Clinico-epidemiological profile of COVID-19 patients admitted during third wave of pandemic in a tertiary care hospital in New Delhi, India

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Abstract

Even nearly two years after the first reported case, the novel coronavirus (SARS-CoV-2) continues to ebb and flow around the world. A retrospective cohort study was carried out to determine the clinico-epidemiological profile and outcome of the cases. The study analyzed secondary data from 827 patients who presented to our center with COVID-19-related illnesses between December 15, 2021, and February 15, 2022 (third wave in India). There was a significant difference in the vaccination status of patients treated at home and those admitted, with 87.9% having received two doses compared to 74% in the second group being unvaccinated. Patients who were isolated at home recovered at a rate of 99.4%, while hospitalized patients died at a rate of 26.5%. Vaccination reduces the severity of COVID-19; however, constant vigilance for new variants, precautionary measures, and increased vaccination drives are critical moving forward.

Introduction

The novel coronavirus, severe acute respiratory syndrome - Coronavirus 2 (SARS-CoV-2), continues to spread across Europe, South America, Russia, and various countries in the Southeast Asia region even after almost two years of the first reported case. With the increase in the vaccination coverage and experience gained after managing the previous two waves of the pandemic, the latest variant of concern [1] "Omicron" has been managed better.

It is well-established that although most patients with Coronavirus Disease 2019 (COVID-19) have mild to moderate symptoms and show recovery, a significant proportion requires timely hospitalization to reduce the risk of complications and mortality [2,3].

The state of Delhi, comprising the Indian capital city with a population of 19.3 million, has recorded 1.86 million COVID-19 cases and 26,148 associated deaths as of March 24, 2022 [4]. The

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current study analyzes the presented data to establish a clinico-epidemiological profile of the cases presented in this time frame. Also, to establish differences noted within the two groups (cases in home isolations and cases admitted in hospital) in the current wave.

Methods

We conducted a retrospective cohort study through secondary data analysis from in-patient and out-patient data of patients diagnosed as COVID-19 with Real Time-Polymerase Chain Reaction (RT-PCR) between December 15, 2021, to February 15, 2022, at the Vardhman Mahavir Medical College and Safdarjung Hospital (VMMC and SJH), the largest central government tertiary care hospital in New Delhi, India. In Delhi, patients with mild disease were not immediately hospitalized in any government hospital, and instead, a district health team ascertained their suitability for home isolation [5]. Patients with mild disease who experienced worsening symptoms or depletion of oxygen saturation, along with those with moderate to severe COVID-19 disease were referred to the author institution for management. The SARS-CoV-2 testing protocol in the hospital was in accordance with the Indian Council of Medical Research (ICMR) guidelines. The population tested for COVID-19 prior to admission included pregnant females, high-risk patients like those undergoing chemotherapy, and admitted patients posted for elective surgeries [6].

Clinico-epidemiological data were collected for the patients who tested positive during this period, including age, history of previous COVID-19. Disease, history of vaccination, comorbidities, and symptoms during the illness. Gene sequencing was done by consecutive sampling for 16 patients admitted in the Intensive care unit for establishment of circulating variants.

Two study groups were divided based on clinical management at home (isolation) and hospital (admitted). The data was entered into M.S. Excel 365 and cleaned and divided into two groups: patients treated at home and patients admitted to the hospital. The nominal data were analyzed using the SPSS (IBM Corp. Released 2020. IBM SPSS Statistics, Version 27.0. Armonk, NY, USA), comparing various factors between the two groups, and noted statistically significant values. The data were analyzed by means of a nonparametric approach due to the non-normal distribution of interval variables. The median and ranges as well as Mann Whitney's U test were used. Categorical variables were analyzed by means of simple frequencies. A p-value <0.05 was considered statistically significant.

