Original Article

An in-depth appraisal of clinico-biochemical and radiological findings of COVID-19 patients during the COVID-19 pandemic in a dedicated COVID Care Hospital in Eastern India and its outcome in relation to the COVAXIN vaccination status: A 2-year study

C. Mohan Rao[1], Amrut Kumar Mohapatra[1], Aswini Kumar Patnaik[2], Prem S. Panda[3], Prasanta Ranjan Behera[4]

[1]Department of Pulmonary Medicine, Kalinga Institute of Medical Sciences Bhubaneswar, Odisha, India, [2]Department of Nephrology, Kalinga Institute of Medical Sciences Bhubaneswar, Odisha, India, [3]Department of Community Medicine, Kalinga Institute of Medical Sciences Bhubaneswar, Odisha, India, [4]Department of Critical Care Medicine, Kalinga Institute of Medical Sciences Bhubaneswar, Odisha, India

Abstract

Introduction: COVID-19 pandemic hit Odisha province from April 2020 to December 2020, then from April 2021 to August 2021 and from February 2022 to April 2022 as the first, second, and third waves, respectively, with the most severe form witnessed during the second wave. Kalinga Institute of Medical Sciences hospital in Odisha was declared a Dedicated COVID Hospital (DCH) during those three waves and witnessed 9485 cases of admissions among which there were 1214 deaths. COVAXIN vaccination of the vulnerable population was launched in February 2021 onwards. This study has been done to know the clinic-biochemical profiles, radiologic findings of COVID-19 admitted patients, the predictors of mortality in the second wave, and clinical outcomes in the three waves in relation to COVAXIN vaccination status. **Material and Methods:** This was a serial three-round retrospective study from the electronic medical records using multistage random sampling where we collected and critically analyzed the demographic, and all the relevant possible health data of the cases that consist of 514 cases admitted in three waves. The data from death certificates among the 555 cases in the second wave have been analyzed to conclude predictors of mortality. **Results:** Mortality increased with age, male gender, comorbidities, and raised C-reactive protein level. High NL ratio, extent of pulmonary involvement. There was a wide variation in incidence and spectrum of illness starting from 79% incidence of mild symptomatic in the initial and third wave, but remained in the range of 35–65% in the second wave, respectively, and the most noticeable symptomatic illness was that of the upper respiratory tract. In fulminant cases, the mode of presentations was severe pneumonia and acute respiratory distress syndrome. Males were more sufferers than females. Children had better outcomes compared to adults. COVID-associated coagulopathy had a normal platelet count. Subsequently, in 2021 year onwards vaccination of the vulnerable population was launched in a phased manner that changed the dynamics of the disease outcome by better survival chances despite intercurrent COVID infection by induction of herd immunity. On the contrary, there was a higher prevalence of serious illness among non-vaccinated individuals. While the cases continued during the second wave of the pandemic, long COVID became a clinical entity of symptomatic that persisted or recurred among the COVID illness recovered cases after reverse transcriptase polymerase chain reaction results for COVID-19 became negative. The symptoms consisted of fatigue, cough, dyspnea as pulmonary manifestations and extra-pulmonary involvement of the cardiac, renal, and central nervous systems

Address for correspondence: Dr. Prem S. Panda, Department of Community Medicine, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha – 751 024, India.
E-mail: drpspanda@gmail.com

Received: 17-09-2022 **Revised:** 08-12-2022
Accepted: 24-01-2023 **Published:** 31-05-2023

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_1853_22

How to cite this article: Rao CM, Mohapatra AK, Patnaik AK, Panda PS, Behera PR. An in-depth appraisal of clinico-biochemical and radiological findings of COVID-19 patients during the COVID-19 pandemic in a dedicated COVID Care Hospital in Eastern India and its outcome in relation to the COVAXIN vaccination status: A 2-year study. J Family Med Prim Care 2023;12:971-8.

and the pulmonary imaging features consisted of interstitial pneumonia, consolidation, cavity pattern, and prone to microbial infection. These events lead to morbidity and admission. Coinciding with the vaccination of all population of Odisha province with the first dose of the vaccine by around the period of the first quarter of 2022, there was a new variant named Omicron responsible in the third wave, in which the majority of the admitted cases had.mild upper respiratory illness. This was not as lethal as its predecessors due to its lower propensity to invade the lungs and blood vessels. **Conclusion:** Immune dysregulation plays a central role in the pathogenesis of the manifestations. Vaccine-induced protection and the induction of herd immunity played a proactive role in the waning of the severity of clinical presentations.

