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Post covid-19 syndrome among recovered cohort during the convalescence: prospective study

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ABSTRACT

Background: Hospitalization is not normally necessary in all COVID patients, nor is lab tests and PCR. There is subjective evidence that patients with "slight" COVID-19 may complain of persistent symptoms weeks after the infection. *Methods:* A group of 489 patients was tracked for 8 months after recovering from mild to severe COVID-19 infection at a Saudi tertiary hospital between March 6th and December 2nd 2021, IRB and informed permission acquired #89742/2022, and participation was freely. We evaluated the clinical condition, lab findings, and demographic features of the patients and used SPSSversion26 to perform our statistical analysis. *Results:* All of them were followed up until the second follow-up visit at 4.3 months (median 131 days (IQR 112-149). Age was a significant indicator of post CL syndrome, obtained p-value for age, 0.032, was less than critical alpha level of 0.05. BMI was a significant indicator of post CL syndrome, obtained p-value 0.032 (odds ratio (OR) 1.04;95% confidence interval (95% CI): (1.00 - 1.073)), body aches was a significant indicator of post CL syndrome, obtained p-value 0.040 (OR 0.59;95% CI (0.36-0.98)), fatigue was a significant indicator of post CL syndrome, obtained p-value .005 (OR 2.05; 95% CI (0.99-4.22)). *Conclusion:* Manifold signs are present around 3 months after the onset of signs in formerly hospitalized and non-hospitalized participants with established or suspected COVID-19. This suggests the presence of a "(post-COVID-19 syndrome)" and peaks the final healthcare needs in a subset of individuals with "slight" or "Spartan" COVID-19.

Keywords: Post Covid-19 Syndrome, Recovered, Cohort, Convalescence.

1. INTRODUCTION

We are about to reach an end for a pandemic last for four years and almost all the planet has been infected, many people were admitted to hospitals because of this virus (Cascella et al., 2022). Almost all symptoms and signs have been

reported during the period of infection with COVID, whether these symptoms were respiratory, extra respiratory or general symptoms (Li et al., 2020; Guan et al., 2020). After the patients were completely free from COVID and became lab free with PCR, 10% only of patients did not report any post COVID repeated or related symptoms, while 30% of patients reported the persistence of one-two signs and 60% of patients reported to have more than three to four post COVID symptoms (Carf et al., 2020). Needless to say, that most of people have been infected however they did not perform PCR test to confirm what they have suffered from new symptoms and signs. Even though those who need hospitalization (Li et al., 2020; Stringhini et al., 2020).

Indeed, in developing countries where the lab tests and resources are scarce they had no capacity to perform tests or take the vaccine in spite of the severity of the disease, and they stay home till resolve or die (Spruit et al., 2020; Gandhi et al., 2020). Those patients and many other patients were suffering what's called persistence of COVID symptoms or post COVID syndrome. The period and time of inset varied from patient to another to be ten days to 3 months (Garner, 2020; Alonso-Lana et al., 2020). This study evaluated whether or not various pertinent symptoms recuperate subsequent "hospitalized and non-hospitalized" patients with COVID-19.

2. METHODS

A cohort of 489 patients was followed for 8 months after they have been recovered from mild to moderate COVID-19 infection in a big hospital in KSA, IRB and informed consent obtained #89742/2022 and participation was voluntarily. We evaluate the clinical condition, lab results and demographic characteristics of the patients. We measured the symptoms and indicator of post-COVID-19 syndrome (PCS), the duration of onset for PCS and the linear and logistic regression analysis. Between March 6th and December 2nd 2021, a total of 498 COVID-19- convalescent healthcare workers presented to the post-COVID outpatient clinic of KSUMC, they were followed up until the second follow-up visit at 4.3 months (median 131 days (IQR 112-149). The proportion of 53.5% men (260/498) and 44.9% women (218/498) was balanced. Those Participants have had associated comorbidities like Vitamin D deficiency, Bronchial asthma, HTN, DM, depression, GERD, obesity, IBS, osteoarthritis, and osteoporosis (Table 1).

