

## ORIGINAL ARTICLE

# ANALYSIS OF THE USE OF ANTIBIOTICS IN ASYMPTOMATIC, MILD, AND MODERATE COVID-19 PATIENTS TREATED IN BHAYANGKARA HOSPITAL

*Analisis Penggunaan Antibiotik pada Pasien COVID-19 Asimtomatik, Ringan dan Sedang di Rumah Sakit Bhayangkara Surabaya*

Putri Ayu Irma Ikasanti<sup>1</sup>, Rika Yulia<sup>2</sup>, Ruddy Hartono<sup>3</sup>, Puri Safitri Hanum<sup>4</sup>, Fauna Herawati<sup>5</sup>

<sup>1</sup>Student of Pharmacy Study Program, Faculty of Pharmacy, Universitas Surabaya, Surabaya Indonesia, 60293, [putriayuirma@gmail.com](mailto:putriayuirma@gmail.com)

<sup>2</sup>Department of Clinical-Community Pharmacy, Faculty of Pharmacy, Universitas Surabaya, Surabaya Indonesia, 60293, [rika\\_y@staff.ubaya.ac.id](mailto:rika_y@staff.ubaya.ac.id)

<sup>3</sup>Bhayangkara H.S. Samsoeri Hospital Mertojoso, Surabaya Indonesia, 60231, [rudd\\_apt@yahoo.com](mailto:rudd_apt@yahoo.com)

<sup>4</sup>Bhayangkara H.S. Samsoeri Hospital Mertojoso, Surabaya Indonesia, 60231, [purisafitrihanum@staff.ubaya.ac.id](mailto:purisafitrihanum@staff.ubaya.ac.id)

<sup>5</sup>Department of Clinical-Community Pharmacy, Faculty of Pharmacy, Universitas Surabaya, Surabaya Indonesia, 60293, [fauna@staff.ubaya.ac.id](mailto:fauna@staff.ubaya.ac.id)

Corresponding Author: Rika Yulia, [rika\\_y@staff.ubaya.ac.id](mailto:rika_y@staff.ubaya.ac.id), Department of Clinical-Community Pharmacy, Faculty of Pharmacy, Universitas Surabaya, Surabaya Indonesia, 60293

## ARTICLE INFO

### Article History:

Received August, 14<sup>th</sup>, 2021

Revised form September, 10<sup>th</sup>, 2021

Accepted May, 13<sup>th</sup>, 2022

Published online May, 30<sup>th</sup>, 2022

### Keywords:

antibiotics;

ddd (defined daily dose)/100 bed-days;

hospital;

sars-cov-2 (severe acute respiratory syndrome coronavirus-2)

### Kata Kunci:

antibiotik;

ddd (defined daily dose)/100 bed-days;

rumahsakit;

sars-cov-2 (severe acute respiratory syndrome coronavirus-2)

## ABSTRACT

**Background:** COVID-19 is an infectious disease caused by a new type of virus named SARS-CoV-2. There is still no specific treatment for COVID-19; the antibiotic is used for therapy and to prevent severe disease, so the increasing use of antibiotics in COVID-19 patients will lead to a detrimental impact and the risk of antibiotic resistance. **Purpose:** This study aims to analyze antibiotic use frequency and determine the number of DDD per 100 bed-days in July – December 2020 at Bhayangkara Hospital Surabaya. **Methods:** This research was a descriptive study with a retrospective study design conducted at Bhayangkara Hospital Surabaya in May – June 2021. The data were collected from 94 medical records, inclusion criteria: all ages; asymptomatic, mild, and moderate categories; all hospitalized patients in July-December 2020 who received antibiotics; the exclusion criteria: non-confirmed COVID-19 patients who had comorbidities and received antibiotics; the patient who died. The variables: frequency of antibiotic use with calculating the number of DDD/100 bed-days and percentage of COVID-19 patients who received antibiotics during hospitalization. **Results:** The frequency of antibiotic use in asymptomatic, mild, and moderate COVID-19 patients: 86.56 DDD/100 bed-days, the most antibiotic

**How to Cite:** Ikasanti, P., A., I., Yulia, R., Hartono, R., Hanum, P., S., & Herawati, F. (2022). Analysis of the use of antibiotics in asymptomatic, mild, and moderate covid-19 patients treated in bhayangkara hospital. *Jurnal Berkala Epidemiologi*, 10(2), 179-188.