Keywords: COVAXIN, C-reactive protein, D-dimer, delta variant, long COVID, neutrophil-lymphocyte ratio, severe acute respiratory infection

Introduction

Coronavirus infection as epidemic outbreaks occurred in the twenty-first century, namely, severe acute respiratory syndrome (SARS). Since then it has resulted in several cases of pneumonia, acute respiratory distress syndrome (ARDS), multi-organ dysfunction, etc.[1] Added to these, the recent outbreak of novel coronavirus infection (COVID-19) has spread worldwide rapidly. The COVID-19 pandemic has been both devastating and ever-changing,[2] its biological behavior on the human host has been changing, new strains not only have enhanced transmissibility because of the modified spike protein but also its phylodynamic nature is responsible for the mutation pattern among the strains in different continents.

The initial period of the pandemic in 2020 was due to the original Wuhan strain,[3] the consequent clinical illness was mild and limited to the upper respiratory tract in the majority subsequently multiple SARS-CoV-2 variants have emerged due to D614G mutation in its gene.[4] World health organization (WHO) labeled different strains isolated country-wise—Alpha (UK), Beta B1.351 (South Africa), Gamma (Japan, Brazil) P1, Delta (India), Epsilon B.1.427 and 429 (California-USA), and these variants had the potential to be more transmissible and the possibility to cause severe disease.[5] B.1.617.2 lineage (Delta) was identified in 2020 and caused the same severe disease.[6]

The clinical pattern of presentations was protean and diverse during the cycles of pandemics witnessed in Odisha province that included the first wave between April 2020 and December 2020, the second wave from April 2021 to August 2021, and the third wave between February 2022 and April 2022, its severe clinical pulmonary presentations consisting of pneumonia, ARDS, Thromboembolic episodes was hypothesized to occur due to development of intense and or prolonged inflammation in the course of the illness.[7] It is imperative to know any adverse host factor, comorbid illness, inflammatory biomarkers including C-reactive protein (CRP), D-dimer, and increase N/L ratio could be responsible for morbidity and mortality.[8,9] 555 death cases were taken during the second wave of COVID-19 to find out the predictors of mortality.

From the first quarter of 2021 during the second wave, vaccination against COVID-19 was launched among the vulnerable population as per the priority to the individuals as the first dose, second booster dose, and third compassionate dose, respectively, on a mass scale as per local health authority guidelines. COVAXIN was available in Odisha state and it was continued in the subsequent period covering the majority of its population. It was also noticed that following the vaccination, persons continued to be admitted with reverse transcriptase polymerase chain reaction (RT-PCR) positive for COVID-19 illness, and these cases needed evaluation. The Odisha province has administered more than three crore doses of COVAXIN vaccination and the entire population has been given the first dose by end of 2021. Following the recovery from COVID illness some cases despite RT-PCR negative results continued to suffer from pulmonary with or without extra-pulmonary clinical illness that persisted beyond 4 weeks after the onset of the first COVID clinical illness. These cases came under the definition of long COVID. The third wave due to a new variant of the SARS-Cov19 strain called Omicron started during the first quarter of 2022, surprisingly the admitted cases were few in number and had a mild upper respiratory illness.

This study highlights the primary care physician about antibiotic stewardship and limits the use of steroids for maintaining the immunity of the cases. The protective role of COVAXIN is also a factor to promote vaccination of the individuals. So critical appraisal needs to be done for the outcome of the admitted cases, and the clinical presentations during the pre-vaccination and post-vaccination era. These will be useful for clinicians about antibiotic stewardship, judicious use of corticosteroids that may be useful in the long run, and also for the planning and research for vaccination programs guidance to public health authorities.

The variant strain of SARS-COV-2 virus has been responsible for varied clinical presentations as witnessed from the first wave onwards.

COVAXIN administered to the population resulted in decreased incidence and severity of infection. The biomarkers in COVID patients were not predictive of mortality, rather the extent of pulmonary involvement and comorbid illness played role in mortality.

Long COVID is a consequence of immune dysregulation, so antibiotics and corticosteroids should be used judiciously.

