

Prevalence and Determinants of Long COVID among the COVID-19 Survivors: A Cross-sectional Study from A Rural Area of Maharashtra

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Abstract

Background: Most patients infected with the COVID-19 virus may experience long-term effects from COVID-19 infection, known as post-COVID or long COVID conditions. Long COVID may last for weeks, months or years and may limit ones day to day activities and needs health care.

Aim & Objective: To study the prevalence and risk factors of long COVID among the COVID-19 survivors of a rural area of Maharashtra.

Methods and Material: A Community-based cross-sectional study was conducted in adult subjects residing in Chanai village from Maharashtra who have had a history of COVID-19 and have passed more than 3 months since the diagnosis from May 2022 to June 2022. The interview of the study participants was conducted with the help of a pre-designed, semi-structured questionnaire for data collection.

Statistical Analysis: Data was analyzed using Microsoft Excel 2010, Open EPI-Info version 3.01 updated on 2013/04/06. Data was presented in tables, graphical format, frequencies and percentages and the statistical association was shown using the chi-square test.

Results: The majority of participants were males (59%), from 19 to 39 years of age group (57%), having fever as presenting symptom (83%), with mild COVID (13%), and required hospitalization (53%). Long COVID was associated with the elderly age group, male sex (27.1%), severe COVID presentation (88.2%) after 12 weeks, and those required intubation (80%).

Conclusion: The prevalence of long COVID was 17.5%. Determinants associated with long COVID were the elderly age group, male sex, severe COVID presentation and who required intubation.

Keywords: Infant, Female, SARS-CoV-2, Cross-Sectional Studies, Prevalence, COVID-19, Post-Acute COVID-19 Syndrome, Surveys and Questionnaires, Survivors, Hospitalization, Intubation, Intratracheal.

INTRODUCTION

Most people with COVID-19 experience mild symptoms or moderate illness. Approximately 10 to 15% of cases progress to severe disease, and about 5% become critically ill.^[1] Patients suffer from symptoms such as fever, dry cough which are mild in about 80% of cases; the severity may progress to develop respiratory distress.^[2] While the respiratory system is most affected, the virus may affect all major systems in the body. After recovery, widespread respiratory, circulatory, neurological, and musculoskeletal complaints persist.^[3]

Apart from acute illness, the chronic effect of COVID-19 were reported even in mild cases.^[4] Sizeable patients who have recovered from acute COVID-19 infection have reported lingering symptoms. Patients experiencing this syndrome have been coined COVID-19 long-haulers.^[5] Multiple

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nomenclatures began to appear to describe this condition, including long COVID, chronic COVID syndrome, long hauler COVID, post-acute sequelae of COVID-19, post-acute COVID-19 syndrome, etc.^[6,7]

Post-COVID syndrome by consensus, is defined as signs and symptoms that develop during or after an infection consistent with COVID-19 which continue for more than 12 weeks and are not explained by alternative diagnosis.^[8] Symptoms have been reported to persist for as long as 9 months after onset.^[9] In addition to the critically ill and hospitalized patients, mild COVID-19 were observed to experience a delayed return to their baseline health.^[10]

There is uncertainty about the magnitude and associated factors of long COVID.

AIM AND OBJECTIVE

To study the prevalence and risk factors of long COVID among the COVID-19 survivors of a rural area of Maharashtra.

MATERIALS AND METHOD

Study Design: A Community-based cross-sectional study.

Study Population & Sample Size: The study population consisted of Adult subjects residing in Chanai village of Maharashtra who have had a history of COVID-19 and have passed more than three months since the Diagnosis by RTPCR/RAT. Chanai village comes under Bhavthana Primary health center and the list of all COVID-19 patients residing there was obtained. As per list, there were about 287 subjects who have had COVID. Subjects were traced to this list and included in the study. A convenience sampling method was used and 200 subjects were included in the study.

Study Period: May 2022 to June 2022.

Inclusion Criteria: Participants with COVID positive history. Those who were willing to participate in the study and given consent for the study.

Exclusion Criteria: Those who were not on the list and were absent at the interview.

Ethical Approval: Ethical committee approval was obtained from the Institutional ethical committee (Letter: S.R.T.R.G.M.C./Pharma/IEC/DHR/Outward No.09/Date-25/04/2022) prior to the start of the study.

