PREVALENCE, PROFILE AND DETERMINANTS OF POST-COVID SYNDROME AMONG PATIENTS RECOVERED FROM COVID-19 IN BANGALORE, SOUTH INDIA

ABSTRACT

Introduction: Covid 19 has caused morbidity and mortality at an unprecedented scale globally. Primarily affecting respiratory system though affects all systems of the body. Even after recovery have widespread complications. Studies focusing on Post covid syndrome manifesting after 12 weeks after recovery are sparse. Hence we undertook his study, to aid in better management of post covid sequelae.

Objectives: To estimate the prevalence, profile and factors associated with Post Covid syndrome among patients recovered from Covid 19.

Methodology: A cross sectional study was done in a tertiary care center in Bangalore. All patients who got admitted for Covid 19 and discharged > 12 weeks back from the hospital were included for the study. By simple random sampling, a total of 180 study subjects were interviewed telephonically. Information regarding socio-demography, co-morbidity, covid status - severity, duration of hospitalization, vaccination, treatment, presence of post covid symptoms - profile etc., was collected.

Results: Among 180 post covid individuals interviewed 63.9% were males, 22.2% were in the age group of 41-50 years and 55% of them had atleast one co-morbidity. Prevalence of Post-Covid syndrome was 72.8%. Most common symptom being fatigue, seen in 62%; followed by hair fall and sleep disturbance seen in 45% and 24% respectively. Nearly 25% of them had experienced 2 symptoms. There was statistically significant association between the presence of

Post-Covid symptom and age, gender, presence of co-morbidity, duration of hospitalization and use of anticoagulant for treatment of covid.

Conclusion: Prevalence of Post-Covid syndrome is high and its profile includes fatigue, sleep disturbance and musculoskeletal pain. These were significantly high in specific groups. Further research is needed to better understand post covid sequelae as the spectrum of Post-Covid syndrome is diverse and wide.

Key Words: Post covid syndrome, Post covid sequelae, Covid-19

INTRODUCTION

Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), the pathogen responsible for corona virus disease 2019 (Covid 19), has caused morbidity and mortality at an unprecedented scale globally.[1] Over 760 million cases and 6.9 million deaths have been recorded worldwide since December 2019.[2] In India, close to 44 million people have been infected and 0.5 million deaths due to Covid 19 have been reported so far.[3]

Covid 19 considerably affects respiratory system though all major systems of the body get affected.[4] Even after recovery from the disease, widespread respiratory, circulatory, neurological, and musculoskeletal complaints may persist. These post Covid 19 symptoms may be from direct viral damage, but may also be attributed to the immune response, cytokine storm, a pro-coagulant state induced by SARS-CoV-2 infection, as a side effect of the therapy, underlying co-morbidities or due to a combination of any of these.[5-7]

It has been found that many patients have been experiencing short to long-term sequelae of the disease. As per the existing literature, post Covid period is divided into subacute or ongoing symptomatic Covid (4-12 weeks beyond acute Covid 19) and chronic Covid or Post Covid syndrome (symptoms persisting beyond 12 weeks of onset of acute Covid 19).[8] Studies focusing on Post Covid syndrome in South India are sparse. Therefore we undertook this study to understand the profile, estimate the prevalence and associated factors of Post Covid syndrome. This aids in better understanding of the epidemio-pathological basis of these Post Covid symptoms. Thereby, further helps in laying down better management guidelines of Post Covid syndrome or similar post viral symptoms for future references.

OBJECTIVES

1. To estimate the prevalence of Post Covid syndrome among patients recovered from Covid 19.
2. To describe the profile of Post Covid syndrome among the study subjects.
3. To know the factors associated with Post Covid syndrome among the study subjects.

METHODOLOGY

A cross sectional study was conducted in a tertiary care hospital which was a Covid Care Center in Bangalore. Sampling frame included all laboratory confirmed Covid 19 positive patients who were hospitalized and got discharged from the hospital. Among them patients who got discharged > 3months back prior to January 2022 were included for the study, as this would aid in collecting information on symptoms manifesting in post covid period > 12 weeks of infection which is referred as Post Covid 19 syndrome. Sampling was done by simple random sampling method. Sample size was calculated using the following formula: $N = Z^2 PQ/ E^2$

Here, N=Sample size

Z= constant=1.96

P=prevalence of post covid symptoms from previous studies. i.e 87%

Q = (100-P)

E ==Margin of error. i.e 5%

N: 173 =**180**

Method of Data Collection:

Initially line listing of all laboratory confirmed Covid 19 patients who got discharged from the hospital prior to >3 months back of January 2022 was done. This was extracted from the hospital data base. Among them, 180 study subjects were randomly selected by random number tables. Contact numbers of these subjects were obtained from the hospital data base. Later these subjects were contacted telephonically. Data was collected after seeking verbal consent. It was collected using a pre-designed and semi structured questionnaire using interview technique. It was pilot tested initially and questionnaire was revised and reformed for final data collection. Information regarding – demography, covid vaccination status prior to hospitalization, existing co-morbidities, severity of covid during hospitalization, duration of hospitalization, presence of any post covid symptoms, profile of such symptoms, severity, treatment sought for the same was collected from each of these study subjects by qualified medical staff.

