

## A STUDY OF POST COVID SEQUEL AMONG COVID-19 PATIENTS – AN OBSERVATIONAL STUDY

Received : 04/07/2023  
 Received in revised form : 10/08/2023  
 Accepted : 24/08/2023

**Keywords:**  
 Post COVID sequelae, COVID – 19 sequelae

Corresponding Author:  
**Dr. C. Bharathi,**  
 Email: bharathi\_sathis@yahoo.in

DOI: 10.47009/jamp.2023.5.5.22

Source of Support: Nil,  
 Conflict of Interest: None declared

*Int J Acad Med Pharm*  
 2023; 5 (5); 102-106



**T. Hemamalini<sup>1</sup>, C.S. Sathis<sup>2</sup>, A.S. Bharranitharan<sup>3</sup>, C. Bharathi<sup>4</sup>, R. Niruba<sup>5</sup>**

<sup>1</sup>Assistant Professor, Department of Physiology, Annapoorana Medical College & Hospitals, Salem, Tamil Nadu, India

<sup>2</sup>Associate Professor, Department of Anesthesiology, Annapoorana Medical College & Hospitals, Salem, Tamil Nadu, India.

<sup>3</sup>Assistant Professor, Department of General Medicine, Annapoorana Medical College & Hospitals, Salem, Tamil Nadu, India.

<sup>4</sup>Associate Professor, Department of Physiology, Annapoorana Medical College, Salem, Tamil Nadu, India.

<sup>5</sup>Professor, Department of Physiology, Annapoorana Medical College & Hospitals, Salem, Tamil Nadu, India.

### Abstract

**Background:** Post COVID – 19 sequel means group of symptoms occurring after recovery from COVID 19. During the acute phase of SARS – COV – 2 infections, the patients experience a wide range of clinical symptoms. Few patients, who had recovered from the acute infection, were found to develop long term complications. Though the primary clinical manifestation of COVID – 19 is the respiratory infections, involves multi – organ systems including heart, lungs, vascular systems, brain and other organs. These long-term effects have become the area of interest to the scientific and medical communities, as it aids in multidisciplinary approach to treatment. **Materials and Methods:** Survivors of COVID – 19 illnesses were selected from AMCH. A total of 250 post COVID – 19 infected individuals were selected for the study and face to face questionnaire were designed to assess their current health status. **Result:** The most-common post COVID sequelae observed was fatigue (89.6%). Other symptoms included headache (74%), anosmia and ageusia (71.6%), muscle and joint aches (68.4%), generalized weakness (62%), shortness of breath on exertion (58%), shortness of breath at rest (49.2%), elevated blood sugar levels (46.15%), productive cough (46%), gastric ulcer (42%), dry cough (41%), insomnia (40%), weight loss (35%), scratchy throat (32%), hair loss (27.2%), abdominal pain (12%), palpitations (10.8%), chest pain (5.6%), walking difficulty (3.2%), rashes (2.8%), nausea or vomiting (2%), discoloration of fingers or toes (1.2%), tinnitus (0.4%). **Conclusion:** From this study it is concluded that Post COVID sequel was common among COVID infected individuals. Post COVID sequel had a variety of symptoms, which when diagnosed will help to improve the quality of life. A comprehensive understanding of patient care needs detailed study of symptoms beyond the acute phase which helps in the development of infrastructure for COVID -19 clinics, that will be equipped to provide integrated multispecialty care in the outpatient setting.

## INTRODUCTION

Corona virus disease 2019 (COVID – 19) is a disease involving multiple systems in the body, caused by severe acute respiratory syndrome corona virus – 2 (SARS – COV – 2). SARS-CoV-2 has been related to acute and post-acute sequel. While the respiratory symptoms are the commonest and maximum, the

virus affects all the systems including lungs, heart, vascular system, brain and other organ systems of the body.<sup>[1]</sup> Despite immunization, COVID – 19 has affected 476 million people worldwide.<sup>[2]</sup> Person to person spread are more likely to occur via fomites, direct touch, or airborne transmission via respiratory droplets.<sup>[3]</sup> There are various SARS – COV – 2 variants, among which the delta and omicron variants

