



## PREVALENCE OF LONG COVID AND ITS DETERMINANTS AMONG COVID-19 PATIENTS IN SURENDRANAGAR DISTRICT: A CROSS SECTIONAL STUDY

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### ABSTRACT

**Introduction:** There is an urgent need to pay attention towards long term sequelae of COVID-19.

**Objectives:** To estimate prevalence of Long COVID among COVID-19 Patients in Surendranagar District. To assess the determinants of persistent post COVID-19 symptoms. To determine association between occurrence of Long COVID and its determinants. **Methods:** A cross-sectional study was carried out during the period of August 2020-December 2020 amongst all laboratory confirmed (RT PCR test positive/RAT positive) COVID-19 Patients. A study group consisted of 345 cases reported by the District health authority during September 2020. Those who had symptoms 3 or more weeks after COVID-19 onset were considered as Long COVID. Data was collected through telephonic communication by using pretested, pre-designed, semi structured questionnaires at the end of October month. Data analysis was done by using appropriate statistical tests. **Results:** Study estimated 26% prevalence of Long COVID. Most common symptoms reported were fatigue or weakness (47.8%) followed by cough (43.3%), difficulty in breathing (10%) and Headache (10%). With increase in age there was an increase in proportion of Long COVID cases. Percentage of Long COVID was higher among symptomatic patients (29.29%) at the time of testing. Half of those who had 5 or more symptoms at the time of testing had Long COVID. Almost 50% of the study participants with comorbidities had developed Long COVID. **Conclusion:** Long COVID symptoms includes multiple systems of the body. Increasing age, presence of symptoms at the time of investigation, more frequency of symptoms, pre-existing conditions and severity of the disease were determinants of long COVID.

**KEYWORDS :** Long COVID, Determinants, Cross-sectional study, COVID19 patients

### INTRODUCTION:

The World Health Organization (WHO) has declared COVID-19 as a pandemic on 11 March, 2020<sup>[1]</sup>. As on 25 November, 2020, 59.4 Million total cases including 1.4 million deaths were reported worldwide<sup>[2]</sup>. India is currently the world's second-worst-hit country by the pandemic, with over 92.22 lakh total COVID cases, including over 1.34 lakh deaths<sup>[3]</sup>. This pandemic has disrupted life across the world. The people of the world have had to suffer a lot from overstressed health care systems to diminishing economies because of COVID-19. At the beginning of the pandemic majority of the research focused on the acute effects of COVID-19 which had suggested that patients with mild to moderate illness recovered within two weeks<sup>[4]</sup> and those with severe illness, it could take six weeks or more to get back to their previous health status<sup>[5,6,7]</sup>.

As the pandemic continued to grow further studies related to COVID symptoms showed that a number of people suffered from one or more symptoms even after recovering from acute illness though it was mild in nature but irritating and exhausting<sup>[8,9]</sup>.

Later on, the term has emerged "Long COVID" which described illness in people who have either recovered from COVID-19 but still continue to suffer from one or more symptoms, or have had usual symptoms for quite a longer period than the expected period of time<sup>[10]</sup>. Different studies

have reported different prevalence rates for the Long COVID<sup>[8,11,12]</sup>.

MMWR (Morbidity and mortality weekly report) published on 24 July, 2020 reported that the clinical course of mild COVID 19 illness is still not completely clear<sup>[11]</sup>. The different studies on Long COVID revealed that symptoms continuing vary from person to person and last long, regardless of the severity of the disease and status of comorbidities<sup>[8,9,12,13,14]</sup>.

Long COVID is a "very bizarre disease" as narrated by Paul Garner, that symptoms repeatedly hurt during the first 8 weeks which subsequently reduce with fatigue continuing to hit for the next few weeks<sup>[14]</sup>. Most common symptom experienced by the patients was fatigue<sup>[6, 9,14,16]</sup>. Other symptoms were cough, loss of taste, joint pain, headaches, anosmia (loss of smell), sore throats, delirium, chest pain etc.<sup>[6,10,15,16]</sup>. Risk factors for lingering effects include high blood pressure, obesity, mental illness and old age<sup>[6,15]</sup>.