Accordingly, operational definition of severity of Covid -19 during hospitalization was:

Mild - Upper Respiratory Tract symptoms, without shortness of breath, Spo2 >93% in room air

Moderate - Respiratory Tract symptoms, with or without shortness of breath and Spo2 -90-93% in room air

Severe - Respiratory Tract symptoms, with or without shortness of breath and Spo2<90% in room air

Statistical analysis

Data was entered onto Microsoft excel spread sheet and analyzed using standard statistical

software. Data was analyzed using descriptive statistics like rates and proportions. Test of association like chi-square test was used to establish the association between the variables.

Ethical clearance was sought from the Institutional Ethics Committee.

RESULTS

A total of 180 post Covid subjects were interviewed. Among them majority were males and around 36% were females, none of them were pregnant or lactating. Majority - 30% were in the age group of 31-40 years with an age range of 9-90 years, mean of 43.2 ± 14.9 years. Majority of our study subjects had studied until 12^{th} grade and belong to Class I socio-economic class as per Modified BG Prasad's Socio-economic scale 2022.

Majority of the study subjects - 55%, had one or more co-morbidities. Common co-morbidities were diabetes mellitus in 51 individuals, followed by hypertension in 35 and thyroid disorders in 5 individuals. Around 11 % of the study subjects had the habit of smoking and around 14% were consuming alcohol. [Table1]

Only 2 study subjects had not received covid vaccine prior and rest all had received Covishield. Around 22% of our study subjects had suffered moderate degree of Covid -19 and in nearly 29% of them required Oxygen support as part of Covid management. Steroid and anticoagulants were given as part of treatment in 53.3% of covid -19 patients. Around 9% of covid patients in our study required ICU admission. Nearly half of the study subjects were hospitalized for less than 7 days. [Table 2]

Table 1: Socio-demographic profile

Profile		Number	Percentage
Gender	Males	115	63.9

	Females	65	36.1
Age (years)	< 20	08	04.5
	21- 30	30	16.7
	31 - 40	54	30
	41 - 50	40	22.2
	51 - 60	20	11.1
	> 60	28	15.5
Education	Upto 7^{th} grade	35	19.4
	8^{th} - 12^{th} grade	80	44.4
	≥ Graduation	65	36.1
Socio- economic status	Class I	99	55
	Class II	64	35.6
	Class III	13	07.2
	Class IV	04	02.2
Presence of co-morbidity	Nil	81	45
	1	65	36.1
	2	30	16.7
	3	03	1.7
	5	01	0.5
Co-morbidity	Diabetes mellitus	51	28.3
	Hypertension	35	19.4
	Thyroid disorder	05	2.8
	Lung disease	02	1.1
	Heart disease	02	1.1
Habits	Smoking	21	11.6
	Alcohol	26	14.4

110 Table 2: Distribution of study subjects with Covid related variables

Covid related variable	Number	Percentage

Covid vaccine received	Yes	178	98.9
	No	2	1.1
Covid severity	Mild	131	72.8
	Moderate	39	21.7
	Severe	10	5.6
Oxygen support	Administered	52	28.9
	Not administered	128	71.7
Steroid therapy	Given	96	53.3
	Not given	84	46.7
Anti-coagulant	Given	96	53.3
	Not given	84	46.7
ICU Admission	Yes	16	8.9
	No	164	91.9
Duration of hospitalization (days)	≤ 7	88	48.9
	8-14	67	37.2
	15-21	21	11.7
	≥ 22	4	2.2

Post-covid symptoms were reported in 72.8% (131 Post-Covid individuals) in our study. Among them most common symptom being fatigue, seen in 62%; followed by hair fall in 45% and sleep disturbance in 24% of post covid individuals. Table 3 enlists the other Post-covid symptoms. In majority of them - 94% it was of mild degree and only 5% of them sought treatment for the same. Around 55% of the post-covid subjects experienced re-appearance of their covid like symptoms like cough, sore throat, arthralgia and myalgia. Nearly 25% of them had experienced 2 symptoms. [Graph 1]

