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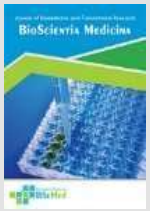

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Clinical and Demographic Profile of Chronic Kidney Disease Patients Undergoing Kidney Transplantation at a Tertiary Hospital in Indonesia

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A B S T R A C T

Background: Chronic kidney disease (CKD) is a global health problem, and kidney transplantation is the treatment of choice for end-stage renal disease (ESRD). This study aimed to describe the clinical and demographic profile of CKD patients undergoing kidney transplantation at Dr. M. Djamil General Hospital, Padang, Indonesia. **Methods:** A descriptive retrospective study was conducted using medical records of CKD patients who underwent kidney transplantation between 2015 and 2023. Data on age, gender, duration of hemodialysis, donor-recipient relationship, blood pressure, blood type, crossmatch results, serum urea and creatinine levels, and etiology of CKD were collected and analyzed. **Results:** The study included 18 patients, all aged 19 to 59 years. The majority of patients were male (55.6%) and had undergone hemodialysis for less than 3 years (55.6%). Prehypertension and hypertension were the most prevalent blood pressure categories (44.4% each). Blood types A and O were most common (27.8% each), with consistent crossmatch results across groups. High levels of serum urea and creatinine were predominant, and hypertension was the most frequent etiology of CKD (66.7%). **Conclusion:** This study provides valuable insights into the characteristics of CKD patients undergoing kidney transplantation in Indonesia. The findings highlight the importance of early detection and management of CKD, particularly hypertension, to reduce the burden of ESRD and the need for transplantation.

1. Introduction

Chronic kidney disease (CKD) is a global health concern characterized by a gradual and irreversible decline in kidney function. It affects millions of people worldwide, with a rising prevalence due to an aging population and an increase in comorbidities such as diabetes and hypertension, which are significant risk factors for CKD development. This condition poses a significant burden on healthcare systems and economies, as it can lead to various complications, including cardiovascular disease, anemia, bone mineral disorders, and end-stage renal disease (ESRD). ESRD, the final stage of CKD, requires renal replacement therapy, either dialysis or kidney transplantation, to sustain life. Although dialysis can serve as a bridge to transplantation or as a long-term treatment option for those who are not eligible for transplantation, it is associated with limitations in quality of life and increased mortality rates. Kidney transplantation offers the best chance for ESRD patients to improve their quality of life, reduce mortality, and return to a more active and productive lifestyle.[1-4]

Kidney transplantation is a complex surgical procedure that involves replacing a diseased kidney with a healthy kidney from a deceased or living donor. The success of kidney transplantation depends on several factors, including the patient's overall health, the presence of comorbidities, the compatibility between the donor and recipient, and the adherence to immunosuppressive medications after transplantation. Immunosuppressive drugs are essential to prevent rejection of the transplanted kidney, but they can also have side effects and increase the risk of infections and other complications. Despite the challenges associated with kidney transplantation, it remains the treatment of choice for ESRD, as it offers significant benefits in terms of patient survival, quality of life, and cost-effectiveness compared to long-term dialysis. However, the demand for kidney transplantation far exceeds the supply of available organs, resulting in long waiting times and a significant number of patients who die while waiting for a suitable kidney.[5-7]

In Indonesia, the prevalence of CKD is increasing, with a reported incidence of 0.18% in 2018. The major causes of CKD in Indonesia include hypertension and diabetic nephropathy. This trend reflects the global rise in CKD prevalence, which is attributed to factors such as an aging population, increased prevalence of diabetes and hypertension, and lifestyle factors such as poor diet and lack of physical activity. Understanding the clinical and demographic profile of CKD patients undergoing kidney transplantation is crucial for healthcare providers, policymakers, and researchers to develop effective strategies for prevention, early detection, and management of CKD. This information can help to identify high-risk populations, optimize patient selection for transplantation, and improve post-transplant outcomes.[8-10] This study aimed to describe the clinical and demographic characteristics of CKD patients who underwent kidney transplantation at Dr. M. Djamil General Hospital Padang, a tertiary referral hospital in Indonesia.

2. Methods

A descriptive retrospective study was conducted at the Kidney Transplantation Unit of Dr. M. Djamil General Hospital Padang, Indonesia. This tertiary referral hospital serves as a major center for kidney transplantation in the region, providing comprehensive care to patients with end-stage renal disease (ESRD). The retrospective design was chosen to analyze existing medical records and describe the characteristics of CKD patients who had undergone kidney transplantation at this hospital. This approach allowed for a comprehensive overview of the patient population and their clinical profiles, contributing valuable insights into the current status of kidney transplantation in Indonesia.

The study population included all CKD patients who underwent kidney transplantation at Dr. M. Djamil General Hospital Padang between January 2015 and December 2023. This period was chosen to capture a substantial number of patients who had undergone the procedure, providing a representative sample of the CKD population undergoing kidney transplantation at this center. The sample size was determined based on the proportion of CKD cases in Australia (1.1%), using the following formula for descriptive categorical research;

$$n = (Z\alpha^2 \times P \times Q) / \alpha^2.$$

Notes: n = minimum sample size; Zα = standard deviation of alpha (1.96); P = proportion of CKD cases in Australia (1.1%); Q = 1 - P.

