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Bacterial Sputum Culture Results with Moderate and Severity Covid-19 Patients in Pinere Room Arifin Achmad Hospital, Riau Province

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ABSTRACT

SARS CoV-2 is a new type of coronavirus and infects respiratory tract. Covid-19 may occur secondary bacterial infection, notably in severe degrees. Secondary bacterial infections are generally associated with viral respiratory infections concurrently after the primary infection. Sputum examination is essential to diagnose the etiology of the disease. So far, there has not been much research on secondary bacterial infections in Covid-19 patients. This research is a descriptive retrospective study. The study was conducted on moderate and severe Covid-19 patients treated in the PINERE Room by looking at the results of bacterial sputum cultures in confirmed Covid-19 patients from the Clinical Pathology Laboratory of Arifin Achmad Hospital, Riau Province starting from August 2020 to July 2021. This study is for the results of bacterial sputum culture with secondary infection in moderate and severe Covid-19 patients. The purpose of this research to analyze the relationship between sputum culture results and severity and outcome in Covid-19 patients. Of the 204 samples of bacterial sputum culture, the results obtained were normal flora 42.16%, Klebsiella pneumonia 22.55%, no growth of bacteria 10.78%, Acinetobacter baumannii 6.37%, Staphylococcus aureus 5.39%, Pseudomonas aureginosa 3, 43%, Staphylococcus maltophilia, Escheria colli, Enterobacter clocae 2.45% each. Based on the morphology of Gram-negative bacteria, 41.1% more than Gram-positive 6.37%.

Keywords: Covid-19, secondary bacterial infection, bacterial sputum culture.

Introduction

Data from the World Health Organization (WHO) until September 2021 showed about 219 million confirmed cases of Coronavirus disease 19 (Covid-19) found in 222 countries, with 4.5 million cases of death (Emergency Response Team, 2021). This disease was initially called the 2019 novel coronavirus (2019-nCov), then in February 2020, changed to Severe Acute Respiratory Syndrome Disease Coronavirus-2 (SARS-CoV-2) (Emergency Response Team, 2021; Zhu et al., 2020a). Cases in Indonesia based on data until September 2021, there were 4.2 million confirmed cases with 143 thousand cases of death (Kemenkes RI, 2021). Data from Riau Province until September 2021 there were 127,362 thousand confirmed cases with 4064 cases of death. 4 Data contained in the Arifin Achmad Regional General Hospital (RSUD) Riau Province since March 2020 recorded 1875 confirmed cases and 194 deaths (Electronic Data Process RSUD Arifn Achmad, 2021).

Based on the clinical degree of infection with the SARS-CoV-2 virus, there are several degrees, namely asymptomatic or asymptomatic, mild, moderate, severe to critical degrees. The mild degree is characterized by fever, cough, fatigue, and myalgia. The moderate degree is characterized by clinical signs of pneumonia such as fever, cough, shortness of breath, and rapid breathing without evidence of severe pneumonia, namely oxygen saturation of 93% at room temperature. Severe grade SARS-CoV-2 virus infection is characterized by clinical symptoms of

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severe pneumonia such as fever, cough, shortness of breath, and rapid breathing followed by one of the respiratory rates of more than 30 breaths per minute, severe respiratory distress, or oxygen saturation of less than 93% at room temperature. Critically ill patients are characterized by acute respiratory distress syndrome (ARDS), sepsis, and septic shock (Zhu et al., 2020b; Burhan et al., 2020).

The phenomenon of secondary bacterial infection often occurs in Covid-19 cases, especially in severe and critical degrees (Chen et al., 2020). Zhang et al. found that the bacterial pneumonia of 221 patients was 7.7%, with the most bacteria being Acinetobacter baumannii. Research in France by Contou et al (2020) found 28% of secondary bacterial infections, the most common pathogens being Staphylococcus aureus, Haemophilus influenza, and Streptococcus pneumonia. In this study, empiric antibiotics have reduced mortality, especially in severe and critical degrees, with third-generation cephalosporin monotherapy.