In India, though some information on prevalence of Long COVID and its determinants is available, yet there is an urgent need to pay attention towards long term sequelae of this exotic disease.

This study is proposed

1. To estimate prevalence of Long COVID among COVID-19

Patients in Surendranagar district.

2. To find out determinants of Long COVID in Surendranagar district.

3. To determine association between occurrence of Long COVID and its determinants.

## MATERIAL AND METHODS:

A cross-sectional study was carried out during the period of August 2020-December 2020 amongst all laboratory confirmed (RT PCR test positive/RAT positive) COVID-19 Patients reported by the District health authority. A study group consisted of all cases listed by District health authority during September 2020.Total confirmed cases during September 2020 was 508 which includes 20 deaths. Total 28 study participants could not be contacted even after 3 consecutive call attempts, 29 were not willing to participate, 83 contacts could not be reached due to wrong contact number. Three participants from the study group had expired. All these were excluded and the final sample size for the study came to be 345.

For operational definition those who had symptoms 3 or more weeks after COVID-19 onset were considered as Long COVID<sup>[4]</sup>. The ethical approval for the study was obtained from the Institutional Ethical Committee prior to the initiation of the study. Data collection was started at the end of the October month. Data was collected through telephonic communication. Repeated calls were made (maximum three calls) in case of contact was not available or information was incomplete.

Pretested, pre-designed, semi structured questionnaires were used for data collection including socio demographic details, comorbidities, addiction and clinical course of COVID-19 using Kobo collect app.

Data entry was done in Microsoft Excel and analysis was done using SPSS software version 23.

## RESULTS:

Out of total Study Participants (N= 345), 55% were from Wadhwan taluka while others were scattered over the remaining nine talukas of Surendranagar district ranging between 8.4% from Dhrangadhra to 3.47% from Muli except Wadhwan taluka. (Figure:1)



**Figure :1** Taluka Wise Distribution of Study Participants. (N=345)

## Tables

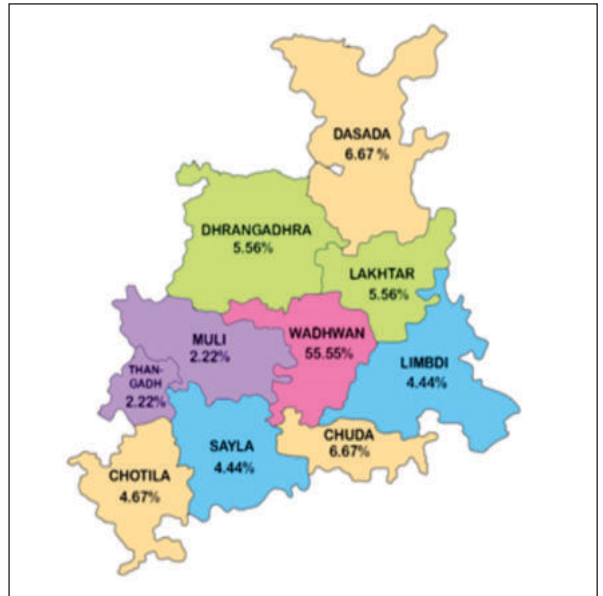
**Table 1: Age And Gender Wise Distribution Of Study Participants (N=345)**

Age Group (in completed years)	Gender		Total No(%)
	Male (%)	Female (%)	
<20	013 (65.00) (05.7)	007 (35.00) (06.1)	020 (100) (05.8)