<https://dx.doi.org/10.20473/jbe.v10i22022.179-188>

use was azithromycin at 50.42 DDD/100 bed-days and Levofloxacin at 22.70 DDD/100 bed-days. All asymptomatic, mild, and moderate COVID-19 patients (100%) at Bhayangkara Hospital Surabaya were treated with antibiotics, whereas the condition of patients was 5.32% asymptomatic, 48.94% mild, and 45.74% moderate. **Conclusion:** There is overuse of antibiotics in asymptomatic, mild and moderate COVID-19 patients at Bhayangkara Hospital Surabaya.

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### ABSTRAK

**Latar Belakang:** COVID-19 adalah penyakit infeksi yang disebabkan virus jenis baru, yaitu SARS-CoV-2. Pengobatan penyakit ini masih belum ditemukan secara spesifik, sehingga antibiotik masih digunakan untuk mencegah perburukan penyakit, dan penggunaan antibiotik yang tinggi pada pasien COVID-19 akan menimbulkan resiko resistensi antibiotik. **Tujuan:** penelitian ini bertujuan untuk menganalisis frekuensi penggunaan antibiotik dan menghitung jumlah pasien COVID-19 tanpa gejala, ringan, dan sedang yang mendapatkan antibiotik pada periode Juli – Desember 2020 di Rumah Sakit Bhayangkara Surabaya. **Metode:** Penelitian ini merupakan penelitian deskriptif dengan desain studi retrospektif yang dilakukan di Rumah Sakit Bhayangkara Surabaya pada periode Mei – Juni 2021, menggunakan sampel 94 data rekam medis dengan kriteria inklusi semua usia; kategori tanpa gejala, ringan, dan sedang; serta semua pasien rawat inap pada periode Juli – Desember 2020 yang mendapatkan antibiotik, kriteria eksklusi pasien tidak terkonfirmasi COVID-19 yang memiliki komorbid dan mendapatkan antibiotik; pasien meninggal. Variabel penelitian ini adalah kuantitas penggunaan antibiotik yang dihitung menggunakan metode DDD/100 bed-days dan parameter persentase pasien COVID-19 yang mendapatkan antibiotik selama rawat inap. **Hasil:** Frekuensi total penggunaan antibiotik pada pasien COVID-19 tanpa gejala, ringan, dan sedang, yaitu 86,56 DDD/100 bed days. Antibiotik yang banyak digunakan adalah Azitromisin sebesar 50,42 DDD (Defined Daily Dose)/100 bed-days dan Levofloksasin sebesar 22,70 DDD/100 bed-days. Semua pasien COVID-19 (100%) tanpa gejala, ringan, dan sedang yang dirawat di Rumah Sakit Bhayangkara Surabaya diberikan antibiotik, dimana kondisi pasien tanpa gejala sebanyak 5,32%, ringan 48,94%, dan sedang 45,74%. **Kesimpulan:** terjadi overuse penggunaan antibiotik pada pasien COVID-19 tanpa gejala, ringan dan sedang di Rumah Sakit Bhayangkara Surabaya.

