fatigue, joint pain and chest pain. The clinico-radiological profile of post-COVID patients shows that lung function tests may reveal reduced lung capacity, diffusion capacity, and abnormal gas exchange. Radiological imaging, such as chest X-rays and CT scans, can show evidence of lung fibrosis, ground-glass opacities, and consolidation[4,5].

Various studies have revealed that patients with COVID-19 who are released from the hospital have had ongoing symptoms, abnormal chest imaging findings, reduced lung functions, and poor quality of life[4,6]. In order to address this, the World Health Organisation (WHO) issued International Classification of Disease (ICD) codes in September 2020 to make it easier to describe clinical side effects following SARS-CoV-2 infection[7]. After the acute phase of the COVID-19 pandemic, healthcare systems that are already overburdened may be threatened by the post-COVID-19 state, and managing it is still difficult[8]. Over 50 post COVID-19 disease symptoms are reported in published reviews[9, 10] many of which are incapacitating and significantly worsen mental health and quality of life.

To avoid further challenges, it is crucial that medical organisations comprehend post-COVID lung sequelae better. Hence, this study was aimed to create baseline data on the range of post-COVID lung issues because there is a lack of scientifically validated information on these complications in this region of the country. We also aimed to find the clinico-radiological correlation of these patients' pulmonary sequelae, and demonstrate its association with other risk factors.

MATERIALS AND METHODS

Study design and setting:

This is a cross sectional study conducted in the department of internal medicine, Tripura Medical College, Hapania for the period of one year from June 2021 to June 2022.

Study participants:

Patients aged 18 years and above with a Reverse Transcriptase Polymerase Chain Reaction (RT-PCR)/ Rapid Antigen Test (RAT) positive for COVID – 19 who completed their quarantine at home/hospital or become negative and consented to participate in the study were included. Patients who were known cases of ILD were excluded from the study.

Sample size:

The sample size calculated to 68 considering, the prevalence (p) of acute myocardial injury 23%[11] and level of significant 5% and absolute precision (e) 10% by using the statistical formula (n) = $z^2_{(1-\alpha/2)} \times p\ (1-p)/e^2$

Data collection:

Data was collected using a Non-random convenience sampling method. After getting the informed consent, the long term pulmonary involvements of recovered COVID-19 patients after being discharged from the hospital or after completing the home quarantine was assessed based on the clinical manifestation by the physician as well as by the use of preformed questionnaire, pulse oximetry and chest CT scan.

Statistical analysis:

The IBM Statistical Package for the Social Sciences (SPSS) version 22 was used to examine the data after it had been entered and cleaned in an excel spreadsheet. The socio demographic data was summarised using descriptive statistics including percentages, means, and standard deviation. Using the Chi square test and logistic regression, the independent variables were categorised for analysing the association between each independent and outcome variable. Kruskal-Wallis test was used for continuous variables. Variables with a P-value of <0.05 were considered to be statistically significant.

Ethical approval:

The study was approved by the Ethical Committee of Tripura Medical College, Hapania. Written informed consent was obtained from the participants and they were guaranteed the confidentiality and privacy of their records.

RESULTS

Socio demographic and clinical characteristics of the respondents

The data were not normally distributed. The median age was 64 years (Inter Quartile Range (IQR): 16). The median duration of follow-up was 5 days (IQR: 2). various demographic and clinical characteristics of the patients are enumerated in **Table 1** and **Table 2.** Of the 69 study

participants, the majority (65.22%) of them belonged to the age group of more than 60 years, the mean age of the respondents being 60.31 ± 11.97 years. Men made up more than two-thirds (69.5%) of the population, and the majority (73.9%) practised Hinduism.

Hospitalisation history was reported by 82.6% of the 69 respondents. Among respondents, 65.2% and 56.5%, respectively, reported having a history of diabetes and hypertension. Nearly 61% of the participants have experienced dyslipidaemia in the past. A history of alcohol consumption was reported by 55% of the respondents.