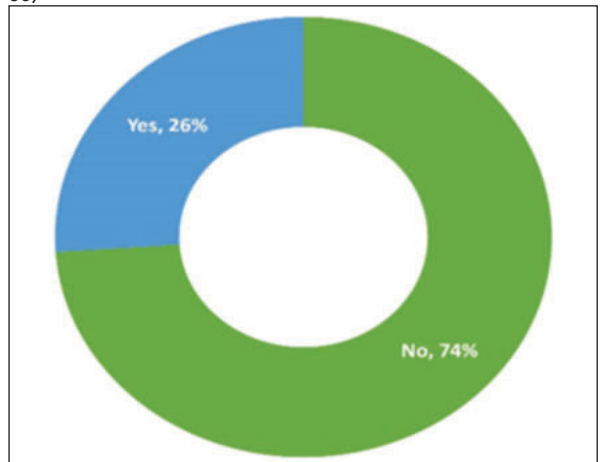
21-40	099 (70.21) (43.0)	042 (29.79) (36.6)	141 (100) (40.9)
41-60	070 (62.50) (30.4)	042 (37.50) (36.6)	112 (100) (32.46)
61-80	044 (66.67) (19.2)	022 (33.33) (19.1)	066 (100) (19.13)
>80	004 (66.67) (01.7)	002 (33.33) (01.7)	006 (100) (01.73)
Total	230 (66.67) (100)	115 (33.33) (100)	345(100) (100)

Table 1 shows age and gender wise distribution of study participants. Majority of the study participants were from the 21 to 40 years of age group (40.9%) followed by 41-60 years (32.46%). Participants <20 years and more than 80years were 5.8% and 1.73% respectively. Mean age was 44.5+-17.3 years. Male participants (66.67%) were almost double as compared to females (33.33%).

Out of total Long COVID cases more than half were from Wadhwan taluka (55%) and others (45%) were scattered over nine talukas of the district. Apart from Wadhwan taluka Dasada, Chuda and Chotila had the same no of cases (6.67%) followed by Dhrangadhra (5.56%), Lakhtar (5.56%), Limdi (4.44%), Sayla (4.44%), Muli (2.22%) and Thangadh (2.22%). (Figure:2)

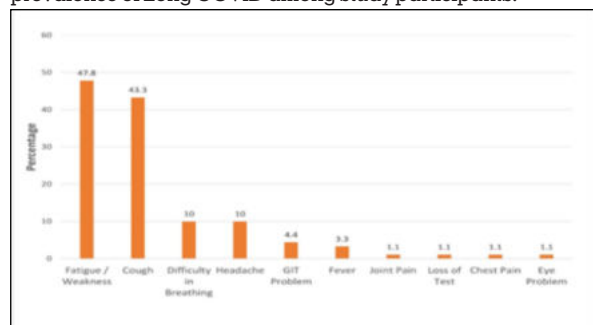


**Figure :2** Taluka Wise Distribution Of Long COVID Cases (N=90)



**Figure :3** Prevalence Of Long COVID Among Study Participants (N=345)

As depicted in figure 3 present study estimated 26% prevalence of Long COVID among study participants.



**Figure :4** Symptoms Of Long COVID Among Study Participants (N=90)

\*multiple symptoms were reported by the study participants

Figure 4 depicts various symptoms of Long COVID among study participants. Most common symptoms reported were fatigue or weakness (47.8%) followed by cough (43.3%), difficulty in breathing (10%) and Headache (10%).

Study participants had also complained symptoms like GIT problem (4.4%), fever (3.3%), joint pain (1.1%), loss of taste (1.1%), chest pain (1.1%) and eye problem (1.1%). One fifth (20%) of those who had Long COVID reported only one symptom and others were having more than one symptom.

**Table :2** Determinants Of Long COVID Among Study Participants (N= 345)

Variables	Long COVID		Total N (%)	Chi square test value / Fisher's exact test value	p-value
	Present N (%)	Absent N (%)			
Age	<20	02 (10.0)	18 (90.0)	F=18.12	p<0.05
	21-40	25 (17.73)	116 (82.27)		
	41-60	34 (30.36)	78 (69.64)		
	61-80	25 (37.88)	41 (62.12)		
	>80	04 (66.67)	02 (33.33)		
Gender	Female	29 (25.22)	86 (74.78)	X <sup>2</sup> = 0.0676, df = 1,	p>0.05
	Male	61 (26.52)	169 (73.48)		
Presence of symptoms of Covid 19 among study participants at the time of testing	Yes	82 (29.29)	198 (70.71)	X <sup>2</sup> = 7.8865, df = 1,	p<0.05
	No	8 (12.31)	57 (87.69)		