There was statistically significant association between presence of Post-Covid symptom and age. It was significantly higher in older age group covid patients. Similarly, it was significantly higher in females as compared to males. Presence of comorbidity

significantly increased the appearance of Post-covid symptoms. There was statistically significant association between duration of hospital stay and presence of Post-covid symptoms; it was more in covid patients who were hospitalized for more than 8 days. It was significantly higher in covid patients who received anticoagulant during treatment of covid. [Table 4]

Table 3: Profile of Post-covid symptoms

Sl.No	Post-covid symptoms	Number	Percentage
1	Fatigue	80	61.53
2	Hair fall	60	45.80
3	Sleep disturbance	31	23.66
4	Headache	25	19.08
5	Arthralgia	24	18.32
6	Myalgia	23	17.55
7	Loss of appetite	22	16.79
8	Loss of smell sensation	17	12.97
9	Cough	12	9.16
10	Anxiety	12	9.16
11	Loss of taste sensation	11	8.39
12	Sleeplessness	10	7.63
13	Fever, Rash	9	6.87
14	Bowel disturbances	7	5.34
15	Inability to concentrate	6	4.58
16	Irregular cycles, altered smell sensation	5	3.81
17	Breathlessness, altered taste sensation, depression, skin pigmentation, abdominal pain	4	3.05
18	Poor sugar control, mood changes, acne	3	2.29
19	Chest pain, palpitation, nausea, vomiting, dizziness on standing	2	1.52
20	Menorrhagia, running nose, weight loss, swelling of lower limbs	1	0.76

Graph 1: Number of Post-Covid symptoms

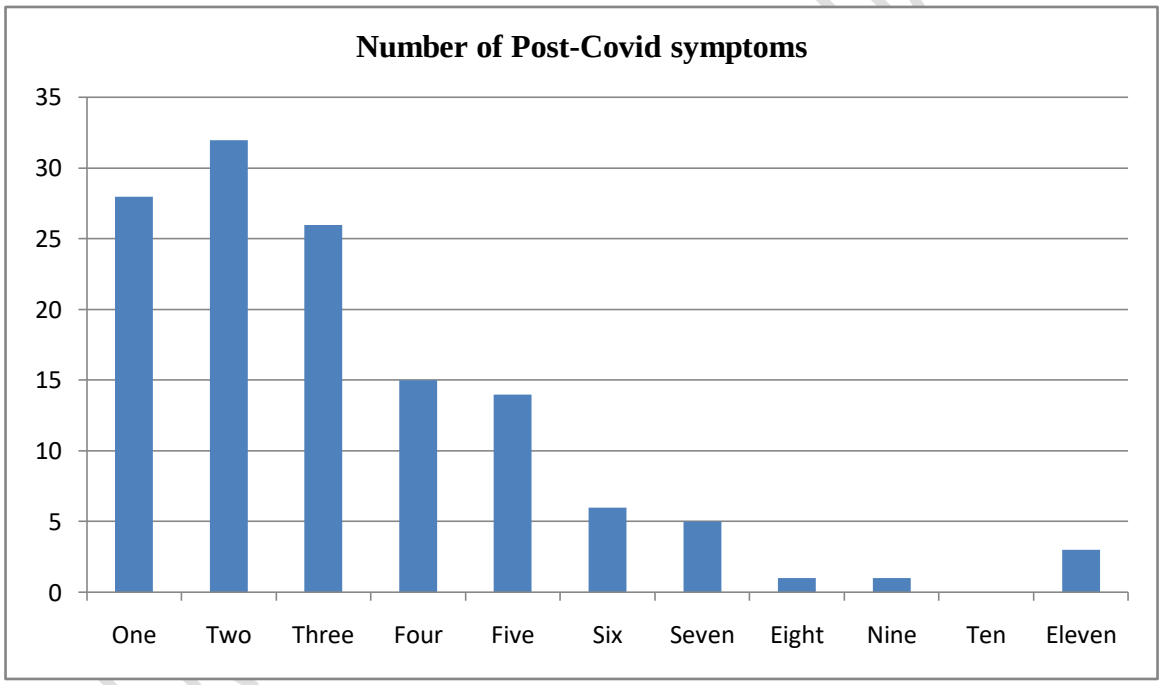

Table 4: Association of Post-Covid symptoms with different variables

Variables	Post-Covid symptoms				Chi-square value (p value)
		Presence	Absence	Total	
Age (years)[§]	< 60	106 (69.7%)	46 (30.3%)	152 (100%)	(0.03)*
	≥ 60	25 (89. 3%)	03 (10.7%)	28 (100%)	