Despite the females being the minority group in the sample, majority were affected by body aches, abdominal pains, SOB and fatigue. Notably men led in cough and sore throat symptoms. Thee chosen symptoms were chosen because they were above 2 % of the total population. From the bar graph, it is clear that body aches were the most frequently recorded. Some of these symptoms were respiratory symptoms of COVID-19 and other symptoms were not related to respiratory system. Frequency distribution of post COVID-19 symptoms were illustrated in figure 1 and enumerated in table 2 in relation to males and females. Notably, analysis on Table 2 show that Abdominal Pain was also frequent followed by headache, cough and SOB.

SPSS v25.0 was used for statistical analysis and visualization. As applicable, mean, sd, median, and IQR, or as frequency and percentage. The Chi-squared test or the Kruskal–Wallis H tests were used for between-group comparisons. Following that, post hoc analyses using a Bonferroni adjustment for multiple comparisons were out. The threshold of significance was decided to be 0.05.

3. RESULTS

Participants

Median age was 43 years (31-54) and mean age was 36.3 years. None of our participants were hospitalized, admitted to ICU or mechanically ventilated. The majority of the participants were married 404(83 %), 218(53.9%) were males. 60% were Saudi Nationals, 182(62.7%) were males. 91% were nonsmokers, 228(51.4%) were males. 91% had no allergies while 2.7% had aspirin allergy and 2.1% had allergy against chicken and egg. Body mass index (BMI) was measured in our participants as indication to height and weight, and 156 (31.3%) were obese (>30), with mean of 34.01, of them 84 (53.8%) were males and 72 (46.2%) were females. 98 (19.6%) only were of normal average weight, their BMI was (20-25), mean was 22.22, half of them was males and half was females. Participants used to take medication for chronic Diseases associated were 117(24.7%), 64(54.71%) and 53(45.29%) were females (table 1).

Table 1 Demographics characteristic of the participants

		Male N (%)	Female N (%)	Total N (%)
Gender		218(44.9)	260(53.5)	498(100)
Marital Status	Married	218(53.9)	186(46.1)	404(83.1)
	Single	43(59.7)	29(40.3)	72(14.8)

	Divorced	0(0)	2(100)	2(0.4)
Mean Age±SD (years)		36.29±7.2	36.32±6.1	36.3 ±8.5
Median age (IQR)		34(24-42)	34(26-56)	43 (31-54)
BMI N (%) Mean ±SD	<20	28(52.8)15.65±3.8	25(47.2)15.16±3.2	53(10.6)15.41±3.7
	20-<25	49(50)22.41±4.2	49(50)22.04±4.3	98(19.6)22.22±4.00
	25-30	76(61.2)27.25±7.2	48(38.8)27.97±7.1	124(24.8)27.53±7.19
	>30	84(53.8)34.08±9.5	72(46.2)33.92±8.7	156(31.3)34.01±9.1
Nationality	Saudi	182(62.7)	108(37.3)	290(59.7)
	Non-national	78(37.5)	130(62.5)	208(40.3)
Smoking Status	Non-smoker	228(51.4)	215(48.6)	443(88.96)
	smoker	32(58.1)	23(41.9)	55(11.04)
Allergies	Aspirin	8(61.5)	5(38.5)	13(2.7)
	Chicken and Egg	5(50)	5(50)	10(2.1)
	Ciprofloxacin	1(100)	0(0)	1(.2)
	Dried fish sea food	0(0)	1(100)	1(.2)
	Dust	0(0)	1(100)	1(.2)
	No Allergies	240(54.18)	203(45.82)	443(91.2)
	penicillin and cephalosporin	5(71.4)	2(28.6)	7(1.4)
	Shrimp	1(100)	0(0)	2(.4)
Medication for Chronic Disease	No	196(54.29)	165(54.71)	361(75.3)
	yes	64(54.71)	53(45.29)	117(24.7)
Comorbidities	Yes	66(54.6)	55(45.4)	121(24.2)
	No	214(56.7)	163(43.3)	377(75.8)
Post CI symptoms	Yes	60(55.04)	49(44.96)	109(21.88)
	No	200(51.41)	189(48.59)	389(78.12)

Symptoms and indicator of post-COVID-19 syndrome (PCS)

109(21.88%) of our participants had (persistent vs new onset) symptoms after clearance and complete cure from COVID-19, 60(55.04%) of them were males and 49(44.96%) were females. Some of these symptoms were respiratory symptoms of COVID-19 and other symptoms were not related to respiratory system. Frequency distribution of post COVID-19 symptoms were illustrated in figure 1 and enumerated in table 2 in relation to males and females. Notably, analysis on Table 2 show that Abdominal Pain was also frequent followed by headache, cough and SOB.