Material and Methods

A study was undertaken in KIIMS COVID hospital from April 2020 to April 2022 for a critical appraisal of clinical laboratory, imaging, and outcome of 514 patients who were triaged and treated as per WHO guidelines and analysis of death records of 555 patients among the total 1214 deaths in the hospital out of 9485 total admitted in COVID hospital. The death that was maximumly witnessed in the second wave. These cases were admitted during the COVID pandemic that hit Odisha province in the first wave from April 2020 to December 2020, then in the second wave from April 2021 to August 2021, and lastly as the third wave from February 2022 to April 2022, respectively. The period enumerated as the waves depends upon the notification by the local health authorities. The study was approved by the Institutional Ethics Committee, Kalinga Institute of Medical Sciences Bhubaneswar via letter no. 678 dt 31/05/2021.

It was a retrospective study of the multistage random sampling of the data about the clinical presentation, host factor, comorbid illness, extent of the disease as per imaging of the lung, biomarkers of immune dysregulation, status of vaccination in detail, morbidity, mortality as outcome all collected from the electronic medical records among the cases admitted from April 2020 to April 2022. All cases of mortality that happened in the second wave have been retrieved from the death records in our hospital. For the convenience of the analysis, the 2-year period was arbitrarily segregated into pre-vaccination and post-vaccination periods in Odisha province after February 2021, when vaccination with COVAXIN among the target population was kick started as per local health authorities' instructions.

Study population: Out of 514 patients, 272 were from inpatient non-ICU wards, 42 were from ICU in the first wave, and 200 in the second wave who were hospitalized in dedicated COVID hospital (DCH) as COVID-19-positive (RT-PCR) were included.

The 555 patients who died due to the infection or its complications while undergoing treatment were considered as **"COVID-19 deaths."**

Statistical methods: It included frequency analysis (%) for categorical variables and mean ± SD for continuous variables. Comparisons were determined by student t-test for continuous variables and Chi-squared test or Fischer exact test for categorical variables. A *P*-value <0.05 were considered significant. All calculations were performed using Statistical Package for the Social Sciences v16.0. (Chicago: SPSS Inc.)

Results

Mortality pattern of 555 cases during the second wave: The mean duration of hospitalization was 8.39 ± 7.00 days. Mortality percentage increased with age; the higher number of deaths in the age group of 41–60 years may be due to an increased number of admissions [Figures 1 and 2]. Diabetes mellitus (DM) was the most common comorbidity associated with mortality followed by hypertension and chronic kidney disease [Figure 3], these comorbidities can increase both the risk and severity of COVID-19 infection [Table 1]. Mean CRP was 172.45 ± 20.9 but its values varied according to the number of comorbidities.

Clinical scenario during the first wave—(pre-vaccination period) from April 2020 to June 2020 (n = 272): Among the 272 non-ICU cases, the percentage of shifting from positive cases to negative as weeks progress gradually increased from 1st week to 5th week; however, delayed viral clearance beyond 2 weeks was seen in 13% of cases [Figure 4]. Most of the patients (79.04%) were asymptomatic [Figure 5]. There were almost normal parameters of hematologic and biochemical results among them [Table 2]. The mortality rate was 1.9%. Of the 5 death 2 had Diabetes Mellitus (DM), 2 were hypertensive, and 1 had chronic obstructive pulmonary disease (COPD) as a comorbid illness. Four were male and one was female [Table 3].

Fever (18.38%), cough (17.27%), dyspnea (16.91%), and myalgia (14.7%) were noticed [Table 4]. Severity was mild in 78.94% of cases. The typical imaging features of novel SARS-CoV-2 infection were seen in 12–13% of cases in High Resolution Computed Tomography (HRCT) images.

ICU case evaluation during April 2020–May 2020 (n = 42): The majority of the patients were male (67%). The mean age among survivors was 50 years and among non-survivors, it was 63 years. Fever was more frequent as a symptom (87.5%) in non-survivors

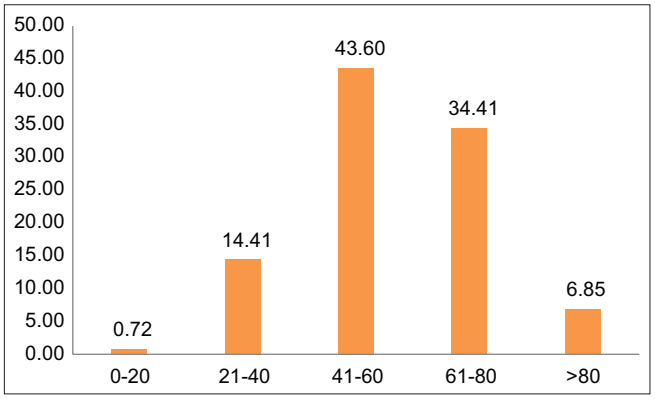

Figure 1: Percentage of death rate according to age group (n = 555)