Based on this formula, the minimum required sample size was 5. However, the study included all 18 patients who met the inclusion criteria to maximize the data and provide a comprehensive profile of the study population. This decision to include all eligible patients aimed to enhance the study's statistical power and provide a more detailed understanding of the clinical and demographic characteristics of this patient group.

The inclusion criteria for the study were; Patients with CKD who received kidney transplantation therapy between January 2015 and December 2023;

Patients who did not have any contraindications to kidney transplantation. These criteria ensured that the study population comprised individuals who had undergone kidney transplantation as a treatment for CKD during the specified timeframe and were deemed suitable candidates for the procedure. The exclusion criteria were; Patients with incomplete medical records. This criterion aimed to maintain the quality and reliability of the data by excluding patients whose medical records lacked essential information required for the study analysis.

Data were collected from the medical records of CKD patients who met the inclusion criteria. This involved a detailed review of the patients' medical charts, including their demographics, medical history, laboratory results, and treatment information. The data collection process was standardized to ensure consistency and accuracy, with trained researchers extracting the relevant information from the medical records using a structured data collection form. This form was designed to capture the specific variables of interest, minimizing the risk of bias and errors in data collection.

The following variables were collected and analyzed; Age: Categorized as adult (19-59 years) or elderly (≥60 years); Gender: Male or female; Duration of hemodialysis: Categorized as less than 3 years or 3 years or more; Donor-recipient relationship: Categorized as donor related (family member or spouse) or donor unrelated; Blood pressure: Categorized as normal, prehypertension, or hypertension based on standard blood pressure classifications; Blood type: Classified according to the ABO system; Crossmatch results: Categorized as negative (≤10%), borderline (10-20%), or positive (>20%); Serum urea level: Categorized as low, normal, or high based on reference ranges for males and females; Serum creatinine level: Categorized as low, normal, or high based on reference ranges for males and females; Etiology of CKD: Classified as glomerulonephritis, diabetes mellitus, polycystic kidney disease, hypertension, or other. These variables were chosen based on their relevance to the study objectives and their potential impact on kidney transplantation outcomes. The categorization of certain variables, such as age, duration of hemodialysis, and blood pressure, aimed to simplify the analysis and facilitate the identification of trends and patterns within the data.

Data were analyzed using descriptive statistics to determine the frequency distribution of each variable. This involved calculating the number and percentage of patients in each category for categorical variables, as well as measures of central tendency (mean, median) and dispersion (standard deviation) for continuous variables. The results were presented in tables and figures to provide a clear and concise overview of the study findings. The data analysis process was conducted using statistical software to ensure accuracy and efficiency.

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. The study protocol was approved by the Ethics Committee of Dr. M. Djamil General Hospital Padang. As the study involved the use of retrospective medical records, patient consent was not required. However, all data were anonymized to protect patient confidentiality. The researchers adhered to strict data protection protocols to ensure the privacy and security of patient information.

3. Results

Table 1 provides a detailed overview of the demographic and socioeconomic characteristics of the 18 participants in the study; Age: The majority of participants were in their 30s (38.9%) and 40s (27.8%), indicating that middle-aged adults represent a significant portion of kidney transplant recipients. The youngest age group (19-29) and the oldest (50-59) each accounted for 16.7% of the participants. This suggests that kidney transplantation is performed across a wide range of adult ages; Gender: A slightly higher proportion of participants were male (55.6%) compared to female (44.4%). This might reflect gender differences in the prevalence of CKD or access to transplantation services; Marital Status: Most

participants were married (66.7%), followed by single (16.7%). This information could be relevant for assessing social support systems, which can play a role in post-transplant recovery; Education Level: The most common education level was senior high school (38.9%), followed by a bachelor's degree (33.3%). This indicates a relatively high level of education among the participants; Occupation: More than half of the participants were employed (55.6%), suggesting that many individuals are able to maintain employment despite CKD and transplantation. A significant proportion were unemployed (27.8%), which could reflect the impact of CKD on work capacity or the challenges of finding employment after transplantation; Household Income: The most frequent income bracket was 5,000,000-10,000,000 IDR (38.9%), followed by < 5,000,000 IDR (33.3%). This suggests a relatively diverse income distribution among the participants; Residential Area: The majority of participants resided in urban areas (77.8%), which might reflect differences in access to healthcare facilities and transplantation services between urban and rural areas; Health Insurance: Most participants had government health insurance (83.3%), highlighting the importance of government support in providing access to kidney transplantation.