PCS after COVID-19 clearance were; Body Aches 33 (6.8 %), Fever 7 (1.4 %), Diarrhea 5 (1.0 %), Nausea 3 (0.6 %), Fatigue 11 (2.3 %), Cough 16 (3.3 %), Headache 16 (3.3 %), Sore Throat 11 (2.3 %), Absence of Smell 3 (0.6 %), Vomiting 2 (0.4%), Vertigo 2 (0.4%), SOB 14 (2.9 %), Palpation 6 (1.2 %), Chest Pain 10 (2.1 %), Abdominal Pain 28 (5.8 %), Runny nose 7 (1.4 %), Intellectual Impairment 0(0.00 %), Dry Red Eye 7 (1.4 %), Difficult swallowing 1(0.2%), Nasal congestion 2 (0.4%), Nasal bleeding 1(0.2%), Sleep disturbance 2 (0.4%), Appetite and mood disturbance 1(0.2%), Bilateral tonsillar grade 3 nodular 1(0.2%), UTI 1(0.2%), Depression 4(0.8 %), Earache 4(0.8 %), Hair loss 5 (1%), Decreased hearing 1(0.2%) (Table 2).

Duration of onset for PCS

Figure 2 and figure 3 shows how time of onset symptoms was distributed. From the recorded data it is clear that the first visit happened on approximately the 5th day while the last recorded visit happened approximately on the 78th day. We observed that 28.7% (143/498) were found to have long-term health consequences after three months, defined by the existence of at least one symptom (body aches, abdominal pain, headache, cough, SOB, sore throat, etc.). In the total cohort this represented 18.2% (91/498).

Health related events also persisted at month 3 in 18.8% patients (94/498). 75% of participants started to have PCS 10-40 days after COVID clearance. While 25% of participants started to have PCS 40-80 days after COVID clearance.

Linear and logistic regression analysis

The logistic regression models fitted on the data considered symptoms as indicator variables because the respondents who showed post CL syndrome reported one or more symptom. Univariate logistic regression acute COVID-19 were related to an increased risk of PCS after 10 days. Age was a significant indicator of post CL syndrome, obtained p-value for age 0.032, was less than critical alpha level of 0.05. BMI, Body aches, diarrhea and fatigue were significant indicator of post CL syndrome, obtained p-value for 0.0058, 0 .002, 0.01 and 0.0010 respectively. Headache, absent smell, abdominal pain, and sleep disturbance were significant indicator of post CL syndrome, obtained p-value for 0.0054, 0.021, 0.0049, and 0.0016. Appetite and mood disturbance, depression and hair loss were significant indicator of post CL syndrome, obtained p-value for 0.010, 0.0032 and 0.0021.

Multiple logistic regression models fitted on the data considered symptoms as indicator variables showed factors that were linked to an increased risk of PCS after 10 days. BMI was a significant indicator of post CL syndrome, obtained p-value 0.032 (odds ratio (OR) 1.04;95% confidence interval (95% CI): (1.00 - 1.073)), body aches was a significant indicator of post CL syndrome, obtained p-value 0.040 (OR 0.59;95% CI (0.36-0.98)), fatigue was a significant indicator of post CL syndrome, obtained p-value .005 (OR 2.05; 95% CI (0.99-4.22)), hair loss was a significant indicator of post CL syndrome, obtained p-value 0.015 (OR0.94; 95% CI (0.53-1.67)) (Table 2).