Table 1: Mortality data in the second wave: Mean CRP values of subjects in patients with a comorbid condition (n=555)

Variable	Comorbidities (n=555)	Mean Value	Standard deviation	*P*
CRP (mg/L)	No comorbidity (n=341)	168.6199	127.92860	P=0.00000[S]
	Single comorbidity (n=116)	173.4087	128.95338	
	2 or more comorbidities (n=98)	161.7333	115.96486	
Mean CRP level	172.45±20.9			

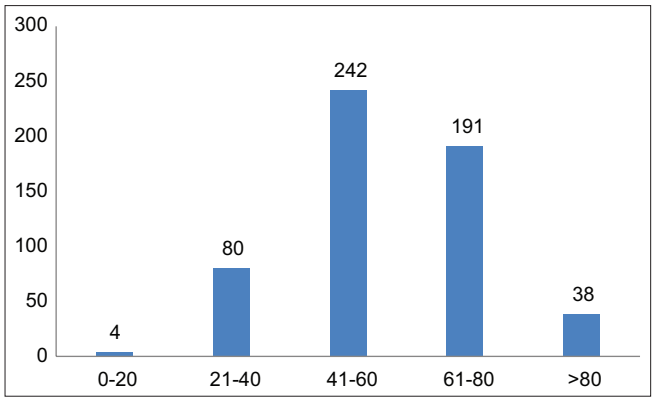

Figure 2: Number of deaths according to age groups (*n* = 555)

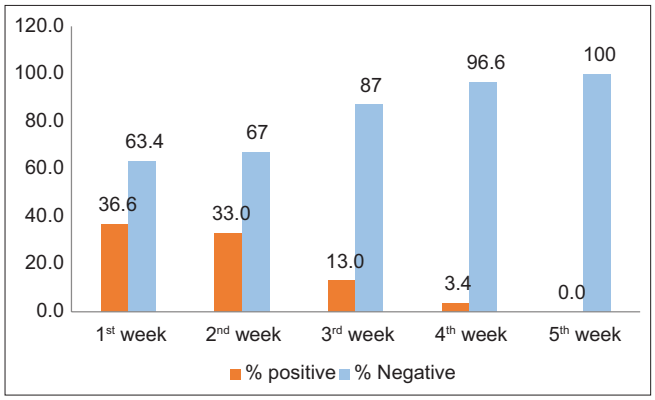

Figure 4: Percentage of shifting of positive cases to negative as weeks progress

Table 2: Pre-vaccination-mean laboratory parameters of patients in the first wave (*n*=272)

Parameter	Mean±SD	Normal range
TLC (1000/µL)	8.40±3.42	4-10
N (%)	58.09±11.63	40-80
L (%)	29.62±9.34	20-40
Bilirubin (mg/dL)	0.453±0.99	0.2-1.2
SGOT (U/L)	43.61±35.24	0-40
SGPT (U/L)	41.54±37.58	5-40
Urea (mg/dL)	21.95±7.8	12-42
Creatinine (mg/dL)	0.72±0.34	0.6-1.3

Table 3: Mortality data during the first wave (*n*=5)

	No. of cases	%
Sex distribution		
Male	4	80
Female	1	20
Comorbidities		
Initial presentation with ARDS	4	80
DM	2	40
Hypertension	2	40
COPD	1	20

than in survivors (76.47%). The time to admission to the critical care unit (CCU) from the onset of symptoms was 5 days.

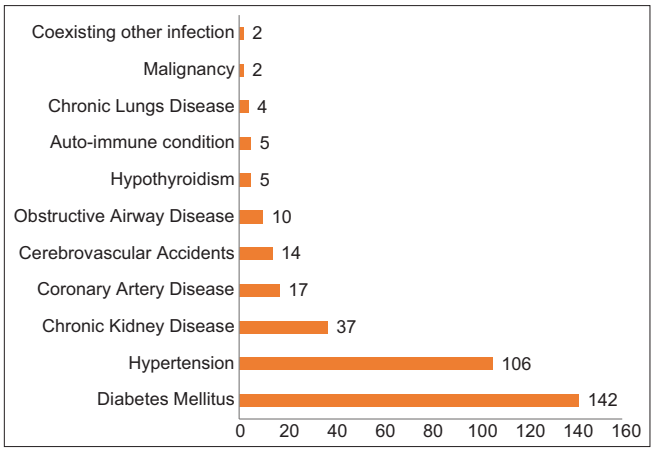

Figure 3: Pattern of associated comorbid conditions in dead individuals

Figure 5: Patchy consolidation in the right posterior segment in lung COVID

Serum creatinine (2.39 ± 2.8 mg/dl) and C-Reactive Protein (CRP) (56.74 mg/L) were found to be higher in the case of non-survivors. Surprisingly survival was possible in critical cases even with raised levels of Trop I, NT proBNP, and D-dimer due to close monitoring and appropriate timely intervention. Awake self-prone position of the patients had a salutary effect in cases of managing hypoxia.