Table 2 presents the clinical characteristics of the 18 participants in the study, offering insights into their health status and medical history related to CKD and kidney transplantation; Duration of Hemodialysis: The most common duration of hemodialysis before transplantation was 1-2 years (38.9%), followed by less than 1 year (16.7%). This suggests that many patients undergo transplantation relatively soon after initiating hemodialysis. A substantial proportion of patients (33.3%) had been on hemodialysis for 3 years or more, indicating that some individuals experience longer waiting times for transplantation; Primary Cause of CKD: Hypertension was the leading cause of CKD (66.7%), highlighting its significant contribution to kidney disease burden. Diabetes mellitus (16.7%) and glomerulonephritis (11.1%) were also identified as primary causes, reflecting the multifactorial nature of CKD; Comorbidities: Hypertension was the most prevalent comorbidity (83.3%), emphasizing the strong association between hypertension and CKD. Cardiovascular disease (38.9%) and diabetes mellitus (27.8%) were also common, indicating a high prevalence of cardiovascular risk factors in this population; Blood Pressure: The mean systolic blood pressure was 135 mmHg, with a standard deviation of 15 mmHg. The mean diastolic blood pressure was 85 mmHg, with a standard deviation of 10 mmHg. These values suggest that blood pressure control may be a challenge for some patients, even after transplantation; Blood Type: Blood type distribution was relatively even across A (27.8%), B (22.2%), O (27.8%), and AB (22.2%). This information is crucial for donor-recipient matching in transplantation; Crossmatch Results: The distribution of crossmatch results was equal across negative (33.3%), borderline (33.3%), and positive (33.3%). This finding suggests that a significant proportion of transplants involved some degree of immunological risk; Laboratory Values: The mean hemoglobin level was 10.5 g/dL, indicating that anemia is a common issue in this population. The mean serum creatinine level was 5.8 mg/dL, reflecting impaired kidney function. The mean blood urea nitrogen level was 65 mg/dL, further supporting the presence of kidney dysfunction; Immunosuppressive Regimen: The majority of patients (77.8%) received a tacrolimus-based immunosuppressive regimen, which is a standard treatment to prevent rejection after transplantation. A smaller proportion (22.2%) received a cyclosporine-based regimen, suggesting that individualized immunosuppression strategies are employed.

Table 1. Participant characteristics.

Characteristic	Category	Frequency	Percentage (%)
Age (years)			
	19-29	3	16.7
	30-39	7	38.9
	40-49	5	27.8
	50-59	3	16.7
Gender			
	Male	10	55.6
	Female	8	44.4
Marital status			
	Married	12	66.7
	Single	3	16.7
	Divorced	2	11.1
	Widowed	1	5.6
Education level			
	Elementary School	1	5.6
	Junior High School	3	16.7
	Senior High School	7	38.9
	Bachelor's Degree	6	33.3
	Master's Degree or Higher	1	5.6
Occupation			
	Employed	10	55.6
	Unemployed	5	27.8
	Student	2	11.1
	Retired	1	5.6
Household income (IDR per month)			
	< 5,000,000	7	38.9
	5,000,000 - 10,000,000	6	33.3
	> 10,000,000	5	27.8
Residential area			
	Urban	14	77.8
	Rural	4	22.2
Health insurance			
	Government Insurance	15	83.3
	Private Insurance	3	16.7

Table 2. Clinical characteristics of participants.

Characteristic	Category	n	Percentage (%)
Duration of hemodialysis (years)			
	< 1	3	16.7
	1-2	7	38.9
	2-3	2	11.1
	>3	6	33.3
Primary cause of CKD			
	Hypertension	12	66.7
	Diabetes Mellitus	3	16.7
	Glomerulonephritis	2	11.1
	Other	1	5.6
Comorbidities			
	Hypertension	15	83.3
	Diabetes Mellitus	5	27.8
	Cardiovascular Disease	7	38.9
	Other	3	16.7
Blood pressure (mmHg)			
Systolic	Mean (SD)	135 (15)	-
Diastolic	Mean (SD)	85 (10)	-
Blood type			
	A	5	27.8
	B	4	22.2
	AB	4	22.2
	O	5	27.8
Crossmatch results			
	Negative	6	33.3
	Borderline	6	33.3
	Positive	6	33.3
Laboratory values			
Hemoglobin (g/dL)	Mean (SD)	10.5 (1.5)	-
Serum creatinine (mg/dL)	Mean (SD)	5.8 (2.1)	-
Blood urea nitrogen (mg/dL)	Mean (SD)	65 (30)	-
Immunosuppressive regimen			
	Tacrolimus + Mycophenolate + Steroids	14	77.8
	Cyclosporine + Mycophenolate + Steroids	4	22.2

