

Epidemiology and Clinical Features of Covid-19 Patients Admitted To Udayana University Hospital, Bali, During The First Two Years of Covid-19

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Background

In only a year, COVID-19 had changed a lot of regular human lifestyle. World Health Organization (WHO) declared COVID-19 as a global pandemic in March 2020. At March 2020, COVID-19 had entered Indonesia. Soon, Bali harbor the first death due to COVID-19 in the nation.

Method

The study collected data from medical records of patients admitted to Udayana University Hospital from April 2020 to March 2022. This report comprises epidemiological, clinical, and laboratory characteristics as well as treatment and outcome of the patients while discharged.

Results

Patients mean age was 45.75 years old, with male constituting 53.8% of patients admitted. 113 (3.7%) patients had a history of international travels prior to admission. Almost all patients had fever (90.8%), and a majority had cough (79.3%) and sore throat (58.3%). Then, it was followed by less common traits such as chest tightness (39.7%), myalgia (31.3%), headache (29.4%), cold (19.0%), anosmia (15.1%), dizziness (12.7%), and diarrhea (4.6%). Laboratory results during admission showed an average leukocyte count of $1.76 \pm 1.07 \times 10^9$ cells/L, neutrophil of $4.69 \pm 2.96 \times 10^9$ cells/L, and lymphocyte of $1.76 \pm 1.07 \times 10^9$ cells/L.

Conclusion

The first two year of COVID-19 pandemic in Indonesia had shown how public health policies shaped the epidemiological characteristics of our patients. However, Udayana University Hospital being a tertiary referral COVID-19 hospital justifies a higher mortality rate of 5.2% compared to other studies.

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At the end of 2019, a mysterious unknown pneumonia-like outbreak was first observed in Wuhan, Hubei. Epidemiologically traced, all cases admitted to the hospital had some sort of contact with Huanan Wet Market. Soon, the government and the world were alerted by the emergence of a novel coronavirus, temporarily named 2019-nCoV and soon definitively named as SARS-CoV-2. The virus soon emerged to be a notoriously infectious pathogen, forcing WHO as the international global health custodian to declare that the world is facing a COVID-19 pandemic.

Due to most cases being asymptomatic or showing really mild and non-specific symptoms, patients infected by SARS-CoV-2 often goes unnoticed. This trait elevates reproductive numbers through undetected communal and international transmission. Currently, no antiviral agent and treatment protocol has been proven to be both efficacious and safe to combat the pathogen, therefore preventing the spread is the best way to control the pandemic.¹ Preventing deaths in high-risk patients with comorbidities through strict outbreak-control protocols and physical distancing may help mitigate the impact of COVID-19 pandemic.

Although COVID-19 is, first and foremost, a global health crisis, it has evolved to become a collateral multisectoral damage due to both deaths and policies instigated by the outbreak.² Therefore, policies established mainly driven by social and economic conditions compromises ideal outbreak containment strategies. This becomes even more prominent on developing countries, where strict lockdowns may prompt chaos and looting.³ These policies came with the expense of new clusters, proven by increasing number of cases post-holiday in January 2021 although special holiday travel restrictions were issued in Bali.⁴

Lukewarm policies contributed to shape the case count curve, once again emphasizing how political and economic interest affects public health. Therefore, we collected medical records regarding epidemiology and initial experiences, clinical features, and management of all confirmed COVID-19 patients admitted to Udayana University Hospital, Bali, Indonesia in one year from April 2020 to March 2022.

MATERIALS & METHODS

This study analyzes observational study reports secondary data of all 3048 confirmed COVID-19 patients admitted to Udayana University Hospital up

to the end of March 2022. Patient was deemed diagnosed positive COVID-19 if RT-PCR results showed positive. This report comprises epidemiological, clinical, laboratory, and radiological characteristics as well as treatment – antiviral therapy, antibiotics, anticoagulant, and ventilator support – during admission and the outcome of the patients when discharged. Patients below 18 years old were excluded from analyses.