Clinical, lab, and imaging study of 70 vaccinated and 130 non-vaccinated cases from May to June 2021 in the second wave [Tables 5–8].

There was no statistical difference in the severity of the patients with age groups in both vaccinated and non-vaccinated groups. Similarly, there was also no statistical difference in severity with gender in both the vaccinated and unvaccinated groups [Table 5]. There were 12 deaths (6%) and the rest 188 cases (94%) survived. Out of 12 deaths 7 belonged to non-vaccinated and the rest 5 belonged to vaccinated groups [Table 6]. There is no significant difference in CRP level, D-dimer, and Neutrophill-lymphocyte ratio (NLR) between the vaccinated and non-vaccinated groups [Table 7].

Out of 70 vaccinated individuals, 5 deaths happened, among 51 cases—following single dose vaccination out of 3 deaths, 2 deaths occurred in 2 weeks, and 1 death happened in 2–4 weeks. In the rest 19 fully vaccinated groups 2 deaths happened in

2 weeks, thus bringing mortality to 7.14% among the total vaccinated admitted cases [Table 8].

A comparative analysis of various parameters such as admission, discharge, death, the severity of symptoms, CT scan findings, and various symptoms have been described in Table 9.

Long COVID during post-vaccination: Plethora of pulmonary radiological abnormalities was noticed that includes interstitial pulmonary fibrosis, consolidation, cavitation, etc., as per Figures 5–7.

Discussion

Biological behavior of the virus

COVID-19 virus in the initial first period of the pandemic was less lethal in clinical presentations,[10] a delayed viral clearance beyond 3 weeks was seen.[11] Among the critical cases delay in presentations seeking admission were the cause of increased mortality, elevated biomarkers did not have negative outcomes, possibly due to close and intense monitoring.[12]

Mortality analysis of the 555 revealed that diabetes was the major comorbid illness followed by hypertension, chronic kidney disease, and COPD. It is postulated that poor blood glucose control had an overall increased risk of complications and mortality. The expression of ACE-2 is increased in patients with hypertension, diabetes, and COPD. Hence, these comorbidities can increase both the risk and severity of COVID-19 infection. The Delta variant of COVID-19 the propensity to invade the lung, vessels, and involve heart, kidneys, haemopoetic systems, extra-pulmonary organ and responsible for high morbidity, mortality, more patients needed care in Critical Care Unit (CCU), high dependency units. Changes associated with immune senescence (decreasing immunity with age) might explain the increased vulnerability to infection and the disproportionately high mortality in older patients, comorbidities, and a declining FEV1 can lead to worse outcomes in COVID-19. In this study, mortality (%) increased with age; the higher number of deaths in the age group of 40–60 years may be due to an increased number of admissions.

The increase in incidence of delta variant of COVID-19 in India was due to several potential factors like inherent nature of its transmissibility, facilitated due to reduced adherence to public health safety and festivals.[13] for WHO had determined that the delta variant viruses within the lineage a VOC (VARIANT OF CONCERN). Due to the better host defense potential, adolescents had good outcomes compared to adults.[14]

The elevated levels of CRP might be linked to the overproduction of inflammatory cytokines in severe patients with COVID-19, it may be a valuable early marker in predicting the possibility of disease progression in patients with COVID-19.[15] From other studies, it was observed that increased NLR in patients could signal the progression of pneumonia and an increased risk of death. Neutrophils generate large amounts of reactive oxygen species and could save the cell from the virus by inducing DNA damage. These patterns of clinical presentation were more noticed till the second wave. In the first quarter of 2021 during the second

Table 4: Symptoms of patients in the first wave (*n*=272)

Symptoms	No. of cases	% of cases
No symptoms	215	79.04
Fever	50	18.38
Cough	47	17.28
Breathlessness	46	16.91
Myalgia	40	14.71
Diarrhea	7	2.57
Anosmia	2	0.73
Abdominal pain	1	0.37