4. Discussion

This study unearthed a tapestry of demographic characteristics among the participants, offering a glimpse into the lives of those who have undergone kidney transplantation. The concentration of participants in the 30-49 age bracket aligns with the global trend of CKD increasingly affecting middle-aged individuals. This is a period of life often marked by peak responsibilities, both personally and professionally. The diagnosis of CKD and the subsequent need for transplantation can disrupt this trajectory, imposing physical, emotional, and financial

burdens on individuals and their families. Imagine a 40-year-old parent, the primary breadwinner for their family, suddenly faced with the daunting prospect of dialysis and the uncertainty of receiving a transplant. Their life is put on hold, their career aspirations potentially derailed, and their family's financial stability threatened. However, the presence of participants from both younger and older age groups emphasizes that CKD does not discriminate. Younger individuals may face unique challenges, such as navigating the transition to adulthood with a chronic illness and managing the impact of CKD on their education and career aspirations. A young adult diagnosed with CKD may struggle with feelings of isolation and uncertainty about their future. They may face difficulties in completing their education, finding employment, and forming intimate relationships. Older individuals may contend with age-related comorbidities and the complexities of post-transplant care in the context of aging. An elderly individual undergoing transplantation may have a higher risk of complications and a longer recovery period. They may also require additional support to manage their medications and adhere to their treatment plan. This age diversity underscores the need for tailored approaches to patient care, recognizing the unique needs and challenges faced by individuals across the lifespan. Healthcare providers should be equipped to address the specific concerns of each age group, providing age-appropriate education, support, and resources. For instance, young adults may benefit from peer support groups and online resources tailored to their needs, while older adults may require home healthcare services and assistance with medication management. The slightly higher proportion of male participants echoes the gender disparity observed in CKD prevalence worldwide. Men may have a higher susceptibility to certain kidney diseases, such as glomerulonephritis. This could be due to genetic factors or differences in the immune response. Hormonal differences may also play a role in kidney function and disease progression. For example, testosterone may have a protective effect on kidney function, while estrogen may increase the risk of certain kidney diseases. Men are more likely to engage in behaviors that increase the risk of CKD, such as smoking, excessive alcohol consumption, and unhealthy dietary habits. These behaviors can damage the kidneys over time, leading to CKD. Men are more likely to be employed in occupations that expose them to nephrotoxins, such as heavy metals and solvents. These toxins can damage the kidneys and increase the risk of CKD. Men may be less likely to seek medical attention for early signs and symptoms of CKD, leading to delayed diagnosis and treatment. This could be due to a variety of factors, including societal expectations of masculinity, reluctance to admit vulnerability, and lack of awareness about CKD. Addressing this gender disparity requires a multi-pronged approach. Public health campaigns should raise awareness of CKD risk factors and encourage early detection and management, particularly among men. These campaigns could target men in workplaces, community centers, and sporting events. Healthcare providers should be vigilant in screening for CKD in male patients and addressing any barriers to healthcare access. This may involve offering flexible appointment times, providing culturally sensitive care, and addressing language barriers. The predominance of married participants highlights the potential importance of social support in coping with CKD and navigating the transplantation process. Spouses, family members, and friends can provide a crucial network of emotional, practical, and financial support. Emotional support can help individuals cope with the stress, anxiety, and depression that often accompany CKD and transplantation. Imagine a patient receiving a diagnosis of CKD and facing the prospect of dialysis and transplantation. Their world is turned upside down, and they may experience a range of emotions, including fear, anger, and sadness. A supportive spouse, family member, or friend can provide a listening ear, a shoulder to cry on, and encouragement to persevere. Practical support can assist with daily tasks, transportation to medical appointments, and medication management. CKD and

transplantation can be physically demanding, and patients may require assistance with activities of daily living, such as bathing, dressing, and preparing meals. Family and friends can provide this support, allowing patients to focus on their recovery. Financial support can alleviate the economic burden of transplantation, which can be substantial. The costs of surgery, medications, and long-term follow-up care can place a significant strain on patients and their families. Financial support from family, friends, or community organizations can help to alleviate this burden and ensure that patients can access the care they need. Healthcare providers should recognize the value of social support and encourage patients to engage with their support networks. Support groups and counseling services can also provide valuable resources for patients and their families. Support groups offer a safe space for patients to connect with others who understand their experiences, share coping strategies, and build a sense of community. Counseling services can help patients and their families address emotional challenges, develop coping mechanisms, and improve communication. The relatively high educational attainment of the participants suggests a link between education and access to kidney transplantation services. Individuals with higher levels of education may have greater health literacy, enabling them to better understand their condition, navigate the healthcare system, and advocate for their needs. They may also have greater access to financial resources and social support, which can facilitate access to transplantation. However, education also plays a crucial role in empowering patients to manage their CKD and adhere to post-transplant care. Patients who understand their condition and treatment plan are more likely to make informed decisions, follow medical recommendations, and achieve optimal outcomes. For example, a patient who understands the importance of medication adherence is more likely to take their medications as prescribed, reducing the risk of rejection and other complications. Healthcare providers should prioritize patient education, providing clear and comprehensive information about CKD, transplantation, and post-transplant care. Educational materials should be tailored to the individual's literacy level and cultural background. This may involve using visual aids, simplified language, and interpreters for patients who do not speak the dominant language. The mix of employed and unemployed participants reflects the complex interplay between CKD, transplantation, and work capacity. While many individuals are able to maintain employment despite their health challenges, CKD can significantly impact work productivity and attendance. Fatigue, pain, and the need for frequent medical appointments can make it difficult to sustain employment. Imagine a patient experiencing fatigue and nausea as a side effect of their medication. They may struggle to concentrate at work, miss deadlines, and require frequent breaks. Transplantation can improve work capacity and quality of life, enabling some individuals to return to work or pursue new career opportunities. However, the recovery process can be lengthy, and some individuals may face challenges in re-entering the workforce. Discrimination and stigma associated with CKD can also create barriers to employment. Some employers may be hesitant to hire individuals with CKD, fearing that they will be less productive or require more time off. Vocational rehabilitation programs and support services can play a vital role in assisting patients in regaining or maintaining employment. These programs can provide job training, career counseling, and assistance with job placement. Employers should also be educated about CKD and transplantation to promote workplace inclusivity and support employees with chronic health conditions. This may involve providing flexible work arrangements, accommodating medical appointments, and creating a supportive work environment. The varied income distribution among participants highlights the financial challenges associated with kidney transplantation. The costs of surgery, medications, and long-term follow-up care can be substantial, creating a significant barrier to access for individuals with limited financial resources.