Data Collection: Informed written consent was taken from study participants and an interview of the study participants was conducted with the help of a pre-designed, semi-structured questionnaire. Participants were asked about their symptoms at the time of presentation of COVID-19, socio-demographic profile, co-morbidities if any and clinical details of the illness. Participants were also asked about any symptoms which were there after three months of having COVID-19.

Data Analysis: Data was analyzed using Microsoft Excel 2010, Open EPI-Info Version 3.01 updated on 2013/04/06. Data was presented in tables and graphical format. Results were shown in frequencies and percentages and statistical association using the chi-square test. The level of significance was set at p-value less than 0.05.

RESULTS

Table 1 shows the socio-demographic profile of study participants. Among 200 study participants, 118 (59%) were males while 82 (41%) were females. Majority 153 (76%) were married and 47 (23.5%) were unmarried. Among them 61 (30.5%) had education up to high school, 57 (28.5%) had intermediate schooling, followed by graduation in 25 (12.5%), 27 (13.5%) were illiterate and fewer completed education up to primary 14 (7%), post-graduation 9 (4.5%) and middle school 7 (3.5%). By the modified B. G. Prasad scale maximum study participants were belonged to socio-economic class III i.e. 61 (30.5%) and class II i.e. 41 (20.5%). Regarding type of family 88 (44%) belonged to joint family and 93 (46.5%) belonged to nuclear families. The majority of study participants belonged to age group of 19 to 39 years i.e. 114 (57%) and the least belonged to age group less than 18 i.e. 15 (7.5%). Half of the total study participants, 100 (50%) were unskilled workers, followed by 55 (27.5%) and 40 (20%) were involved in semiskilled and skilled professions, respectively. Table 2 shows symptoms at the time of presentation of COVID. Main presenting symptom among study participants were fever 166 (83%), bodyache 153 (76.5%), fatigue 151(75.5%), cough 139 (69.5%). Sore throat was present in 105(52.5%) and loss of smell and taste was present in 122(61%) study participants. Only few 9 (4.5%) had diarrhoea.

Among study participants, 78% had mild COVID, 13% had moderate COVID and 9% had severe COVID according to SpO₂ score at presentation.

This study shows 106 (53%) study participants required hospitalization due to COVID-19 illness.

The ongoing symptoms in the majority of study participants i.e. 81 (40.5%), lasted for two weeks followed by 63 (31.5%) study participants had symptoms for a week, 30 (15%) for five weeks, 21 (10.5%) for three weeks and 5 (2.5%) for four weeks. In Table 3, the prevalence of long COVID i.e. the study participants having some symptoms after 12 weeks of COVID, was 35 (17.5%).

Table 4 shows the most common long COVID symptom was fatigue which was present in all study participants showing post-COVID. Many study participants had locomotor difficulty in climbing stairs 32 (91.43%), loss of balance while getting up 17 (48.5%). Anxiety was seen in 24 (68.57%) study participants and shortness of breath 23 (65.71%) was also a common complaint in these study participants.

In Table 5, regarding age group and presence of long COVID, elders were associated with long COVID more than those in other age groups, and it was statistically significant. Males had significantly more participants with long COVID i.e., 32 (27.1%) than females i.e. 3 (3.7%).

As the severity increased, most of the study participants had long COVID i.e. those with severe COVID presentation 15 (88.2%) had a significantly higher number of long COVID. The presence of long COVID was significantly associated with those who required intubation 8 (80%) during hospital stay,

Table 1: Socio-demographic profile

Variables		Frequency	Percentage (%)
Sex	Female	82	41.0
	Male	118	59.0
Marital status	Married	153	76.5
	Unmarried	47	23.5
Education	Graduate	25	12.5
	High school	61	30.5
	Illiterate	27	13.5
	Intermediate	57	28.5
	Middle school	7	3.5
	Postgraduate	9	4.5
Socio Economic Class	Primary school	14	7.0
	1	36	18.0
	2	41	20.5
	3	61	30.5
	4	45	22.5
Type Of Family	5	17	8.5
	Joint	88	44.0
	Nuclear	93	46.5
Age group (years)	Three generation	19	9.5
	<18	15	7.5
	>60	34	17.0
	19-39	114	57.0
	40-59	37	18.5
Occupation	Semiskilled	55	27.5
	Skilled	40	20.0
	Unemployed	5	2.5
	Unskilled	100	50.0
Total		200	100.0

Table 2: Complaints/symptoms at the COVID-19 presentation.

