

A comparative analysis of COVID-19 cases with comorbidities according to epidemiological and demographic characteristics in South Bengkulu Regency, Indonesia

Fiya Diniarti¹, Bintang Agustina Pratiwi^{2*} , Ferry Surahman¹, and Tuti Rohani¹

¹Public Health Program, Faculty of Health Sciences, Universitas Dehasen Bengkulu, Indonesia

²Public Health Program, Faculty of Health Sciences, Universitas Muhammadiyah Bengkulu, Indonesia

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Corresponding author:

Bintang Agustina Pratiwi, SKM., MKM

Public Health Program, Faculty of Health Sciences, Universitas Muhammadiyah Bengkulu

Jl. Adam Malik. Km. 8,5 Gading Cempaka Kota Bengkulu, Indonesia

Email: bintangagustinap@umb.ac.id

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Abstract

Background: COVID-19 continues to be a global threat, and Indonesia has the highest COVID-19 in ASEAN.

Objective: This study aimed to analyze COVID-19 cases according to epidemiological and demographic characteristics in South Bengkulu Regency, Indonesia.

Methods: This research used quantitative methods with a case-control approach. A sample of 326 people was included as secondary data obtained from the Regional General Hospital of South Bengkulu Regency, Indonesia. The sampling technique uses consecutive sampling. Data (age, gender, education) from medical records in hospitals and epidemiological data (contact records with patients, travel records, and social contact records) were measured using questionnaires validated online (Google form). Chi-square and multiple regression logistics were used for data analysis.

Result: Most groups infected with COVID-19 were in the risk age range (46.6%), men (51.2%), low education (48.2%), had a record of contact with patients (54.6%), had a travel record (53.7%), had a record of social contact (51.5%) and had the highest comorbidities such as tuberculosis (36.2%). There were significant relationships between age ($p = 0.004$), sex ($p = 0.002$, OR= 2.054), history of contact with the patient ($p = 0.001$, OR= 2.120), travel history ($p = 0.003$, OR= 1.959), social contact history ($p = 0.003$, OR = 2.003), and comorbidities type ($p = 0.017$) with the incidence of COVID-19. The dominant factor associated with COVID-19 was the record of social contact ($p = 0.032$, OR = 1.724).

Conclusion: The study findings can be used to increase public knowledge about COVID-19 prevention and mitigation efforts as one of the strategies to reduce the risk of COVID-19 events.

Keywords: COVID-19; comorbidities; influencing factors; demography; characteristics; Indonesia

Background

The COVID-19 pandemic is still a problem that spreads throughout the world. A person exposed to

and infected with the 2019 coronavirus (COVID-19) can show symptoms and without symptoms, and even severe pneumonia characterized by acute breathing occurs in 20% of patients who come to

home healthcare services ([Abu-Raya, 2020](#); [Zhou et al., 2020](#)).

According to the World Health Organization (WHO), the virus has a nucleic acid sequence. Coronaviruses are the most prominent group of viruses shrouded in positive RNA divided into four common types; alpha, beta, delta, and gamma. This variant is known for its rapid infection in humans. Therefore, early diagnosis of COVID-19 is an important part of paramedics, sensitivities, and clinical specialization (radiological and laboratory tests used to analyze COVID-19).

The number of COVID-19 cases recorded worldwide is 183 million cases and 3.97 million deaths. Recent evidence suggests that a series of symptoms can persist long after acute SARS-CoV-2 infection. Studies have shown that prolonged COVID-19 can affect organs not limited to the respiratory organs alone but the cardiovascular, neurological, gastrointestinal, and musculoskeletal organs. Symptoms of long COVID-19 include fatigue, tightness, heart defects, cognitive impairment, and disturbing ([Crook et al., 2021](#); [T. Pratiwi et al., 2022](#); [World Health Organization, 2020](#)).

Confirmed global data on COVID-19 on 20 July 2021 with the number of confirmed cases around 190,743,225 cases and 4,099,018 cases died. According to the data, the ten countries with the highest problems were the United States, India, Brazil, Russia, France, Turkey, the United Kingdom, Argentina, Colombia, and Italy. The country with the highest COVID-19 cases in ASEAN is Indonesia, with 2,950,058 cases and 76,200 deaths (case fatality rate: 2.6%), compared to other countries (Philippines, Malaysia, Thailand, Myanmar, Singapore, Cambodia, Vietnam, Laos, and Brunei Darussalam) ([Kementerian Kesehatan Republik Indonesia, 2020, 2021](#); [Tosepu et al., 2020](#)).