An analysis using SPSS Statistics 25 was performed to present final results of data gathered during this research. Test of distribution using Shapiro-Wilk test if the number of subjects were below 30 and Kolmogorov-Smirnov test if the number of subjects were above 30. The test was performed to determine the format of reporting, with mean ($\pm$ standard deviation) for data distributed normally and median (Q_1 - Q_3) for data not distributed normally. Ethical approval was released by the ethical committee of Udayana University (No: 1010/UN1422VII14/LT/2020). Information about subjects were kept highly confidential and are only used in accordance with research ethical guidelines.

RESULTS

A total of 3048 subjects admitted to Udayana University Hospital between April 2020 to March 2022 were included in the study (**Figure 1**). Patients excluded were those with an age lower than 18 years old and those isolated but was negative through RT-PCR result. Patients included had a mean age of 45.75 (SD $\pm$ 15.40) years old, ranging from 18 up to 90 years old. Male patients were more prevalent, constituting 53.8% of all patients admitted. Almost all patients

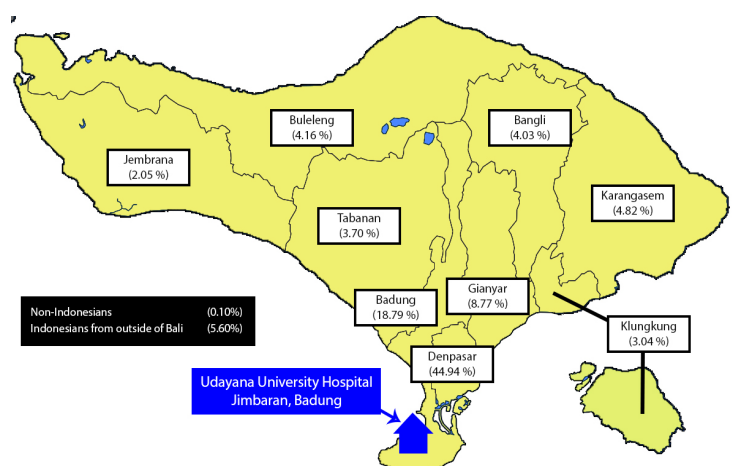


Figure 1 District Origins of COVID-19 Patients Admitted to Udayana University Hospital Between April 2020 to March 2022 (n=3048)

Table 1 Demographic Profile of COVID-19 Patients (n=3048)

Category	Frequency	Percentage
Age Group		
18–20	67	2.2
21–40	1122	36.8
41–60	1311	43
61–80	521	17.1
≥81	27	0.9
Gender		
Male	1640	53.8
Female	1408	46.2
Occupation		
Private Corporation Employee	960	31.5
Housewife / Household Assistant	329	10.8
Entrepreneur	329	10.8
Public Worker	293	9.6
University Student	250	8.2
Healthcare Worker	168	5.5
Retired / Unemployed	149	4.9
Migrant Worker	122	4
Merchant	85	2.8
Teacher	70	2.3
Laborer	61	2
Farmer	58	1.9
State-Owned Corporation Employee	49	1.6
Others	125	4.1
Recent Travel		
Yes	113	3.7
No	2935	96.3

admitted were Indonesian (99.3%). A complete demographic profile of our patients could be seen in [Table 1](#).

Udayana University Hospital is a tertiary referral hospital dedicated as a major COVID-19 center in Bali. In cases where people came for other emergencies such as trauma, Udayana University Hospital will only stabilize the patient and further refer them to other healthcare centers. In one year since admitting its first COVID-19 patient, Udayana University Hospital had received patients referred from every regency in Bali (94.40%), Indonesians from regions out of Bali (5.60%), and non-Indonesian patients (0.10%). A majority of our patients came from Denpasar (44.94%), Badung (18.79%), and Gianyar (8.77%). Clinical profile of our patients may be seen in [Table 2](#) while the laboratory profile may be seen in [Table 3](#).