cause more infections and cause rapid spread than previous variants of the virus.<sup>[4-7]</sup> Patients with acute and silent/ asymptomatic infection may develop post – COVID complications. These post – COVID complications and symptoms are being studied by medical and research communities.<sup>[8]</sup> About 80% of patients who were infected with COVID-19 complained of health problems following acute infection and numerous adverse effects were documented. There are two definitions of post – COVID 19 according to the guidelines by national institute for health and care excellence (NICE), Ongoing symptomatic COVID – 19 syndromes, defined as symptoms lasting 4-12 weeks after the beginning of acute symptoms. Post COVID 19 syndromes, defined as symptoms lasting more than 12 weeks after the onset of acute symptoms.<sup>[9]</sup> Furthermore, various studies observed the prevalence of long – term symptoms after COVID – 19 infection.<sup>[10]</sup> The factors associated with COVID 19 and its lethality has been surveyed, but the probable morbidity it generated and increased number of patients who were hospitalized needed additional research on the post COVID sequelae. The characteristic differentiating feature between COVID-19 and other respiratory infections are its symptomatology involving multiple organ systems, long term sequelae and complications. The extent of these long term consequences is broad and managing the long term post COVID sequelae will be a major challenge for health care services.<sup>[11]</sup> In a review of COVID 19 patients, 80% of COVID - 19 patients had a persistent health problem after the acute infection with more than 50 adverse effects reported.<sup>[12]</sup> Although the pathophysiology of post COVID complications is not known, a symptom lasts for several weeks or occurs after 3 months or longer.<sup>[13-17]</sup> Nearly 90% of patients who survived from COVID-19 has developed post COVID sequelae.<sup>[18]</sup>

The clinical findings and post COVID-19 symptoms differ from person to person and it has been deliberately being studied by various research and medical organizations. Only few studies are available in India for post COVID sequelae beyond 6 months after the acute infection. Post COVID sequelae/ infection have been associated with health-related quality of life, wellbeing and working capacity. The present study was undertaken to estimate the post COVID 19 sequelae among post COVID 19 patients.

### **Objectives**

The objectives of the study were to study the post COVID sequelae among post COVID 19 subjects and to estimate the post COVID sequelae among SARS – COV-2 infected subjects.

## **MATERIALS AND METHODS**

**Sampling Procedure:** It is an observational study conducted at Annapoorana Medical College, Salem. Information was collected from the patients attending

OPD. Survivors of COVID – 19 illnesses were selected randomly from AMCH. The date of COVID – 19 diagnosis was based on the first PCR test for SARS – COV – 2. COVID -19 patients contact details and mobile numbers were obtained from MRD. Verbal consent was obtained from all subjects. Secrecy of the subjects were guaranteed throughout the study. Data was collected with the help of special face to face questionnaire which were designed to assess their current health status. The questionnaire contained details about the clinical features experienced after COVID-19 and the demographical details. Detailed clinical histories were obtained regarding the symptoms they experienced after COVID – 19 illnesses. The symptoms were graded according to the Likert scaling into 4 grades. Grade 1 - very mild, Grade 2 - mild, Grade 3 - moderate, Grade 4 - severe, Grade 5 - Very severe. The subjects were selected beyond 3 months after infected by COVID – 19 illnesses. They were contacted over telephone and asked to visit the hospital when they come for other ailments. A total of 250 patients were selected for the study and informed written consent was obtained after getting clearance from IEC.

**Ethical clearance:** Ethical clearance was obtained from Annapoorana Medical College ethical committee for human research to conduct the study.

**Design of study:** Qualitative study

### **Inclusion Criteria**

Males and females aged more than 18 years who were infected by SA

RS – COV – 2 viruses with positive RT – PCR report, who underwent hospitalization were included in the study.

### **Exclusion Criteria**

SARS – COV – 2 viruses infected patients younger than 18 years.