Results

A total of 827 patients with COVID-19 related illnesses were reported to our center during the study period of which 372 were managed at home (isolation) while 455 needed hospital admission. The patient's vaccination status has been reported in Table 1, showing that most of the patients treated at home had received two doses of the vaccine, while the majority of those admitted had not been vaccinated. The clinico-epidemiological profile of patients with COVID-19 in the third wave has been shown in Table 2. A significantly higher percentage of patients in home isolation showed a history of previous COVID-19 disease ($p<0.001$). While patients above 60 years and below 18 years showed a higher need for hospitalization, the 18-40 age group had a significantly higher percentage under home isolation ($p<0.001$). Symptoms like fever, cough, fatigue, malaise, and headache were significantly more commonly seen in patients isolated at home ($p<0.001$). Vaccination could be seen as an explicit factor differentiating the two groups; while 87.9% of those in home isolation had received two doses, an alarmingly high 74% of those admitted to the hospital were unvaccinated ($p<0.001$). The outcome showed a stark difference, too, with a 99.4% recovery rate in those isolated at home, while the mortality in the hospitalized patients was 26.5% ($p<0.05$). Of the 16 patients in whom gene sequencing was done, 12 (75%) were found to have B.A.2 sub lineage, which was the dominant strain spreading across the world towards the end of the third wave [7] (Tables 1 to 4).

Discussions

The third wave of COVID-19 in India showed a distinctly different pattern of clinical characteristics and outcomes in patients. The wave was attributed to the Omicron variant of SARS-CoV-2. The Omicron variant first reported from South Africa is distinct from the previous Delta variant, affecting a younger population with lower proportion presenting with an acute respiratory condition along with lower oxygen and ventilator requirements [8].

Table 1. Vaccination status of COVID-19 patients.

Patients treated at home Parameters	Not vaccinated	Only 1 dose	Only 2 doses	Total
Total	33	12	327	372
Patients with comorbidities	7	2	12	21
Patients >60 years	0	0	7	7
Patients <15 years	14	0	0	14
Patients admitted in hospital	**Not vaccinated**	**Only 1 dose**	**Only 2 doses**	**Total**
Total	337	39	79	455
Patients with comorbidities	125	21	57	203
Patients >60 years	40	8	27	75
Patients <15 years	101	0	0	101

In the current study, among the study participants, 55% were admitted, of which 73.8% were unvaccinated, which was comparable to a study in South Africa by Maslo *et al*., where 41.3% were admitted and 66.4% unvaccinated [8]. The figures highlight the growing evidence of vaccination reducing hospitalizations in COVID 19 patients.

Table 2. Clinico-epidemiological profile of COVID-19 patients during 3rd wave.

Characteristics	Patients in home isolation (n=372)		Patients admitted in hospital (n=455)		Total (n=827)		p-value
	Number	%	Number	%	Number	%	
History of COVID-19 disease	49	13.17	12	2.64	61	7.38	<0.001
Age							
<12 years	11	2.96	85	18.68	96	11.61	<0.001
12-17 years	4	1.08	23	5.05	27	3.26	<0.05
18-40 years	299	80.38	208	45.71	507	61.31	<0.001
41-60 years	52	13.98	70	15.38	122	14.75	0.570
>60 years	7	1.88	69	15.16	76	9.19	<0.001
Gender							
Male	212	56.99	194	42.64	406	49.09	0.004
Female	160	43.01	261	57.36	421	50.91	
Symptoms							
Symptomatic since (mean number of days)	2.01		3.93		2.97		<0.001
Fever	330	88.71	106	23.30	436	52.72	<0.001
Cough	217	58.33	66	14.51	283	34.22	<0.001
Dyspnea	0	0.00	82	18.02	82	9.92	-
Chest pain	0	0.00	15	3.30	15	1.81	-
Hemoptysis	0	0.00	1	0.22	1	0.12	-
Diarrhea	5	1.34	3	0.66	8	0.97	>0.05
Fatigue	146	39.25	12	2.64	158	19.11	<0.001
Malaise	50	13.44	7	1.54	57	6.89	<0.001
Anosmia	1	0.27	0	0.00	1	0.12	-
Dysgeusia	2	0.54	2	0.44	4	0.48	>0.05
Headache	45	12.10	17	3.74	62	7.50	<0.001
Nausea/vomiting	4	1.08	15	3.30	19	2.30	<0.05
Any other	0	0.00	0	0.00	0	0.00	
Vaccination status							
Only one dose	12	3.23	39	8.57	51	6.17	0.001
Two doses	327	87.90	79	17.36	406	49.09	<0.001
Unvaccinated	33	8.87	337	74.07	370	44.74	<0.001
Comorbidities							
Hypertension	6	1.61	59	12.97	65	7.86	<0.001
Diabetes	7	1.88	41	9.01	48	5.80	<0.001
Coronary artery disease	0	0.00	27	5.93	27	3.26	-
Chronic kidney disease	0	0.00	17	3.74	17	2.06	-
Chronic liver disease	1	0.27	12	2.64	13	1.57	<0.05
Cancer	3	0.81	14	3.08	17	2.06	<0.05
Immunosuppressed	0	0.00	4	0.88	4	0.48	-
Chronic respiratory disease	2	0.54	17	3.74	19	2.30	<0.05
Outcome							
Recovered	370	99.46	334	73.41	704	85.13	<0.05
Died	1	0.27	121	26.59	122	14.75	