Out of all patients treated up to March 2022, majority of them recovered (94.8%) and were safely discharged. The fatality rate within our hospital (5.2%) is slightly higher compared to those described in literatures per age group due to referred patients admitted in already complicated conditions or that these patients had complex comorbidities.⁵

[Figure 2](#) shows the number of monthly admissions and deaths between April 2020 to March 2022, where there are peaks connected to real-life situations happening within the province and the country.⁶

DISCUSSION

In our study, we found that a majority of our patients (79.8%) were of working age (21-60 years old). Male predominates our patients by a slight 53.8%. This demographic state occurs due to a large number of women within the country operates as housewives, though it didn't exclude the possibility of outbreaks on market which will mainly elevate number of women infected. Men in working age had a higher mobility and frequent contacts with other people. This is consistent with some studies which men of working age predominates total number of cases.⁷⁻¹²

In terms of occupation, 31.5% of patients admitted were private corporation employee. This was due to premature installment of new normal policies such as allowing employees under 45-years old to work from office.¹³ This was followed by reopening of larger public facilities on June 1.¹³ This reopening caused housewives / household assistant (10.8%), entrepreneurs (10.8%), and public workers (9.6%) to place second to fourth. Healthcare workers composed 5.5% of all cases, consistent with some studies.⁹ This is

Table 2 Clinical Profile of COVID-19 Patients

Category	Frequency	Percentage
Symptom		
Fever	2768	90.8
Cough	2417	79.3
Sore Throat	1777	58.3
Chest tightness	1210	39.7
Myalgia	954	31.3
Headache	896	29.4
Cold	579	19
Anosmia	460	15.1
Dizziness	387	12.7
Diarrhea	140	4.6
Comorbidity		
Hypertension	683	22.4
Diabetes Mellitus	439	14.4
Heart Disease	326	10.7
Chronic Lung Disease	108	3.5
Malignancy	24	0.8
HIV	12	0.4
Kidney Disease	61	2
Autoimmune Disease	3	0.1
Others	87	2.9
Antivirus		
Faviripavir	1735	56.9
Remdesivir	1187	38.9
Oseltamivir	105	3.4
Molnupiravir	30	1
Lopinavir/ritonavir	21	0.7
Antibiotic		
Azithromycin	1612	52.9
Levofloxacin	600	19.7
Chloroquine	259	8.5
Meropenem	55	1.8
Therapy		
Vitamin C	2972	97.5
Anticoagulant	951	31.2
Plasma Convalescence	52	1.7
Tocilizumab	34	1.1
IVIG	9	0.3
Regdanvimab	5	0.2
Hospitalization		
≤14 days	1993	65.4
14–20 days	743	24.4
21–28 days	234	7.7
>28 days	78	2.6
Discharge		
Recovered	2889	94.8
Died	159	5.2

Table 3 Laboratory Profile of COVID-19 Patients

Parameter	Mean (± SD)
Hemoglobin (g/dL)	13.63 (± 1.70)
Hematocrit (%)	40.22 (± 4.64)
Leukocyte (×10 ⁹ /L)	7.16 (± 2.86)
Lymphocyte (×10 ⁹ /L)	1.76 (± 1.07)
Neutrophil (×10 ⁹ /L)	4.69 (± 2.96)
Neutrophil Lymphocyte Ratio	3.62 (± 3.89)
Platelet (×10 ⁹ /L)	246.13 (± 99.50)
Aspartate Transaminase (U/L)	42.50 (± 36.61)
Alanine Transaminase (U/L)	42.14 (± 36.07)
Blood Urea Nitrogen (mmol/L)	12.76 (± 5.62)
Serum Creatinine (mg/dL)	0.75 (± 0.31)
Random Blood Glucose (mg/dL)	119.84 (± 57.22)

higher in earlier months due to unprepared systems and inadequate personal protective equipment (PPE) availability, also seen in some studies.¹²

