Categorization of patients with post covid status in emergency department of a tertiary care hospital- A retrospective study

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ABSTRACT
Background: Recent studies are indicative of potential long-term complications ranging from disturbance of olfaction and taste sensations, cough, fatigue and dyspnoea, to more dire symptoms resultant of cardiac, respiratory and cognitive dysfunction. Present study was aimed to study assessment and categorization of patients with post covid status in emergency department of a tertiary care hospital. **Material and Methods:** Present study was single-center, analytical retrospective observational study, conducted in patients of age > 18 years, either gender, with confirmed positive diagnosis of SARS-CoV-2, patients completed 2 weeks being covid positive, came to emergency department. **Results:** In present study, among 80 cases, majority were from 51-60 years age group (26.25 %) & from 41-50 years age group (25 %). Majority were male (65 %) & male to female ratio was 1.9:1. Common chief complaints observed were fatigue (76.25 %), breathlessness (68.75 %), abdominal pain (46.25 %), vomiting (43.75 %), swelling bilateral lower limbs (40 %), chest pain (26.25 %) & diarrhoea (22.5 %). Majority patients had potentially infection related-symptoms (up to 4–5 weeks) 25 (31.25 %), followed by acute post-COVID symptoms (from week 5 to week 12) (27.5 %), long post-COVID symptoms (from week 12 to week 24) (23.75 %) & persistent post-COVID symptoms (lasting more than 24 weeks) (17.5 %). According to emergency severity index, majority patients were of level 5 (27.5 %) followed by level 4 (20 %), level 1 (18.75 %), level 3 (17.5 %) & level 2 (16.25 %). **Conclusion:** Categorization of patients with post covid status in emergency department according to emergency severity index is useful triaging practice.
Keywords: post covid status, emergency department, emergency severity index, categorization

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INTRODUCTION

On 11 March 2020, WHO declared SARS-CoV-2 or COVID-19 a global pandemic.[1] The pandemic of the coronavirus disease 2019 (COVID-19) has provoked a second pandemic, the "long-haulers", i.e., individuals presenting with post-COVID symptoms. The long-term outcome for these patients is unknown.[2]

However, recent studies indicate potential long-term complications ranging from disturbance of taste/ smell, cough, fatigue and dyspnoea, to more pronounced cardiac, respiratory and cognitive dysfunction and also Post-COVID-19 symptoms and diseases appeared on many survivors from COVID-19 are similar to that of the post-severe acute respiratory syndrome (SARS) fatigue.[3]

Recent studies are indicative of potential long-term complications ranging from disturbance of olfaction and taste sensations, cough, fatigue and dyspnoea, to more dire symptoms resultant of cardiac, respiratory and cognitive dysfunction. Many published studies have found that 50-70% of hospitalised patients exhibit several post covid symptoms up to almost 3 months after getting discharged from the hospital.[4,5] Present study was aimed to study assessment and Categorization of patients with post covid status in emergency department of a tertiary care hospital.

MATERIAL AND METHODS

Present study was single-center, analytical retrospective observational study, conducted in Emergency Medicine Department, at Bharati Vidyapeeth Deemed to be University Medical College, Pune, India. Study duration was of 2 years (October 2020 to December 2021). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients of age > 18 years, either gender, with confirmed positive diagnosis of SARS-CoV-2 with real-time reverse transcription- polymerase chain reaction [RT/PCR] and/or positive SARS-CoV-2 antibodies testing and /or RAPID Antigen test and/or CT findings s/o covid infection from October 2020 to December 2021, presenting to emergency department of tertiary care hospital with a systemic disorder after recovering from SARS CoV-2 infection, patients completed 2 weeks being covid positive, willing to participate in present study

Exclusion criteria

- Patients with no confirm RTPCR/CT report of COVID 19 pneumonia.
- Patients with active COVID 19 infection.

Detailed history, examination and investigations was undertaken as per hospital protocol for patients. Details of preadmission interventions if any and their responses will be noted. Triage of patients according to emergency severity index (ESI)[6] was done. Management in the emergency medicine department and evaluation at the end of 6 hours in emergency department was conducted. Compilation of data and its statistical analysis was performed.

History including chief complaints, date and time of arrival to hospital, treatment the patient received before reporting to hospital, significant past history like HTN, diabetes mellitus, CVS, TB, asthma, personal history, family history was noted. Details of covid history (Positive date/month, severity of disease, time of hospitalization & CT severity score) were also noted. Treatment history of covid (Oral/IV Steroids, oral hypoglycaemics, insulin, remedesivir, monoclonal antibodies & colchicine) was also assessed.