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### INTRODUCTION

COVID-19 is a disease caused by a new type of virus that has never been found in humans, the type of virus is SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) (Setiadi et al., 2020). This virus is a type of virus that is classified as a very dangerous coronavirus after the

SARS-CoV (Severe Acute Respiratory Syndrome Coronavirus) and MERS (Middle East Respiratory Syndrome) (Harahap, 2020). The spread of this coronavirus occurs very quickly; according to epidemiological and virological studies, transmission of COVID-19 disease can occur through direct contact with people infected with SARS-CoV-2 from a close distance as droplets, or

by objects that the virus has contaminated (WHO, 2020).

According to epidemiological data, when there were cases of COVID-19 infection in Wuhan every day, China experienced an increase in infected cases and soared high at the end of the month, which is between late January and early February 2020. Many of these cases occurred in Hubei and its surroundings but then spread to other provinces and the whole country of China. As of January 30, 2020, 7,736 confirmed COVID-19 cases in China, and 86 cases have been confirmed positive in various countries. It included Germany, South Korea, India, Japan, Australia, Malaysia, Saudi Arabia, France, Nepal, Finland, Taiwan, Canada, Thailand, Sri Lanka, Singapore, Philippines, Vietnam, and Cambodia (Susilo et al., 2020). While in Indonesia, it was first announced that there were cases of infection with the COVID-19 virus on March 2, 2020, or about 4 months after the appearance of the first case in China. At the time, 2 cases were found in March 2020, then 2 cases were also found on March 6, 2020 (Burhan et al., 2020).

Treatment for patients infected with COVID-19 is still not found with certainty (Setiadi et al., 2020). All types of drugs have been used in order to prevent the COVID-19 death rate from getting higher, one of which is the administration of antibiotics. Antibiotic therapy is not a therapy that can cure COVID-19. Still, antibiotics are one of the therapies that can be used to prevent the worsening of COVID-19 symptoms due to bacterial infection, considering that Indonesia is an endemic area for infectious diseases caused by bacteria. It will trigger the high use of antibiotics in COVID-19 patients. Excessive use of antibiotics can risk causing adverse effects of antibiotic resistance (Mahmudah, Sumiwi, & Hartini, 2016), i.e., reduced effectiveness of antibiotics (Romadhona, Herawati, & Yulia, 2020). In addition, antibiotic resistance also results in a longer duration of treatment, so the cost of care and treatment will be expensive, and the severity of the disease will be higher (Colyn, Herawati, & Yulia, 2020).

The use of antibiotics that are more selective and according to indications and evaluation of their usage is an effort to prevent the occurrence of antibiotic resistance (Pratama, Suprapti, Ardiansyah, & Shinta, 2019). In addition, according to Permenkes No. 8 of 2015 in article 10 paragraph 1, it is stated that it is necessary to evaluate the implementation of the Antibiotic

Resistance Control Program (PPRA) by the PPRA team at the hospital. One of the things that must be evaluated was the use of antibiotics by analyzing the frequency of the antibiotics use. The antibiotics use was applied the DDD (Defined Daily Dose)/100 bed-days method and utilized the percentage parameter of patients who received antibiotics during hospitalization (Kementerian Kesehatan RI, 2015). This study aims to analyze the frequency of antibiotic use in asymptomatic, mild, and moderate COVID-19 patients at Bhayangkara Hospital Surabaya.

## METHODS

This research was an observational study with the direction of taking retrospective data and analyzed descriptively. The material for this research was medical record data of hospitalized COVID-19 patients at Bhayangkara Hospital Surabaya from July to December 2020. The sampling technique in this research was purposive sampling. The total population was 640 people, with samples taken from 94 people. Samples were taken by determining the inclusion and exclusion criteria from the medical record data of COVID-19 patients. The inclusion criteria for COVID-19 patients were all ages, had a disease degree with categories of asymptomatic, mild, and moderate, all hospitalized patients for the period July – December 2020 who received antibiotics. Moreover, the exclusion criteria included patients with non-confirmed COVID-19 who had comorbid illnesses and received antibiotics for infectious diseases other than COVID-19 and those who died. Research samples that have met the inclusion and exclusion criteria will be analyzed. The variables in this study were the frequency of use of antibiotics calculated using the DDD/100 bed-days method and the parameter percentage of COVID-19 patients of asymptomatic, mild, and moderate who received antibiotics during hospitalization. Conditions of symptoms of COVID-19 diseases, such as asymptomatic, mild, and moderate, were categorized by reviewing the symptoms experienced by the patient and adjusted to the symptom category in the 3<sup>rd</sup> edition of the COVID-19 management guidelines (Burhan et al., 2020). The operational definition of this study included patients who were confirmed positive for COVID-19, of all ages, female and male, and the frequency of antibiotics would be calculated by looking at the dose, route, and interval of antibiotic administration recorded in the medical record data.

