



## PREVALENCE AND ANTIBIOTICS UTILIZATION AMONG COVID-19 PATIENTS IN A SELECTED HOSPITAL IN KORONADAL CITY: A RETROSPECTIVE ANALYSIS

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### Abstract

This study aimed to determine the prevalence and antibiotic utilization among COVID-19 patients in selected hospital in Koronadal City. A retrospective quantitative-descriptive method was used in this study. This research utilized frequency and percentage to present continuous and categorical data and descriptive statistics with confidence intervals was used in this investigation. Also, the researchers utilized the multiple regression analysis to determine if there is a significant relationship on the prevalence and frequency of antibiotics utilization among COVID-19 patients based on patient's demographic profile. Results of the statistical analysis revealed an existing significant difference ( $p < 0.05$ ) in the level of prevalence and antibiotic utilization among COVID-19 patients. Results signifies that most of the usage, duration, used in ICUs, frequently prescribed, route of administration and dosage strength of antibiotics has no significant relationship on patients' age, sex, comorbidities, and drug allergen. The findings revealed that the demographic profiles of the COVID-19 patients matter to the prevalence and antibiotic utilization. The results also showed a close frequency rate of each factor on the variables which cannot be disregarded and should also be considered potential reasons in understanding the utilization of antibiotics in COVID-19 patients. However, this study provides further evidence that a significant proportion of patient who went to the hospital with COVID-19 had taken antibiotics.

**Keywords:** COVID-19, Prevalence, and Antibiotics Utilization

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## INTRODUCTION

The Novel Coronavirus Disease-19 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) has rapidly become a global health concern. There have been around 10 million confirmed cases of COVID-19 and 500,000 reported deaths, leading to a new public health crisis that threatens the healthcare system (Surandi et al., 2022). Bacterial infections have been recognized as a common complication of several viral respiratory tract infections and significant causes of morbidity and mortality. Furthermore, there is no current evidence of definitive treatment for COVID-19 patients. However, antibiotics are being widely used in most centers for treatment due to the low prevalence of bacterial infection in patients (Sucandra et al., 2022).

Antibiotics save lives and its use should ensure effectiveness for as long as possible. Some patients with severe COVID-19 also have bacterial co-infections and need antibiotics to survive, explained by Dr. Nino Berdzuli, Director of WHO/Europe's Division of Country Health Programmers. As many as 70% of patients with COVID-19 received antimicrobial either in the outpatient or inpatient setting (Isaric 2020; Langford et al., 2021). This may favor the emergence of Antimicrobial Resistance (AMR).

In COVID-19 patients, for example, despite the administration of antibiotics, the prevalence of bacterial co-infection and secondary infection is fairly low. The discrepancy between the frequency with which antibiotics are provided and the prevalence of bacterial illness in these patients emphasizes the risk of antibiotic overuse in these patients. In contrast, antibiotic usage in SARS-CoV-2 patients can increase the pressure for antimicrobial resistance to develop (Langford et al., 2020).

According to Wang et al. (2021), although there is limited evidence for the benefits of antimicrobial use in such patients, the pandemic may accelerate the threat of AMR due to increased use of antibiotics, increased exposure to hospital environments and invasive procedures used in COVID-19 treatment. In the aftermath of COVID-19, many antimicrobial resistance (AMR) experts have expressed worry about the safety of antibiotic use in COVID-19 patients, urging the development of stronger antimicrobial stewardship (AMS) programs.

Antibiotic stewardship initiatives that attempt to improve the appropriateness of antibiotic usage have also been linked to a lower rate of drug-resistant illnesses and antibiotic use (Hesham et al., 2020). Understanding COVID-19 antibiotic prescription patterns and predictors can help discover antibiotic stewardship opportunities and improve antibiotic quality and safety by identifying intervention opportunities and focusing on antibiotic stewardship activities (Samer et al., 2022). The overuse of antibiotics can lead to management failure to treat or prevent infection and antimicrobial resistance – the future consequence of the COVID-19 pandemic (Surandi et al., 2022). Therefore, this study aims to determine the prevalence and frequency of antibiotics utilization among COVID-19 patients in a selected hospital in Koronadal City.