**Period of Study:** 6 months

## **RESULTS**

A total of 250 subjects were included in the study, of which 162 were males and 88 were females. Among the males, 15.2% were smokers and 39.6% were alcoholics. In this study 67.6 % were diabetic and 63.2% were hypertensives. In our study the mean age of the study population was 47 years (+ 5.48), the mean height was 166 cm (+ 7.51), weight was 72 kg (+10), average BMI was found to be 26 kg/m<sup>2</sup> (+ 3.86). The descriptive statistics are represented in [Table 1].

The commonest post COVID sequelae observed was fatigue (89.6%). Other symptoms included headache (74%), anosmia and ageusia (71.6%), muscle and joint aches (68.4%), generalized weakness (62%), shortness of breath on exertion (58%), Shortness of breath at rest (49.2%), elevated blood sugar levels (46.15%), productive cough (46%), gastric ulcer (42%), dry cough (41%), insomnia (40%), weight loss (35%), scratchy throat (32%), hair loss (27.2%), abdominal pain (12%), palpitations (10.8%), chest

pain (5.6%), walking difficulty (3.2%), rashes (2.8%), nausea or vomiting (2%), discoloration of fingers or toes (1.2%), tinnitus (0.4%). [Figure 1] Among the 250 post COVID subjects included in the study, shortness of breath at rest was seen in 123 subjects and shortness of breath on exertion was seen in 145 subjects. When association was studied between smoking and shortness of breath at rest and exertion, out of 123 subjects who had shortness of breath at rest, 21 were smokers and 102 were nonsmokers with a p value of 0.417. In 145 subjects who had shortness of breath on exertion, 28 were smokers and 117 were nonsmokers with a p value of 0.033. [Table 2]

