Section: Pulmonary Medicine

Original Research Article

CLINICAL PROFILE OF OBSTRUCTIVE AIRWAY DISEASE AMONG POST COVID-19 PATIENTS – A CROSS-SECTIONAL STUDY

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Abstract

Background: Covid -19 infection predominantly affects respiratory system. The immediate and delayed effects of the virus infection vary in different populations. The after effect of the infection is manifested in various organ systems which includes respiratory, cardiovascular, psycho neurological, dermatological systems. The respiratory system involvement can vary from dry cough to lung fibrosis. However obstructive airway disease is the most common presentation. **Materials and Methods:** The present study aims at the clinical and spirometric profile of post Covid patients. This is an observational study which includes patients attending the post Covid clinic of a tertiary teaching hospital in central Kerala in the southern part of India. The clinical and spirometric pattern of patients were recorded and analysed. **Result:** The most common clinical pattern was recent onset obstructive airway disease; however, majority of the Spirometry values were showing restrictive abnormality. The small airway dysfunction was noticed in majority of patients. **Conclusion:** Obstructive airway disease was common among Post Covid patients. Small airway dysfunction could be a significant contributor to exertional breathlessness among post-Covid patients.

INTRODUCTION

The World Health Organization declared COVID-19 a global pandemic on March 11, 2020. The pandemic was deemed a major public health emergency, calling all nations to take urgent measures to curb the rapid spread of the disease. The first COVID-19 infection in India was reported in Kerala on January 27, 2020. Extensive research was conducted to map the pathways of disease transmission, progression, and the effects of the virus on various other body systems. [1,2]

SARS-CoV-2 infection is associated with lung complications. The virus predominantly affects the respiratory system. However, it has a profound effect on other organ systems as well. The dysregulated inflammatory process leaves behind sequela in the lungs. [3-5]

Characteristic of Covid 19 is the extensive injury to alveolar epithelial cells and endothelial cells with secondary fibroproliferation, indicating a potential for chronic vascular and alveolar remodeling leading to lung Fibrosis and/or pulmonary hypertension. These findings generate concerns regarding the assessment of lung injury among discharged patients. The inflammatory process may last for several weeks to months. Literature is available regarding the persisting symptoms even after the acute phase of COVID-19 infection is over. [6-8]

Long Covid and post Covid syndromes are well recognized clinical entities in the current medical practice. Knowledge regarding those symptoms will help the clinician to detect and treat them early. Thus, the extended sequelae can be controlled to a greater extent. The COVID-19 virus can trigger an inflammatory process leading to asthma exacerbation. However, there are anecdotal reports that asthma like clinical picture is seen in patients who have recovered from COVID-19 infection, and minor airway dysfunction has also been reported.[9]

The characterization of obstructive airway disorders still needs to be performed in this part of the world. Assessment of pulmonary function after recovery will help to identify the effect of infection and repeated follow-up studies can interpret the change in pulmonary function over time and the impact of treatment, whether it was beneficial or not. Evidence about pulmonary function tests among post COVID-19 patients was limited. The present study details the clinical and Spiro metric profiles of patients who have recovered from acute COVID-19 illness, which has not been studied in the state.[10]

MATERIALS AND METHODS

A hospital based cross-sectional study was conducted in the outpatient department of Pulmonary Medicine of Government Medical College Thrissur, Kerala, during August and September 2022. Ethics approval was obtained from the appropriate ethics committee. Patients diagnosed with Obstructive airway disease after recovering from COVID-19 were taken as study subjects. Consecutive post-Covid patients with obstructive airway disease will be enrolled in the study. Patients with a previous diagnosis of obstructive airway disease were excluded from the study. A detailed history of COVID-19 illness, clinical presentation, vaccination status, post-COVID symptoms, clinical examination of the respiratory and other systems, relevant investigations, and Spiro metric assessment were done. The data entered into the Proforma and were analyzed. The qualitative data were expressed in proportions, and the quantitative data were expressed in means and standard deviation.

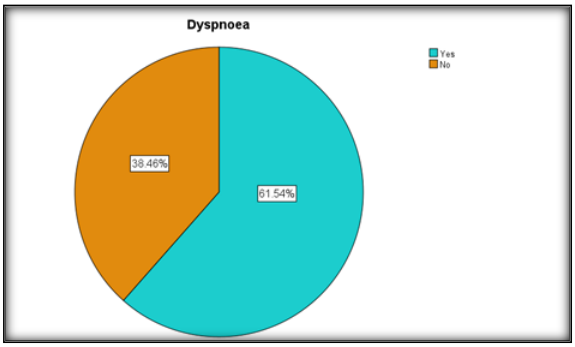
Data collection procedure:

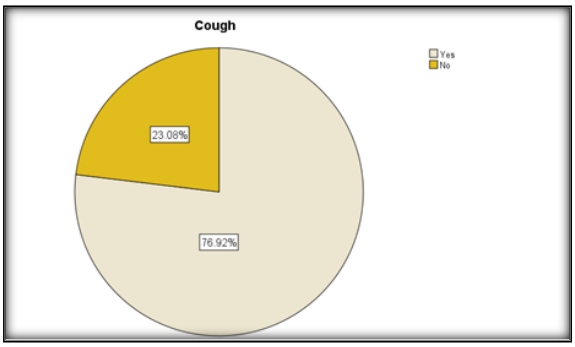
Data were collected using a structured proforma. The proforma had two parts. The first part was used to collect socio-demographic variables, clinical presentation, presence of any comorbidities, results of laboratory investigations, treatment given and treatment outcome at the hospital.