## METHODOLOGY

This study described the previous state of COVID-19 patients using the antibiotics in a selected hospital in Koronadal City. The researcher then conducted a retrospective study and a total population sampling method to collect the data of the respondents. Respondents of this study are based

on the numbers of confirmed COVID-19 patients from May 2020 to February 2022.

After the collection of the data, the researchers utilized frequency and percentage to present continuous and categorical data and descriptive statistics with confidence intervals. Also, the researchers utilized the multiple regression analysis to determine if there is a significant relationship on the prevalence and frequency of antibiotics utilization among COVID-19 patients based on demographic profile.

**Ethical considerations**

For this study, researchers assure that the data collected were safe and secured. All personal information will be kept confidential and all data given will be hidden from anyone for respondent’s privacy and protection. Researchers will abide what is written in Republic Act No. 10173 or the Data Privacy Act of 2012. Protection of respondent’s privacy and confidentiality will be private and protected. And this research study is for educational purposes only.

**RESULTS**

**Demographic Profile**

Age	Frequency	Percentage
Below 18	15	1.11%
18-30	39	2.88%
31-45	301	22.21%
46-59	425	31.37%
60 and above	575	42.43%
Total	1355	100%

**Table 1.** *The demographic profile of the respondents in terms of age*

Table 1 shows the demographic profile of the respondents in terms of age. It can be seen that there are 15 or 1.11% who are below 18 years old. There are 39 or 2.88% who are 18 to 30 years old 301 or 22.21% who are 31 to 45 years old 425 or 31.37% who are 46 to 59 years old. And there are 575 or 42.43% who are 60 years old and above. It indicates that most of the COVID-19 patients were 60 years old and above which means that they have a weaker immunity.

According to Arbaje et al. (2022), older people are especially vulnerable to severe illness. The research shows that adults, 60 years old and older, especially those with pre-existing medical conditions, especially hypertension, heart disease, lung disease, diabetes or cancer are more likely to have severe — even deadly — coronavirus infection than other age groups. In addition, Yanez et al. (2021), stated that the largest reported case-fatality series from Northern Italy in patients 60 years or older was 36%

than in younger patients which was 15%. Older people are vulnerable to COVID-19 because of physical and social reasons. Older people don't have strong immune system so they are more vulnerable to infectious disease. They're also more likely to have heart, lung, kidney disease or diabetes - all of which reduce the body's ability to fight infection (Tulenکو, 2020).

**Table 2.** *The demographic profile of the respondents in terms of sex*

Sex	Frequency	Percentage
Male	765	56.46%
Female	590	43.54%
Total	1355	100%

In terms of sex, there are 765 or 56.46% respondents who are male. And there are 590 or 43.54% who are female. This indicates that male patients are more prone to COVID-19.

Hasan & Rahman (2021) stated that 60.12% of male became more infected to SARS-CoV-2 than females with a percentage of 39.88. Also, among the 43-case series, 13 (30.2%) were diagnosed with mild or moderate pneumonia, while 14 (32.6%) and 16 (37.2%) were diagnosed with critical or severe pneumonia, respectively. Chi-square ( $\chi^2$ ) test for trend indicated that men's cases of COVID-19 tended to be more serious than women's ( $P = 0.035$ ) according to the clinical classification of severity. Males are considered the weaker sex in aspects related to endurance and infection control. Studies show that viral RNA clearance is delayed in males infected with COVID-19.

In addition, a recent study has indicated that the testis can harbor coronavirus and

consequently, males show delayed viral clearance according to Wu et al. (2020). Also, males show higher mortality from diseases including heart disease, diabetes, liver disease, and cancer. Since these diseases are known to show sex-specific occurrence, they could be contributing factors for the sex-biased mortality from COVID-19 (Pradhan et al. 2021).