Examination findings such as vitals (BP, PR, RR, and SpO_2), temperature, approximate weight, pallor, icterus, cyanosis, clubbing, oedema, lymphadenopathy, etc. systemic examination findings of respiratory, cardiovascular, abdomen, central nervous system were noted. Patients were classified into levels according to emergency severity index (ESI)[6]

1. Level-1: patient need immediate lifesaving intervention
2. Level-2: Those patients doesn't fit in level 1 and should not be wait for treatment and vitals are in danger zone-HR>100, RR>20, SpO_2<92%.
3. Level-3: 2/ >2 resources and vitals are not in danger zone
4. Level 4: only one resource

5.   Level 5: no need of resources

Clinical diagnosis, investigations such as ECG, Random blood sugar, ABG (blood pH, HCO_3 levels, anion gap, electrolytes, pO2, pCO2), Bed side CX-RAY & TROP I were taken a note of. Treatment received in emergency department was also recorded. All the data of patients were documented in a POST COVID AUDIT FORM and analysed on the basis of demographic data, severity of covid infection in past, presenting clinical features and will be categorised as :

[1] potentially infection related-symptoms (up to 4–5 weeks),

[2] acute post-COVID symptoms (from week 5 to week 12),

[3] long post-COVID symptoms (from week 12 to week 24)

[4] persistent post-COVID symptoms (lasting more than 24 weeks).

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

In present study, among 80 cases, majority were from 51-60 years age group (26.25 %) & from 41-50 years age group (25 %). Majority were male (65 %) & male to female ratio was 1.9:1.

Table 1: Age & gender distribution

Age group (years)	Male	Female	Total
19-30	6 (7.5 %)	4 (5 %)	10 (12.5 %)
31-40	11 (13.75 %)	4 (5 %)	15 (18.75 %)
41-50	13 (16.25 %)	7 (8.75 %)	20 (25 %)
51-60	13 (16.25 %)	8 (10 %)	21 (26.25 %)
61-70	8 (10 %)	4 (5 %)	12 (15 %)
>70	1 (1.25 %)	1 (1.25 %)	2 (2.5 %)
Total	52 (65 %)	28 (35 %)	80

Common chief complaints observed were fatigue (76.25 %), breathlessness (68.75 %), abdominal pain (46.25 %), vomiting (43.75 %), swelling bilateral lower limbs (40 %), chest pain (26.25 %), diarrhoea (22.5 %), decreased urine output (21.25 %), burning micturition (20 %) & increased frequency of micturition (17.5 %).

Table 2: Chief Complaints on admission

Chief Complaints	No. of patients	Percentage
Fatigue	61	76.25
Breathlessness	55	68.75
Abdominal pain	37	46.25
Vomiting	35	43.75
Swelling bilateral lower limbs	32	40
Chest pain	21	26.25
Diarrhoea	18	22.5
Decreased urine output	17	21.25
Burning micturition,	16	20
Increased frequency of micturition	14	17.5

Joint pain	11	13.75
Constipation	10	12.5
Right sided upper limb & lower limb weakness, left sided facial deviation	6	7.5
Left side decreased vision, swelling of left side face	6	7.5
Bilateral upper limbs & lower limbs proximal muscle weakness	5	6.25
Seizure GCTS	5	6.25
Anxiety/palpitations	4	5

On Clinical examination common findings were respiratory rate as 23-30 per minute (31.25 %) & 19-22 per minute (28.75 %) in majority of cases. Extremes of systolic blood pressure as < 90 mm of Hg (10 %) & >160 mm of Hg (27.5 %) were noted. SpO2 was <80 % (6.25 %), 81-89 % (12.5 %) & 90-95 % (42.5 %) was noted. Bilateral crepitations (42.5 %) & Bilateral decreased air entry (5 %) were common respiratory system findings. Murmur was present in 5 % cases. Common central nervous system findings were confusion and irritability (13.75 %). On admission blood sugar level was 201-500 mg/dl (33.75 %) & >500 mg/dl (11.25 %).

Table 3: Clinical examination findings

Clinical examination findings	No. of patients	Percentage
Respiratory Rate (per minute)		
<18	22	27.5
19-22	23	28.75
23-30	25	31.25
>30	10	12.5
Systolic blood pressure (mm of Hg)		0
<90	8	10
91-139	33	41.25
140-160	17	21.25
>160	22	27.5
SpO2 (%)		0
<80	5	6.25
81-89	10	12.5
90-95	34	42.5
>95	31	38.75
Respiratory System findings		0
Bilateral crepitations	34	42.5
Bilateral decreased air entry	4	5
Bilateral crepitations and wheeze	2	2.5
Bilateral wheeze occasional crepitations	1	1.25
WNL	39	48.75
Cardiovascular System findings		0
Murmur present	3	3.75
Systolic murmur	1	1.25
WNL	76	95
Central Nervous System findings		
Confused irritable	11	13.75
Disoriented	1	1.25
Unconscious	1	1.25