Table 2 Frequency distribution of PCS among male and female participants

		Male (n = 261)	Female (n = 226)	Total (n = 487)
	Median (IQR) onset duration	23 (17)	19.50 (17)	22 (17)
Symptoms	Body Aches	15 (5.7 %)	18 (8.0 %)	33 (6.8 %)
	Fever	4 (1.5 %)	3 (1.3%)	7 (1.4 %)
	Diarrhea	3 (1.1 %)	2 (0.9 %)	5 (1.0 %)
	Nausea	2 (0.8 %)	1 (0.4 %)	3 (0.6 %)
	Fatigue	4 (1.5 %)	7 (3.1 %)	11 (2.3 %)
	Cough	11 (4.2 %)	5 (2.2 %)	16 (3.3 %)
	Headache	8 (3.1 %)	8 (3.5 %)	16 (3.3 %)
	Sore Throat	7 (2.7 %)	4 (1.8%)	11 (2.3 %)
	Absence of Smell	3 (1.1 %)	0 (0.0 %)	3 (0.6 %)
	Vomiting	0(0.00 %)	2 (0.9%)	2 (0.4%)
	Vertigo	1 (0.4%)	1 (0.4%)	2 (0.4%)
	SOB	6 (2.3 %)	8 (3.5 %)	14 (2.9 %)
	Palpation	2 (0.8 %)	4(1.8 %)	6 (1.2 %)
	Chest Pain	5 (1.9 %)	5 (2.2 %)	10 (2.1 %)
	Abdominal Pain	12 (4.6 %)	16 (7.1%)	28 (5.8 %)
	Runny nose	3 (1.2 %)	4 (1.8 %)	7 (1.4 %)
	Intellectual Impairment	0(0.00 %)	0(0.00 %)	0(0.00 %)
	Dry Red Eye	3 (1.2 %)	4 (1.8 %)	7 (1.4 %)
	Difficult swallowing	0(0.00 %)	1 (0.4%)	1(0.2%)
	Nasal congestion	2 (0.8 %)	0(0.00 %)	2 (0.4%)
	Nasal bleeding	0(0.00 %)	1 (0.4%)	1(0.2%)
	Sleep disturbance	1 (0.4%)	1 (0.4%)	2 (0.4%)
	Appetite and mood disturbance	1 (0.4%)	0(0.00 %)	1(0.2%)
	Bilateral tonsillar	1 (0.4%)	0(0.00 %)	1(0.2%)

grade 3 nodular			
UTI	0(0.00 %)	1 (0.4%)	1(0.2%)
Depression	3 (1.2 %)	1 (0.4%)	4(0.8 %)
Earache	2 (0.8 %)	2 (0.8 %)	4(0.8 %)
Hair loss	1 (0.4%)	4 (1.8 %)	5 (1%)
Decreased hearing	1 (0.4%)	0(0.00 %)	1(0.2%)