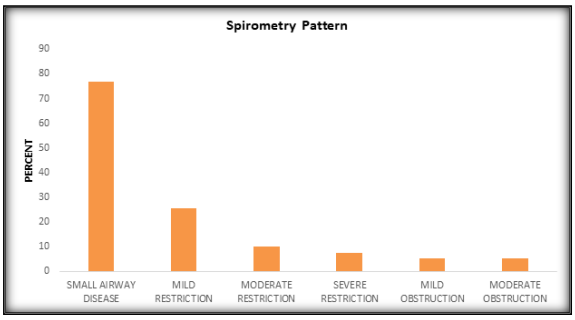
Data was collected from patients by interview method and spirometry. Variables studied were general information about participants, signs and symptoms of Obstructive airway diseases, Information regarding COVID-19 infection, COVID test positivity, duration of symptoms, vaccination status and other comorbidities and spirometry parameters.

RESULTS

Among the total 39 participants, the majority were females. It includes 24 (61.54%) females and 15 (38.46%) males. The mean age of study participants was 41.4, and the standard deviation was 14.184. Among the participants, the majority were unemployed and manual laborers (64.1%). The unemployed category includes housewives and elderly people, and Manual laborers, including migrant workers, coolies, quarry workers, tile workers etc. Among the study participants, 41% tested positive 12-18 months before the study period. Most study participants tested positive within 6-18 months before the study period. Fever was the symptom most of the patients had (87.2%) .46.2% had headaches, and 48.7% had cough when they tested positive for COVID-19. Only 9 participants (23.1%) felt dyspnea and anosmia when they tested Covid positive. Thirty-one participants (79.5%) were Category A and 7 (17.9%) were Category C based on their Covid symptoms. Among them, only three required hospitalizations, and the rest were managed at their home itself. 75% of hospitalized patients were category C. Among the participants, 4 (10.3%) had diabetes mellitus and hypertension. Asthma was a co-morbidity in 4 participants (10.3%). Cough and dyspnoea were the two main post-Covid symptoms suffered by the participants.







Thirty participants (76.9%) had a cough, and 24 (61.5%) had dyspnea. Among those who had coughs, 10 % had associated expectoration. 27 Participants (69.2%) had sought medical care due to their symptoms. 61.6% of the participants were given inhaled corticosteroids. Among them, 11 (28.2%) were given Inhaled corticosteroids along with Long-acting beta-agonists, and 2.6% received short-acting beta-agonists. Twelve participants hadn't sought any medical treatment before. 28.2 % were given treatment for four weeks, and 17.94 % required treatment beyond three months. Polyphonic wheeze was the most common respiratory system examination finding. Thirty-five participants had wheeze, and one participant had both wheeze and crackles. Eighteen participants showed typical pulmonary function test results. 10.25 % showed an obstructive pattern, whereas 43.58% of participants showed a restrictive way. Among those with obstructive patterns, 50% showed mild, whereas 50%

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showed moderate obstruction. 25.6% of participants showed mild restriction, whereas 7.7% showed severe restriction. Twenty-eight patients (77%) had spirometric values suggesting minor airway dysfunction. Spirometric values indicating small airway obstruction were also seen in patients with regular spirometric patterns. This finding could be attributed to the symptom of exertional breathlessness of post-COVID patients.

DISCUSSION

COVID-19 infection predominantly affects the respiratory system. The infection is associated with lung complications. Studying the clinical and spirometric profile of patients recovered from acute COVID-19 infection will throw light on the pathophysiological effects of COVID-19 on the respiratory system. This study was conducted on patients diagnosed with Obstructive airway disease clinically after having recovered from COVID-19 in the outpatient department of Pulmonary Medicine in a tertiary care teaching hospital.[1]

Age-wise data of the study population revealed the mean age of the participants as 41.36 years with a standard deviation of 14.18. In a study conducted by Anastasio F, Barbuto S et al,[2] the mean age of study participants was 56 years. In contrast, the study by Siba S et al,[9] got a mean age of 31.49 years with a standard deviation of 18.4. Demographic analysis of the study population revealed that 61.54% were females and only 38.46% were males. It is in concordance with the study of Siba S et al,[9] where females were 63%. But in the study by Anastasio F, Barbuto S et al,[2] males were 45.9%. In contrast to other studies, the present study addresses the participants' occupations. It showed that unemployed individuals, including elderly people and housewives and manual labourers, including coolies, quarry workers, and tile workers who need more physical activities, constitute most of the study population, probably due to perceived breathlessness.