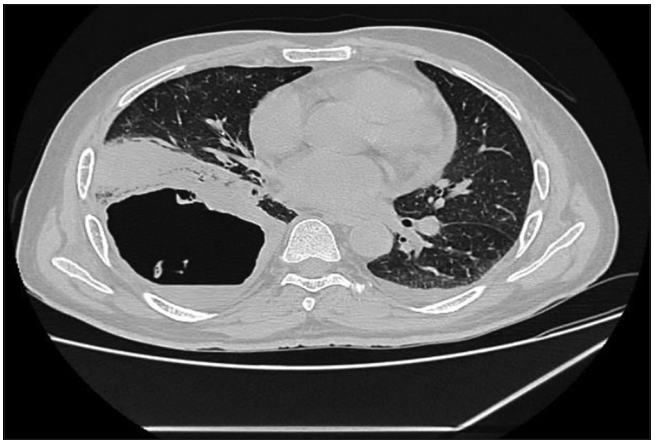

Figure 6: Thick walled cavitary lesion suggestive of lung abscess in lung COVID

Table 5: Post-vaccination-pattern of the severity of illness among vaccinated and unvaccinated groups during the second wave (*n*=200)

Group	Severity	Age Group (years)				*P*	Gender		*P*
		n %	18-38	39-59	≥60		Male	Female	
Non-vaccinated (*n*=130)	Mild	21%	17	24	1	Chi-square=7.037	28	14	Chi-square=1.256
	Moderate	21%	11	25	6	*P*=0.133	28	14	*P*=0.5336
	Severe	23%	19	20	7		35	11	
Vaccinated (*n*=70)	Mild	7%	2	7	5	Chi-square=4.785	10	4	Chi-square=0.482
	Moderate	18%	1	28	7	*P*=0.310	26	10	*P*=0.785
	Severe	10%	1	13	6		16	4	

Table 6: Comparison of different variables between vaccinated and unvaccinated groups (*n*=130 non-vaccinated, *n*=70 vaccinated)

	Non-vaccinated	Vaccinated	Reference range	*P*
Group				
18-38	11	1		Chi-square=8.167
39-59	25	28		*P*=0.0168
60+	6	7		
Sex distribution				
Male	28	26		Chi-square=0.281
Female	14	10		*P*=0.5961
Pulmonary manifestations				
Cough	0	23		Chi-square=20.140
Chest pain	0	0		*P*=0.0000
Breathlessness	23	18		
Extra-pulmonary manifestations				
Fever	19	16		Chi-square=0.027
Loose motions	2	2		*P*=0.8706
Comorbidities				
Diabetes Mellitus	7	14		Chi-square=1.203
Hypertension	6	7		*P*=0.5479
Sickle Cell Disease	0	2		
Coronary Artery Disease	1	1		
CerebroVascular Accident	0	1		
Laboratory evaluation				
NLR	5.27±4.7	4.33±2.62		*P*=0.2965
Biomarker				
CRP (mg/L)	86.66±79.65	102.78±94.157	<5	*P*=0.4
D-dimer (ng/mL)	1.67±5.26	1.4±2.14	<0.5	*P*=0.78
Imaging-CT severity score				
≤10	6	6		Chi-square=3.754
10-15	9	12		*P*=0.1530
>15	22	10		
Outcome				
Survived	38	33		Chi-square=3.754
Death within 14 days of admission	3	2		*P*=0.1530
Death beyond 14 days of admission	1	1		

Table 7: Comparison of biochemical parameters between vaccinated and unvaccinated groups (*n*=70 vaccinated, *n*=130 non-vaccinated)

Parameters	Vaccinated group	Unvaccinated group	*P*
CRP (mg/L)	95.2±88.5	90.22±83.69	0.7
D-DIMER (ng/mL)	1.26±1.72	1.52±3.7	0.96
NLR	5.44±5.75	7.03±5.69	0.078

wave vaccination was launched among the population by the vulnerability risk stratification. In Odisha province, COVAXIN was administered as a choice of vaccination against COVID-19, leading to the induction of antibodies, although they may be prone to intercurrent COVID infection. The outcome among them was a satisfactory recovery despite elevated biomarkers like CRP. D-dimer increased N/L ratio compared to non-vaccinated persons contrary to many studies. Comorbid illness and extensive parenchymal involvement played a big role in mortality.[16,17]