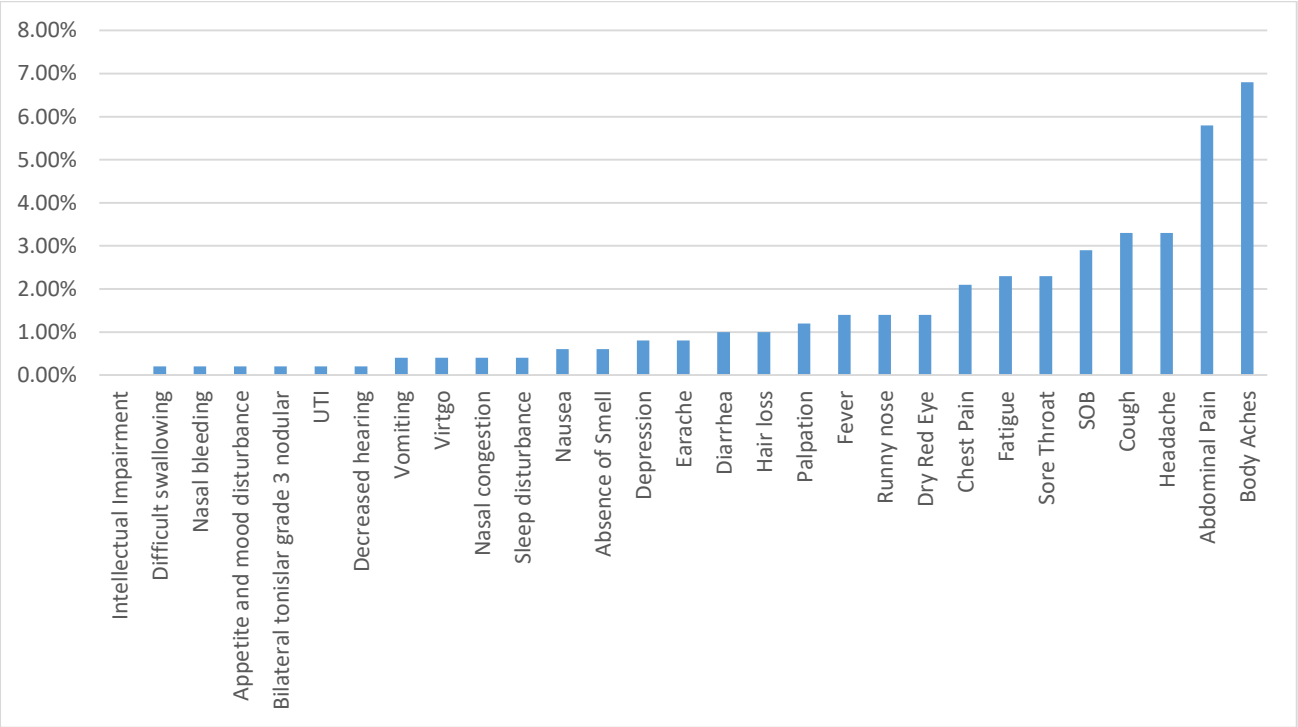

Figure 1 Frequency distribution of PCS

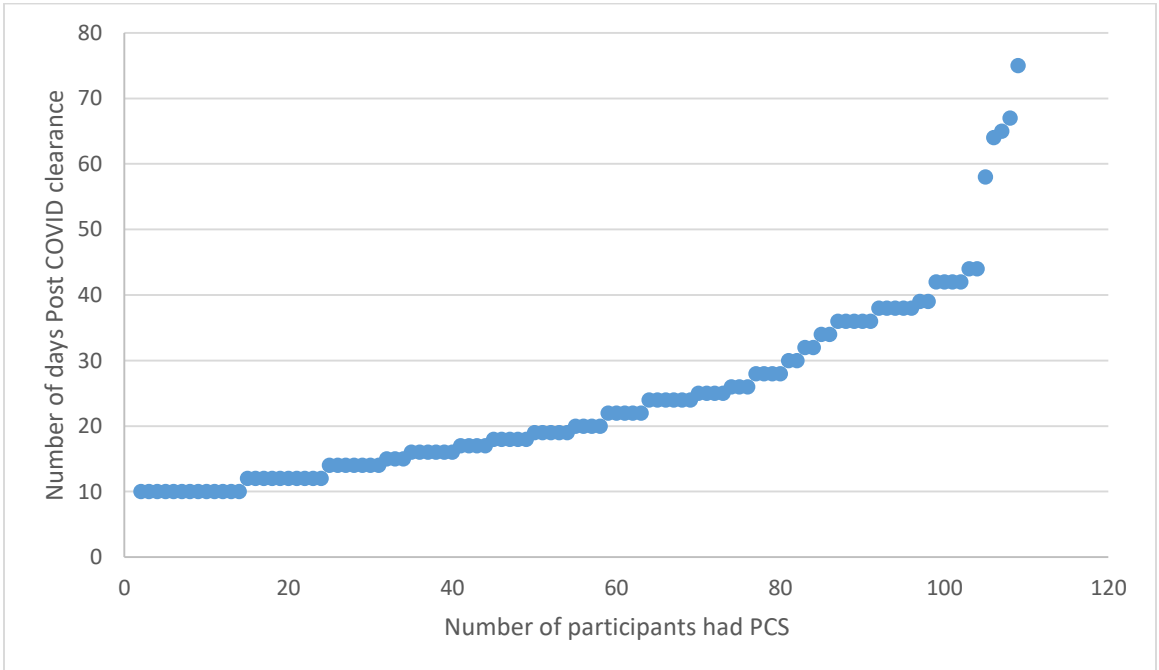

Figure 2 The figure shows the duration of onset with a median of 22 days and interquartile range of 17 days.