**Table 3.** *The demographic profile of the respondents in terms of comorbidities*

Comorbidities	Frequency	Percentage
Hypertension	586	39.65%
Asthma	84	5.68%
Diabetes/Diabetes Mellitus	328	22.19%
Coronary Heart Disease	48	3.25%
None	317	21.45%
Others	115	7.78%
Total	1478	100%

In terms of the comorbidities experienced by the respondents, there are 586 or 39.65% of patients who experienced hypertension, 84 or 5.68% have asthma, 328 or 22.19% have diabetes (Diabetes Mellitus), 48 or 3.25% have coronary heart disease. Aside from the mentioned comorbidities, there are 115 or 7.78% disease that were not mentioned. There are 317 or 21.45% of the respondents who do not have any comorbidity. This means that most of the COVID-19 patients have hypertension.

Gou et al. (2019) stated that 69.5% of elderly patients had underlying diseases and the most common comorbidities included hypertension (43.8%), diabetes (25.7%), and cardiac disease (16.2%). In addition, 37.2% of patients had at least one underlying disorder (i.e., hypertension, diabetes, cardiovascular diseases, and chronic lung diseases) (Wu et al., 2020).

Furthermore, patient comorbidities such as hypertension and diabetes have been shown to be associated with higher COVID-19 mortality. Since the number of comorbid conditions steadily increases with age, this could be another logical explanation of the observed increased mortality in older patients (Yanez et al., 2020). Furthermore, according to Zeshan et al. (2021), patients with pneumoniae were diagnosed with aspiration, diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD), ischemic heart disease (IHD) and hypertension (HTN).

**Table 4.** *The demographic profile of the respondents in terms of their drug allergy*

Drug Allergen	Frequency	Percentage
Yes (Penicillin, Azithromycin)	9	0.66%
None	1346	99.34%
Total	1355	100%

In terms of the respondent's drug allergen, there are 9 or 0.66% who are allergic to any antibiotics given. There are also 1346 or 99.34% who are not allergic to any drugs given. This means that only few of the patients have drug allergen.

Penicillin allergy is a known cause of morbidity in hospitalized patients. The use of second-line antibiotics and broader-spectrum antibiotics as a result of the penicillin allergy label puts the patient at risk for a poorer treatment response, longer hospital stay, higher health-care expenses, and higher risk of infection with drug-resistant organisms. Penicillin allergy label is common; up to 10% of patients was reported to have PCN allergy with symptoms varying from rash and hives to severe drug reactions (Dalessio et al., 2020). Brewer (2020) added that

azithromycin can cause allergic reaction to other COVID-19 patients like trouble breathing, swelling of throat or tongue and severe skin reactions, based on

Dalessio et al. (2021) stated that penicillin allergy label was the result in the use of second-line antibiotics and broader-spectrum antibiotics that may put the patient at risk for poorer response to treatment. Up to 10% of patients was reported to have PCN allergy with symptoms varying from rash and hives to severe drug reactions including anaphylaxis. COVID-19 symptoms can be mild or severe. Poorer clinical outcomes are correlated with a number of comorbidities. In COVID-19, the use of antibiotics is prevalent, and penicillin allergies may affect the antibiotics chosen and the results of the disease (Kaminski, 2021). For the development of risk mitigation strategies, such as antibiotic stewardship programs to reduce needless antibiotic usage in the patients, patients with penicillin allergy could be prioritized as a higher-risk group for COVID-19 (Southall, 2021).

## Prevalence of Antibiotics

**Table 5.** Usage of antibiotics on patients

Usage of antibiotic on patients	Frequency	Percentage
Severe Pneumonia	236	15.35%
Moderate Pneumonia	541	35.25%
Respiratory Tract Infection	102	6.62%
Meningitis	6	0.37%
Sore Throat	84	5.47%
Abdominal infections	12	0.76%
Chronic bronchitis	486	31.64%
Sepsis	7	0.44%
Urinary Tract Infection	63	4.10%
Total	1535	100%

Table 5 shows the prevalence on the usage of antibiotics on COVID-19 patients. It can be observed that moderate pneumonia has the highest frequency of 541 or 35.25% followed by chronic bronchitis and severe pneumonia with a frequency of 486 or 31.64% and 236 or 15.35% respectively. On the other hand, meningitis has the lowest frequency of 6 or 0.37%. This means

that patients with pneumonia are mostly prescribed with antibiotics.