Sputum or phlegm is material expelled from the lungs and trachea through the mouth. Sputum examination is essential to diagnose the etiology of infection. They determined the type of pathogen in secondary bacterial infections, among others, by culture or culture of sputum by taking non-invasive specimens obtained from coughed-up sputum, sputum induction, or aspiration of secretions from an endotracheal tube or tracheostomy. Bacterial sputum culture is a diagnostic modality that relies on the growth of microorganisms on suitable culture media. Necessary bacterial growth conditions include temperature and atmospheric conditions. Sputum culture results were assessed by evaluating colony morphology and biochemical tests. Specimens are invasively obtained from bronchoalveolar lavage (BAL), bronchus protective specimen brush (PSB), or bronchial swabs. Culture examination can be performed at any facility that allows semiquantitative or quantitative methods assessed based on colony forming units (CFU) (Cappuccino & Welsh, 2019). The purpose of this research is to analyze the

Material and Methods

This study is an analytical study using a cross-sectional design to determine the relationship between the incidence of secondary coinfection through the results of bacterial sputum culture with the severity and outcome of Covid-19 patients at the Arifin Achmad Hospital. This research will be carried out in the New-Emerging and Re-Emerging Infectious Diseases (PINERE) RSUD Arifin Achmad Riau Province, medical record installation, Clinical Pathology laboratory in September-October 2022 by taking medical record data starting from August 1, 2021 - July 31, 2022.

Data analysis in this study using the chi-square test because the variables compared are categorical scales. The data obtained from the data collection process was simplified into tabular form, and then the data were processed using the SPSS Windows version 17 statistical program. The sampling technique in this study was total sampling in the affordable population by looking at the medical records of confirmed Covid-19 patients who were treated on August 1, 2021 – 31 July 2022, in the Pinere isolation room at the Arifin Achmad Hospital. Subjects who meet the research criteria will be the research sample. The data obtained were age, gender, definitive results of microorganisms in bacterial sputum cultures, and the degree of disease and Covid-19 outcomes. The affordable population of this study is the medical records of confirmed moderate, severe, and critical Covid-19 patients who were treated in the PINERE room of the Arifin Achmad Hospital, Riau Province, on August 1, 2021 - July 31, 2022.

Results and Discussion

This research was conducted in September 2021 at the Arifin Achmad Hospital, Riau Province. This research is an analytic study with a cross-sectional method by taking secondary data from Pinere isolation room, Medical Record Installation, and Clinical Pathology Laboratory that meet the research criteria. The data collected from August 1, 2021 - July 31, 2022, is data on patients with a confirmed Covid-19 diagnosis of 1071 people. Then the data for mild Covid-19

patients are excluded, and data for patients with moderate, severe, and critical grades who do not have bacterial sputum culture results. Samples according to the inclusion criteria, namely, moderate, severe, and critical confirmed Covid-19 patients who had bacterial sputum culture results, were 204 patients. The variable in this study independent variable (independent) was secondary coinfection from the results of bacterial sputum culture. The dependent variables (bound) are age, gender, severity, and outcome of Covid-19 patients.

Characteristics of patients treated in the Pinere room of Arifin Achmad Hospital, Riau Province, in this study, namely the age of 18 - 59 years as many as 145 people (71.1%) and age 60 years as many as 59 people (28.9%) with the proportion of men 118 people (57.8%) more than women 86 people (42.2%) (Table 1). The median age of the subjects in this study was 52 years, with the youngest patient aged 18 years and the oldest patient being 92 years old. The most bacterial sputum culture results in this study were normal flora in 86 people (42.16%), followed by the most negative Gram culture results were Klebsiella pneumonia in 46 samples (22.55%), negative or no germ growth in 22 samples (10, 78%), Acinetobacter baumannii as many as 13 samples (6.37%), Staphylococcus aureus 11 samples (5.39%), Pseudomonas aureginosa 7 samples (3.43%), Staphylococcus maltophilia, Escheria colli, Enterobacter clocae each as many as 5 samples (2.45%) and Aeromonas veronii, Burkholderia clocae, Citobacter yonger, Staphylococcus epidermidis each (0.49%) (Table 2).