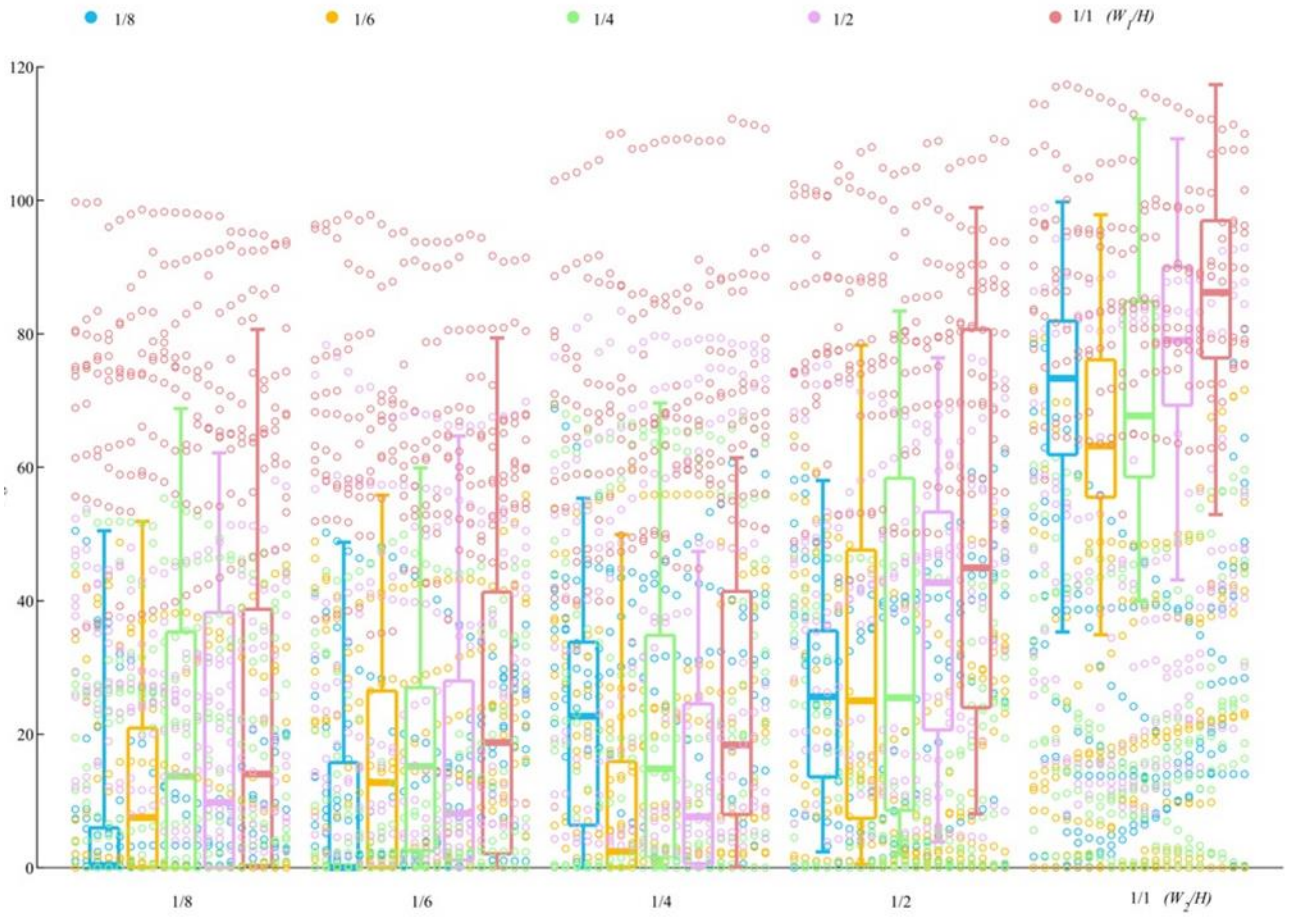

Figure 3 Box plot showing the relation between the duration of onset and the cruelty of the disease