Government health insurance plays a crucial role in ensuring equitable access to transplantation. Adequate insurance coverage can help to alleviate the financial burden and ensure that transplantation is not limited to those with substantial wealth. Financial assistance programs and charitable organizations can also provide support for patients who face financial hardship. Healthcare providers should be aware of the financial challenges faced by patients and connect them with resources that can help to address these challenges. Financial counseling and support can empower patients to navigate the complexities of healthcare costs and make informed decisions about their care. The concentration of participants from urban areas underscores the disparities in access to healthcare services between urban and rural regions. Urban areas tend to have a higher concentration of healthcare facilities, including specialized transplantation centers. Rural residents may face challenges in accessing these services due to distance, transportation costs, and lack of available providers. Imagine a patient living in a remote rural area, hours away from the nearest transplantation center. They may face difficulties in traveling to appointments, accessing specialized care, and finding transportation for follow-up visits. Improving access to transplantation services in rural areas requires a multi-faceted approach. Telehealth technologies can facilitate remote consultations and monitoring, reducing the need for travel. Mobile clinics and outreach programs can bring specialized care to rural communities. Investing in infrastructure and training healthcare providers in rural areas can also improve access to transplantation services. The reliance on government health insurance highlights the critical role of government support in providing access to kidney transplantation. Adequate insurance coverage can help to ensure that transplantation is not limited to those with the financial means to pay for it out-of-pocket. Government health insurance programs should provide comprehensive coverage for kidney transplantation, including pre-transplant evaluation, surgery, medications, and long-term follow-up care. Financial assistance programs and subsidies can further support patients who face financial hardship. Healthcare providers should advocate for policies that promote equitable access to transplantation services, ensuring that all individuals with CKD have the opportunity to receive life-saving care, regardless of their socioeconomic status. It's crucial to remember that these demographic characteristics don't exist in isolation. They intersect and interact in complex ways, shaping the individual's experience with CKD and transplantation. For example, a young, unemployed individual from a rural area may face a unique set of challenges compared to an older, employed individual from an urban area. The young individual may struggle with accessing transportation to medical appointments, affording medications, and finding employment after transplantation, while the older individual may have more resources and support but may face age-related complications and a longer recovery period. Healthcare providers must adopt a holistic approach to patient care, considering the individual's unique demographic profile and tailoring interventions to address their specific needs and circumstances. This may involve collaborating with social workers, financial counselors, and other healthcare professionals to provide comprehensive support. For instance, a young, unemployed individual from a rural area may benefit from referrals to social services, transportation assistance programs, and vocational rehabilitation services. By understanding the demographic landscape of kidney transplantation, we can develop more effective strategies to improve access to care, reduce disparities, and empower individuals with CKD to live full and productive lives. This may involve advocating for policies that expand access to healthcare in rural areas, providing financial assistance for transplantation costs, and addressing the unique needs of different age groups and genders.[11-15]

The clinical characteristics of the study participants provide a window into the intricate landscape of CKD and the multifaceted journey of kidney transplantation. The duration of hemodialysis

