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Strategizing Antiviral Medication Usage for Chronic Kidney Disease Patients with SARS-CoV-2: Insights from Inpatient Pharmacy Practices at Hospital Settings

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ABSTRACT

The emergence of the SARS-CoV-2 virus in 2020 led to the onset of the COVID-19 pandemic, posing significant challenges globally. As of December 19, 2021, the worldwide confirmed cases surpassed 273 million, with a devastating death toll exceeding 5.3 million. Indonesia reported its first case on March 2, 2020, and has since faced escalating numbers, necessitating urgent attention.Chronic kidney disease (CKD) has emerged as a commonly occurring comorbidity among COVID-19 patients, drawing attention due to the vulnerability of CKD patients to medical complications. Understanding the use of antiviral drugs in CKD patients with COVID-19 is essential, considering the risks of drug toxicity and interactions. This study aims to investigate the frequency of antiviral drug usage in COVID-19 patients with CKD, providing insights into treatment strategies and guiding medical practitioners. Conducted at Dr. Soedomo Trenggalek Regional Hospital, the research utilizes a cross-sectional, non-experimental design and purposive sampling method. Data collection involves patients' medical records, focusing on demographics, antiviral drug usage, disease severity, treatment duration, mortality rates, and potential side effects. The demographic analysis reveals that the majority of COVID-19 patients with CKD are aged 50 and above, with males comprising 74% of the cohort. Age and gender influence disease severity, with older individuals and males at higher risk. Antiviral drug usage predominantly includes favipiravir (64%) and remdesivir (36%), underscoring their importance in treatment protocols. Decisions regarding antiviral therapy in CKD patients with COVID-19 require careful consideration of benefits, risks, and patient characteristics.

Keywords :
COVID-19, Chronic Kidney Disease (CKD), Antiviral Drugs, Treatment Strategies, Patient Outcomes

INTRODUCTION

In 2020, the global community faced significant challenges with the emergence of a new virus known as SARS-CoV-2, leading to the onset of the COVID-19 pandemic (Nugroho, B. P., 2024). Acknowledged as a serious health crisis, the control of COVID-19

has become an immensely important issue (Prasetyawn, F., 2023). By December 19, 2021, the total confirmed cases of COVID-19 worldwide surpassed 273 million, with a tragic death toll exceeding 5.3 million lives. Indonesia reported its first COVID-19 case on March 2, 2020, approximately four months after the virus was first detected in Wuhan, China (Oktadiana, I., 2024). Since then, the number of cases in Indonesia has continued to rise, demanding significant attention (Shaharin, N. S., 2022). Additionally, the identification of various virus variants circulating in different regions of Indonesia has increased the risk of infection and posed challenges to the effectiveness of vaccines (Prasetyawn, F., 2023).

During the ongoing COVID-19 pandemic, chronic kidney disease (CKD) has been recognized as one of the commonly occurring comorbidities in patients infected with the SARS-CoV-2 virus (Velavan, T. P., 2021). This situation has garnered serious attention in the field of public health because CKD patients tend to have a vulnerable immune system and are at risk of experiencing various other medical complications (Fatmawati, E. N., 2024). Furthermore, research experts and medical practitioners have highlighted the importance of a deeper understanding of the use of antiviral drugs in CKD patients infected with COVID-19, considering the potential risks of drug toxicity and possible drug interactions that may occur (Saristiana, Y., 2023).

Previous studies have shown that the use of antiviral drugs, such as favipiravir and remdesivir, has been a crucial strategy in managing COVID-19 (Ardianto, N., 2023). However, the use of these drugs must be carefully considered in CKD patients due to the risk of drug accumulation and increased toxicity risk. Therefore, a comprehensive understanding of the frequency of antiviral drug usage in this population is highly important to provide accurate guidance in the clinical management of CKD patients infected with COVID-19 (Diao, X., 2021). Research related to the frequency of antiviral drug usage in CKD patients with COVID-19 can also provide new insights into effective and safe treatment strategies in managing this vulnerable patient population (Khumaeni, E. H., 2023). Thus, this research aims to fill the knowledge gap in medical literature and provide valuable contributions to the development of better clinical guidelines in managing COVID-19 in CKD patients (Nababan, O. A., 2024).