A limited percentage of individuals who took antibiotics for COVID-19 pneumonia had positive bacterial microbiology results. Antibiotic-treated patients frequently required additional oxygen and had more severe pneumonia. Antibiotic patients also experienced greater diarrhoea. Antibiotic use did not reduce the need for subsequent ICU admissions and was not independently linked to a decrease in mortality rate (Ong et al., 2022).

Ginsburg & Klugman (2020), stated that most

Duration of antibiotic treatment to COVID-19 patients	Frequency	Percentage
Less than 7 days	246	18.15%
More than 7 days	1109	81.85%
Total	1355	100%

bacterial pneumonias caught early enough can be safely and effectively treated with antibiotics, and broad-spectrum antibiotics are being widely used in patients with COVID-19.

**Table 6.** Duration of antibiotic treatment to COVID-19 patients

Table 6 shows the duration of antibiotic treatment to COVID-19 patients. As can be observed, 1,109 or 81.85% were treated in more than 7 days and 246 or 18.15% are treated less than 7 days.

Mustafa et al. (2020) stated that the duration of antibiotic treatments in the ICU was longer (12 days) than reported in other studies in which antibiotic treatment lasted more than 7 days. This finding indicates the non-critical use of antibiotics in most COVID-19 cases, which

practice has been opposed by European Study Group on Antibiotic Policies (ESGAP).

Similar results on comorbidities were found in other investigations of COVID-19 patients who were admitted to an ICU. The majority of patients with COVID-19 were admitted on days 7, 8, and 10 after the onset of symptoms. However, symptoms began in an average of 9.27 days before patients were admitted to the ICU. These patients, before being sent to the ICU, were hospitalized for an average of 6.53 days; the majority of cases were diagnosed on days 5, 7, and 8 (Countou et al. & Sharifipour et al., 2021).

**Table 7.** Antibiotic used in the ICUs

Antibiotic used in the ICUs	Frequency	Percentage
Azithromycin	18	26.87%
Azithromycin + Clarithromycin	7	10.45%
Piperacillin + Tazobactam	16	23.88%
Ceftriaxone	6	8.96%
Ceftriaxone + Vancomycin	5	7.46%
Meropenem + Piperacillin + Tazobactam	6	8.96%
Levofloxacin	1	1.49%
Others	8	11.93%
Total	67	100%

Table 7 shows the prevalence of antibiotics among COVID-19 patients on the use of antibiotics in ICUs. It can be seen that there are 67 patients who were admitted in ICU. Among them were given azithromycin which has the highest frequency of 18 or 26.87%. It is followed

by piperacillin + tazobactam with a frequency of 16 or 23.88%. On the other hand, levofloxacin has least frequency of 1 which indicates as the least used antibiotic in ICUs.

The prevalence of patients admitted to intensive care units (ICUs) with SARS-CoV-2 infection who were prescribed antibiotics is undetermined and might contribute to the increased global antibiotic resistance (Abu-Rub et al., 2021). During hospitalization, antibiotics were prescribed in over 90% of cases. In ICU, they were prescribed for all patients. The use of antibiotics at this level was also reported by Miranda et al & Tolaj et al. (2020). Azithromycin was also the most used antibiotic in ICU (30 cases; 57.7%) followed by piperacillin/tazobactam (28 cases; 53.8%), ceftriaxone (17 cases; 32.7%), and fluoroquinolone or macrolides (35 cases; 67.3%) according to Mustafa et al. (2020).

Furthermore, Tolaj et al. (2020) reported that patients in the ICU were treated with a combination of antibiotics; three antibiotics (29 cases; 55.8%), two antibiotics (18 cases; 34.6%), and rarely with one antibiotic (5 cases; 9.6%). Miranda et al. (2020) stated that antibiotics in COVID-19 cases are given in 71% of cases, out of these, 45% were part of combination therapy, and 25% was single antibiotic. The similar high percentage (71.9%) of antibiotic administration in COVID-19 patients was also reported by Langford et al. (2021).