This research has obtained an ethical feasibility permit from the Health Research Ethics Committee of Bhayangkara Hospital Surabaya H.S. Samsuero Mertojoso Surabaya Number 17/VI/2021/KEPK/RUMKIT.

## RESULTS

In this study, there were 100 samples, and research samples met the inclusion and exclusion criteria, as many as 94 samples. Furthermore, it will evaluate the frequency of use of antibiotics.

### Characteristics of Research Sample

The characteristics of the sample in this study were asymptomatic, mild, and moderate COVID-19 patients at Bhayangkara Hospital Surabaya in the period July to December 2020. It was based on patient demographic data (age and gender), symptoms or categories of patient conditions (asymptomatic, mild, and moderate), comorbidities, length of days, and patient outcomes, which can be seen in Table 1.

Table 1 shows that most samples were found in the male sex, with 58 (61.70%), late adolescence (17-25 years) had 32 (34.04%), and early adulthood had 23 (24.47%). COVID-19 patients with mild symptoms as many as 46 (48.97%) and moderate symptoms as many as 43 (45.74%); comorbid hypertension was 7 (7.45%), the most extended length of stay was patients with moderate symptoms for 162 days with SD = 4,84. COVID-19 patients who showed recovery outcomes when discharged from the hospital were asymptomatic (80%), mild (84.78%), and moderate (86.04%).

Table 2 shows that the pattern of antibiotic use in this study was widely used, named Azithromycin and Levofloxacin. Patients were asymptomatic (Azithromycin 4(80%)), mild symptoms (Azithromycin 33(71.74%)), and moderate symptoms (Azithromycin 29(67.44%) and Levofloxacin 16(37.21%)).

Table 3 shows that the frequency of antibiotic use in this study was 86,56 DDD/100 bed-days, where the use of antibiotics in COVID-19 patients was of 3 types, namely Azithromycin, Levofloxacin, and Moxifloxacin in the oral administration route. Then there are 5 parenteral routes of administration, namely Azithromycin, Levofloxacin, Moxifloxacin, CefoperazonSulbactam, Meropenem. The highest use of antibiotics in the oral route was Azithromycin at 50,42 DDD/100 bed-days, while

in the parenteral route, Levofloxacin was 22,70 DDD/100 bed-days.

**Table 1**

Characteristics of asymptomatic, mild and moderate COVID-19 patients at Bhayangkara Hospital Surabaya

Characteristics	n	%
<b>Gender</b>		
Male	58	61.70%
Female	36	38.30%
<b>Age</b>		
Toddler	1	1.06%
Children	1	1.06%
Early teens	3	3.19%
Late teens	32	34.04%
Early adulthood	23	24.47%
Late adulthood	13	13.83%
Early elderly	15	15.96%
Late elderly	6	6.38%
<b>Symptoms</b>		
Asymptomatic	5	5.32%
Mild	46	48.94%
Moderate	43	45.74%
<b>Comorbid</b>		
Hypertension	7	7.45%
DM	2	2.13%
Asthma +	1	1.06%
Hypertension		
Heart	1	1.06%
Without		
Comorbidities	83	88.30%
<b>Length of Stay</b>		
Asymptomatic	39 day	SD = 7.8
Mild	162 day	SD = 3.52
Moderate	208 day	SD = 4.84
<b>Asymptomatic (n = 5)</b>		
Outcome		
Recover	4	80%
Become better	1	20%
<b>Mild (n = 46)</b>		
Outcome		
Recover	39	84.78%
Become better	7	15.22%
<b>Moderate (n = 43)</b>		
Outcome		
Recover	37	86.04%
Become better	6	13.95%