Considering this background, research on the frequency of antiviral drug usage in SARS-CoV-2 patients with chronic kidney disease in inpatient pharmacy settings is expected to provide a deeper understanding of optimal treatment strategies and provide appropriate guidance for medical practitioners in caring for patients affected by both conditions (Alifa, C. S., 2023). Although COVID-19 can affect individuals of all age groups, its clinical impact on children is generally milder compared to adults. As the pandemic progresses, variations in infection rates, hospitalization rates, and mortality rates across countries and regions have prompted investigations into risk factors and protective measures against COVID-19 (Prasetyawan, F., 2023). Key determinants influencing the severity and mortality of COVID-19 include laboratory values, levels of proinflammatory cytokines, and the presence of other comorbidities (Yıldırım, 2022).

The severity classification of COVID-19 includes asymptomatic, mild, moderate, severe, and critical categories (Akhmal, F., 2023). Chronic kidney disease stands out as a complicating factor that renders the immune system more vulnerable, thereby exacerbating the impact of COVID-19 (Mildawati, R., 2024). Consequently, the COVID-19 pandemic demands serious attention due to its potential to significantly increase the global death rate (Sherina, 2023).

Individuals with chronic kidney failure face a high risk of severe COVID-19 infection. Therefore, strict prevention measures are recommended for this population to minimize the risk of virus transmission. To reduce the spread of COVID-19, chronic kidney failure patients exposed to the virus should undergo hemodialysis following stricter protocols (Rudiansyah, 2020).

Currently, there are no specific recommendations for the prevention or treatment of COVID-19. Treatment protocols are primarily based on in vivo, in vitro, and controlled randomized trials. Broad-spectrum antiviral drugs, including nucleoside analogs, neuraminidase inhibitors, SARS-CoV-2 RNA polymerase nucleotide analog inhibitors, RNA-dependent RNA polymerase (RdRp) inhibitors, and HIV protease inhibitors, are used until specific antivirals are available. The use of antivirals for COVID-19 patients in Indonesia depends on the severity of symptoms (Hakim, A.L., 2023). Commonly used antivirals for COVID-19 in various countries include lopinavir or ritonavir, remdesivir, oseltamivir, chloroquine, hydroxychloroquine, and Favipiravir (Zhong., 2020).

METHODS

This study is a cross-sectional, non-experimental study that utilizes purposive sampling method to select participants. The primary data are derived from patients' medical records, particularly in a retrospective format. The focus of this study is on individuals suffering from COVID-19 and Chronic Kidney Disease (CKD) undergoing antivirus therapy. The research objectives include evaluating the reduction in disease severity after antivirus treatment, determining the treatment duration for this group, assessing the mortality rate, and examining potential side effects associated with antivirus drugs in COVID-19 patients with CKD.

The study involves a non-interventional cross-sectional examination, utilizing a purposive selection approach based on the medical records of individuals suffering from both COVID-19 and Chronic Kidney Disease (CKD). The main aim is to understand the reduction in disease severity, treatment duration, mortality rate, and potential side effects of antivirus drugs in individuals with this dual condition after undergoing treatment.

This research was conducted at Dr. Soedomo Trenggalek Regional Hospital, located at Jl. dr. Sutomo No.2, Cengkong, Tamanan, Kec. Trenggalek, Trenggalek Regency, East Java 66311, during the month of August 2023. Data collection involves various instruments from Medical Records, including patients' demographic information, records of antivirus drug usage, oxygen saturation examination results, ClCr examination, and COVID-19 tests. Data analysis consists of two segments: Descriptive and Inferential. Descriptive analysis employs percentages to describe variables related to antivirus drugs (independent) and COVID-19 patients with chronic kidney disease. Univariate analysis uses descriptive methods to depict independent variables of antivirus drugs and dependent variables of COVID-19 patients with chronic kidney disease. During this data analysis, percentages are applied as descriptive tools, using the percentage formula to convey information about the relationship between antivirus drug variables and the condition of COVID-19 patients with chronic kidney disease.

The formula for calculating percentages, represented as P = n : (Total Samples) x 100%, plays a fundamental role in numerous analytical endeavors spanning diverse disciplines. Within this equation, the variable "P" denotes the percentage, signifying the relative magnitude of a specific quantity within a given dataset. It serves as a measure of

proportion or fraction, elucidating the significance of a particular subset of data. Meanwhile, "n" represents the number of constituent parts or elements contributing to the desired percentage value. These components may encompass various entities, ranging from individuals within a population to components within a mixture or occurrences of specific events within a dataset. The term "Total Samples" encompasses the entirety of the population or dataset under examination, providing the foundation for determining the relative proportion of the specific subset being analyzed. By multiplying the fraction of parts (n) by 100%, the formula converts this proportion into a percentage, thereby expressing it as a value relative to the total sample size.