Azithromycin, a macrolide antibiotic, has a well-known safety profile. It is easily produced at a low cost as a generic drug and declared as an essential medicine by the WHO (Lepere et al., 2020).

### Frequency of Antibiotics Utilization

**Table 8.** *Frequently prescribed antibiotic*

Frequently Prescribed antibiotic	Frequency	Percentage
Azithromycin	367	23.91%
Piperacillin + Tazobactam	289	18.83%
Amikacin	80	5.21%
Ceftriaxone	201	13.09%
Cefuroxime	90	5.86%
Meropenem	91	5.93%
Co-amoxiclav	234	15.24%
Levofloxacin	134	8.73%
Vancomycin	49	3.20%
Total	1535	100%

Among the antibiotics given to COVID-19 patients, table 8 shows the frequency of antibiotics utilization among COVID-19 patients. Among these is azithromycin which has the highest frequency of 367 or 23.91% followed by piperacillin + tazobactam with a frequency of 289 or 18.83%. Among the antibiotics prescribed, vancomycin has the lowest frequency of 49 or 3.20%. This means that the highly used

antibiotic is used to cure bronchitis and pneumonia.

Among the 78 studies that reported the type of antibiotics used in the treatment of COVID-19 patients, azithromycin was the most frequently prescribed antibiotic (accounting for 28.0% of studies) followed by ceftriaxone (17.8%), moxifloxacin (14.4%), meropenem (14.4%), and piperacillin/tazobactam (12.7%). The study also shows that there is an increase in the use of azithromycin and has been documented amid the pandemic in many African countries (Cong et al., 2021). Evidence has also shown that routine use of azithromycin for reducing time to recovery or risk of hospitalization for people with suspected COVID-19 in the community has been documented to offer no benefit (Adebisi et al., 2021).

As the pandemic continues to spread, there have been efforts to re-purpose existing medications as treatments for COVID-19 disease. One potential treatment is an antibiotic called azithromycin. Azithromycin is widely used to treat respiratory and skin infections, and is generally considered safe for its current approved indications, according to Gbinigie, K. (2021). An online survey found that azithromycin is one of the most commonly prescribed treatment for COVID-19 by doctors. Azithromycin is commonly used in patients with COVID-19 for either its antimicrobial, anti-inflammatory, or purported antiviral activity. The anti-inflammatory effects of azithromycin may reduce cytokine levels that may help prevent progression to tissue damage and severe COVID-19, especially if administered early in the disease course (Oldenburg, C. & Brogdon, J., 2021).



Route of Administration	Frequency	Percentage
Oral (Azithromycin, Clindamycin, Levofloxacin,, and Co- amoxiclav)	631	41.11%
Intravenous (Azithromycin, Cefuroxime, Piperacillin+tazo bactam, Amikacin, and Vancomycin)	904	58.89%
Total	1535	100%

**Table 9.** Route of administration

In table 9, it can be seen that 631 or 41.11% of the given antibiotics such as azithromycin, clindamycin, levofloxacin, and co-amoxiclav are taken orally and 904 or 58.89% of antibiotics like azithromycin, cefuroxime, piperacillin+tazobactam, amikacin, and vancomycin are administered intravenously.

Intravenous (IV) route of administration of antibiotics was mostly used to patients which were defined as having moderate or severe COVID-19 infection and may have had an impaired oral absorption (Chedid et al., 2021).

Spencer et al. (2018) stated that antibiotics are commonly administered through intravenous (IV) administration. Many of these drugs can be administered via IV push, intermittent IV infusion, and/or continuous IV infusion, depending on the medication. IV push allows for administration of an antibiotic in a minimal fluid volume. And the faster administration time may provide advantages in the emergency department (ED), so that time-to-first-dose can be shortened.