Table 4 shows that one hundred percent of COVID-19 patients, asymptomatic, mild, and moderate patient groups are receiving antibiotics, whereas asymptomatic COVID-19 patients treated at Bhayangkara Hospital Surabaya are 5.32%, mild symptoms are 48.94%, and moderate symptoms as much as 45.74%.

**Table 2**

Patterns of using antibiotics for COVID-19 patients

Types of Antibiotics	n	%
<b>Asymptomatic (n = 5)</b>		
Levofloxacin and meropenem	1	20%
Azithromycin	4	80%
<b>Mild (n = 46)</b>		
Azithromycin	30	65.22%
Levofloxacin	10	21.74%
Levofloxacin and azithromycin	3	6.52%
Cefoperazonsulbactam and levofloxacin	1	2.17%
Moksifloxacin	2	4.35%
<b>Moderate (n = 43)</b>		
Levofloxacin and azithromycin	6	13.95%
Azithromycin	16	37.21%
Levofloxacin	10	23.26%
Cefoperazonsulbactam and azithromycin	5	11.63%
Moksifloxacin	4	9.30%
Azithromycin and moksifloxacin	2	4.65%

## DISCUSSION

### Demographic data

#### Gender

The most significant sample in this study was male, as much as 58 (61.70%). There are similarities in the research conducted by Audina & Fatekurohman (2020) by looking at the data on COVID-19 patients in Jember District through the official website for the COVID-19 monitoring data on June 17, 2020, namely the sample with the highest exposure to COVID-19 was the sample with male sex as much as 44 (48.89%).

**Table 3**

The Use of Antibiotics in COVID-19 Patients Based on value DDD/100 bed-days

Types of Antibiotics	Group	ATC	DDD /100 bed-days
<b>Oral</b>			
Azithromycin	Macrolida	J01FA10	50.42
Levofloxacin	Quinolon	J01MA1 2	1.23
Moksifloxacin	Quinolon	J01MA1 4	0.18
<b>Parenteral</b>			
Levofloxacin	Quinolon	J01MA1 2	22.70
Azithromycin	Macrolida	J01FA10	4.55
Moksifloxacin	Quinolon	J01MA1 4	4.09
Cefoperazonsulbactam	3 <sup>rd</sup> generation Cephalosporin	J01DD62	2.93
Meropenem	Carbapenem	J01DH02	0.45
<b>Total</b>			<b>86.56</b>

**Table 4**

Percentage of Asymptomatic, Mild and Moderate COVID-19 Patients who Received Antibiotics during Hospitalization

Symptom Condition	n	%
Asymptomatic	5	100%
Mild	46	100%
Moderate	43	100%

According to the study's results from the USA, China, and WHO, the group with the male gender is a group that can be at high risk of being infected by COVID-19 (Siagian, 2020). It can be seen based on male social factors, where some scientists state that some men have a smoking habit (Fuadi & Irdalisa, 2020). According to Amin Soebandrio (a Head of the Eijkman Institute of Biology and Higher Education), a person who is used to smoking will cause lung cells to have a susceptibility to infected with the SARS-CoV-2 virus with an increased receptor, namely the ACE-2 receptor (Siagian, 2020). In addition, men have

more physical activity outside the home, leading to a high risk of being exposed to COVID-19 (Fuadi & Irdalisa, 2020).