Post - COVID lung sequelae and clinico-radiological findings

The majority (63.8%) of study patients experienced shortness of breath (SOB), followed by cough and fever, while Ground-glass opacity (GGO), followed by fibro band and consolidation, predominated in clinico-radiological imaging, as seen in **Figure 1** and **Figure 2**.

Correlation between age and duration of follow-up

There was a correlation, although weak (R^2=0.0056), between age and duration of follow-up (**Figure 3**), implying that with progressive age, the duration of follow-up may increase, leading to complications and abnormal radiological findings.

Clinico- radiological association of lung sequalae with risk factors

Table 3 shows the associations between various demographic and clinical factors and radiological outcomes. None of the demographic and clinical factors were significantly associated with the radiological outcomes. The results of logistic regression analysis also showed that none of the demographic and clinical factors were significantly associated with the radiological outcomes

DISCUSSION

Our present study investigated the lung sequelae and clinico-radiological profile of post- COVID patients who had completed their quarantine at home/hospital or become negative for COVID 19. Some people will experience post-infection sequelae for a considerable amount of time after they have recovered from the acute infection, despite the fact that the majority will totally recover. Their symptoms might range in severity from mild to incapacitating.

The three most common respiratory symptoms post COVID infection identified were shortness of breath, cough and fever in approximately 64%, 20% and 16% respectively. The finding of shortness of breath/ dyspnoea is greater than that of earlier research studies done both nationally and internationally. A similar kind of study conducted in a tertiary care hospital in Delhi revealed that 60% of patients had breathlessness followed by cough[12]. Shortness of breath was more likely to occur with age and being male in our study[13]. Sudre CH et al.[14] found comparable results with regard to age, but contrasting results with regard to gender. Other findings like cough and fever were similar to several research studies[12, 15-17]. Other associated symptoms identified in various other studies were anosmia, tachypnoea, hypoxia, chest pain, depression and fatigue[12, 14, 18, 19]. Further studies have found that, patients with a pre-existing respiratory condition are more symptomatic and even may suffer from deterioration in the clinical course[12].

It is revealed that patients recovering from COVID-19 can have CT abnormalities of variable severity. On clinico- radiological finding, the most common finding was Ground-glass opacity (GGO), followed by fibrotic band (firbo band) and consolidation. This was in concordance with the findings of the studies by Malesevic S, et al[20], Rai D et al[21], and You J et al[22]. In addition to the aforementioned radiological findings, other findings include subpleural bands with concomitant pulmonary function abnormalities, diffuse reticulations[13], fibrotic-like changes[19].

CONCLUSION

COVID is new and emerging disease and few studies are available till date in this field. In this very study spectrum of lung complications in the form of consolidation, fibrotic bands and ground glass opacities are detected which can also be found in other lung disease like ILD. But as the patients presented here were not known cases of ILD, hence such presentations in these cases are alarming and enlightening. Thus, a long-term follow-up of post covid patients are warranted for early identification and better management of patients with post covid lung complications to decrease the mortality & morbidity.

Limitations-

1) Sample size is small.
2) Duration of the study is less.
3) It is a retrospective study. As this is a dynamic process a prospective study with larger sample size would be appropriate.

Table 1: Socio demographic characteristics of the study participants (n= 69)

Socio demographic characteristics	Frequency	Percentage (%)
Age group		
< 60 years	24	34.78
≥ 60 years	45	65.22
Gender		
Female	21	30.43
Male	48	69.57
Religion		
Hindu	51	73.91
Muslim	14	20.29
Others	4	5.80

Table 2: History of past illness, and personal habits (n=69)

History of past illness, and personal habits	Frequency	Percentage (%)
Previous Hospitalization		
No	12	17.39%
Yes	57	82.61%
Hypertension		
Yes	45	65.22
No	24	34.78
Diabetes Mellitus		
No	30	43.48
Yes	39	56.52
Dyslipidaemia		
No	27	39.13
Yes	42	60.87
Alcohol intake		
No	31	44.93
Yes	38	55.07

Table 3: Associations between various demographic and clinical factors and radiological outcomes. (n=69)