International travel history as recent as 14 days were recorded in only 3.7% patients, in which all of them happened during the first 3 months. Most of them were migrant workers, where their work setting does not tightly implement COVID-19 protocols and many have forced them to go home due to economic instability.^{11,14}

Almost all of patients admitted had fever (90.8%), followed by cough (79.3%), sore throat (58.3%), and chest tightness (39.7%). Anosmia, which is a relative indicator to a moderate to mild COVID-19, was rarely seen (15.1%). Due to Udayana University Hospital being a tertiary referral COVID-19 hospital, symptoms shown were higher than described in literatures. Almost all findings are consistent with a some studies, except that fever affects almost all patients in our hospital.^{9,11,12}

Hypertension (22.4%) is the most common comorbidity in patients admitted, followed by diabetes mellitus (14.4%), heart disease (10.7%), and chronic lung disease (3.5%). Although there were other comorbidities, most do not happen in a significantly large amount. This is consistent with a some studies, where hypertension tops the list,¹⁰ followed by the rest three comorbidities.^{9,11,12}

In accordance to therapies published by Indonesian Association of Internal Medicine, we administered azithromycin (52.9%), levofloxacin (19.7%), chloroquine (8.5%), and meropenem (1.8%) combined with faviripavir (54.69%), remdesivir (38.9%), oseltamivir (3.4%), molnupiravir (1.0%), and lopinavir/ritonavir (0.7%) to our patients. Almost all of our patients were given vitamin C (97.5%), and a

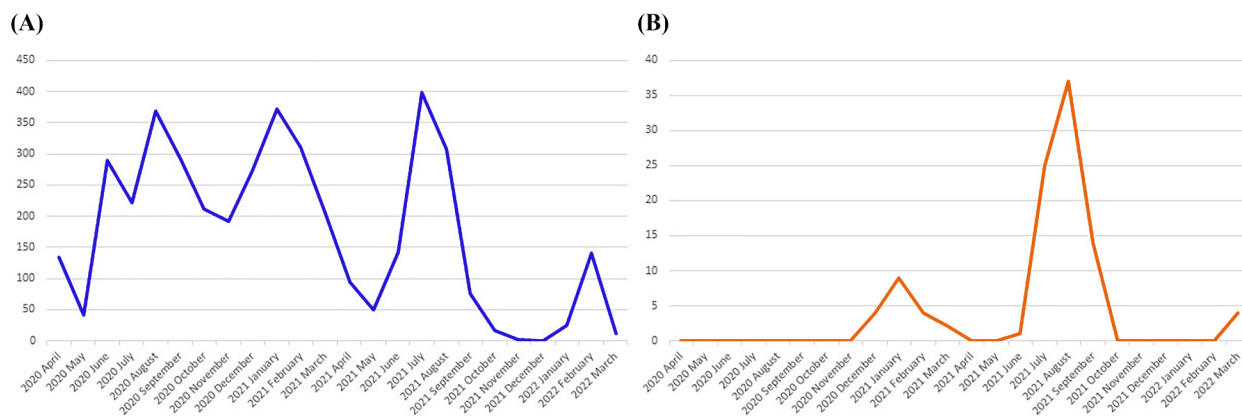


Figure 2 Monthly Admission (a) and Death (b)

few were given anticoagulants (31.2%) as a prophylaxis to possible coagulopathies. Plasma convalescence therapy were given only to critical patients in ICU (1.7%). Tocilizumab (1.1%), IVIG (0.3%) and Regdanvimab (0.2%) only given on critical patients.

Most of our patients were hospitalized <14 days (65.4%), followed by 15-20 days (24.4%), 21-28 days (7.7%), and >28 days (2.6%). We do not find any significance between duration of hospitalization and age nor COVID-19 symptom level classification.