**Table 10.** Dosage strength

Dosage strength	Frequency	Percentage
200mg (Cefixime)	61	3.97%
250mg (Azithromycin, Ceftriaxone)	46	3.01%
400mg (Moxifloxacin)	49	3.20%
500mg (Azithromycin, Cefuroxime, Amikacin, Levofloxacin, Meropenem, Vancomycin, Co- amoxiclav)	802	52.25%
750mg (Levofloxacin)	5	0.35%
1g (Ceftriaxone, Meropenem, Vancomycin)	353	23.04%
2g (Ceftriaxone)	92	6.07%

4.5g (Piperacillin + Tazobactam)	127	8.11%
Total	1535	100%

Table 10 shows the frequency of antibiotics utilization among COVID-19 patients in terms of dosage strength. It can be seen that the dosage of 500mg antibiotic (such as azithromycin, cefuroxime, amikacin, levofloxacin, meropenem, vancomycin, and co-amoxiclav) has the highest frequency of 802 or 52.25%. It is followed by 1g of antibiotic like (ceftriaxone, meropenem, and vancomycin) with a frequency of 353 or 23.04%. On the other hand, 750mg (levofloxacin) of dosage were given 5 times only to patients.

Ginsburg et al. (2020) reported that azithromycin 500 mg is commonly used in primary care for bacterial respiratory infections and is similar to the dose used in early studies for COVID-19. Also, azithromycin was

Test Variables		F-value	P-value	Remarks	
Sex	<b>Prevalence of antibiotic among Covid-19 patients</b>	Usage of antibiotic	0.356	0.433	Not significant
		Duration of antibiotic	0.041	0.127	Not significant
		Antibiotic used in ICUs	466.28	0.0001	Not significant
	<b>Frequency of antibiotics utilization</b>	Frequently prescribed antibiotic	1.294	0.288	Not significant
		Route of administration	0.411	0.363	Not significant
		Dosage strength	0.212	0.341	Not significant

administered intravenously as a 1-hour infusion at a dosage of 500 mg, followed by 500 mg orally. Cefuroxime was administered intravenously at a dosage of 750 mg, followed by cefuroxime axetil at a dosage of 500 mg orally (Vergis et al., 2020).

### Significant Relationship

**Table 11.** Testing the significant relationship on the prevalence and the frequency of antibiotics utilization among COVID-19 patients based on their age

As supported by the computed f-value and p-value, the usage of antibiotic, duration, the antibiotics used in ICU, frequently prescribed antibiotic and the dosage strength has a significant relationship with the age of the patient. On the other hand, the route of administration has a p value greater than  $\alpha=0.05$  which means that it has no significant relationship with the age of the patient.

Individuals older than 65 years of age has higher antibiotic consumption. Antibiotic consumption by the elderly population was found to be 11% to 45% with a significant rise over the past decade (Marra et al., 2010). Also, Kong et al. (2019) stated that as much as 18% of the total antibiotic prescriptions in older adults was unnecessary, with 54% of them prescribed for acute respiratory conditions. Furthermore, the fundamental outcomes were the prevalence of ICU COVID-19 patients with prescribed antibiotics stratified by age, type of antibiotics prescribed, and the presence of co-infections and comorbidities (Abu-Rub et al., 2021).

**Table 12.** Testing the significant relationship on the prevalence and the frequency of antibiotics utilization among COVID-19 patients based on their sex

Test Variables		F-value	P-value	Remarks	
Age	<b>Prevalence of antibiotic among Covid-19 patients</b>	Usage of antibiotic	1.375	0.32	Significant
		Duration of antibiotic	0.159	0.066	Significant
		Antibiotic used in ICUs	1799.6	0.002	Significant
	<b>Frequency of antibiotics utilization</b>	Frequently prescribed antibiotic	4.992	0.025	Significant
		Route of administration	1.589	0.528	Not significant
	Dosage strength	0.817	0.047	Significant	

The result, as supported by the computed f-value and p-value, which are all greater than  $\alpha=0.05$  ( $p\text{-value} > \alpha$ ), is not to reject the null hypothesis. This implies that there is no significant relationship between the prevalence of antibiotic and the frequency of antibiotics utilization among COVID-19 patients and their sex.