For instance, let's consider a scenario where we're investigating the percentage of COVID-19 patients with chronic kidney disease experiencing adverse reactions to antivirus drugs within a hospital population. Here, "P" would represent the percentage of patients encountering adverse reactions, with "n" denoting the count of patients exhibiting such reactions. The total samples would encompass the entire population of COVID-19 patients with chronic kidney disease under study. By applying the percentage formula to this dataset, we can quantitatively articulate the prevalence of adverse reactions within the patient population.

Comprehending and appropriately applying the percentage formula are imperative for precise data interpretation and informed decision-making. It enables researchers, analysts, and policymakers to discern the relative importance of specific subsets within a larger dataset, facilitating comparisons between different groups or time periods and enabling the identification of trends and patterns. Through the provision of a standardized metric for expressing proportions, percentages augment the clarity and communicative efficacy of statistical analyses. This formula is widely applicable across numerous fields, including epidemiology, economics, demography, and quality control, where the evaluation of relative proportions is integral to understanding phenomena and guiding actions.

In practical terms, the percentage formula finds application in diverse contexts. In pharmaceutical research, for example, it can be utilized to evaluate the effectiveness of a drug by determining the percentage of patients experiencing symptom alleviation. In educational settings, it can indicate the proportion of students achieving proficiency in standardized tests. Similarly, in marketing, it can quantify the percentage of consumers favoring a particular product or brand. Through the systematic application of the percentage formula, stakeholders can gain valuable insights into the distribution, prevalence, and impact of various phenomena, thereby facilitating informed decision-making and problem-solving.

RESULTS AND DISCUSSION

In 2022, RSUD dr. Soedomo faced the challenge of managing a cohort of 50 patients diagnosed with Coronavirus Disease 2019 (COVID-19) while concurrently suffering from chronic kidney disease. These patients presented a complex medical scenario that necessitated specialized care and attention. As frontline healthcare providers, the medical team at RSUD dr. Soedomo had to navigate the intricate interplay between COVID-19 and chronic kidney disease, both of which can significantly impact patient outcomes. The demographic profile of these patients offers valuable insights into the population being studied. Understanding the demographic characteristics, such as age, gender,

comorbidities, and other relevant factors, is essential for tailoring treatment strategies and optimizing patient care. Among the demographic parameters, age plays a crucial role, as older individuals are generally at higher risk of severe illness and complications from COVID-19 and chronic kidney disease.

Gender may also influence disease progression and treatment response, as certain conditions may manifest differently in males and females. Comorbidities, such as hypertension, diabetes, and cardiovascular disease, are common in patients with both COVID-19 and chronic kidney disease and can exacerbate the severity of illness. Socioeconomic factors, including access to healthcare resources and socioeconomic status, may impact disease management and treatment outcomes. Additionally, geographic location and environmental factors may contribute to variations in disease prevalence and presentation among different populations.

The demographic data collected from these patients provide a comprehensive understanding of the population demographics and help identify patterns and trends that may influence disease management and outcomes. Analyzing demographic characteristics allows healthcare providers to tailor interventions and allocate resources effectively to address the specific needs of this patient population. Furthermore, demographic information can inform public health initiatives and policies aimed at preventing and controlling the spread of COVID-19 and mitigating the impact of chronic kidney disease. By examining demographic trends over time, researchers and policymakers can monitor changes in disease burden and identify populations at higher risk for targeted interventions. The demographic profile of COVID-19 patients with chronic kidney disease is essential for developing evidence-based strategies to improve patient outcomes and enhance healthcare delivery.

Tabel 1. Carakteristik Responden COVID-19 With CKD

Carakteristik Responden	Total	
	Frekuensi	Persentase (%)
Age		
<15 Years	4	8
16-35 Years	7	14
36- 50 Years	9	18
> 50 Years	30	60
Gender		
Male	37	74
Female	13	26
Total	50	100

Analvyzing the demographic information of confirmed COVID-19 patients with chronic kidney disease at RSUD dr. Soedomo Trenggalek, it is evident that the majority, accounting for 60%, are aged 50 and above. The number of males dominates at 74%. Factors influencing the severity of COVID-19 are related to demographics such as age and gender. Older individuals, who often experience physiological function decline including immune systems governed by B and T cells (Fitriani, NI. 2020), tend to be more vulnerable to various diseases.