The present study included participants irrespective of the duration between when they tested COVID-19 positive and the study period. The study conducted by Anastasio F, Barbuto S et al,[2] evaluated the subjects after four months of diagnosis. In contrast, the cohort study by Siba S, Anjana NKN et al,[9] followed up for three months. 69.2 % of this study's participants tested positive 6-18 months before the study period.

In the present study, the COVID symptoms we tried to analyse were headache, fever, myalgia, cough, dyspnoea, and anosmia. Fever was the most predominant symptom (87.2%), followed by headache (48.7%). COVID-19 infection affects the respiratory system predominantly, cough was the most common respiratory symptom, which was present only in 48.7%, followed by dyspnoea in 23.1%. Myalgia was present in 28.2% and anosmia in 23.1%. This result is not in agreement with the results of a study conducted by Çalıca Utku A, Budak G et al,[10] in which cough (56.6%) and weakness (56.6%) were the predominant symptoms. Fever was present only in 33.6%.

On the categorisation of patients based on their symptoms at the time of COVID-19 infection, 79.5% of them were Category A (mild symptoms), and 17.9% (7 participants) were Category C (severe symptoms). This has resulted in concordance with observation by Siba S, Anjana NKN et al. [9] In their study, 70.8% of the participants were Category A, and only 2 had severe symptoms (Category C).

In the present study, we observed that the proportion of hospitalisation was 7.7%, and 75 % of them were Category C. In the study of Torres-Castro R, Vasconcello-Castillo L et al,[1] 20% required hospitalisation. In contrast, 64.4% required hospitalisation in the study done by Anastasio F, Barbuto S et al,[2] and 81.81% in that of Garg A et al. [5]

In the present study, 20.51% of the participants had some co-morbidities. The common co-morbidities observed were diabetes mellitus, hypertension, and asthma. The prevalence of diabetes mellitus, hypertension, and asthma was 10.3%. The prevalence of co-morbidities observed was 14.12% in a study done by Fernández-de-las-Peña's C, Torres-Macho J et al,[3] and Anastasio F, Barbuto S et al,[2] observed a total of 44.3% prevalence for co- morbidities.

Even though the acute stage of COVID-19 infection predominantly showed nonspecific symptoms, the most common post-COVID symptoms were cough and dyspnoea. Cough was present in 76.9% and dyspnoea in 61.5% of participants. 10% of the participants with a cough had associated expectoration. According to Anastasio F, Barbuto S et al,[2] the most common post-Covid symptoms were exertional dyspnoea (42.7%) followed by weakness (29.8%). Fernández-de-las-Peñas C, Torres-Macho J et al,[3] also observe dyspnoea on exertion and fatigue as the most common post-Covid symptoms. A study by Kamal M. et al,[12] and Pavli A et al,[13] also addresses fatigue as the most common post-COVID symptom.

On analysis, we could infer that among the participants, 69.23% had sought medical care for their post-Covid symptoms. 88.9% of them were managed with inhaled corticosteroids alone or in combination with other drugs. 28.2% were given a metered dose inhaler with an inhaled corticosteroid and long-acting beta-agonist combination. 23.1 % required additional medications for symptom control along with inhaled corticosteroids and long-acting beta-agonists. 30.8% of participants did not seek any medical care. 30.8% of participants had to take treatment only up to 4 weeks, whereas 60% required an extension of treatment beyond four weeks. Respiratory system examination could make an impression regarding the characteristic finding of wheezing in 89.7% of the participants, and 7.7 % had wheeze and crackles.

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Ultimately, the effect of COVID-19 infection was assessed by the pulmonary function test values. Impairment in lung function could be interpreted easily with that. In our study, 46.2% of the clinically suspected participants had a regular pattern in pulmonary function tests. The most common abnormality detected was the restrictive pattern in pulmonary function tests, which was present in 43.58% of participants, whereas the obstructive pattern was present only in 10.25%. Other studies also give similar results. A study by Frija–Masson J, Debray M-P et al,[11] showed an obstructive pattern in 4% and a restrictive pattern in 26% of participants. A similar result is obtained in the study of Torres-Castro R, Vasconcello-Castillo L et al,[1] with a 7% obstructive and 15% restrictive pattern. Another study done by Garg A, Nagpal P et al,[5] showed a 20% obstructive and 33% restrictive pattern.

CONCLUSION

COVID-19 infection leaves a spectrum of sequelae, and many patients present with persistent respiratory complaints. The knowledge regarding the pathophysiological effects of COVID-19 infection makes assessing pulmonary function after acute infection relevant. Small airway dysfunction could be a significant contributor to exertional breathlessness among post-Covid patients. A large number (77%) of patients with respiratory symptoms had spirometric features of minor airway dysfunction. Even though clinical suspicion was high, the pulmonary function test of the majority of participants was normal in 46%. The frequent abnormal pattern found in Spirometry was restrictive.

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