WNL	67	83.75
Abdominal examination findings		0
Diffuse tenderness	3	3.75
Epigastric tenderness	1	1.25
Mc Burny's point tenderness	1	1.25
Tense/guarding/tender	1	1.25
WNL	74	92.5
On admission blood sugar level (mg/dl)		
<120	11	13.75
121-200	33	41.25
201-500	27	33.75
>500	9	11.25

In majority of cases, CT severity Score was 18-21 (53.75 %) , hospital stay was >15 days (37.5 %), ICU admission was required in 53.75 % cases, while only O_2 requirement was seen in 46.25 % cases. Steroids received by 100 %, Remdesivir received by 76.25 %, 57.5 % were on insulin, 22.5 % were on Oral Hypoglycemic Agents, Monoclonal Antibodies received by 31.25 % cases & colchicine by 32.5 % cases.

Table 4: COVID 19 related characteristics

Characteristics	No. of patients	Percentage
CT severity Score		
13-17	37	46.25
18-21	33	41.25
>21	10	12.5
Hospital stay (days)		
>10	21	26.25
10-15	29	36.25
16-20	21	26.25
>21	9	11.25
SEVERITY		0
ICU admission	43	53.75
Only O_2 required	37	46.25
Other characteristics		0
Steroids received	80	100
Remdesivir received	61	76.25
Insulin	46	57.5
Oral Hypoglycemic Agents	18	22.5
Monoclonal Antibodies	25	31.25
Colchicine	26	32.5

ECG findings were ST elevation in lead II, III, AVF (7.5 %), Global T wave inversion (3.75 %), T wave inversion in inferior leads and in anterior leads (2.5 %) & Q waves in inf leads (2.5 %).

Table 5: ECG findings

ECG findings	No. of patients	Percentage
ST elevation in lead II, III, AVF	6	7.5
Global T wave inversion	3	3.75
T wave inversion in inferior leads and in anterior leads	2	2.5

Q waves in inf leads	2	2.5
S1Q3T3	2	2.5
Ventricular tachycardia	1	1.25
S elevation in lead II, III, AVF	1	1.25
WNL	63	78.75

Chest X-ray findings were Bilateral fibrosis (26.25 %) & Bilateral pleural effusion (5 %).

Table 6: Chest X-ray findings

Chest X-ray	No. of patients	Percentage
Bilateral fibrosis	21	26.25
Bilateral pleural effusion	4	5
Bilateral pulmonary edema	1	1.25
Cardiomegaly with pleural effusion	1	1.25
Emphysematous	2	2.5
Increased bronchovascular markings	2	2.5
Pulmonary edema	1	1.25
White out lung	1	1.25
WNL	47	58.75

In present study, majority patients had potential infection related-symptoms (up to 4–5 weeks) 25 (31.25 %), followed by acute post-COVID symptoms (from week 5 to week 12) (27.5 %), long post-COVID symptoms (from week 12 to week 24) (23.75 %) & persistent post-COVID symptoms (lasting more than 24 weeks) (17.5 %). According to emergency severity index, majority patients were of level 5 (27.5 %) followed by level 4 (20 %), level 1 (18.75 %), level 3 (17.5 %) & level 2 (16.25 %).

Table 7: Categorization in levels according to emergency severity index

Categorization	Levels according to emergency severity index					
	Level 1	Level 2	Level 3	Level 4	Level 5	Total
Potentially infection related-symptoms (up to 4–5 weeks),	6 (7.5 %)	7 (8.75 %)	5 (6.25 %)	4 (5 %)	3 (3.75 %)	25 (31.25 %)
Acute post-COVID symptoms (from week 5 to week 12),	4 (5 %)	3 (3.75 %)	4 (5 %)	5 (6.25 %)	6 (7.5 %)	22 (27.5 %)
Long post-COVID symptoms (from week 12 to week 24),	4 (5 %)	2 (2.5 %)	3 (3.75 %)	5 (6.25 %)	5 (6.25 %)	19 (23.75 %)
Persistent post-COVID symptoms (lasting more than 24 weeks).	1 (1.25 %)	1 (1.25 %)	2 (2.5 %)	2 (2.5 %)	8 (10 %)	14 (17.5 %)
Total	15 (18.75 %)	13 (16.25 %)	14 (17.5 %)	16 (20 %)	22 (27.5 %)	80

DISCUSSION

The disease manifestation of COVID 19 ranges from being completely asymptomatic and being detected only on screening due to a history of contact, or may present with rapidly progressive hypoxic respiratory failure due to pneumonia and acute respiratory distress syndrome (ARDS).[7]