Table 3 Logistic Regression showing predictors of post COVID syndrome

	Post COVID-19 symptoms		Univariate Regression		Multivariable Regression	
	No N (%)	Yes N (%)	OR (95 % CI)	P value	OR (95 % CI)	P value
Median (IQR) Age	35 (12)	32 (12)	0.958(0.988-0.996)	0.032	1.01 (0.97 -1.05)	0.19
Median (IQR) BMI	27.87 (10.81)	26.68 (6.27)	0.98 (0.947 - 1.031)	0.0058	1.04 (1.00 - 1.073)	0.032*
Male	201 (77.0 %)	60 (23.0)	0.882 (0.456 - 1.705)	0.709	1.13 (0.587 - 2.191)	0.709
Female	62 (78.8 %)	48 (21.2)	Ref		Ref	
Body Aches	465 (93.37)	33 (6.8)	0.99 (0.97-1.01)	.002	0.59 (0.36-0.98)	.040*
Fever	491 (98.59)	7 (1.4)	Ref		Ref	
Diarrhea	493 (99.00)	5 (1.0)	0.88 (0.53-1.46)	0.01	Ref	
Nausea	495 (99.40)	3 (0.6)	Ref		Ref	
Fatigue	487 (97.79)	11 (2.3)	1.04 (0.91-1.07)	.0010	2.05 (0.99-4.22)	.005*
Cough	482 (96.79)	16 (3.3)	Ref		Ref	
Headache	482 (96.79)	16 (3.3)	1.28 (1.13-1.46)	.0054	1.90 (1.13-3.18)	.824
Sore Throat	487 (97.79)	11 (2.3)	Ref		Ref	
Absence of Smell	495 (99.40)	3 (0.6)	0.78 (0.50-1.21)	.021	Ref	
Vomiting	496 (99.60)	2 (0.4)	Ref		Ref	
Vertigo	496 (99.60)	2 (0.4)	Ref		Ref	
SOB	484 (97.19)	14 (2.9)	1.37 (0.85-2.19)	.263	Ref	
Palpation	492 (98.80)	6 (1.2)	1.27 (0.81-2.00)	.179	Ref	

Chest Pain	488 (97.99)	10 (2.1)	1.15 (0.73-1.82)	.316	Ref	
Abdominal Pain	470 (94.38)	28 (5.8)	1.21 (0.78-1.88)	.0049	1.29 (1.08-1.55)	.537
Runny nose	491 (98.59)	7 (1.4)	Ref		Ref	
Intellectual Impairment	498 (100.00)	0(0.00)	Ref		Ref	
Dry Red Eye	491 (98.59)	7 (1.4)	1.44 (0.93-2.23)	.400	Ref	
Difficult swallowing	497 (99.80)	1(0.2)	Ref		Ref	
Nasal congestion	496 (99.60)	2 (0.4)	Ref		Ref	
Nasal bleeding	497 (99.80)	1(0.2)	Ref		Ref	
Sleep disturbance	496 (99.60)	2 (0.4)	2.19 (1.21-4.00)	.0016	0.84 (0.48-1.47)	.277
Appetite and mood disturbance	497 (99.80)	1(0.2)	1.92 (0.99-3.72)	.010	Ref	
Bilateral tonsillar grade 3 nodular	497 (99.80)	1(0.2)	Ref		Ref	
UTI	497 (99.80)	1(0.2)	Ref		Ref	
Depression	494 (99.20)	4(0.8)	1.78 (1.09-2.91)	.0032	1.50 (0.78-2.91)	.051
Earache	494 (99.20)	4(0.8)	Ref		Ref	
Hair loss	493 (99.00)	5 (1)	1.04 (1.00 - 1.073)	.0021	0.94 (0.53-1.67)	.015*
Decreased hearing	497 (99.80)	1(0.2)	Ref		Ref	

4. DISCUSSION

To our best of knowledge, this is the first research to indicate that most CVD-19 patients and non-hospital patients get symptomatic therapy within three months of the beginning of symptoms (Clark et al., 1995). Indeed, both patients and patients have distinct symptoms three months following the commencement of symptoms. Furthermore, some of those questioned reported no symptoms (Darbishire et al., 2003). This is particularly true for persons aged 47 and over, many of whom have medical difficulties and need care both during and after sickness (Docherty et al., 2020).