Gender	Male	78 (67.8%)	37(32.2%)	115 (100%)	3.94 (0.04) *
	Female	53 (81.5%)	12 (18.5%)	65 (100%)	
Presence of atleast 1 co-morbidity	Yes	54 (81.8%)	12 (18.2%)	66 (100%)	4.29 (0.03) *
	No	77(67.5%)	37 (32.5%)	114 (100%)	
Duration of hospitalization	≤ 7 days	57 (64.8%)	31 (35.2%)	88(100%)	5.56 (0.01) *
	≥ 8 days	74 (80.4%)	18 (19.6%)	92 (100%)	
Use of anti-coagulant for Covid treatment	Yes	79 (82.3%)	17 (17.7%)	96 (100%)	9.39 (0.002) *
	No	52(61.9%)	32 (38.1%)	84 (100%)	
Total		**131 (72.8%)**	**49 (27.2%)**	**180 (100%)**	

* indicates statistically significant association at P < 0.05; § Fisher's exact test

DISCUSSION

Prevalence of Post-covid syndrome (> 12 weeks of Covid) in our study conducted in Bangalore, South India was found to be 72.8%. Similar findings were found in a prospective study done in Delhi, wherein prevalence of post covid symptoms after 3 months of recovery of Post-Covid was nearly 78%.[9] It was found to be 21% in a similar study done in Kerala, South India.[10] It was found to be around 10% in a study conducted in North India and wherein myalgia, fatigue, shortness of breath, cough, insomnia, mood disturbances and anxiety were the common symptoms, whereas fatigue, hair fall, sleep disturbance, headache, arthralgia and myalgia were common in our study.[11] Post-Covid symptoms included weight

loss, hair loss, Fatigue/Tiredness, myalgia and sleeplessness in another study conducted in Chennai, Tamil nadu which is very similar to our study findings.[12] In another community based prospective study done in Kerala, fatigue, headache, myalgia, joint pain and exertional dyspnea were the predominant Post-Covid symptoms.[13] Comparable results were found in a Systematic review on Post-COVID-19 Syndrome which was undertook by Salamanna F et al, wherein nearly one fifth of reports on long-term COVID-19 symptoms were on abnormal lung functions, one-forth on neurologic complaints and olfactory dysfunctions, and more than half were on specific widespread symptoms, mainly chronic fatigue and pain.[14]

In our study, majority of these Post-Covid symptoms were of mild degree and majority had 2 Post-Covid symptoms at the time of interview which is similar to a longitudinal study conducted among non-hospitalized Covid patients, where in majority had 1-2 symptoms and were of mild degree during their follow up.[15]

Post- Covid symptoms were found to be significantly high in females in our study. Similar findings were found in a multicenter cohort study done in Spain.[16] As per the study done in Kerala as previously mentioned; there was significant association between female gender and presence of a family member infected with COVID 19 with the development of post covid events.[13] Whereas in our study, Post-Covid symptoms were found to be significantly high in females, in older individuals, in individuals with presence of co-morbidity, longer duration of hospitalization and use of anti-coagulants as part of treatment. Similar findings were found in a study done in Dhaka, Bangladesh where in older age, being female, comorbidity, cigarette smoking, hospitalization, and contact with COVID-19 cases were independently associated with presence of Post-Covid symptoms.[17] Also comparable results

were found in a study done by Chithira V Nair et al, where in female sex and steroid administration during hospital stay were found to be significant risk factors for the presence of post-covid 19 symptoms at 6 weeks post discharge.[18] In a study done in United States by Hill E et al, found that middle age, females, longer or extended duration of hospital, receipt of mechanical ventilation and presence of co-morbidities were associated with increased likelihood of long covid, which is comparable to our study findings done in South India.[19]

Spectrum of Post-Covid syndrome as found in our study is very similar and comparable to many other study findings conducted across India and globally and as well as conducted in varied settings.[9-19]

CONCLUSION

Prevalence of Post-Covid syndrome was found to be high. Profile of Post-Covid syndrome were related to fatigue, sleep disturbance and musculoskeletal pain. These were significantly high in old age, females, presence of co-morbidity, longer hospitalized individuals and receipt of anticoagulant therapy. The diagnosis, treatment, and prevention of post-covid syndrome requires integrated rather than organ or disease specific approaches. Further clinical and epidemiological research is needed to better understand underlying mechanisms as the spectrum of Post-Covid syndrome is diverse and wide.

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