### Age

The largest sample in this study were adolescents and adults, respectively, 32 (34.04%) and 23 (24.47%). There are similarities in the research conducted by Elviani, Anwar, & Sitorus (2021) at RSMH Palembang in 2021; the highest age group was found in the 26-35 year age group, as many as 74 (23.90%).

The incidence of COVID-19 often occurs in adolescents and adults because they are a group with high productivity and mobility outside the home at that age. It will have the potential to have close contact with people who have been infected with COVID-19 (Yanti, Fridalni, & Harmawati, 2020). In addition, according to CSIS (Centre for Strategic and International Studies), the transmission of infection can start in a young age group who has high productivity or mobility. Also, according to a BPS (Central Statistics Agency) report, people between the ages of 17 and 30 have violated health protocols by up to 51% (Elviani et al., 2021). This study only examined asymptomatic, mild, and moderate COVID-19 patients, so most of those infected were teenagers and adults. It is different from the case of COVID-19 patients with severe and critical conditions, where the most infected with COVID-19 are the elderly group because the immune system at that age is lower than young people.

### COVID-19 Symptom Profile or Condition Category

Most samples in this study were COVID-19 patients with mild and moderate symptoms, respectively, 46 (48.94%) and 43 (45.74%). There are similarities in the review study conducted by (Grace, 2020), the symptoms that many COVID-19 patients experience, namely fever (98%), cough (76%), shortness of breath (55%), and feeling tired (44%). According to the COVID-19 management guidelines, clinical symptoms such as fever, cough, feeling tired, and shortness of breath indicate mild and moderate symptoms in COVID-19 patients (Burhan et al., 2020).

In this study, the least number of asymptomatic COVID-19 patients were at Bhayangkara Hospital Surabaya. It is because the priority patients to be treated at the hospital were COVID-19 patients with mild, moderate, and severe degrees of severity, while COVID-19

patients asymptomatic enough to self-isolate at home. It can be shown in the management guidelines edition 3 for December 2020, which states that COVID-19 patients asymptomatic should self-isolate at home for 10 days while remaining under the supervision of health workers in the nearest area (Burhan et al., 2020).

### COVID-19 Patient Comorbid

In this study, 11 of 94 patients with COVID-19 had comorbidities, and the largest sample was patients with comorbid hypertension as many as 7 (7.45%). It is similar to the research conducted by Puswati, Yanti, & Yuzela (2021) at 50 Pekan Baru City Health Centers; the blood pressure of many COVID-19 patients was uncontrolled, as many as 45 (68.20%).

Hypertension comorbidities correlate with COVID-19 disease, namely, the action of the virus will bind to the ACE-2 (Angiotensin Converting Enzyme 2) receptor. Patients who have hypertension will be given treatment with the group ARB (Angiotensin Receptor Blocker) and ACEI (Angiotensin Converting Enzyme Inhibitor) (Gunawan, Prahasanti, & Utama, 2020). The use of ARB and CEI drugs indicated for hypertension can make patients with hypertension susceptible or at risk of being infected with the SARS-CoV-2 virus. It is because the ARB and ACEI drug classes have the potential to increase the ACE 2 receptor. Therefore, it can cause the SARS-CoV-2 virus to bind more and more to the ACE 2 receptor (Alfhad, Saftarina, & Kurniawan, 2020).

### Profile of Length of Stay for COVID-19 Patients

The average length of stay at Bhayangkara Hospital is 9 days with 13 (11.71%). Most patients at Bhayangkara Hospital Surabaya are patients with mild and moderate symptoms. This condition has similarities to reports from the WHO that the COVID-19 virus in patients with asymptomatic or asymptomatic conditions, mild to moderate symptoms can be isolated for 8-9 days after the patient's symptoms appear (WHO, 2020). Patients with mild conditions have a faster recovery rate, approximately one week (Levani, Prastya, & Mawaddatunnadila, 2021).