prior to transplantation varied significantly among participants, with some receiving a transplant within the first year of initiating dialysis, while others endured years of this life-sustaining treatment. This variability reflects the delicate balance between the urgency of transplantation and the availability of suitable organs. For those fortunate enough to receive a transplant early in their dialysis journey, the benefits are profound. Hemodialysis, while essential for survival, can be a physically and emotionally taxing experience, often accompanied by fatigue, nausea, and restrictions on daily life. Transplantation offers a chance to break free from the constraints of dialysis, restoring a sense of normalcy and improving quality of life. However, the reality of organ shortage casts a long shadow. A substantial number of patients in this study faced extended waiting times, enduring years of dialysis with its associated complications. Prolonged dialysis can lead to cardiovascular problems, anemia, bone disease, and infections, increasing the risk of morbidity and mortality. The longer the wait, the greater the toll on the patient's physical and mental health. This underscores the urgent need to increase organ donation rates. Public awareness campaigns, education initiatives, and policy changes are crucial to address the organ shortage and ensure that patients receive timely access to transplantation. Hypertension emerged as the leading cause of CKD in this study, a stark reminder of the insidious nature of this "silent killer." Uncontrolled hypertension can damage the delicate blood vessels in the kidneys, leading to scarring and impaired function. This highlights the critical importance of blood pressure control in preventing and managing CKD. Effective management of hypertension involves a combination of lifestyle modifications and pharmacological interventions. Lifestyle changes, such as adopting a healthy diet, engaging in regular physical activity, and maintaining a healthy weight, can significantly reduce blood pressure and protect kidney health. Pharmacological interventions, such as angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs), can further lower blood pressure and slow the progression of CKD. Diabetes mellitus and glomerulonephritis also played significant roles in the development of CKD among participants, underscoring the multifactorial nature of this condition. Diabetes can damage the kidneys through various mechanisms, including high blood sugar levels, high blood pressure, and abnormal lipid metabolism. Glomerulonephritis, a group of diseases that cause inflammation of the kidney's filtering units (glomeruli), can lead to scarring and impaired kidney function. Early detection and management of diabetes and glomerulonephritis are crucial to prevent or delay the onset of CKD and its associated complications. This involves regular screening for these conditions, particularly in high-risk individuals, and prompt initiation of treatment to control blood sugar levels, blood pressure, and inflammation. The high prevalence of comorbidities, particularly hypertension and cardiovascular disease, paints a picture of a patient population grappling with a complex web of health challenges. CKD often coexists with other chronic conditions, such as diabetes, hypertension, and cardiovascular disease, creating a synergistic effect that increases the risk of complications and mortality. Comprehensive management of comorbidities is crucial to optimize pre-transplant health and reduce the risk of post-transplant complications. This involves a multidisciplinary approach, with healthcare providers from various specialties working together to address the patient's diverse needs. For example, a patient with CKD and diabetes may require coordinated care from a nephrologist, endocrinologist, and dietitian to manage their kidney function, blood sugar levels, and dietary needs. The mean systolic and diastolic blood pressure values among participants suggest that blood pressure control remains a challenge for some individuals, even after transplantation. Achieving optimal blood pressure control is a delicate balancing act, requiring careful monitoring and individualized management. High blood pressure can damage the transplanted kidney, increasing the risk of graft

failure. It can also contribute to cardiovascular complications, such as heart attack and stroke, which are leading causes of death in kidney transplant recipients. Close monitoring of blood pressure is essential, both before and after transplantation. Healthcare providers should work with patients to develop individualized treatment plans that address their specific needs and circumstances. This may involve lifestyle modifications, such as dietary changes and stress management techniques, as well as pharmacological interventions, such as antihypertensive medications. The relatively even distribution of blood types among participants reflects the diversity of the population and highlights the importance of blood type compatibility in kidney transplantation. Blood type matching is crucial to prevent hyperacute rejection, a rapid and severe form of rejection that can occur when the recipient's immune system attacks the transplanted kidney due to incompatible blood types. The ABO blood group system classifies blood into four main types A, B, AB, and O. Each blood type has specific antigens (proteins) on the surface of red blood cells and antibodies (proteins that fight foreign substances) in the plasma. Incompatibility between the donor and recipient's blood types can trigger a rapid immune response, leading to graft failure. Ensuring the availability of donors across different blood types is essential to provide timely access to transplantation for all patients. This requires ongoing efforts to increase organ donation rates and promote diversity in the donor pool. The crossmatch results revealed a significant proportion of transplants involving some degree of immunological risk. The crossmatch test is a critical component of pre-transplant evaluation, assessing the compatibility between the donor and recipient's immune systems. A positive crossmatch indicates the presence of antibodies in the recipient's blood that can attack the donor's kidney, increasing the risk of rejection. Careful assessment of immunological compatibility is crucial to minimize the risk of rejection and optimize graft survival. This involves a thorough evaluation of the recipient's immune history, including previous transplants, blood transfusions, and pregnancies, which can sensitize the immune system and increase the risk of rejection. Advances in immunosuppressive therapies and desensitization protocols have improved the success of transplantation even in the presence of immunological challenges. Immunosuppressive medications suppress the immune system, reducing the risk of rejection, while desensitization protocols aim to remove or reduce the levels of harmful antibodies in the recipient's blood. Laboratory values confirmed the presence of anemia and impaired kidney function, which are common manifestations of CKD. Anemia, a deficiency of red blood cells, can cause fatigue, weakness, and shortness of breath. Impaired kidney function can lead to a buildup of waste products in the blood, causing nausea, vomiting, and other symptoms. Anemia management is crucial to improve quality of life and reduce cardiovascular complications. This may involve iron supplementation to address iron deficiency, erythropoiesis-stimulating agents to stimulate red blood cell production, and blood transfusions in severe cases. Monitoring of kidney function through serum creatinine and blood urea nitrogen levels is essential to assess graft function and guide treatment decisions. These tests provide valuable information about the kidney's ability to filter waste products from the blood. Regular monitoring allows healthcare providers to detect early signs of graft dysfunction and adjust treatment accordingly. The majority of patients received a tacrolimus-based immunosuppressive regimen, a cornerstone of post-transplant care. Immunosuppressive medications prevent rejection of the transplanted kidney by suppressing the immune system. However, these medications can also have side effects, such as increased risk of infections, cardiovascular problems, and certain cancers. Careful monitoring and individualized adjustments of immunosuppressive therapy are necessary to balance the benefits of preventing rejection with the risks of side effects. Healthcare providers must carefully consider the patient's individual needs and

