# Epidemiological, Clinical Profile and Outcome of Hospitalized COVID Patients in a Tertiary Hospital in Nepal during the Second Wave

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#### Citation

Dhungana D, Acharya RR, Banstola B, Tiwari R, Dawadi V. Epidemiological, Clinical Profile and Outcome of Hospitalized COVID Patients in a Tertiary Hospital in Nepal during the Second Wave. *Kathmandu Univ Med J.* 2025; 89(1):73-8.

## ABSTRACT

#### Background

COVID-19 caused a global pandemic. It caused significant morbidity and mortality worldwide. The cases peaked at different intervals. The second wave, worldwide, was caused by delta variant. Majority of cases occurred from April 2021 to November 2021. Nepal was also affected during this period, causing a shortage of intensive care unit beds, oxygen supplies, and trained healthcare professionals.

#### Objective

To assess the clinical profile and outcome of patients admitted to a tertiary hospital in Nepal.

#### Method

An observational study was conducted with data collected from the medical records department after obtaining permission from the hospital authority and ethical clearance from the institutional review board. Sociodemographic variables, clinical profiles including symptoms on presentation, laboratory and imaging reports, duration of hospital stay, and outcome were obtained. Data were entered into SPSS and analysed.

#### Result

Among 307 patients, mean age of the patients was 58.73 years (S.D=17.77). Most common reported symptoms were breathlessness in 59.6% (53.9, 65.1), fever in 58.6% (52.9, 64.2) and cough in 44.3% (38.6, 50.1) cases. The mortality rate was found to be 38.8% (33.2%, 44.5%). Breathlessness on presentation was associated with increased odds of mortality (adjusted odds ratio: 3.24, 95% CI 1.88, 5.60). Males were found to be at 1.77 (95% CI 1.01, 3.11) times risk of death as compared to females.

#### Conclusion

Nearly two-third of admitted patients had at least one or more comorbidities. Variability in symptoms on presentation may predict possible patient outcomes. The government should prioritize infectious diseases and plan for disease outbreaks at the national, provincial, and local levels.

## **KEY WORDS**

COVID-19, Comorbidities, Coronavirus, Pandemic, Mortality

# **INTRODUCTION**

Coronavirus disease 2019 (COVID-19) started in late 2019 and caused a pandemic. As of December 1, 2021, there were 263,109,864 confirmed cases of COVID-19, including 5,234,511 deaths.<sup>1</sup> The first 2019 novel coronavirus case in Nepal was reported in January 2020.<sup>2</sup> According to update provided by the Ministry of Health and Population, Nepal, there were 821,366 confirmed cases of COVID-19, with 11,526 deaths as of December 1, 2021. Based on national data, Kaski was among the five districts with the highest number of affected individuals, accounting for 38476 cases in total.<sup>3</sup>

Various studies have been conducted on the characteristics of covid patients worldwide. A study performed in the Philippines revealed that the most common chief complaint was fever (32.47%), followed by cough (27.58%), and shortness of breath (25.75%). Those identified with poor prognosis were aged 60 years and older, with complaints of shortness of breath and delayed symptom presentation.<sup>4</sup> Another study conducted in a tertiary hospital in Dhaka reported that patients were predominantly male (64%), aged between 35 and 49 years (28%), had at least one comorbidity (52%), and had COVID-19 symptoms for one week before hospitalization (66%).<sup>5</sup>

Delta wave was associated with increased hospitalization, intensive care unit (ICU) stay and death in comparison to the alpha variant.<sup>6,7</sup> There is paucity of published data concerning the second wave in Nepal. Hence, this research was an attempt to study the demographics, morbidity, and mortality patterns in reference to the clinical profile of patients in a referral tertiary hospital.

# **METHODS**

This was a retrospective analytical study that included all adult patients who were admitted with a COVID-19 diagnosis during the delta wave in Manipal teaching hospital, Nepal. Manipal Teaching Hospital is a tertiary level hospital with 550 beds that provides multispecialty services and is situated in Pokhara, Nepal. This hospital is the main referral center for most district hospitals in Gandaki Province. As one of the main hospitals of Gandaki Province, it provided treatment to COVID-19 patients in accordance with the standard WHO guidelines for both inpatients and outpatients.