The results of retrospective studies show that out of 85 patients, fatal cases of COVID-19 with a high risk occur in old age. The elderly who are positive for COVID-19 also have accompanying factors that can cause death and pain. The average age of patients who died from COVID-19 was 65.8 years, dominated by men; 72.9% also had a history of diseases such as diabetes, hypertension, and coronary heart disease and were at high risk of comorbidities. COVID-19 patients with type 1 diabetes and type 2 diabetes require intensive care in a COVID-19 unit

with male characteristics at risk. The results of a retrospective study showed that at Iran's Shahid Modarres Taheran Hospital, 35 patients had COVID-19 deaths caused by chronic lung and kidney cancers and age ([Alamdari et al., 2020](#); [Irnaningsih et al., 2021](#); [Zhou et al., 2020](#)).

A systematic review of 220 studies found that the risk factors for COVID-19 were hypertension, diabetes, ischemic heart disease, and the incidence of various cardiovascular complications was quite large. The results of the systematic review and meta-analysis study of 22 articles in four databases found the results of COVID-19 risk factors that caused deaths to be diabetes, gender, older age, chronic kidney disease, and lung disease. In addition, a systematic review analysis carried out comprehend tracing, including a formal database, obtained the results of 25 observational studies of the risk of death from COVID-19 due to age, female sex, and comorbidities ([Gao et al., 2021](#); [Pellicori et al., 2021](#); [Schlesinger et al., 2021](#)).

Epidemiological analysis of COVID-19 states that certain comorbidities increase the risk of infection, with worse lung injuries and the risk of death. Common comorbidities reported to date are hypertension, cardiovascular and diabetes. In the proportion of COVID-19 patients obtained from the ICU Unit, comorbidities are a potential risk factor for COVID-19 patients. Another research states that it is necessary to understand clinical management in providing solutions to prevent COVID-19 with comorbidity and therapeutic approaches to the community. Understanding the pathophysiology of COVID-19 aims to make the public identify risk factors ([Ejaz et al., 2020](#); [Zipeto et al., 2020](#)).

The government, until now, continues to urge the public to take precautions against COVID-19. Families with a history of degenerative diseases or comorbid diseases should pay more attention to preventive behavior for themselves and those around them ([Kementerian Kesehatan Republik Indonesia, 2020](#)).

This research is beneficial for the community and health workers and scientifically adds references to the risk factors for COVID-19 based on characteristics (age, gender, education) and looks at the history of disease transmission from the scope of epidemiology (travel history, contact history with

patients, and a history of social contact. The community can do prevention this by making good preparations to reduce the transmission rate by reducing mobility, as well as understanding other risk factors such as age, education, and gender.

The results of this study are expected to be a reference in the prevention and transmission of COVID-19 - from the start so that, before a bigger risk can occur, namely a spike in cases and deaths, improving public services while still establishing social distancing rules as an effort to prevent the transmission of COVID-19.

Methods

Study Design

This was an observational analytic study with a case-control design (retrospective) to determine the frequency according to the time and region of the event and to determine the determinants of host event factors (age, gender) and agent factors (contact records, and environmental factors such as travel records).

Samples

The population in this study was all patients who received treatment from January to December 2020 with COVID-19-positive disease and suspected comorbidities. The case group consisted of patients diagnosed positive for COVID-19 with comorbidities, while the control group was patients suspected of COVID-19 with comorbidities.

A sample of 326 people was included using consecutive sampling obtained from secondary data from the Regional General Hospital of South Bengkulu Regency, Indonesia. Data collected for this study include age, gender, education, contact records with patients, travel records, and social contact records.

Data Analysis

Descriptive statistics, chi-square, and multiple regression logistics were used for statistical analysis.

Ethic Consideration

This research has passed the ethical clearance from the Ethics Division of Dehasen University, Indonesia.

Results

Table 1 shows that almost half of respondents with a risk age range (46.6%), men (51.2%), low education (48.2%), have a record of contact with patients (54.6%), have a travel record (53.7%), have a record of social contact (51.5%). The highest comorbidity was tuberculosis (36.2%).

Table 1 Respondents' Characteristics

Variable	f	%
Age		
High risk	152	46.6
Moderate risk	104	31.9
Low risk	70	21.5
Gender		
Male	159	48.8
Female	167	51.2
Education		
Low	157	48.2
Middle	98	30.1
High	71	21.8
Contact Record		
Yes	178	54.6
No	148	45.4
Travelling Record		
Yes	175	53.7
No	151	46.3
Social Contact Record		
Yes	168	51.5
No	158	48.5
Comorbidities Type		
Hypertension	60	18.4
Diabetes mellitus	55	16.9
Coronary Heart	32	9.8
Gastritis	28	8.6
Hepatitis B	33	10.1
Tuberculosis	118	36.2
COVID-19 Status		
Case	163	50
Control	163	50

As shown in **Table 2**, it is indicated the variables related to the incidence of COVID-19 were age ($p = 0.004$), sex ($p = 0.002$, OR= 2.054), history of contact with the patient ($p = 0.001$, OR= 2.120), travel history ($p = 0.003$, OR= 1.959), social contact history ($p = 0.003$, OR = 2.003), and comorbidities type ($p = 0.017$).