Many instances, both within and outside the clinic, were utilized to generate a tilt of 29 basics (certified or suspected CV-19 from discharged patients). This describes the information accessible so that we may get the first reliable information regarding in-hospital and out-of-hospital covid-19 symptoms throughout the first three months of covid-19 symptoms. People who have not been hospitalized often experience weariness and fatigue, with an average of 6 signs per patient. Carf and colleagues found tiredness and sadness in COVID-19 patients who were self-proclaimed to the infirmary 60 days before the beginning of covadic symptoms (Carf et al., 2020). This is consistent with the findings of previous research including post-mortem / post-cancer symptoms and cancer patients self-proclaimed to the unit (other than Covid) but it will come later.

He was delivered at a hospital (Lechien et al., 2020) Instructions according to current studies, hospital professionals do not work in nursing homes. It is the first evidence of 'postoperative-19' in a few people who had been on therapy for three months. Only, thirty-six % of the vicissitudes in registering symptoms can be clarified by the participants' age, prior working situation, beginning of symptoms, and next symptoms (Lam et al., 2009; Moldofsky & Patcai, 2011). This is compelling evidence for many organizations that prefer to utilize particular physical, mental, emotional, and social controls to healthier comprehend the development of these signs and to pinpoint specific areas of concern (Schanke & Stanghelle, 2001; Voss, 2005). There are several medications available, but no treatment (Svenningsen et al., 2017). It has been exposed to alleviate weariness and fatigue syndrome (Spruit et al., 2013; Polastri et al., 2020). These medications are not known to be effective after covid-19. Furthermore, it is unknown if the etiology of the symptoms induced by CCIDID-19 is comparable to-those-of-other (spiritual) disorders. For many months, diarrhea, a single heart attack, headache, aging, thirst, and coldness have been observed in addition to earlier symptoms (Yancey & Thomas, 2012).

The authors provide a copyright warning to readers, indicating that the majority of responses are women with greater symptoms than males (Torjesen, 2020). CCIDID-19 individuals also reported www.coronalongplein.nl and chronic symptoms in the study's Facebook page. Without hesitation, CCIDID-19 patients' unpleasant symptoms may intensify. Previous research found that males with cancer were more complicated, had a high “BMI” and were more numerous than any other category of patients. As a

consequence of this research, health practitioners, employers, insurance companies, and the general public were particularly cautioned that thousands of CCD-19 patient's did not completely recover within three months (Bardel et al., 2019).

It is a critical first step in resolving this issue because persons with "moderate" COVID-19 often use their own equipment and get little or no therapy as compared to hospital patients (Petrilli et al., 2020). Medical professionals are aware of the various possibilities accessible due to the acknowledgment and care of patients (friends, family, employers, and medical staff).

5. CONCLUSION

Its leftovers unidentified what "typical" COVID-19 patients are experiencing at this time. According to a recent research, the mainstream of COVID-19 "plain" patients (folks requiring hospitalization) exhibited the majority of symptoms. This outcome is consistent with previous research on people healing at home. Despite the limitations mentioned above, a significant number of defendants said that exists were outstanding beforehand to the bout. This is still the case for a sizable proportion of people. To accomplish, based on the available data, this big taster of persons with long-established or supposed COVID-19 infection three months after infection demonstrates a broad variation of symptoms and may be talented to discourse their fitness wants. An upsurge in "post-COVID-19 disease" strength is the reason of indications that endure aimed at months afterward contagion.

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Author Contributions

Each author contributes equally in manuscript writing & production.

Ethical approval

The study was approved by the Medical Ethics Committee of KSMC University (ethical approval code: #89742/2022).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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