Total population sampling was done. All the patients admitted during the delta wave from April 11, 2021 to November 30, 2021 were included in the study. Outpatient department patients were not included in the study. Total population sampling was done. The required data was gathered by reviewing the patients' medical records. The diagnosis was made based on positive SARS-CoV-2 reverse transcription–polymerase chain reaction (RT-PCR) or positive rapid antigen test (RAT) results. Data were collected from the medical records department after obtaining written permission from the hospital. The data included sociodemographic variables, such as age, sex, and area of residence, and comorbidities, such as diabetes mellitus, hypertension, known cardiac conditions, and chronic respiratory illness. The presenting symptoms of the patients were also included. Laboratory parameters included total leukocyte count, renal function tests, and C-reactive protein, ferritin, and D-dimer levels. For patients who underwent CT, data regarding CT severity scores were also obtained. Data related to the use of antivirals, duration of hospital admission, and outcomes in the form of death, leave against medical advice, or discharge were also included.

The study was approved by the Institutional Review Committee (IRC) of the Manipal College of Medical Sciences (MEMG/495/IRC).

The data were initially entered into the Statistical Package for the Social Sciences (SPSS) and analyzed for any duplication or incomplete data. After removing duplicate data, the data were analyzed. Descriptive statistics, such as the mean and standard deviation, were used. Categorical data were analyzed using the chi-squared test and Fisher's exact test. Odds ratios (ORs) and their corresponding 95% Confidence Intervals (CIs) were computed, and binary logistic regression analysis was used to adjust for confounding factors in the associations between different variables and in-hospital mortality in COVID-19 patients. Patients who went on leave against medical advice (LAMA) were not included in the mortality analysis because their outcomes were unknown.

# RESULTS

## Sociodemographic characteristics

Among the 307 patients admitted during the delta wave in the hospital, 201 (65.5%) were male. The mean age of the admitted patients was 58.73 years (S.D. = 17.77). Half of the cases (51.1%) were from Kaski district, followed by Syangja (11.4%), Baglung (6.5%), and Tanahun (6.2%). Diabetes mellitus (DM) is the most common morbidity, followed by hypertension, chronic kidney disease (CKD), chronic cardiac disease, and chronic respiratory illness. Ninetyseven (31.6%) patients were admitted to the intensive care unit (ICU) upon arrival (Table 1).

## **Clinical and laboratory features**

Breathlessness was the predominant symptom among the admitted patients. Other common symptoms were fever, cough, and chest pain. Among the patients who underwent high-resolution computed tomography (CT), 36.14% had severe lung involvement and 63.86% had mild-to-moderate involvement. Approximately 50% of the patients were discharged after recovery (Table 2).

Characteristics				
Age	Mean: 58.73, S.D=17.77			
Sex	Male 201 (65.5%)			
Area of residence	Kaski	188 (61.2%)		
	Syangja	35 (11.4%)		
	Baglung	20 (6.5%)		
	Tanahun	19 (6.2%)		
	Parbat	12 (3.9%)		
	Myagdi	14 (4.6%)		
	Rest	19 (6.2%)		
Comorbities	Present	192 (62.5%)		
	DM	95 (30.94%)		
	Hypertension/Cardiac	69 (22.47%)		
	Chronic respiratory illness	14 (4.56%)		
	April	28 (9.12%)		
	May	91 (29.64%)		
	June	20 (6.51%)		
Month of admission	July	56 (18.24%)		
	August	57 (18.56%)		
	September	23 (7.49%)		
	October	16 (5.21%_		
	November	16 (5.21%)		
Aroa of admission	ICU	97 (31.59%)		
Area of admission	Ward	210 (68.41%)		

Table 1. Patient socio-demographic characteristics (n=307)

 Table 2. Clinical presentation and investigations of COVID-19

 patients (n=307)

Diagnostic test/s	RT-PCR	219 (71.3%)	
Presenting complaints	Breathlessness	183 (59.6%)	
	Fever	180 (58.6%)	
	Cough	136 (44.3%)	
	Chest pain	17 (5.5%)	
Lab Values	Abnormal leukocyte count	101 (32.9%)	
	Abnormal kidney function tests	133 (43.3%)	
	Hyponatremia	69 (22.47%)	
	Renal impairment	64 (20.84%)	
Radiological CTSI (n=119)	Mild-to-moderate	76 (63.86%)	
	Severe	43 (36.14%)	
Duration of admission	Average: 6.65 (Range: 1 to 30)		
	Discharged	152 (49.5%)	
Outcome	Expired 119 (3		
	LAMA	36 (11.7%)	