Table 3 shows that the dominant factor related to COVID-19 disease was a record of social contact with a p-value of 0.032 (OR = 1.724).

Table 2 Factors related to COVID-19 cases

Variable	COVID-19		Total	CI 95%	p
	Case n (%)	Control n (%)			
Age					
High risk	91 (55.8)	61 (37.4)	152 (46,6)		0.004
Moderate risk	44 (27)	60 (36,8)	104 (31.9)		
Low risk	28 (17.2)	42 (25,8)	70 (21,5)		
Gender					
Male	94 (57.7)	65 (39.9)	159 (48.8)	2.054 (1.321-3.194)	0.002
Female	69 (42.3)	98 (60.1)	167 (51.2)		
Education					
Low	77 (47.2)	80 (49.1)	157 (48.2)		0.889
Moderate	51 (31,3)	47 (28.8)	98 (30.1)		
High	35 (21,5)	36 (22.1)	71 (21.8)		
Contact Record with Patient					
Yes	104 (63.8)	74 (45,4)	178 (54.6)	2.120 (1.360-3.305)	0.001
No	59 (36.2)	89 (54,6)	148 (26,4)		
Travelling Record					
Yes	101 (62)	74 (45,4)	175 (53,7)	1.959 (1,260-3,047)	0.003
No	62 (38)	89 (54,6)	151 (46,3)		
Social Contact Record					
Yes	98 (60.1)	70 (42,9)	168 (51,5)	2,003 (1,289-3.11)	0.003
No	65 (39.9)	93 (57.1)	158 (48.5)		
Types of Comorbidities					
Hypertension	32 (19.6)	28 (17.2)	60 (18.4)		0.017
Diabetes Mellitus	37 (22.7)	18 (11)	55 (16.9)		
Coronary Heart	12 (7.4)	20 (12.3)	32 (9.8)		
Gastritis	15 (9.2)	13 (8.0)	28 (28)		
Hepatitis B	19 (11.7)	14 (8.6)	33 (10.1)		
Tuberculosis	48 (29.4)	70 (42,9)	118 (36.2)		

Table 3 Dominant factor of the incidence of COVID-19

Variable	OR	p
Age	2.000	0.996
Gender	0.000	0.997
Education	0.000	0.996
Contact record	3.333	0,999
Traveling record	0.082	1.000
Social contact record	1.724	0.032*
Types of comorbid	1.220	0.341

Discussion

This study found that there was an association between age and the incidence of COVID-19, in line with the findings of [Davies et al. \(2020\)](#), which state that increasing age can increase the percentage of being infected with COVID-19 based on age group, increasing age can show clinical symptoms of COVID-19 also increase.

Residents aged 20-34 years and 35-49 years are considered a group with high mobility. This age group distributes the spread of COVID-19 as an effect of their mobility behaviors ([Monod et al., 2021](#)). Therefore, age could be the antecedent of COVID-19. COVID-19 patients aged 65 years and over and suffering from other diseases and infections can get treatment in the ICU and have a risk of death due to COVID-19. Therefore, patients with comorbidities should immediately carry out preventive activities to avoid COVID-19, leading to the worst prognosis ([Sanyaolu et al., 2020](#)).

The characteristics of patients who died from COVID-19 were people aged >64 years (22%) and 19-64 years (77.3%). Males (60.6%) and females (39.4%). There was a relationship between age and gender with risk factors for death from COVID-19. According to the study of comorbidities, the highest comorbidity is diabetes mellitus ([Satria et al., 2020](#)).

Other findings from hospitalized patients showed that the average age of patients was 58.5 years, male (68%), comorbidities hypertension (38.8%), diabetes (16.4%), and coronary heart (14.7%). In hypertensive patients, it is significantly experienced by patients with higher severity conditions (Xiong et al., 2020).

Gender was also related to COVID-19 disease, but this condition is aggravated by smoking activities mostly carried out by men. This smoking behavior causes men to be more at risk of contracting hypertension and diabetes mellitus, as well as causing men to be at risk of comorbidities. In addition, education was not related to COVID-19 because it was found that 31.3% and 21.5% of people with moderate and low education were still infected with COVID-19. Education is referred to by employment, highly educated and secondary people with working conditions that put them working outside the home at risk of contracting COVID-19. Most cases occurred in health workers (22%), drivers (18%), traders (18%), cleaning services and housewives (9%), and public security officers (7%) (Lan et al., 2020).