The biomarker is defined as "a characteristic that is objectively measured and evaluated as an indicator of normal biological process, pathogenic process or pharmacological response to therapy." It can be used as a surrogate to phenotype a patient as well as measure the response to therapy. Much more concern is raised D-dimer, it is identified as hypercoagulable marker that predicts adverse outcomes among hospitalized patients. It is

Figure 7: Dense area of consolidation with cavitary changes in right lung COVID

Table 8: Death following vaccination in relation to the number of doses

Patient details	Duration between vaccination and death	No. of deaths
Patients admitted after 1 dose of vaccine (*n*=51)	≤14 days	2
	>14-28 days	1
Patients admitted after 2 doses of vaccine (*n*=19)	≤14 days	2
	>14-28 days	0

Table 9: Comparative analysis of the pattern of presentation among three waves

Pattern of presentation	First wave	Second wave	Third wave
Admission	6003	3007	475
Discharge	5414 (90.2%)	2451 (81.5%)	406 (85.5%)
Death	589 (9.8%)	556 (18.5%)	69 (14.5%)
Asymptomatic	79%	0	70%
Mild grade	19.1%	28%	15.5%
Moderate grade	0	39%	0
Severe grade	1.9%	33%	14.5%
Symptoms			
Upper respiratory infection	19.1%	0	15.5%
Pulmonary symptoms	5%	41%	0
Extra-pulmonary	3%	35%	2%
CT thorax positive	13%	32.5%	0
CT thorax normal	87%	67.5%	100%
Comorbid illness	2%	19.5%	16.9%

postulated that COVID virus induced endothelial inflammation through ACE-2 receptor mediated effects, cytokine mediated haemophagocytic lymphohistiocytosis-like syndrome, and neutrophil extracellular trap may be responsible for this hypercoagulable state.[18] Contrary to studies in our series our close supervision and appropriate medical measure has averted the adverse outcome in the majority of the victims.

Course of the COVID illness

Virus induced neutralizing antibody response, cytokine release, and healing by fibrosis have inflicted structural damage to the pulmonary and extra-pulmonary organs. Consequent to the recovery of COVID illness after RT-PCR negativity attained these symptomatic cases were labeled as "long COVID." This has been noticed in the second wave.

Acute COVID-19—up to 4 weeks, long COVID (Post COVID-19 sequel)—beyond 4 weeks persistent symptoms include fatigue dyspnea—reduced oxygenation index on effort, cough, extra-pulmonary cardiac myopathy, diastolic dysfunction, psychiatric post-traumatic stress disorder, insomnia, agitation, neurologic-meningitis, stroke pulmonary pathologies included the radiological pattern of combination or lone presentation with interstitial fibrosis pattern, pneumothorax, pneumatocele with secondary infection, and pneumonia.[19]

The pandemic that hit Odisha province and the vaccination drive undertaken has generated antibodies in the population. A study of a serosurvey in Odisha undertaken by Regional Medical Research an affiliate of the Indian Council of Medical Research reveals the presence of COVID-19 antibodies in 20.8%, 68.1%, and 73%, respectively, among the population in August 2020, June 2021, and August 2021, this is due to repeated exposure to the virus and robust vaccination drive.[20] This can result in inducing herd immunity and was responsible for reducing the intensity and reduction in duration of the third wave.

During the third wave, Omicron variant B1.2 strain established itself in multiple cities following its first detection on 2/12/2021 after replacing the delta variant. However, the incidence was less, and the majority were mildly symptomatic, as we witness over its current manifestations. There is less chance of this variant to cause complicating illnesses like invasion of the pulmonary parenchyma and blood vessels and long COVID, these are possible due to mass vaccination and immunological protection.

Conclusion

The initial pandemic was of milder severity and had the delayed viral clearance but did not have any negative outcome. Discordance between levels of systemic biomarkers of inflammation with the severity of the disease. Satisfactory outcomes due to close monitoring and clinical judgment despite elevated biomarker levels may salvage critically ill patients sparing the younger population. Delays in reporting to hospitals can have catastrophic outcomes. In COVID-19 associated coagulopathy, platelet level was normal.