#### Predictors of in-hospital mortality

Patients with comorbidities had significantly higher odds of mortality (COR: 1.70, 95% CI: 1.02–2.83, p = 0.041). Male sex had significant higher chance of death as compared to female sex (COR: 2.24, 95% CI: 1.31–3.81, p = 0.003). Among the clinical presentation of the patients, fever

and cough symptoms didn't have any effect on mortality outcome. Patients presenting with breathlessness had significant higher odds of mortality (COR: 3.52, 95% CI: 2.07-5.97, p < 0.001). Those with severe CTSI had 6.3 times odds of mortality (CI: 2.58-15.41, p < 0.001) as compared to those with mild to moderate CTSI (Table 3).

# Table 3. Association between patient characteristics and COVID outcome (n=271)

Data	Categories	Death (%)	Unadjusted Odd Ratios (95% CI)	p-value		
	Female	28/90 (31.1%)	1	0.003*		
Sex	Male	91/181 (50.3%)	2.24 (1.31-3.81)			
Age	18-64 yrs	68/173 (39.1%)	1	0.042*		
	65 and above	51/98 (52.1%)	1.68 (1.02-2.76)			
	No	35/98 (35.7%)	1	0.041*		
Comorbidity	Yes	84/173 (48.5%)	1.70 (1.02-2.83)			
	Absent	39/89 (43.8%)	1	0.20		
Diabetes	Present	45/84 (53.5%)	1.22 (0.90-1.67)			
Clinical Symptoms Presentation						
Fever	Absent	44/114 (38.6%)	1	0.13		
	Present	75/157 (47.8%)	1.45 (0.89-2.38)			
Breathless- ness	Absent	28/107 (26.1%)	1	<0.001*		
	Present	91/164 (55.5%)	3.52 (2.07-5.97)			
	Absent	71/160 (44.4%)	1	0.85		
Cough	Present	48/111 (43.2%)	1.03 (0.78-1.35)			
Lab findings						
WBC count	Normal	74/181 (40.9%)	1	0.154		
	Abnormal	45/90 (50.0%)	1.45 (0.87-2.40)			
Renal	Present	32/56 (57.1%)	1	0.025*		
impairment	Absent	87/215 (40.6%)	1.41 (1.07-1.87)			
CTSI (n=119)	Mild to moderate	10/76 (13.1%)	1	<0.001*		
	Severe	21/43 (48.8%)	6.30 (2.58-15.41)			
Antivirals treatment	No	52/104 (24.1%)	1	<0.001*		
	Yes	67/115 (58.3%)	2.79			

\*P < 0.05 was considered as significant

However, after adjusting for covariates, comorbidities did not have a significant effect on mortality (AOR: 0.67, 95% CI 0.38, 1.18, p = 0.172). Breathlessness on presentation was associated with increased odds of mortality (adjusted odds ratio: 3.24, 95% CI 1.88, 5.60). Males were found to be at 1.77 (95% CI 1.01, 3.11) times risk of death as compared to females (Table 4). 
 Table 4. Logistic regression analysis on relationships of patient

 characteristics with mortality outcome

Predictors	В	Wald	P-value	Exp (B)	95% C.I.	
Renal impair- ment	.466	1.986	.159	1.594	.833	3.050
Gender	.569	3.880	.049*	1.766	1.003	3.110
Age	405	2.142	.143	.667	.388	1.147
Comorbidity	394	1.868	.172	.675	.384	1.186
Breathless- ness	1.177	17.788	.000*	3.244	1.877	5.605

\*P < 0.05 was considered as significant

## DISCUSSION

The mortality rate in this study was 38.8%, which was higher than that reported in other studies.<sup>6,8-12</sup> However, it was lower than those reported in other studies.<sup>13,14</sup> A meta-analysis that included 58 studies reported mortality rates ranging from 0.6 - 61.5%.15 A possible reason for higher mortality may be that patients may not have been vaccinated prior to infection, unlike in developed and other countries where most people were vaccinated prior to the delta wave.<sup>16</sup> Multiple studies have shown that vaccination decreases disease severity and the risk of death due to COVID-19.8,14,17 Problems in crisis management were reported in national newspapers and media due to the sudden increase in sick cases in Nepal during the delta wave, which cited the unavailability of beds, trained man powers and resources.<sup>18,19</sup> An additional reason is likely that, being a tertiary care hospital in a major city such as Pokhara, most of the cases referred from other health centers were likely to have worsened or not improved at the referring center.