Variables	Asymptotic p value	dF
Age group		
< 60 years	0.617	2
≥ 60 years		
Gender		
Female	0.053	2
Male		
Hospitalized		
No	0.709	2
Yes		
Ventilation		
No	0.865	2
Yes		
Hypertension		
No	0.215	2
Yes		
Diabetes Mellitus		
No	0.896	2
Yes		
Dyslipidaemia		
No	0.083	2
Yes		
Alcohol addiction		
No	0.230	2
Yes		
Clinical symptoms		
Cough		
Fever	0.316	4
SoB		
Duration*		
Age*	0.396	
	0.560	

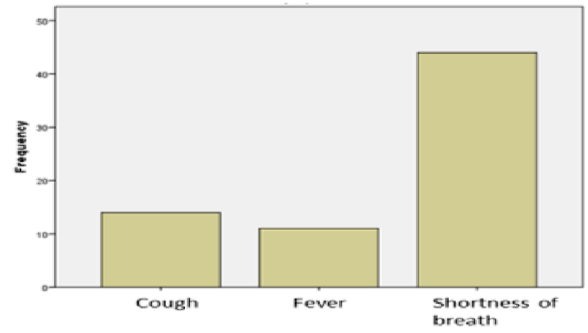

Figure 1. Distribution of study participants as per clinical symptoms.
Shortness of Breath (SOB) was the most common symptom post COVID 19 infection.

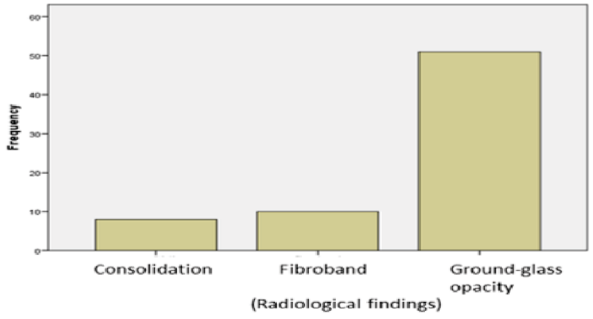

Figure 2. Distribution of study participants as per radiological findings.
Ground-glass opacity was the most common radiological finding among the participants.

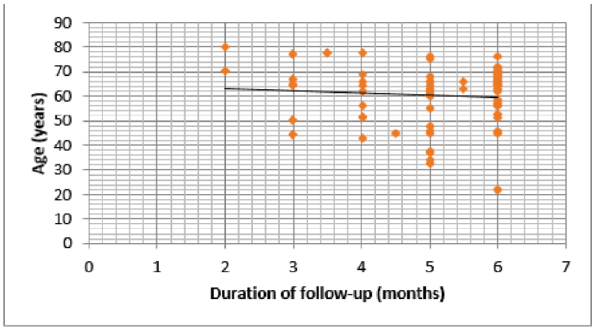

Figure 3. Correlation between age and duration of follow-up.
There was a very weak negative correlation (trend line) between age and duration of follow-up.