Table 3. Reason for hospital admission of COVID-19 patients (n=455).

Cause of admission	Number	%
COVID-19	65	14.29
Incidental COVID-19		
Pregnancy	129	28.35
Post-operative patients	106	23.30
Others*	155	34.07
Total	455	100.00

*Others include cases of trauma, chemotherapy, already admitted in the hospital for different diseases.

Table 4. SARS-CoV-2 genome sequencing among admitted patients (n=16).

Sub lineage	Number	%
B.A.1	1	6.25
B.A.2	12	75
None	3	18.75

In the current study maximum patients were in the 18-40 age group, while two similar studies in South Africa showed a mean age of 36-39 years in their study participants [8,9]. Notably, the mortality in our study group was 26.5% in the hospitalized patients and 14.75% overall, which was much higher compared to the 2.7-7.1% found in the South African and American studies [8-10]. This unusually high mortality can be attributed to the author institute being a tertiary care referral center where patients with severe disease and comorbidities are referred for admission. Of 455 patients admitted in the COVID ward, 14.29% were admitted owing to the COVID-19 pneumonia diagnosis, while the rest (85.71%) were incidental. Among the 390 (85.7%) incidentally diagnosed COVID-19, the mortality was significantly lower at 22.3% compared to 52.3% in the remaining 65 COVID-19 pneumonia individuals. A similar study in South Africa showed that 63% of their omicron cases were incidental diagnosis [9].

The current study showed a marked reduction in severity with a 99.4% recovery rate among the patients who were in home isolation of which the majority (87.9%) had received two doses of either of the two available vaccines (ChAdOx1 and BBV152). This further emphasizes the effectiveness of the two vaccines similar to what was seen in studies by Swarnali *et al*. where they reported a 90% and 80% effectiveness for ChAdOx1 and BBV152, respectively [11]; and Parikh *et al.* showed a miniscule 4.7% RT PCR positivity among the participants [12]. A study by Bharat Biotech showed 100% serum neutralization of the Delta variant and more than 90% of samples showed neutralization of Omicron variant with the BBV152 vaccine [13]. Buachan *et al.* reported that a third / booster dose improves protection against symptomatic infection and provides excellent protection against severe outcomes for both Delta and Omicron variants [14].

Limitations

It is a mono-centric retrospective study, and our results may not be generalizable for the entire population of India. Also, the data was collected from the COVID Data Center and therefore, the effect of variables such as weight, body mass index and history of smoking, on patient outcome could not be assessed.

Conclusions

The current study highlights the importance of vaccination in reducing the severity of COVID-19 and also notable reduction in mortality among hospitalized patients. With vaccines being developed at record speeds, even after more than two years of the first reported case; the virus continues to spread across the world. We need to keep a constant vigil for new variants, take appropriate precautions, boost the vaccination drive to reach underprivileged nations, along with continued research into the need and efficacy of booster doses for high-risk individuals like first responders and healthcare workers.

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