Males accounted for nearly two-thirds of the patients in this study. A male preponderance has also been observed in studies performed in Nepal and elsewhere in Southeast Asia and in other countries, such as Brazil, Ethiopia, and Spain.<sup>5,20-27</sup> The mean age of the admitted patients was 58.73 years. These findings are similar to those of studies conducted in Bangladesh (53.47 years), Brazil (59 years), Poland (59.2 years) and Spain (58 years).<sup>20,21,24,27</sup>

Breathlessness (59.6%), fever (58.6%), and cough (44.3%) were the predominant symptoms observed upon arrival at the hospital. This finding was similar to that of studies performed in Brazil and India, which revealed that breathlessness was the predominant symptom.<sup>21</sup> This finding was slightly different from those of studies performed in Bangladesh, in which fever (80%) was the predominant symptom, followed by cough (60%) and breathlessness (41%).<sup>5,20</sup> In contrast, a study performed in Ethiopia reported that cough was the predominant symptom (67.1%), followed by fever (43.8%) and breathlessness (67.1%). The variation in symptom presentation may be due

to differences in the methods of keeping medical records in paper or digital form, differences in sample size, population setting, differences in the duration of sample size, and the level of healthcare resources available at the study center.

Among the 307 patients, 192 (62.5%) reported having at least one comorbidity, which was similar to the findings of a study performed at a dedicated hospital in Bangladesh during the second wave of COVID-19.<sup>20</sup> This percentage was slightly higher than that reported in tertiary hospitals in Bangladesh during the first wave (52%) and Spain (44%).<sup>5,27</sup> The lower amount of comorbidity data from Spain is likely because the entire population was included, whereas this study included only adults. Among the comorbidities, diabetes mellitus accounted for half of the cases. This finding was different from those of studies that reported hypertension as the predominant condition.<sup>21,24,25,27</sup>

An analysis of the factors that are likely to predict mortality among hospitalized individuals revealed that males were at a greater risk of death than females were. The presence of any comorbidity, an older age of  $\geq$  65 years, breathlessness as the symptomatic presentation, renal impairment on laboratory findings, severe CT severity scoring, and the use of antivirals were found to have significant effects on mortality. Similar to other studies, severe CTSI was shown to predict a greater chance of mortality and is a part of the disease rather than an individual difference.<sup>28</sup> In contrast to other studies, the findings from this study revealed that patients who were administered antivirals were more likely to have mortality outcomes than those who were not administered antivirals. A possible reason may be that antivirals are available in limited use and are administered only when the patient has severe or critical COVID-19 and does not improve despite proven mortality benefit therapy with anticoagulants and glucocorticoids. Another reason may be that the chances of antivirals being given to very sick patients were greater and hence may have accounted for the higher mortality data in that subset of patients. When binomial logistic regression analysis was applied, only male sex and breathlessness were significant predictors of mortality among hospitalized COVID-19 patients. Compared with females, males were found to be 1.76 (1.01-3.11) times more likely to be at risk for mortality. Those with breathlessness at presentation were 3.24 (1.78-5.61) times more likely to have mortality than those without breathlessness at presentation. This finding is in agreement with those of other studies.<sup>4,11</sup>

This was a single-center study and hence cannot be generalized. Given that the study was retrospective, a causal relationship between the independent variables and outcomes could not be established.

## CONCLUSION

Higher mortality of the COVID patients during delta wave highlights the major challenge faced by Nepal during the COVID time. The results of our study showed that male sex and breathlessness on presentation was the major predictor of outcome of death in patients with COVID-19. Hence the government of Nepal should develop a solid plan on resource allocation, outbreak response and clinical management during further waves of COVID-19. Multi-

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centric study, variant-specific comparisons or longitudinal follow-up of discharged patients would strengthen further study research areas and demonstrate the relevance in broader context.

## **ACKNOWLEDGEMENTS**

The authors acknowledge the frontline healthcare professionals who were responsible for caring for the patients.

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