Griffith et al. (2020) stated that a multinational health research database using the TriNetX Network showed that among 14,712 male and female patients with confirmed COVID-19, men were older. Also, the reason for the difference in sex is not clear. They considered that it might be related to differential exposure to antibiotics, with females being more likely to seek medical attention (and therefore be exposed to antibiotics) in the outpatient setting than men. Also, exposure to antibiotics is less likely to be related to sex. However, they found that there is no significant association between sex and antibiotic use, and the effect of sex on acquisition mode was not modified by antibiotic use (Khanna & Pardi, 2011).

**Table 13.** Testing the significant relationship on the prevalence and the frequency of antibiotics utilization among COVID-19 patients based on their comorbidities

Test Variables		F-value	P-value	Remarks	
Comorbidities	<b>Prevalence of antibiotic among Covid-19 patients</b>	Usage of antibiotic	20.802	0.002	Significant
		Duration of antibiotic	2.400	0.031	Not significant
		Antibiotic used in ICUs	27216.93	0.0001	Significant
	<b>Frequency of antibiotics utilization</b>	Frequently prescribed antibiotic	75.503	0.00024	Significant
		Route of administration	23.985	0.128	Not significant
		Dosage strength	12.361	0.198	Not significant

As supported by the computed F-value and p-value the duration of the antibiotic, the antibiotics used in ICU and frequently prescribed antibiotic has a significant relationship with the comorbidities of the patient. On the other hand, the usage of antibiotic, the route of administration and the dosage strength has a p value greater than  $\alpha=0.05$  which means that it has no significant relationship with the comorbidity of the patient.

Specific comorbidities of the patients should be addressed when deciding the type of antibiotic and route of administration. Examining the relationship between the onset of comorbidity and antibiotic prescribing in primary care for 8 types of comorbidities that can increase patients' susceptibility to or risk of negative outcomes from bacterial infection will open opportunities to reduce antibiotic prescribing to patients with comorbidity (Chedid et al., 2021). In addition, an increased prevalence of antibiotic usage among patients who were diagnosed with comorbidity and higher frequency of antibiotic use in a subset of patients were the primary factors driving the increase in prescribing rates (Rockenschaub et al., 2019).

**Table 14.** Testing the significant relationship on the prevalence and the frequency of antibiotics utilization among COVID-19 patients based on their drug allergies.

Test Variables		F-value	P-value	Remarks	
Drug Allergen	<b>Prevalence of antibiotic among Covid-19 patients</b>	Usage of antibiotic	20.802	0.002	Significant
		Duration of antibiotic	2.400	0.364	Not significant
		Antibiotic used in ICUs	27216.93	0.00001	Significant
	<b>Frequency of antibiotics utilization</b>	Frequently prescribed antibiotic	75.503	0.000024	Significant
		Route of administration	23.985	0.128	Not significant
		Dosage strength	12.361	0.198	Not significant

As supported by the computed F-value and p-value the usage of antibiotic, the antibiotics used in ICU and frequently prescribed antibiotic has a significant relationship with the drug allergen of the patient. On the other hand, the duration of antibiotic, the route of administration and the dosage strength has a p value greater than  $\alpha=0.05$

which means that it has no significant relationship with the drug allergen of the patient.

Kaminsky et al. (2021) reported that adult patients diagnosed with COVID-19 with and without antibiotic allergy were matched on demographics and on comorbid conditions associated with more severe illness in COVID-19. The outcomes included the 30-day risk of hospitalization, acute respiratory failure, need for intensive level of care, need for mechanical ventilation, mortality, and bacterial infection after COVID-19 diagnosis. The use of antibiotics in these patients was also explored.

## DISCUSSION

This study aimed to determine the level of prevalence and antibiotic utilization of COVID-19 patients in selected hospitals of Koronadal City. It retrospectively reviewed infections and the usage of antibiotics through the medical records of all patients recorded with bacterial infections who were enrolled into the hospitals during the period of COVID-19 pandemic. The respondents on this study were based on the numbers of confirmed COVID-19 patients from May 2020 to February 2022 using the total population sampling technique.