There was a correlation between contact and COVID-19 patients. COVID-19 spreads because there is direct contact with sufferers. Transmission can occur because the infected person is asymptomatic, so people will think they are healthy. This condition can make COVID-19 infect people close to you (Qiu et al., 2020). Additionally, travel records and social contact records were related to the incidence of COVID-19; their activities outside the home can make contact and interact with other people. This activity is a risk factor for the transmission of COVID-19—the lower the mobility, the smaller the social contact (Nugroho & Rakhman, 2021). Attitude is a person's assessment of something faced by himself or others. Therefore, attitude will shape a person's behavior. A study found respondents who were supportive of the prevention of COVID-19 (OR = 4.557) (B. A. Pratiwi et al., 2022).

The increasing spread of COVID-19 in Wuhan, China, occurred due to the high mobility of people in China. Epidemiological studies found—mobility by people according to age group and gender causes the spread of COVID-19 to increase. Males have higher mobility than females (Kraemer et al., 2020).

Local distance occurs due to the record of trips made by the community (Jesus et al., 2020).

Social contact also occurs because the rules governing mobility has stopped; people have started their activities as usual now. Some of them adhere to health protocols, but some do not. Therefore, COVID-19 cases are not getting higher. Social contact is closely related to mobility carried out by society. Mobility is one of the factors for the transmission of COVID-19. The interaction with various people on the journey puts that person at risk of contracting COVID-19 (Liu et al., 2020; Setyarini & Dwianggimawati, 2021).

COVID-19 patients with comorbidities such as diabetes mellitus, hypertension, cardiovascular, and chronic lung will have a more severe risk of symptoms compared to patients without OR comorbidities for each; 2.61 (95% CI 1.93 to 3.52), 2.84 (95% CI 2.22 to 3.63), 4.18 (95% CI 2.87 to 6.09), and 3.83 (95% CI 2.15 to 6.80) (Liu et al., 2020). In addition, the highest proportion of COVID-19 patients' illnesses is hypertension, lung and diabetes mellitus, and patients with heart injuries, 13 times higher than patients treated in the ICU compared to other patients who are not treated in the ICU (Li et al., 2020).

Comorbid patients require close supervision from medical personnel and themselves because comorbidities can worsen organ conditions (Zhou et al., 2020); Hypertension, cardiovascular disease, chronic kidney disease, and acute lung and kidney injuries are associated with an increase in deaths due to COVID-19, to be even more surprising that acute heart injuries and kidney injuries are closely related to an increase in fatalities from COVID-19. Due to the high risk of comorbidities and the high mortality rate due to tissue injury, organ function must be strictly observed in patients diagnosed with COVID-19 (Zhou et al., 2020).

The study limitation might be related to the secondary data. So, the authors might only see the causative factors based on data availability, while other factors might affect the incidence of COVID-19 in comorbid patients.

Conclusion

Epidemiologically, factors related to COVID-19 cases in South Bengkulu Regency, Indonesia, were

age, gender, history of contact with patients, travel history, history of social contact, and comorbidities. However, the most dominant factor related to COVID-19 cases was the history of social contact. It is possible that, during the COVID-19 pandemic, people might have risky behaviors, such as gathering in the markets or weddings, not wearing masks, and attending traditional events. This research can increase knowledge about COVID-19 prevention and mitigation efforts as one of the strategies to reduce the risk of COVID-19 events in the South Bengkulu Regency, Indonesia.

Declaration of Conflicting Interest

All authors declared no conflict of interest in this study.

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Author Contribution

The authors worked actively in completing the study. The role of the first author was to conceptualize and design research, take care of permits, and analyze and interpret data. The other authors were to complete the article and review the final draft of the article.

Author Biographies

Fiya Diniarti, SKM., M.Kes is a Lecturer of Public Health Program, Faculty of Health Sciences, Universitas Dehasen Bengkulu, Indonesia.

Bintang Agustina Pratiwi, SKM., MKM is a Lecturer of Public Health Program, Faculty of Health Science, University of Muhammadiyah Bengkulu, Indonesia.

Ferry Surahman, SKM., M.Kes is a Lecturer of Public Health Program, Faculty of Health Sciences, Universitas Dehasen Bengkulu, Indonesia.

Dr. Tuti Rohani, SST., M.Kes is a Lecturer of Public Health Program, Faculty of Health Sciences, Universitas Dehasen Bengkulu, Indonesia.

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