circumstances when selecting and adjusting immunosuppressive medications. It's important to recognize that these clinical characteristics are interconnected and influence each other in complex ways. For example, the duration of hemodialysis can affect the patient's overall health and increase the risk of comorbidities. The primary cause of CKD can influence the choice of immunosuppressive regimen. And the presence of comorbidities can complicate post-transplant care and increase the risk of complications. Healthcare providers must adopt a holistic approach to patient care, considering the interplay of these clinical characteristics and tailoring interventions to address the individual's unique needs and circumstances. This may involve collaborating with specialists from various disciplines, such as nephrologists, cardiologists, and infectious disease specialists, to provide comprehensive care. By understanding the clinical landscape of CKD and transplantation, we can develop more effective strategies to prevent CKD progression, optimize pre-transplant health, manage post-transplant complications, and improve long-term outcomes for kidney transplant recipients.[16-18]

The findings of this study have several implications for clinical practice and future research in the field of kidney transplantation. The high prevalence of hypertension and diabetes as causes of CKD underscores the importance of early detection and management of these conditions. Primary care providers should actively screen for CKD risk factors and implement strategies to prevent or delay the progression of kidney disease. The presence of comorbidities highlights the need for a thorough pre-transplant evaluation to assess and optimize patient health before transplantation. This includes managing cardiovascular risk factors, controlling blood pressure, and addressing any other medical conditions that may affect transplant outcomes. The variety of immunosuppressive regimens used in this study suggests that individualized treatment approaches are necessary. Healthcare providers should carefully consider patient-specific factors, such as age, comorbidities, and immunological risk when selecting and adjusting immunosuppressive medications. The relatively high educational attainment of the participants emphasizes the importance of patient education and support. Healthcare providers should provide clear and comprehensive information about CKD, transplantation, and post-transplant care to empower patients to actively participate in their own care. The concentration of participants from urban areas and the reliance on government health insurance highlight the need to improve access to transplantation services for individuals in rural areas and those with limited financial resources. Efforts should be made to expand transplantation services to underserved populations and ensure equitable access to care. Future research should focus on longitudinal studies to assess the long-term outcomes of kidney transplantation in this population. This includes evaluating graft survival, patient survival, quality of life, and the impact of comorbidities on post-transplant outcomes. Comparative studies between different immunosuppressive regimens and treatment protocols can help to identify optimal approaches for managing post-transplant care and minimizing complications. Evaluating the cost-effectiveness of kidney transplantation compared to other treatment modalities, such as dialysis, can provide valuable information for healthcare policymakers and resource allocation. Qualitative research exploring the experiences and perspectives of CKD patients undergoing kidney transplantation can provide deeper insights into the psychosocial impact of this condition and the challenges faced by patients and their families. Research is needed to develop and evaluate public health interventions aimed at increasing organ donation rates and improving access to transplantation services.[19,20]

5. Conclusion

This study provides insights into the clinical and demographic profile of kidney transplant recipients at a tertiary hospital in Indonesia. The findings highlight

the need for early detection and management of CKD, particularly hypertension, which was the leading cause of CKD in this study. The study also underscores the importance of addressing comorbidities, such as hypertension and cardiovascular disease, to optimize pre-transplant health and reduce the risk of post-transplant complications. The variability in the duration of hemodialysis prior to transplantation emphasizes the need to increase organ donation rates and reduce waiting times. The relatively high prevalence of transplants involving some degree of immunological risk suggests the need for careful assessment of immunological compatibility and the use of appropriate immunosuppressive therapies. The study also highlights the importance of patient education and support to empower patients to actively participate in their own care. The concentration of participants from urban areas and the reliance on government health insurance underscore the need to improve access to transplantation services for individuals in rural areas and those with limited financial resources. Future research should focus on longitudinal studies to assess long-term outcomes, comparative studies to evaluate different treatment protocols, and cost-effectiveness analyses to inform healthcare policy. Qualitative research can provide deeper insights into the psychosocial impact of CKD and transplantation. The findings of this study have implications for clinical practice, including early detection and management of CKD risk factors, thorough pre-transplant evaluation, individualized immunosuppressive therapy, and patient education and support. Efforts should be made to expand transplantation services to underserved populations and ensure equitable access to care.