Presenting symptom	Presenting symptoms	
	Frequency (N=200)*	Percentage (%)
Cough	139	69.5
Sore throat	105	52.5
Shortness of breath	69	34.5
Fever	166	83
Bodyache	153	76.5
Diarrhoea	9	4.5
Loss Of Smell Taste	122	61
Fatigue	151	75.5

*multiple answers

while those who didn't need intubation were not having Long COVID i.e. 163 (85.8%). There was no statistical association was found between those who have completed COVID vaccination 119 (84.4%) and those who had received partial

Table 3: Prevalence of long COVID among the study participants

Long COVID	Frequency (N=200)	Percentage (%)
Yes	35	17.5
No	165	82.5
Total	200	100

Table 4: Long COVID symptoms among study participants

Long covid symptoms	Frequency(N=35)*	Percentage(%)
Shortness of breath	23	65.71
Cough	9	25.71
Sore throat	7	20.00
Rhinitis	3	8.57
Anosmia (loss of smell), loss of taste	15	42.86
Locomotor Disturbances/ difficulty in climbing stairs	32	91.43
Fatigue	35	100.00
Sleep disturbances	3	8.57
Chest Pain	11	31.43
Anxiety	24	68.57
Hair Loss	18	51.43
Poor Concentration/brain fog	12	34.29
Loss of Balance	17	48.57

*multiple answers

vaccination against COVID, 46 (78%). Long COVID was also not significantly associated with the consumption of alcohol but was present in tobacco users compared to non-tobacco users. Long COVID was also not associated with presence of hypertension, diabetes mellitus, bronchial asthma and thyroid disease.

DISCUSSION

The present study was undertaken to see the prevalence of long COVID clinical profile of COVID-19 patients in a rural field practice area of medical college of Maharashtra. The study consisted of 200 study participants who have had COVID-19 and has passed more than 12 weeks since the initiation of the study.

Socio-demographic Profile

Most common age group of COVID survivors was 19 to 39 years (57%). This was similar to a study done by Perlis *et al.*^[11] similar results were shown in a study by Verma *et al.* where the mean age of the patients was 48.14 ± 16.2 years.^[12] The study consisted of 59% males and 41% females; this finding is similar to a study done in Jaipur, where 39% females were affected as compared to 61% of males.^[13] In this study most of the study participants were married 76.5%, educated up to high school 30.5% and belonged to class II and class III of the socio-economic class by modified BG Prasad classification. Similarly, in a study, most patients belonged

Table 5: Determinants of long COVID

Variables		Long COVID		Total N(100%)	X ²	P
		Yes N(%)	No N(%)			
Age Group (Years)	<18	0	15 (100)	15	42.632	0.001000*
	19–39	8 (7)	106 (93)	114		
	40–59	9 (24.3)	28 (75.7)	37		
	>60	18 (52.9)	16 (47.1)	34		
	TOTAL	35 (17.5)	165 (82.5)	200		
Sex	Female	3 (3.7)	79 (96.3)	82	18.443	0.000000*
	Male	32 (27.1)	86 (72.9)	118		
Severity	Mild	14 (8.9)	143 (91.1)	157	67.486	0.000000
	Moderate	6 (23.1)	20 (76.9)	26		
	Severe	15 (88.2)	2 (11.8)	17		
Hospitalization	Yes	32 (30.2)	74 (69.8)	106	25.15	0.000000*
	No	3 (3.2)	91 (96.8)	94		
Intubation	Yes	8 (80)	2 (20)	10	28.48	0.000000*
	No	27 (14.2)	163 (85.8)	190		
	Complete	119 (84.4)	22 (15.6)	141		
Vaccination	Partial	46 (78)	13 (22)	59	1.192	0.309
	Yes	3 (15)	17 (85)	20		
Alcohol	No	32 (17.78)	148 (82.22)	180	0.0962	0.5223*
	Yes	17 (30.35)	39 (69.64)	56		
Tobacco	No	18 (12.5)	126 (87.5)	144	1.582	0.104
	Yes	20 (21.05)	76 (78.94)	96		
Diabetes mellitus	No	16 (14.28)	88 (85.71)	104	0.783	0.188
	Yes	19 (20)	76 (80)	95		
Hypertension	No	16 (15.23)	89 (84.77)	105	1.088	1.493
	Yes	21 (20.19)	83 (79.81)	104		
Asthma	No	14 (14.58)	82 (85.42)	96	0.069	0.3959
	Yes	14 (16.66)	70 (83.34)	84		
Thyroid	No	21 (18.10)	95 (81.90)	116		