If yes, then frequency of Symptoms	<=2symptoms	44 (23.66)	142 (76.34)	186 (100)	F= 8.86	p<0.05
	3-4 symptoms	34 (39.53)	52 (60.47)	86 (100)		
	>=5symptoms	04 (50.0)	04 (50.0)	8 (100)		
	Total	82 (29.29)	198 (70.71)	280 (100)		
Pre-existing conditions	Present	43 (45.26)	52 (54.74)	95 (100)	X <sup>2</sup> = 25.0025, df = 1,	p<0.05
	Absent	47 (18.8)	203 (81.2)	250 (100)		
History of tobacco consumption (in any form)	Yes	18 (37.5)	30 (62.5)	48 (100)	X <sup>2</sup> = 3.76, df = 1,	p>0.05
	No	72 (24.24)	225 (75.76)	297 (100)		
Place of treatment	Hospital	64 (42.38)	87 (57.62)	151 (100)	X <sup>2</sup> = 36.98, df = 1,	p<0.05
	Home	26 (13.40)	168 (86.60)	194 (100)		
Total		90 (26.0)	255 (74.0)	345 (100)		

Table 2 shows various determinants of Long COVID among study participants. It was found that with increase in age there was an increase in proportion of Long COVID cases. Among those who were >80 years old, 66.66% had Long COVID. Age wise prevalence of Long COVID was found 37.8% and 30.3% among the age group 61-80 and 41-60 years respectively, however it was low among those who were 40 years and less. This difference was found statistically significant.

Prevalence of Long COVID was found to be almost the same among male (26.52%) and female (25.22%) and the difference was not statistically significant.

Percentage of Long COVID was higher among COVID-19 patients (29.29%) who had symptoms of COVID-19 at the time of testing compared to asymptomatic COVID patients (12.31%) and this difference was found statistically significant. Those who had 5 or more symptoms at the time of testing 50% had persistent symptoms of COVID 19 while among those who had 3 to 4 and 2 or less symptoms prevalence was found 39.53% and 23.66% respectively. The difference was statistically significant.

Almost 50% of the study participants with comorbidities had developed Long COVID, while among those without any comorbidity only 19% had developed Long COVID and the difference was statistically significant.

Among tobacco users, almost two fifth (37.5%) had developed Long COVID while among non-tobacco users only one fourth developed Long COVID however the difference was not statistically significant.

It was seen that Among Those COVID patients who were hospitalized for the treatment, 42.38% had developed Long COVID while among those who were treated at home only 13.4% had developed Long COVID and this difference was found to be statistically significant.

## DISCUSSION:

Surendranagar, one of the districts of Gujarat state in India has ten talukas covering 1.7million population. The first case of COVID-19 was detected on 23 April, 202., two more cases within 20 days and subsequently the cases kept on increasing. During that period, there were several studies reported and published from different countries regarding clinical

presentation of acute COVID infection.<sup>[15,6,17,18]</sup> Apart from the clinical presentation few studies had also reported presence of certain symptoms for long duration among COVID survivors which were named differently as Long COVID, Persistent COVID-19 or Post-acute COVID 19.<sup>[4,8,9,10,16,19,20]</sup>

Persons with three or more weeks symptoms after COVID-19 onset is referred to as Long COVID<sup>[4]</sup>. The same criteria were used to define Long COVID in this study also. Not only COVID-19 but other acute viral infections like SARS, MERS etc. also had long term sequelae among disease survivors as noted in systematic review and meta-analysis by Hassan Ahmed et al in their study.<sup>[21]</sup>

Present study estimated 26% prevalence of Long COVID however different studies showed prevalence rate between 5% to 45%.<sup>[4,8,9,15,19]</sup> Cough (43.3%) and fatigue (47.8%) were the most common symptoms found in the present study and the same was revealed by other studies also.<sup>[9,10,16,20]</sup> Other symptoms were many like difficulty in breathing, headache, Gastrointestinal tract problems, Fever, Joint pain, loss of taste, chest pain and eye problems seen in this study. Long COVID symptoms show wide variation and different studies also has reported similarly. The article published in October 2020 had described the symptoms into two groups; one is respiratory which included cough, breathlessness, fatigue, headache etc. and another was with multisystem involvement which included symptoms related to other body parts like heart, brain, gut etc.<sup>[6]</sup> Different studies revealed that psychological distress<sup>[16]</sup>, post-traumatic stress disorder (PTSD), pain, voice change, dysphagia, continence problem<sup>[16]</sup>, poor sleep<sup>[20]</sup>, anxiety depression<sup>[10]</sup>, rashes metabolic disturbances, COVID toe<sup>[4]</sup> were also the different Long COVID symptoms.