### Frequency of Antibiotic Use in Asymptomatic, Mild, and Moderate COVID-19 Patients

The frequency of antibiotic use in asymptomatic, mild, and moderate COVID-19 patients at Bhayangkara Hospital Surabaya is

86.56 DDD/100 bed-days. The highest use of antibiotics was based on the oral administration, namely Azithromycin at 50.42 DDD/100 bed-days (average one patient 0.50 DDD). Meanwhile, based on the parenteral administration, Levofloxacin was 22.70 DDD/100 bed-days (the average of 1 patient is 0.22 DDD) based on the calculation of DDD/100 bed-days. It shows that the use of the antibiotic Azithromycin exceeds the WHO standard, where the DDD value of the WHO standard Oral Azithromycin is 0.30 DDD. In contrast, the use of the antibiotic Levofloxacin does not exceed the WHO standard, where the standard DDD value of parenteral WHO Levofloxacin is 0.50 DDD. This can happen because the policy guidelines used by Bhayangkara Hospital Surabaya are the guidelines for the management of COVID-19 PDPI edition 2 in the August 2020 period and edition 3 in the December 2020 period (Burhan et al., 2020). The study used medical record data for the period July – December 2020, the guidelines showed that the antibiotics used for COVID-19 patients are Azithromycin and Levofloxacin. These matters have similarities to research carried out, including the antibiotics' use for COVID-19 patients in the period March to April 2020. Azithromycin, with a value of 1,61 DDD/100 bed-days, was the most widely used antibiotic at Moises Broggi Hospital, Barcelona (Murgadella-Sancho, Coloma-Conde, & Oriol-Bermúdez, 2021). The results of another study at the Singapore General Hospital, where the results of the study in February 2020 showed the use of antibiotics in COVID-19 patients increased from 47.40 DDD/100 bed-days to 54.00 DDD/100 bed-days, the most widely used antibiotics were Azithromycin and Levofloxacin (Liew et al., 2020).

The increase in the use of antibiotics is indicated by the increasing value of DDD/100 bed-days, where the impact that will occur is the risk of antibiotic resistance. Several factors cause an increase in the value of DDD/100 bed-days. It includes the number of antibiotics used and the duration of antibiotic use. The longer the period of antibiotic use in patients, the more antibiotics will be used by patients (Sari & Safitri, 2016). Meanwhile, the lower the DDD/100 bed-days value obtained, the more likely it is to minimize the risk of antibiotic resistance. It happens because of the rational use of antibiotics in patients with the right choice of antibiotics (Perdaka, Sagita, & Pratama, 2020).

Azithromycin has a mechanism of action as an antiviral, either directly or indirectly on bronchial epithelial cells and several other host cells. Azithromycin has also been assessed as an antibiotic that can inhibit the SARS-CoV-2 virus, influenza, ebolavirus, rhinovirus, parainfluenza virus, zika virus, enterovirus and dengue (Gyselinck, Janssens, Verhamme, & Vos, 2021). The results of in vitro screening studies that have been approved by the FDA (Food Drug Administration), the antibiotic Levofloxacin had strong work activity as an inhibitor of the SARS-CoV-2 virus. In addition, the relationship of its pharmacokinetic properties, safety profile, anti-inflammatory activity, and affinity for viral binding proteases SARS-CoV-2 showed that the antibiotic Levofloxacin could also be used as a therapy in COVID-19 pneumonia patients (Scroggs et al., 2021).

#### **Percentage of COVID-19 Patients (Asymptomatic, Mild, and Moderate) Who Received Antibiotics During Hospitalization**

One hundred percent of COVID-19 patients were asymptomatic, mild and moderate patients receiving antibiotics, whereas asymptomatic COVID-19 patients treated at Bhayangkara Hospital Surabaya were 5.32%, mild symptoms were 48.94%, and moderate symptoms as many as 45.74%. In addition to being asymptomatic, mild and moderate COVID-19 patients hospitalized in hospitals are also given antivirals, 80%, 97.83%, and 95.35%, respectively.