REFERENCES

1. Singhal T. A Review of Coronavirus Disease-2019 (COVID-19). Indian J Pediatr. 2020;87(4):281–6.
2. Coronavirus disease (COVID-19): Post COVID-19 condition [Internet]. [cited 2023 May 13]. Available from: https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-(covid-19)-post-covid-19-condition
3. Huang C, Huang L, Wang Y, Li X, Ren L, Gu X, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. The Lancet. 2021 Jan 16; 397(10270):220–32.
4. 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. JAMA. 2020 Aug 11; 324(6):603–5. doi: 10.1001/jama.2020.
5. Kanne JP, Little BP, Schulte JJ, Haramati A, Haramati LB. Long-term Lung Abnormalities Associated with COVID-19 Pneumonia. Radiology. 2023 Feb; 306(2):e221806.
6. Zhao YM, Shang YM, Song WB, Li QQ, Xie H, Xu QF, et al. Follow-up study of the pulmonary function and related physiological characteristics of COVID-19 survivors three months after recovery. eClinicalMedicine [Internet]. 2020 Aug 1 [cited 2023 May 15]; 25. Available from: https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(20)30207-8/fulltext
7. Emergency use ICD codes for COVID-19 disease outbreak [Internet]. [Cited 2023 May 15]. Available from: https://www.who.int/standards/classifications/classification-of-diseases/emergency-use-icd-codes-for-covid-19-disease-outbreak
8. Wise J. Long covid: WHO calls on countries to offer patients more rehabilitation. BMJ. 2021 Feb 10;n405
9. Lopez-Leon S, Wegman-Ostrosky T, Perelman C, Sepulveda R, Rebolledo PA, Cuapio A, et al. More than 50 Long-term effects of COVID-19: a systematic review and meta-analysis. MedRxiv Prepr Serv Health Sci. 2021 Jan 30; 2021.01.27.21250617.
10. Michelen M, Manoharan L, Elkheir N, Cheng V, Dagens A, Hastie C, et al. Characterising long COVID: a living systematic review. BMJ Glob Health. 2021 Sep; 6(9):e005427.
11. Solomon JJ, Heyman B, Ko JB, Rany Condos, David A Lynch CT of Post-Acute Lung Complications of COVID-19. Radiology.2021 Nov; 301(2):E383-95. doi: 10.1148/radiol.2021211396
12. Goel N, Goyal N, Kumar R. Clinico-radiological evaluation of post COVID-19 at a tertiary pulmonary care centre in Delhi, India. Monaldi Arch Chest Dis [Internet]. 2021 Mar 8 [cited 2023 May 16];91(3). Available from: https://www.monaldi-archives.org/index.php/macd/article/view/1682
13. Solomon JJ, Heyman B, Ko JP, Condos R, Lynch DA. CT of Postacute Lung Complications of COVID-19. Radiology. 2021 Aug 10; 211396.
14. Sudre CH, Murray B, Varsavsky T, Graham MS, Penfold RS, Bowyer RC, et al. Attributes and predictors of long COVID. Nat Med. 2021 Apr; 27(4):626–31.
15. Jutant EM, Meyrignac O, Beurnier A, Jaïs X, Pham T, Morin L, et al. Respiratory symptoms and radiological findings in post-acute COVID-19 syndrome. ERJ Open Res. 2022 Apr 19;8(2):00479–2021.
16. Buitrago-Garcia D, Egli-Gany D, Counotte MJ, Hossmann S, Imeri H, Ipekci AM, et al. Occurrence and transmission potential of asymptomatic and presymptomatic SARS-CoV-2 infections: A living systematic review and meta-analysis. PLOS Med. 2020 Sep 22; 17(9):e1003346.
17. Oran DP, Topol EJ. The Proportion of SARS-CoV-2 Infections That Are Asymptomatic. Ann Intern Med. 2021 May 18; 174(5):655–62.
18. Ahmad Alhiyari M, Ata F, Islam Alghizzawi M, Bint I Bilal A, Salih Abdulhadi A, Yousaf Z. Post COVID-19 fibrosis, an emerging complicationof SARS-CoV-2 infection. IDCases. 2021; 23:e01041.
19. Prevalence of post COVID-19 condition symptoms: a systematic review and meta-analysis of cohort study data, stratified by recruitment setting [Internet]. 2022 [cited 2023 May 22]. Available from: https://www.ecdc.europa.eu/en/publications-data/prevalence-post-covid-19-condition-symptoms-systematic-review-and-meta-analysis
20. Malesevic S, Sievi NA, Herth J, Schmidt F, Schmidt D, Vallelian F, et al. Chest CT Findings after Mild COVID-19 Do Not Explain Persisting Respiratory Symptoms: An Explanatory Study. Diagnostics. 2023 May 3; 13(9):1616.
21. Rai D, Kumar S, Pandey S, Vardhan H. Radiological Lung Sequelae of Severe COVID-19: A Retrospective Observational Study From a Dedicated COVID Centre of Eastern India. Cureus. 14(1):e21416.
22. You J, Zhang L, Ni-Jia-Ti MY, Zhang J, Hu F, Chen L, et al. Anormal pulmonary function and residual CT abnormalities in rehabilitating COVID-19 patients after discharge. J Infect. 2020 Aug 1; 81(2):e150–2.