Various studies tried to find out different characteristics that could determine Long COVID. These determinants would help us to predict the Long COVID among survivors which will further determine the course of treatment to minimise the suffering. Lingering of acute COVID symptoms will continue for many days, weeks or even for months which was determined by the characteristics of COVID cases at the onset of the disease like age, gender, presence of comorbidities, number of acute phase symptoms, severity of disease etc noted in many studies.<sup>[4,9,15,16,20]</sup> Post-acute phase symptoms were not clearly understood at the onset of pandemic and so the patients continue to suffer without taking any treatment. Further research on Long COVID symptoms and its determinants will help to decide the course of treatment at its earliest stage to alleviate sequel of acute phase.<sup>[15]</sup>

Present study revealed the prevalence was higher among older people than younger ones however, it affected all ages. Same result was noted by other studies<sup>[4,9]</sup>. Updates on long term effects of COVID-19 by WHO mentioned that 20% of those between 18 to 34 years reported prolonged symptoms. In the present study, prevalence of Long COVID was same among male and female while a report on COVID symptom study published on October 21, 2020 mentioned that women of younger age group were more likely to suffer from Long COVID.<sup>[9]</sup> Cases who had one or more symptoms at the time of investigation were likely to suffer more from Long COVID rather than the cases who were asymptomatic at the time of investigation. Importantly, those who had five or more symptoms of COVID-19 almost half of them had a history of persistent symptoms. The report on Long COVID had also mentioned similar findings<sup>[9]</sup>.

Almost half study participants (45.26%) amongst those with pre-existing conditions suffered from Long COVID in the study. Various pre-existing conditions reported by the study participants were hypertension, diabetes mellitus, heart disease, liver problems, lung diseases and thyroid problems.

The association between presence of comorbidities and Long COVID was also discovered by other researchers in their studies.<sup>[4,9,15]</sup> Though the prevalence of Long COVID was slightly higher among those having habits of tobacco use in any form compared to the non-addicted study participants, the difference was not found to be statistically significant. In the present study, the prevalence of Long COVID was higher among those who received hospital treatment. Hospitalization of the patients was based on severity of disease like presence of fever and or SPO2 less than 90 at the time of investigation or later during the course of illness, others were treated at home. So, the reason for higher cases of Long COVID among hospitalized patients seen in this study might be linked to severity of disease.

## CONCLUSION:

The present study concluded that COVID-19 disease has definitely a long-term effect which includes multiple systems of the body. The symptoms were fatigue/weakness, cough, difficulty in breathing, Headache, GIT problems, fever, joint pain, loss of taste, Chest pain and eye problem. Long COVID symptoms vary from person to person. The study revealed that the prevalence of Long COVID increases with increasing age. Other Influencing factors regarding persistent symptoms of COVID-19 were presence of symptoms at the time of investigation, more frequency of symptoms, pre-existing conditions and severity of the disease.

## Recommendation:

Experience of persistent symptoms of COVID-19 among patients remains physically as well as emotionally stressful. These patients may need continuity of care. Regular follow up of all the patients having gnawing symptoms of Long COVID is an immense need and must be addressed especially for elderly, for patients who are having more symptoms and for hospitalised patients. Patients should be made to understand about post-acute aftereffects of the disease and be mentally prepared. Health services including treatment, follow-up, counselling and rehabilitation may be set up with physicians, physiotherapists and counsellors who should get together and address the needs of such patients with Long COVID.

## Limitations:

As this was a cross sectional study and for a specific period of time, we could not explore the duration of Long COVID symptoms among the study population, hence further research regarding the same is needed in future.

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