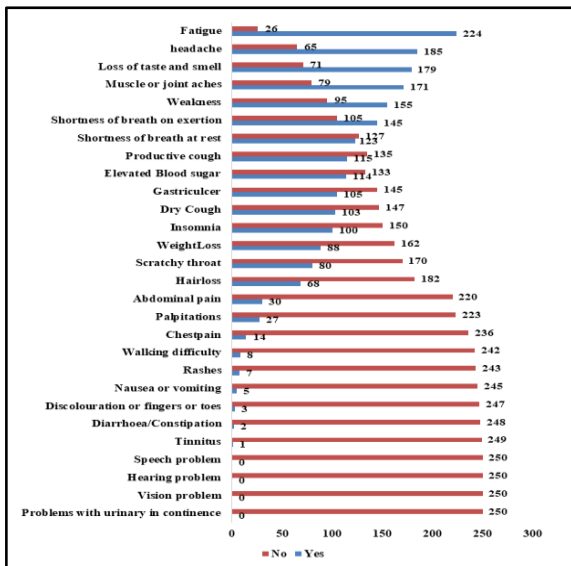


Figure 1: Post Covid sequelae symptoms

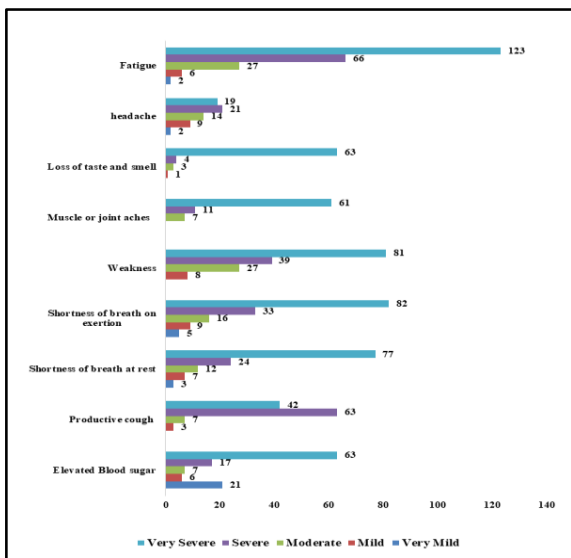


Figure 2: Most prevalent post Covid sequelae symptoms according to Likert scale

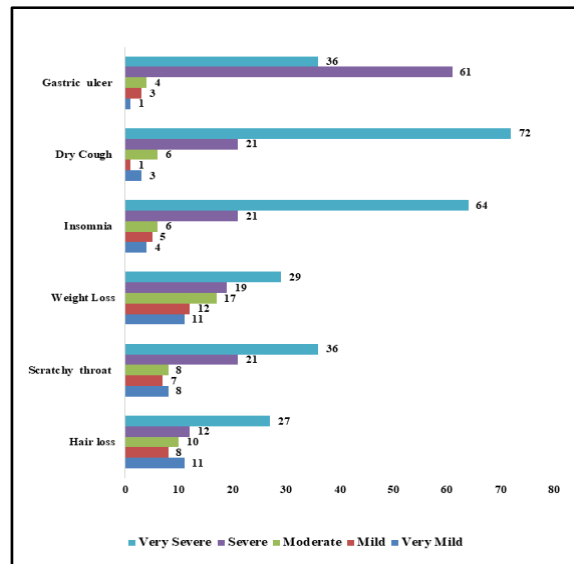


Figure 3: Moderately prevalent post Covid sequelae symptoms according to Likert scale

In this study, association was studied between diabetes and elevated blood glucose levels during the post COVID period. Among the 250 subjects included in the study, 169 subjects had a history of diabetes and on medications. In the 169 diabetic subjects, 113 subjects had elevated blood sugar levels during the post COVID sequel period, with a p value of < 0.001. [Table 3]

The post COVID symptoms were classified into most prevalent, moderate and less prevalent symptoms and the symptoms were graded as very mild, mild, moderate, severe and very severe.

The most prevalent symptoms in our study were fatigue, headache, loss of smell and taste, muscle and joint aches, weakness, shortness of breath at rest and exertion, productive cough and elevated blood sugar levels. The most prevalent symptoms and the grading of symptoms are presented in [Figure 2].

The moderately prevalent symptoms were gastric ulcer, dry cough, insomnia, weight loss, scratchy throat and hair loss [Figure 3].

The less prevalent symptoms were abdominal pain, palpitations, chest pain, walking difficulty, rashes, nausea or vomiting, discoloration of toes and fingers, diarrhea or constipation, tinnitus. [Figure 4]

Table 1: Descriptive statistics showing socio demographic parameters:

Variables	Mean	Standard Deviation	Median (IQR)
Age	47	13.01	47 (39,59)
Height	166	7.51	166 (160,170)
Weight	72	10.00	72 (65,78)

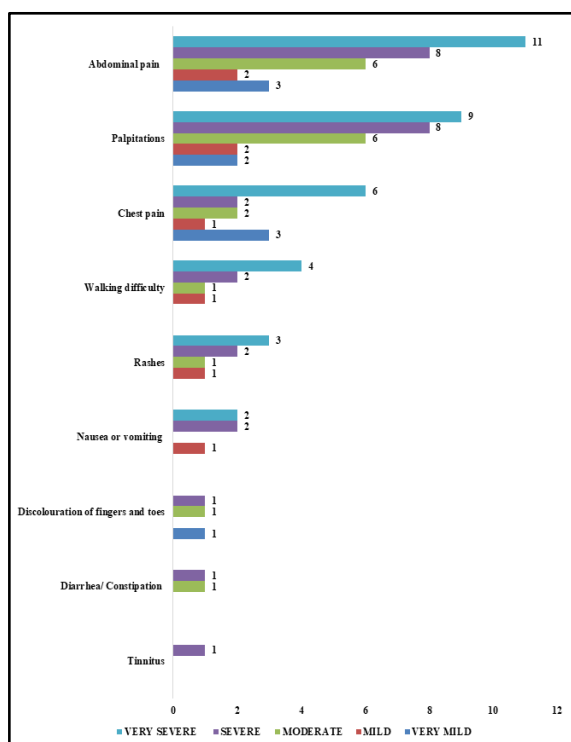
BMI	26	3.86	26 (23,28)
-----	----	------	------------