Based on research conducted in January 2020 at the infectious Disease Hospital of the City of China showed that COVID-19 patients undergoing treatment at the hospital had received antibiotics as much as 71%, with the incidence of co-infection as much as 1% (Lucien et al., 2021). Meanwhile, the results of research conducted at the Udayana University Hospital in Bandung in September 2020 showed that 40% of inpatient COVID-19 patients used antibiotics (Brahmantya, Purnamasidhi, & Sumardika, 2021). Giving antibiotics to COVID-19 patients can function to fight bacteria in the event of bacterial co-infection or secondary bacterial infection in COVID-19 patients (Paluseri, Fajriansyah, Zulfahmidah, & Oktaviani, 2021).

In this study, the data taken were medical records of asymptomatic, mild, and moderate COVID-19 patients in the period July – December 2020, where the policy for the management of COVID-19 used by Bhayangkara Hospital



Surabaya was the COVID-19 management guidelines PDPI edition 2 in the August 2020 period and 3<sup>rd</sup> edition in the December 2020 period. The guidelines show that asymptomatic COVID-19 patients are not given antibiotic therapy, while mild and moderate symptoms are given antibiotic therapy. It can show that the use of antibiotics in COVID-19 patients was following the policies in force. COVID-19 patients with mild symptoms and moderate were given antibiotic therapy. However, in COVID-19 patients with asymptomatic conditions, it was not appropriate to use of antibiotics because there was no need to be given antibiotics in these conditions. Meanwhile, based on the latest COVID-19 management guidelines published on July 14, 2021, there were differences in the management of COVID-19, where asymptomatic, mild, and moderate COVID-19 did not require antibiotics. Only antivirals were given to treat COVID-19 disease. It aims to prevent the increasing incidence of bacterial resistance in COVID-19 patients (Burhan et al., 2020).

## CONCLUSION

The frequency of use of antibiotics for asymptomatic, mild, and moderate COVID-19 patients for the period July – December 2020 at Bhayangkara Hospital Surabaya is high. There is an overuse of antibiotics in asymptomatic, mild, and moderate COVID-19 patients at Bhayangkara Hospital Surabaya. Further research is needed to explore and evaluate the benefits of using antibiotics and antivirals in COVID-19 patients.

## CONFLICT OF INTERESTS

In this study, the researcher did not have a conflict of interest with the agencies involved.

## AUTHOR'S CONTRIBUTION

PAII participated in drafting the manuscript. RY and FH drafted the concept and interpreted the results. Meanwhile, PAII, RY, FH, RH, and PSH audited the manuscript's revised. PAII and RH collected research data. Then, PAII and FH prepared draft articles for publication. RH and PSH assisted in research licensing at Bhayangkara Hospital Surabaya. All writers have read and approved the final manuscript.

## ACKNOWLEDGMENT

The writer would like to thank as much as possible to Bhayangkara Hospital Surabaya, for giving permission to researchers to carry out this research and thank the Faculty of Pharmacy and other parties who helped the researchers to do and complete the research well.

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10<sup>th</sup> Volume, 2<sup>nd</sup> Issue, May 2022

p-ISSN 2301-7171 ; e-ISSN 2541-092X

Jurnal Berkala  
EPIDEMIOLOGI

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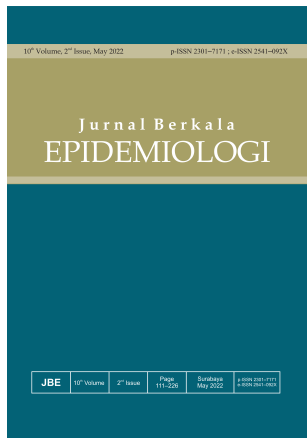
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Vol. 10 No. 2 (2022): Jurnal Berkala Epidemiologi (Periodic Epidemiology Journal)


Published: 2022-05-30

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