In the demographic profile, sixty (60) years old and above are more prone to COVID-19. It indicates that most of them have a weaker immunity. The study shows that adults 60 and older, especially those with preexisting medical conditions, such as hypertension, heart disease, lung disease, diabetes or cancer are more likely to have severe — even deadly — coronavirus infection than other age groups. Meanwhile, the findings shows that the highest percentage of comorbidities of the respondents were hypertension, and male patients were more prone to COVID-19 because they are considered the

weaker sex in aspects related to endurance and infection control. Studies show that viral RNA clearance is delayed in males with COVID-19. Also, males show higher mortality from diseases including heart disease, diabetes, liver disease, and cancer. Since these diseases are known to show sex-specific occurrence, they could be contributing factors for the sex-biased mortality from COVID-19. In terms of the usage of antibiotics on COVID-19 patients, moderate pneumonia has the highest percentage. And most of the COVID-19 patients' antibiotics treatment lasts for more than seven (7) days and the highest percentage of antibiotic used in the ICU was azithromycin.

According to patient's demographic profile, the computed F-value and P-value of the usage of antibiotics, duration, antibiotics used in ICU, and the dosage strength of antibiotics has a significant relationship with the age of the patients. While the sex of patients indicates that there are no significant relationships between the prevalence of antibiotics and the frequency of antibiotics utilization among COVID-19 patients. In addition, the antibiotics' usage, antibiotics used in ICU, and frequently prescribed antibiotics has a significant relationship with the drug allergen of the patients.

## CONCLUSION

This study was conducted to determine the prevalence and antibiotic utilization among COVID-19 patients in selected hospital in Koronadal City. Considering the results of the study, it is evident that the demographic profiles of the COVID-19 patients matter to the prevalence and antibiotic utilization. The results also showed a close frequency rate of each factor on the variables which cannot be disregarded and

should also be considered potential reasons in understanding more the utilization of antibiotics in COVID-19 patients. However, this study provides further evidence that a significant proportion of patient presenting to hospital with COVID-19 had taken antibiotics. In conclusion, male patients and patients aged sixty (60) and above are more prone to COVID-19. Meanwhile, in terms of the prevalence and usage of antibiotic among COVID-19 patients, moderate pneumonia has the highest frequency, azithromycin was the most prescribed antibiotic, and duration of antibiotic treatment is more than seven (7) days and mostly of the antibiotic prescribed to the patients are administered parentally. In addition, the rest of the demographic profile accept the null hypothesis and it implies that there is no significant relationship between the prevalence and the frequency of antibiotics utilization among COVID-19 patients.

## RECOMMENDATIONS

Based on the result of the study and research findings, the researchers have made the following recommendations:

### For the future researchers:

- Recommended to conduct more studies regarding the relationship of demographic profiles and antibiotic utilization to other areas affected by COVID-19 virus in order to gather a more synchronized data.
- Conduct research related to prevalence and antibiotic utilization among COVID-19 patients not only on a selected hospital in Koronadal City but also internationally.
- Have them conduct a qualitative, descriptive or prospective research

related to prevalence and antibiotic utilization among COVID-19 patients.

### Health care providers:

- Recommended to better understand the prevalence and antibiotic utilization among COVID-19 patients.
- Recommended that the empirical antibiotic regimens in case of suspected bacterial co-infection depends on the severity of disease (moderate and severe) and according to local and/or national guidelines.
- Generally, suggest the restrictive use of antibiotic drugs in patients with proven or a high likelihood of COVID-19. This especially applies for patients upon admission who are moderate to severely ill.
- Recommended to follow local and/or national guideline recommendations on antibacterial treatment for patients with COVID-19 and suspected bacterial secondary infection.

### For the Local Government Unit

- Recommended to provide health and continuous monitoring and information dissemination of the proper utilization for COVID-19 patients.
- Recommended to provide the hospital an appropriate amount of antibiotics plan to monitor or track down the result of the prescribe antibiotics on COVID-19 patients.

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