**Table 2: Association between smoking and shortness of breath at rest and exertion**

Variables	Smoking		P value
	Yes n(%)	No n(%)	
Shortness of breath at rest			0.417
Yes	21 (55.3)	102 (48.1)	
No	17 (44.7)	110 (51.9)	
Shortness of breath on exertion			0.033
Yes	28 (73.7)	117 (55.2)	
No	10 (26.3)	95 (44.8)	

**Table 3: Association between diabetes and elevated blood sugar level**

Variables	Diabetes		P value
	Yes n(%)	No n(%)	
Elevated blood sugar			<0.001
Yes	113 (66.9)	1 (1.3)	
No	56 (33.1)	77 (98.7)	



**Figure 4: Less prevalent post Covid sequelae symptoms according to Likert scale**

## DISCUSSION

There had been millions of people who were affected in the COVID-19 pandemic. Prolonged symptoms were reported in patients who recovered from COVID-19. Post COVID sequelae was reported in large number of patients including neurological symptoms, respiratory, musculoskeletal symptoms and symptoms involving various organ systems.

In a study on the post COVID-19 sequelae done in Northern India in 1234 patients, symptoms were reported till twelve weeks in 150 patients and beyond twelve weeks in 122 patients. The number of hospitalized patients were 711. In this study, the most-commonest post Covid-19 sequelae was myalgia. Shortness of breath was reported in 6.1%.

Other symptoms included anxiety, insomnia, chest pain and mood disturbances.<sup>[19]</sup>

In another study on the overview of post-acute sequel in COVID-19 survivors, the prevalence rate of the most-commonest symptoms was found to be fatigue, headache, chest pain, muscle pain, shortness of breath, loss of smell and taste, joint pain and diarrhea.<sup>[20]</sup>

In a population-based study on the post-acute sequelae after infection which evaluated the symptom frequency and severity, neurocognitive impairment and fatigue were the predominant post – COVID symptoms which lead to reduced working capacity and health recovery. The study also documented the prevalence of headache, chest symptoms, pain syndromes, dizziness and mood disturbances.<sup>[21]</sup>

In a review on the short- and long-term rates of post-acute sequelae, which estimated the frequency of organ system involvement, the predominant sequelae were pulmonary sequelae, mental health disorders, anxiety disorder, difficulty in concentration, neurological disorders, fatigue and muscle weakness.<sup>[22]</sup>

In a study done on 234 participants on the sequelae after six months of COVID-19 infection in outpatients, the most-commonest comorbidity was hypertension.

The most persistent symptoms reported were fatigue, anosmia and ageusia. Brain fog was reported in 13% of the patients. Negative impact was reported in the daily living activity like household chores.<sup>[23]</sup>

In a study on the comparison of COVID- specific long-term sequelae to common viral respiratory infections, symptoms of palpitations, fatigue, joint pain, hair loss were documented in the SARS-CoV-2 post infectious sequelae.<sup>[24]</sup>

## CONCLUSION

From this study it is concluded that Post COVID sequelae was common among COVID affected individuals. Post COVID sequel had a variety of symptoms, which when appropriately diagnosed will help to improve the quality of life. A comprehensive

understanding of patient care needs detailed study of symptoms beyond the acute phase which will help in the development of infrastructure for COVID -19 clinics, that will be equipped to provide integrated multispecialty care in the outpatient setting.