6. References

1. Masajtis-Zagajewska A, Muras K, Nowicki M. Effects of a structured physical activity program on habitual physical activity and body composition in patients with chronic kidney disease and in kidney transplant recipients. Exp Clin Transplant. 2019; 17(2): 155–64.
2. Lacquaniti A, Campo S, Casuscelli Di Tocco T, Rovito S, Bucca M, Ragusa A, et al. Acute and chronic kidney disease after pediatric liver transplantation: an underestimated problem. Clin Transplant. 2020; 34(11): e14082.
3. Iqbal MM, Rahman N, Alam M, Deb Nath PK, Waheed S, Islam K, et al. Quality of life is improved in renal transplant recipients versus that shown in patients with chronic kidney disease with or without dialysis. Exp Clin Transplant. 2020; 18(Suppl 1): 64–7.
4. Alqallaf A, Alam A, Sapir-Pichhadze R, Ghali P, Cantarovich M. Pretransplant use of the Chronic Kidney Disease Epidemiology Collaboration equation (CKD-EPI) to estimate glomerular filtration rate predicts outcomes in liver transplant recipients. Exp Clin Transplant. 2021; 19(3): 231–6.
5. Pile T, Raftery M, Thuraisingham R, Kirwan CJ, Harwood S, Yaqoob MM. Treating posttransplant anemia with erythropoietin improves quality of life but does not affect progression of chronic kidney disease. Exp Clin Transplant. 2020; 18(1): 27–33.
6. Rasaei N, Malekmakan L, Mashayekh M, Gholamabbas G. Chronic kidney disease following liver transplant: Associated outcomes and predictors. Exp Clin Transplant. 2022; 21(2): 93–103.
7. De Santo RM, Di Iorio BR. History of sleep disorders in chronic kidney disease: First approach. Exp Clin Transplant. 2023; 21(Suppl 2): 115–20.
8. Mahser A, Serel A, Bozkaya G, Tatar B, Tatar E. Relationship of serum kallistatin level with arterial stiffness and metabolic parameters in obesity-related chronic kidney disease. Exp Clin Transplant. 2024; 22(Suppl 1): 243–6.
9. Farisco M, Blumblyte IA, Franssen C, Nitsch D, Zecchino I, Capasso G, et al. Cognitive decline related to chronic kidney disease as an

exclusion factor from kidney transplantation: results from an international survey. Clin Kidney J. 2024; 17(5): sfae114.
10. Bernieh B, Al Hakim MR, Boobes Y, Abu Zidan FM. Fasting Ramadan in chronic kidney disease patients: clinical and biochemical effects. Saudi J Kidney Dis Transpl. 2010; 21(5): 898–902.
11. Oktavia D, Suhardjono, Nasution S, Setiati S. The clinical factors′ prediction of increased intradialytic qt dispersion on the electrocardiograms of chronic hemodialysis patients. Saudi J Kidney Dis Transpl. 2013; 24(2): 274.
12. Oktavia D, Suhardjono, Nasution S, Setiati S. The clinical factors′ prediction of increased intradialytic qt dispersion on the electrocardiograms of chronic hemodialysis patients. Saudi J Kidney Dis Transpl. 2013; 24(2): 274.
13. Shahbazian H, Shayanpour S, Ghorbani A. Evaluation of administration of oral N-acetylcysteine to reduce oxidative stress in chronic hemodialysis patients: a double-blind, randomized, controlled clinical trial. Saudi J Kidney Dis Transpl. 2016; 27(1): 88–93.
14. Tabriziani H, Lipkowitz MS, Vuong N. Chronic kidney disease, kidney transplantation and oxidative stress: a new look to successful kidney transplantation. Clin Kidney J. 2018; 11(1): 130–5.
15. Khodeir SA, Okda HI, Abdalal HM. Clinical significance of fibroblast growth factor-23 and soluble alpha klotho in different stages of chronic kidney disease. Saudi J Kidney Dis Transpl. 2019; 30(1): 108–18.
16. Vikrant S. Clinical profile of tuberculosis in patients with chronic kidney disease: a report from an endemic Country. Saudi J Kidney Dis Transpl. 2019; 30(2): 470–7.
17. de Freitas AB, Nicoletto BB, Machado d'Almeida KS, Romano de Medeiros Bastos NM, Manfro RC, Souza GC. Effects of dietary counseling on sodium restriction in patients with chronic kidney disease on hemodialysis: a randomized clinical trial. Saudi J Kidney Dis Transpl. 2020; 31(3): 604–13.
18. Shankar M, Narasimhappa S, MuddeGowda MK, Siddappa MN, Ramprasad K, Lingaraj U. Coronavirus disease 2019 and chronic kidney disease - A clinical observational study. Saudi J Kidney Dis Transpl. 2021; 32(3): 744–53.
19. Eyeni Sinomono DT, Loumingou R, Gassongo Koumou GC, Mahoungou GH, Mobengo JL. Chronic renal failure in the brazzaville university hospital center: Epidemiological, clinical and evolutionary aspects. Saudi J Kidney Dis Transpl. 2021; 32(5): 1450–5.
20. Oni OO, Akinwusi PO, Owolabi JI, Odeyemi AO, Israel GM, Ala O, et al. Chronic kidney disease and its clinical correlates in a rural community in southwestern Nigeria. Saudi J Kidney Dis Transpl. 2022; 33(6): 774–83.