to Hindu religion (96%) and socio-economic class II (78.6%) according to modified B G Prasad classification.^[12]

The majority study participants were from nuclear family, i.e. 46.5%, in the age group of 19 to 39 years. Among the study subjects, 50% were unskilled workers, 27.5% were semiskilled workers, 20% were skilled workers, and 2.5% were unemployed.

(Table 2) shows participants at the time of presentation of COVID, main presenting symptoms among them were fever 166 (83%), bodyache 153 (76.5%), fatigue 151 (75.5%), cough 139 (69.5%). Sore throat was present in 105 (52.5%) and loss of smell and taste was present in 122 (61%) study participants. Only few 9 (4.5%) had diarrhoea. In similar study done by Verma A^[12], the most common symptom at the time of presentation was a combination of two or more symptoms, low-grade fever being the most common. Bhandari *et al.*^[14] found that among symptomatic patients, fever (55.90%) was

the most common symptom followed by cough (52.75%), sore throat (49.60%), and shortness of breath (46.45%).

This study shows majority 78% study participants had mild COVID disease at presentation. Also, 53% among the total participants required hospitalization. The symptoms of COVID diseases commonly lasted for two weeks in 40.5% of participants.

Table 3 shows 35 (17.5%) prevalence of long COVID symptoms even after 12 weeks of illness. The overall incidence of Long COVID in a study by Arjun MC^[15] was 29.2%. Similarly, another study from Northern India, which followed up the patients from tertiary care hospitals, estimates that 22% had long COVID.^[3]

Table 4 shows that the most common long COVID symptom was fatigue which was present in all showing post-COVID symptoms. Multiple systematic reviews and meta-analyses on long COVID have listed fatigue as the most common or

among the first three long COVID symptoms.^[16] Many study participants had locomotor difficulty in climbing stairs 32 (91.43%), loss of balance while getting up 17 (48.5%). Anxiety was seen in 24 (68.57%) study participants and shortness of breath 23 (65.71%) was also a common complaint in these study participants.

Table 5 shows various determinants for the presence of long COVID symptoms. long COVID among study participants was significantly associated with age being more than 60, male sex, severe COVID disease and hospitalization due to COVID illness. Those who were intubated had significantly more chances of developing long COVID. This is backed up by a systematic review which found that hospitalization during the acute infection (odds ratio [OR] 2.9, 95% CI 1.3–6.9) was the most significant predictor of developing the post-COVID syndrome.^[17] But vaccination against COVID, complete or partial had no significant association with developing post-COVID sequelae. Alcohol consumption showed no association, whereas tobacco usage showed negative association with long COVID. No significant association was found with long COVID and presence of co-morbidity like DM, HTN, BA thyroiditis. This was in contrast to studies by Arjun MC *et al.* where DM and HTN were proved to be strong predictors of long COVID.^[15] Similar prediction was shown by Fatima *et al.* and carbera *et al.*^[18,19] The paradox in the present study could be because it was done among fewer participants.

CONCLUSION

Prevalence of long COVID was 17.5%. Determinants associated with long COVID were elderly age group, male sex, severe COVID presentation, tobacco consumption and who required intubation.

RECOMMENDATION

As the prevalence of Long COVID in this study was 17.5% and majority of determinants of long COVID were non-modifiable, people with a positive COVID-19 history should be aware of long COVID conditions and needs good healthcare support. Also health care services should have post-COVID OPD for consultation of these symptoms.

LIMITATION OF THE STUDY

Recall bias in study participants during the interview.

RELEVANCE OF THE STUDY

One can understand the Long COVID concept, which is still not being known to most of the healthcare personnel.

FUNDING

This research did/not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST

Nil

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