Table 1. Characteristics of patients

Variable	n	%	Mean	STDV
Age (years)				
18 – 59	145	71,1		
≥ 60	59	28,9		
Gender				
Man	118	57,8		
Woman	86	42,2		

Table. 2. Cultur sputum of pastien covid-19 in Arifin Achmad Hospital

No	Culture	Critical		Severe		Moderate		Total	P-Value
		n	%	n	%	n	%		
1	*Acinetobacter baumani*	1	6,25	3	15,79	9	14,75	13	0,018
2	*Aeromonas veronii*	1	6,25	0	-	0	-	1	-
3	*Burkholderia cepania*	0	-	1	5,26	0	-	1	-
4	*Citobacter yonger*	0	-	1	5,26	0	-	1	-
5	*Esheria colli*	1	6,25	1	5,26	3	4,92	5	0,449
6	*Enterobacter*	0	-	2	10,53	3	4,92	5	0,655
7	*Klebsiella pneumonia*	8	50,00	6	31,58	32	52,46	46	0,000
8	*Pseudomonas aeruginosa*	2	12,50	1	5,26	4	6,56	7	0,368
9	*Staphylococcus aureus*	3	18,75	2	10,53	6	9,84	11	0,030
10	*Staphylococcus epidermidis*	0	-	0	-	1	1,64	1	-
11	*Stenotropomonas maltophilia*	0	-	2	10,53	3	4,92	5	0,655
	Total	16	100	19	100	61	100	96	

The table explains that from 96 samples of culture results, there was a significant relationship between bacterial growth and p-value <0.05 in several coinfected bacteria, namely Klebsiella pneumonia (p = 0.000), Acinetobacter baumannii (p = 0.0018) and Staphylococcus aureus p = 0.030. Meanwhile, in other bacteria, a p-value> 0.05 was obtained. A similar study in China found that the most secondary co-infections were Gram-negative Klebsiella pneumonia, followed by Acinetobacter baumannii. In contrast to the study in France, it was found that the most common types of coinfections were Gram-positive Staphylococcus aureus, followed by Streptococcus pneumonia. A study like the observational cohort study by Vidal et al found that the most coinfected were Gram-positive strains of Streptococcus pneumoniae in CAP and Streptococcus aureus in HAP and VAP. A study in France by Contou et al. (2020), found 28% of bacterial secondary infections with the most causative pathogens are Staphylococcus aureus, Haemophilus influenza, and Streptococcus pneumonia. Lansbury et al reported different pathogenic profiles because the most common bacteria were Mycoplasma pneumonia (42%), followed by Pseudomonas aeruginosa (12%) and Haemophilus influenza (12%). The difference in antibiogram of each hospital is different. Therefore ideally, each hospital has antibiogram data for more appropriate empirical antibiotic management.

Conclusion

The results of the most bacterial sputum culture showed normal flora results in 86 samples (42.16%), followed by Klebsiella pneumonia in 46 samples (22.55%), negative or no germ growth in 22 samples (10.78%), Acinetobacter baumannii as many as 13 samples (6.37%), Staphylococcus aureus 11 samples (5.39%), Pseudomonas aureginosa 7 samples (3.43%), Staphylococcus maltophilia, Escheria colli, Enterobacter clocae each as many as 5 samples (2.45%) and Aeromonas veronii, Burkholderia clocae, Citobacter yonger each 1 sample (0.49%) in Arifin Achmad Hospital, Riau Province. ideally every hospital has antibiogram data for antibiotic management more empirically precise.

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