Gender differences in ACE2 and TMPRSS2 receptor expression may contribute to variations in the severity and mortality rates of COVID-19 (Di Gennaro, 2020). Patient

recovery is associated with exiting the critical period after undergoing treatment for 4 to 7 days, significantly reducing the risk of death. Among patients with kidney disease, the risk of contracting COVID-19 is three times higher than those without chronic kidney disease. This increased risk is attributed to impaired immune systems and routine hospital visits for hemodialysis, which increase the risk of transmission unless strict adherence to health protocols during hospitalization is ensured.

Table 2. Frequency of Antiviral Drug Usage

Nama Obat	Frekuensi (n)	Persentase (%)
Favipirafir	32	64
Remdesivir	18	36
Total	50	100

At RSUD dr. Soetomo, two common antiviral drugs used in combating COVID-19 are favipiravir and remdesivir. The majority of patients, comprising 64%, receive favipiravir, while the remaining 36% are administered remdesivir. Favipiravir, as one of the antivirals with broad coverage, has proven to be effective in clinical trials on patients infected with the COVID-19 virus. Typically, the maintenance dose of favipiravir ranges from 200 to 600 mg, administered twice daily, for 10 to 14 days. However, the initial dose may vary depending on the patient's response and condition, with the initial doses typically being 1600 mg, 1800 mg, or even 2400 mg.

For patients with chronic kidney disease, the use of favipiravir requires careful monitoring as this drug can accumulate in the body and increase the risk of toxicity. Therefore, the dose and frequency of favipiravir administration need to be adjusted according to the patient's kidney function. Remdesivir is also commonly used in the management of COVID-19, although not as popular as favipiravir. This drug is usually considered as an alternative therapy when favipiravir cannot be used or when there is a need to replace or supplement therapy. However, the effectiveness of remdesivir may vary depending on the clinical condition and patient's response to treatment.

The choice between favipiravir and remdesivir in managing COVID-19 in patients with chronic kidney disease should be carefully considered by the attending medical team. Such decisions should take into account the therapy's benefits, potential side effects, as well as the patient's overall medical condition and history. Thus, tailored management based on individual patient conditions may yield more optimal outcomes. Further research may be necessary to understand the comparison between these two types of antivirals, particularly in patients with chronic kidney disease. This can help improve the understanding and management of COVID-19 treatment in patients with complex medical conditions. Additionally, more in-depth research can also aid in finding more effective and safe treatment strategies for this vulnerable patient population.

At RSUD dr. Soetomo, the administration of favipiravir and remdesivir, two commonly used antiviral drugs, underscores the ongoing efforts to combat the COVID-19 pandemic. With 64% of patients receiving favipiravir and 36% receiving remdesivir, it's evident that these medications play a pivotal role in the treatment protocol adopted by the medical team. Favipiravir, renowned for its broad-spectrum antiviral activity, has garnered attention for its efficacy in clinical trials involving COVID-19 patients. The dosing regimen typically involves maintenance doses ranging from 200 to 600 mg, administered twice daily over a span of 10 to 14 days. However, initial dosages may vary based on individual patient

responses and overall health conditions, with initial doses often ranging from 1600 mg to 2400 mg. For patients grappling with chronic kidney disease, the utilization of favipiravir necessitates stringent monitoring due to its potential for accumulation in the body, elevating the risk of toxicity. Hence, adjustments to the dosage and frequency of favipiravir administration are imperative to align with the patient's renal function. Meanwhile, remdesivir, although not as extensively utilized as favipiravir, serves as a viable alternative therapy in cases where the latter is contraindicated or necessitates supplementation. The effectiveness of remdesivir hinges on various factors, including the patient's clinical status and their response to treatment.

The decision-making process regarding the selection of favipiravir or remdesivir for COVID-19 management in patients with chronic kidney disease warrants careful deliberation by the healthcare team. Considerations extend beyond therapeutic benefits to encompass potential adverse effects, patient-specific medical history, and overall health status. Thus, individualized treatment approaches tailored to the unique circumstances of each patient are essential to optimize treatment outcomes.

Further research endeavors aimed at elucidating the comparative efficacy and safety profiles of favipiravir and remdesivir, particularly in the context of chronic kidney disease, are imperative. Such investigations hold promise in refining treatment strategies and enhancing therapeutic outcomes for this vulnerable patient population. Moreover, a deeper understanding of the pharmacokinetics and pharmacodynamics of these antiviral agents in individuals with compromised renal function is essential for guiding clinical practice and ensuring optimal patient care.