The disease course of COVID-19 varies considerably across individuals, even among those severe enough to be hospitalized, with some hospitalized patients recovering after a brief or extended stay, others dying in hospital, experience a worsening of disease and possible death or readmission after initial discharge. There is a growing concern about the disease for various reasons, including the unknown characteristics of the disease and ways to deal with it. High variety of symptoms, severe infection, long latency period, rapid and high transmission rates, as well as its negative impact on physical and mental health of the communities are other areas that deserves our attension.[8]

People with post-covid experience a confusing array of persistent and fluctuating symptoms including cough, breathlessness, fever, sore throat, chest pain, palpitations, cognitive deficits, myalgia, neurological symptoms, skin rashes, and diarrhoea; some also have persistent or intermittent low oxygen saturations.[9,10,11] Other studies conducted elsewhere, including systemic review and meta analysis, fatigue was the most frequently reported symptom as of today with the prevalence ranging from 30% to 82·9%.[12,13]

The most common symptoms is fatigue, which is often profound, prolonged and shares characteristics with chronic fatigue syndrome (CFS) seen with other viral infections. Risk of Post COVID-19 Syndrome (PCS) is more likely in those with more than 5 symptoms during acute COVID-19 and more in women, elderly, in obese individuals and in patients with diabetes.[14,15] Further, persistent symptoms were more common in people with severe disease at presentation and in those with increased convalescent antibody titres.[16]

In study by Daniel A et al.,[17] over a mean follow-up of 140 days, nearly a third of individuals who were discharged from hospital after acute covid-19 were readmitted (14 060 of 47780) and more than 1 in 10 (5875) died after discharge, with these events occurring at rates four and eight times greater, respectively, than in the matched control group. Rates of respiratory disease (P<0.001), diabetes (P<0.001), and cardiovascular disease (P<0.001) were also significantly raised in patients with covid-19, with 770 (95% confidence interval 758 to 783), 127 (122 to 132), and 126 (121 to 131) diagnoses per 1000 person years, respectively.

Maestre-M et al.,[18] studied 587 patients with COVID-19 discharged from hospital, mortality within the following year occurred in 34/266 (12.8%) and 10/321 (3.1%), respectively, due to causes directly or possibly related to COVID-19 in 20.5% and 25% of patients. Post-COVID-19 syndrome was assessed in 543 patients at one year from discharge. Any clinical complaint was reported by 90.1% of patients who needed hospitalization and 80.4% of those discharged from the emergency room (p = 0.002), with breathlessness (41.6%), tiredness (35.4%), ageusia (30.2%), and anosmia (26.3%) being the most common complaints. Ongoing symptoms attributed to COVID-19 were reported by 66.8% and 49.5% of patients, respectively (p < 0.001). Newly developed COPD, asthma, diabetes, heart failure, and arthritis—as well as worsening of pre existing comorbidities—were found.

Overall, the information for post-COVID-19 conditions can be summarized as[19]

1. persistent symptoms seen in 10% to above 80%;

2. more than one symptom observed in 30% to 80%;

3. new-onset symptoms and increased impact observed beyond six months;

4. fatigue, cough, respiratory distress, pain, and insomnia are the main physical symptoms in a range of 10% to 80%;

5. anxiety/depression, fear, and worry are psychological issues faced by 10% to 40%.

Among psychosocial behavioural changes, a sizeable number of recovered subjects also reported anxiety, mood disorders, panic and depression were noted. Such a link with mental and behavioral problems among recovered patients is also reported in other studies.[20]

Long covid, or post-covid syndrome, is not one condition, and is defined by the National Institute for Health and Care Excellence (NICE) 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 an alternative diagnosis."[21]

Post-covid syndrome adds to current healthcare challenges, particularly sustainable high-quality care for long term conditions: inequalities in health, access, and provision; incomplete pathways across community and hospital care; and the need to translate research into clinical practice with sufficient resources.

Information regarding post COVID-19 symptoms and associated risk factors can be used to guide the development of appropriate infrastructure and manpower thereby designing comprehensive post COVID-19 management strategies and patients care plan in hospital as well as in the rehabilitation facilities. Treatment of people with long COVID requires a multidisciplinary approach including evaluation, symptomatic treatment, treatment of underlying problems, physiotherapy, occupational therapy and psychological support.[22]

CONCLUSION

Categorization of patients with post covid status in emergency department according to emergency severity index is useful triaging practice. Understanding the post COVID-19 symptoms and associated risk factors is crucial to reorient the health infrastructure to make it more responsive to the needs of a large number of persons who are likely to require such medical interventions going ahead.

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