Mortality rate in our hospital reached 5.3%, a higher amount than those in literatures possibly due to being a tertiary referral hospital.¹¹ Udayana University Hospital only admits moderate to severe and critical COVID-19 cases; therefore, it is justifiable that the mortality rate is higher than those in literatures which observes a larger array of population.

Notable Event: Early International Transmission

COVID-19 entered Indonesia via international transmission. During this early period, Indonesian government decided not to close international flights nor establish and quarantine policies to limit possible international transmission.¹⁵ Travels weren't restricted and quarantine policies weren't established soon enough. This mistake subsequently shapes how the pandemic progress. Profile of patients admitted during the first 2 months of the pandemic were dominated by patients that had a history international travel as recent as 14 days prior to hospitalization.

Most were migrant workers, travelling back to Indonesia either via international flight or trade ship. Due to no COVID-19 outbreak containment measures, significant number of patients with a history of international travel were recorded.¹⁶ We

also found some patients with travel history from countries experiencing outbreak at that moment such as United States and Italy.⁶

We found that the same trend happened in other countries, where both travel history to high-risk countries accompanied with a delayed travel restriction policy establishment became the start of international spread.^{17,18} These people may then further attend superspreading events (SSEVs), exponentially increasing transmission.^{17,19} Even in some countries, only a small fraction of first wave patients were of their nationality.⁷

Notable Event: Superspreading Events and Holidays

A spike seen from December 2020 up to February 2021 was not mainly due to long-distance travelers. There were strict travel restrictions were imposed to limit mobility between different cities and provinces, cases still rose up to 2.5 times its original numbers before these holidays.^{6,20}

This brings us to another possibility: rising number of cases were due to intracity (potentially SSEVs). Although objectively there was less travelling, – metrically measured by a decrease in gasoline usage during December 2020 compared to November 2020²¹ – there is an increase in offline shopping activity on malls. Enclosed and packed indoor shopping centers were full of people in the mood for new year shopping haul.^{22,23}

Terminologically, SSEV is an event where a person infected with a certain infectious disease spreads the pathogen into an unusually high amount of people; usually due to being in an ideal condition for the pathogen to spread.²⁴ Added by the fact that COVID-19 spreads through aerosol, enclosed air-conditioned indoor setting is an ideal place to massively transmit

COVID-19.²⁵ This trend high number of cases were seen throughout January until February.

Massive SSEVs also happened in India during Kumbh Mela 2021, where 9.1 million pilgrims reportedly took a holy dip in Ganga.²⁶ Observers and experts said that COVID-19 protocols were breached: mask mandates were not strictly enforced and physical distancing impossible.²⁶ This event skyrocketed new cases from 15 to 400 thousand per day.²⁷

CONCLUSION

Our study concludes that in terms of demographic data, patients admitted into our hospital were comparable to other studies. However, in terms of symptoms, patients admitted into our hospital showed more severe forms of the symptoms. International travel history and migrant workers predominates the first two months due to loose travel restrictions, followed by healthcare workers on the second and third month due to inadequate PPE, then followed by office workers due to premature reopening of offices. Even though maximum capacity measures in office were capped at 50% by the government, many offices broke the rules per police findings. Soon, housewives and entrepreneurs created market and shopping mall clusters, skyrocketing their numbers to each compose 10.8% of our patients. Next, intracity activities during public holidays turned transmission due to long-distance

SUMMARY BOX

The first two year of COVID-19 pandemic in Indonesia had shown how public health policies shaped the epidemiological characteristics of our patients.

Common COVID-19 symptoms observed in this study's tertiary center site include fever, cough, and sore throat; followed by less common traits such as chest tightness, myalgia, headache, cold, anosmia, dizziness, and diarrhea.

Tertiary referral centers had a higher mortality rate compared to other sites.

travel into transmission due to SSEVs in shopping centers. Both of this trend is comparable to countries outside Indonesia, where international transmission first occurs due to late COVID-19 travel restriction policy establishment, and as soon as cases went down, government began to loosen restrictions which creates chances for SSEVs to form.

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