The extent of pulmonary involvement raised CRP, N/L ratio, and decreased lymphocyte counts were predictive of mortality only up to the second wave before vaccination of the population was initiated. Vaccination of the target population tilted the adverse outcome toward a favorable outcome. Vaccinated persons are still susceptible to intercurrent COVID illness but of mild severity, moderate grades of illness did not turn worse; however, mortality was witnessed due to the high prevalence of comorbid illness, and severe pneumonia at presentation irrespective of elevated biomarkers long COVID has become a clinical entity needing protocol-based medication. Patients' risk factors require continuous monitoring and aggressive treatment for better outcomes

There was the creation of herd immunity due to ongoing vaccination of all age groups of the population. The Omicron variant has now replaced itself as a new variant in the third wave, but characteristically it is a simple upper respiratory illness. We have to be vigilant enough to observe the biological behavior of this virus. Till scientific researches conquer, COVID appropriate behavior and vaccination against COVID is the key to waning the dreaded pandemic of this century.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. Nat Rev Microbiol 2018;17:181-92.
2. Atri D, Siddiqi HK, Lang JP, Nauffal V, Morrow DA, Bohula EA. COVID-19 for the Cardiologist. JACC Basic Transl Sci 2020;5:518-36.
3. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395:497-506.
4. Chan JFW, Yuan S, Kok KH, To KK, Chu H, Yang J, *et al.* A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: A study of a family cluster. Lancet 2020;395:514-23.
5. Graichen H. What is the difference between the first and the second/third wave of Covid-19? – German perspective. J Orthop 2021;24:A1-3.
6. Contou D, Fraissé M, Pajot O, Tirolien JA, Mentec H, Plantefève G. Comparison between first and second wave among critically ill COVID-19 patients admitted to a French ICU: No prognostic improvement during the second wave? Crit Care 2021;25:3.
7. Yang AP, Liu J, Tao W, Li H. The diagnostic and predictive role of NLR, d-NLR and PLR in COVID-19 patients. Int Immunopharmacol 2020;84:106504.
8. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, *et al.* Clinical characteristics of 138 hospitalized patients with 2019 Novel Coronavirus–infected pneumonia in Wuhan, China. JAMA 2020;323:1061-9.
9. Wang D, Yin Y, Hu C, Liu X, Zhang X, Zhou S, *et al.* Clinical course and outcome of 107 patients infected with the novel coronavirus, SARS-CoV-2, discharged from two hospitals in Wuhan, China. Crit Care 2020;24:188.
10. Kumar G, Mukherjee A, Sharma RK, Menon GR, Sahu D, Wig N, *et al.* Clinical profile of hospitalized COVID-19 patients in first & second wave of the pandemic: Insights from an Indian registry based observational study. Indian J Med Res 2021;153:619-28.
11. Kaushik S, Kaushik S, Sharma Y, Kumar R, Yadav JP. The Indian perspective of COVID-19 outbreak. Virusdisease 2020;31:146-53.
12. Rao CM, Jena SK, Patnaik S, Singh N, Gupta S, Priyadarshini S, *et al.* Clinical course and outcome of critically ill clinical COVID-19 pneumonia or severe acute respiratory illness. J Assoc Physicians India 2021;69:42-9.
13. Kar SK, Ransing R, Arafat SMY, Menon V. Second wave of COVID-19 pandemic in India: Barriers to effective governmental response. EClinicalMedicine 2021;36:100915.
14. Xia W, Shao J, Guo Y, Peng X, Li Z, Hu D. Clinical and CT features in pediatric patients with COVID□19 infection: Different points from adults. Pediatr Pulmonol 2020;55:1169-74.
15. Liu F, Li L, Xu M, Wu J, Luo D, Zhu Y, *et al.* Prognostic value of interleukin-6, C-reactive protein, and procalcitonin in patients with COVID-19. J Clin Virol 2020;127:104370.
16. Behera D, Rao CM, Jagaty SK, Singh NIPA, Subhankar S, Alone VD, *et al.* Clinical, laboratory and radiological profile of COVID-19 patients during the second wave with special reference to vaccination status. J Clin Diagn Res 2022;16:OC12-6.
17. Vaccination status and COVID-19 related mortality: A hospital based cross sectional study. Med J Armed Forces India 2021;77:S278-82.
18. Tang N, Bai H, Chen X, Gong J, Li D, Sun Z. Anticoagulant treatment is associated with decreased mortality in severe coronavirus disease 2019 patients with coagulopathy. J Thromb Haemost 2020;18:1094-9.
19. Udwadia ZF, Koul PA, Richeldi L. Post-COVID lung fibrosis: The tsunami that will follow the earthquake. Lung India 2021;38(Suppl):S41-7.
20. Shervani Z, Bhardwaj D, Nikhat R, Ibbrahim A, Hasan S, Khan I, *et al.* Serosurvey of Haryana and Odisha: COVID-19 hybrid immunity. Eur J Med Health Sci 2022;4:27-32.