In addition to pharmacological interventions, comprehensive management approaches encompassing supportive care, monitoring, and patient education are indispensable components of COVID-19 management, especially in individuals with comorbidities such as chronic kidney disease. Collaborative efforts involving multidisciplinary healthcare teams comprising physicians, pharmacists, nurses, and other allied health professionals are pivotal in navigating the complexities inherent in treating COVID-19 patients with chronic kidney disease. Initiatives aimed at optimizing medication management practices, fostering adherence to treatment protocols, and promoting patient engagement are integral to ensuring the successful implementation of treatment strategies. Patient-centered care models that prioritize individual needs, preferences, and concerns foster a therapeutic alliance between healthcare providers and patients, thereby enhancing treatment outcomes and overall patient satisfaction. As the COVID-19 pandemic continues to evolve, ongoing research endeavors aimed at elucidating the intricacies of the disease process and refining treatment modalities are essential. Collaborative research efforts involving academia, industry, and healthcare institutions are vital in advancing our understanding of COVID-19 and developing innovative therapeutic interventions to mitigate its impact on individuals with chronic kidney disease and other high-risk populations.

The utilization of favipiravir and remdesivir in the management of COVID-19 patients with chronic kidney disease underscores the multifaceted nature of therapeutic decision-making in complex clinical scenarios. Individualized treatment approaches tailored to the unique needs and circumstances of each patient, coupled with ongoing research endeavors aimed at enhancing our understanding of COVID-19 therapeutics, are paramount in

optimizing treatment outcomes and mitigating the burden of the pandemic on vulnerable patient populations.

CONCLUSION

In conclusion, the management of COVID-19 in patients with chronic kidney disease presents a multifaceted challenge that requires a comprehensive and individualized approach. The utilization of antiviral drugs such as favipiravir and remdesivir underscores the evolving landscape of COVID-19 therapeutics and the importance of tailoring treatment strategies to the unique needs of each patient. The demographic data from RSUD dr. Soetomo highlight the prevalence of older patients with chronic kidney disease among those diagnosed with COVID-19. This demographic trend underscores the importance of considering age-related factors and comorbidities in treatment decision-making, as older individuals are more susceptible to severe illness and complications from COVID-19. Moreover, the predominance of male patients in the cohort emphasizes the need for gender-specific considerations in COVID-19 management protocols. Favipiravir and remdesivir emerge as key therapeutic options for COVID-19 patients with chronic kidney disease, with favipiravir being the preferred choice due to its broad-spectrum antiviral activity. However, the use of these medications requires careful monitoring, particularly in patients with renal impairment, to mitigate the risk of toxicity and optimize treatment outcomes. While favipiravir has demonstrated efficacy in clinical trials, its optimal dosing regimen and safety profile in patients with chronic kidney disease warrant further investigation. Similarly, remdesivir's role as an alternative therapy necessitates ongoing research to elucidate its efficacy and safety in this patient population. The decision-making process regarding antiviral therapy in COVID-19 patients with chronic kidney disease should consider not only the therapeutic benefits but also potential adverse effects, patient-specific factors, and overall treatment goals. A multidisciplinary approach involving healthcare professionals from various specialties is crucial in navigating the complexities of COVID-19 management and optimizing patient outcomes. In addition to pharmacological interventions, holistic management strategies encompassing supportive care, monitoring, and patient education are essential components of COVID-19 management in patients with chronic kidney disease. Patient-centered care models that prioritize individual needs and preferences foster a collaborative relationship between healthcare providers and patients, leading to improved treatment adherence and outcomes. As the COVID-19 pandemic continues to evolve, ongoing research endeavors aimed at elucidating the intricacies of the disease process and refining treatment modalities are imperative. Collaborative efforts involving academia, industry, and healthcare institutions are essential in advancing our understanding of COVID-19 therapeutics and developing innovative interventions to mitigate its impact on vulnerable patient populations. In summary, the management of COVID-19 in patients with chronic kidney disease requires a nuanced and multidisciplinary approach that takes into account demographic factors, comorbidities, and treatment goals. Favipiravir and remdesivir represent important therapeutic options, but further research is needed to optimize their use and improve treatment outcomes in this patient population. By integrating evidence-based practices and patient-centered care principles, healthcare providers can effectively navigate the complexities of COVID-19 management and enhance the overall quality of care for patients with chronic kidney disease.

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