## REFERENCES

1. Shivdas Naik, Soumendra Nath Halder et al. Post COVID-19 sequelae. A prospective observational study from Northern India. *Drug Discoveries & Therapeutics*.2021;15(5):254-260.
2. JHU. Coronavirus resource center. John Hopkins University of Medicine.2021. <http://coronavirus.jhu.edu/map.html>. Accessed 24 March 2022.
3. Demongeot J, Oshinubi K, Rachdi M, Seligmann H, Thuderoz F, et al. Estimation of daily reproduction numbers during the COVID-19 outbreak. *Computation*. 2021; 9(10): 109.
4. CDC. COVID-19: Delta variant: what we know about the science. Centers for Disease Control and Prevention. 2021.
5. WHO. Tracking SARS-CoV-2 variants. World Health Organization.
6. University of Wisconsin-Madison. Antivirals, some antibodies, work well against BA.2 omicron variant of COVID-19 virus. *ScienceDaily*. 2022.
7. Takashita E, Kinoshita N, Yamayoshi S, Fujisaki S, Ito M, et al. Efficacy of antiviral agents against the SARS-CoV-2 Omicron subvariant BA.2. *NEJM*. 2022.
8. CDC. COVID-19: post-COVID conditions: information for healthcare providers. Centers for Disease Control and Prevention. 9 July 2021
9. Venkatesan P. NICE guideline on long COVID. *Lancet Respir Med* 2021; 9(2): 129.
10. Rohrer-Meck K, Marchena D, Rubin-Miller L, Bregman H, Lo J, et al. Nearly 1 in 10 COVID patients seek treatment for long-term symptoms. *Epic Health Res Netw*. 2021.
11. Whitaker M, Elliott J, Chadeau-Hyam M, Riley S, Darzi A, et al. Persistent symptoms following SARS-CoV-2 infection in a random community sample of 508,707 people. *medRxiv*. 2021.10.1101/2021.06.28.21259452.
12. Lopez-Leon S, Wegman-Ostrosky T, Perelman C, et al. More than 50 long-term effects of COVID-19: a systematic review and metaanalysis. *Sci Rep* 2021; 11:16144. doi:10.1038/s41598-021-95565-8.
13. Lopez-Leon S, Wegman-Ostrosky T, Perelman C, et al. More than 50 long-term effects of COVID-19: a systematic review and metaanalysis. *Sci Rep* 2021; 11:16144. doi:10.1038/s41598-021-95565-8.
14. Groff D, Sun A, Ssentongo AE, et al. Short-term and Long-term Rates of Postacute Sequelae of SARS-CoV-2 Infection: A Systematic Review. *JAMA Netw Open* 2021;4: e2128568. doi:10.1001/jamanetworkopen.2021.28568
15. Alkodaymi MS, Omrani OA, Fawzy NA, et al. Prevalence of postacute COVID-19 syndrome symptoms at different follow-up periods: a systematic review and meta-analysis. *Clin Microbiol Infect* 2022; 28:657-66.
16. Ceban F, Ling S, Lui LMW, et al. Fatigue and cognitive impairment in post-COVID-19 Syndrome: A systematic review and metanalysis. *Brain Behav Immun* 2022; 101:93-135.
17. Bellan M, Baricich A, Patrucco F, et al. Long-term sequelae are highly prevalent one year after hospitalization for severe COVID-19. *Sci Rep* 2021; 11:22666.
18. Kamal M, Abo Omirah M, Hussein A, Saeed H. Assessment and characterisation of post-COVID-19 manifestations. *Int J Clin Pract* 2021; 75: e13746.
19. Shivdas Naik, Soumendra Nath Halder et al. Post COVID-19 sequele:A prospective observational study from Northern India.*Drug Discoveries & Therapeutics*.2021;15(5):254-260.
20. Adekunle Sanyaolu, Aleksandra Marinkovic et al. Post-acute Sequelae in COVID-19 survivors: an overview.*SN Comprehensive Clinical Medicine*.2022;4:91.
21. Raphael S Peter, Alexandra Nieters et al. post-acute sequelae of COVID-19 six to 12 months after infection: population-based study. *British Medical Journal*.2022; 379: e071050.
22. Destin Groff, Ashley Sun et al.Short-term and long term rates of post-acute sequelae of SARS-CoV-2 infection. A systematic review. *JAMA Network Open*.2021;4(10): e2128568.
23. Jennifer K Logue, Nicholas M et al. Sequelae in adults at 6 months after COVID-19 infection. *JAMA Network Open*.2021;4(2): e210830.
24. William IBaskett, Adnan I Qureshi et al. COVID-Specific long-term sequelae in comparison to common viral respiratory infections. An analysis of 17487 infected adult patients. *Open Forum infectious Disease*.2022;1-10.