

Research Article

Prevalence of Chronic Kidney Disease with Hepatitis B and/or Hepatitis C Comorbid in Hemodialysis Installation at the University of Muhammadiyah Malang General Hospital

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Chronic Kidney Disease (CKD) is a clinical condition in which kidney function and/or structure is characterized by irreversible and slow, progressive evolution. CKD cases in Indonesia in 2018 amounted to 3.8% of the total population (713,783 cases). Prevalence of CKD patients with Hepatitis B and/or Hepatitis C at UMM General Hospital has never been reported before. Data were taken from the medical records of UMM General Hospital. Characteristics of the patients were age, gender, aetiology, vascular access and duration of hemodialysis. The results of the laboratory examinations analyzed were HBsAg and Anti-HCV on CKD patients who underwent hemodialysis every 6 months, starting from January 2020. Data were analyzed with descriptive analysis using SPSS v25. The demographic proportion of CKD patients undergoing hemodialysis was highest in the 50-59 year age group (33.8%). Males were more than females (85 patients, 53.1%). The most common aetiology of CKD at UMM General Hospital was caused by hypertension (92 patients, 57.5%). Vascular access mostly used was AV shunt (107 patients, 66.9%). 107 (66.9%) patients had undergone hemodialysis for 1-5 years. In January-June 2022, there were 2 (1.25%) Hepatitis B patients with CKD and 8 (5%) CKD patients with Hepatitis C. The majority of CKD patients at UMM General Hospital were male patients aged 50-59 years, having had hemodialysis for 1-5 years, using AV Shunt, with the most common cause being hypertension. In January-June 2022, there were 1.25% CKD patients with Hepatitis B and 5% CKD patients with Hepatitis C.

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1. INTRODUCTION

Chronic Kidney Disease (CKD) is a clinical syndrome secondary to definitive changes in kidney function and/or structure and is characterized by an irreversible, slow evolution and progressive process. An adult patient is identified with CKD when the glomerular filtration rate (GFR) is lower than 60 ml/min/1.73 m², or GFR is greater than 60 ml/min/1.73

m2, for a period equal to or greater than three months, with evidence of structural renal injury.(1)

The incidence of CKD in Indonesia in 2018 was 3.8% of the total Indonesian population of 252,124,458 people, so there are 713,783 people who suffer from CKD in Indonesia. The incidence of CKD in East Java Province in 2018 was 0.29% or 75,490 people from a total population of 26,031,034 people. (2) CKD can be caused by infection, malignancy, connective tissue disorders, congenital and hereditary disorders, metabolic diseases, toxic nephropathy, obstructive nephropathy, urinary stones that cause hydrolysis. (3)

Hepatitis is an inflammation of the liver that can progress to fibrosis (scarring), cirrhosis or liver cancer. Hepatitis is caused by various factors such as viral infections, toxic substances (alcohol, drugs etc.), and autoimmune diseases.(4) Hepatitis A and E are transmitted by fecal-oral route, usually associated with unhealthy behavior, acute and can fully recovered. While Hepatitis B, C and D are transmitted parenterally, they can become chronic and cause cirrhosis or liver cancer.(5)

Hepatitis B virus has infected 2 billion people in the world, about 240 million are chronic hepatitis B sufferers, while for hepatitis C sufferers in the world it is estimated at 170 million people. As many as 1.5 million people in the world die every year due to hepatitis (5) . The most common cause of liver disease in patients with chronic kidney disease (CKD) is infection with hepatitis B virus (HBV) and/or hepatitis C virus (HCV). Adverse effects of HBV and/or HCV infection on survival in patients with CKD have been repeatedly confirmed. The excess risk of death in HBsAg-positive or anti-HCV-positive patients related to chronic liver disease with accompanying complications. (6)

The incidence of Hepatitis B and C in CKD patients have not been widely reported in Indonesia. In this study, we report the prevalence of hepatitis B and C in CKD patients at the General Hospital of the University of Muhammadiyah Malang (UMM Hospital) during January 2020 to June 2022.

2. MATERIALS AND METHODS

This study used a descriptive model with a retrospective cross-sectional method taken from medical records of CKD patients at the hemodialysis installation of UMM General Hospital. Patients were all CKD patients who underwent hemodialysis from January 2022 to June 2022. The characteristics of the patients observed were age, gender, etiology, vascular access and duration of dialysis. The results of the Supporting Examinations examined were HBsAg and Anti-HCV tests carried out on CKD patients who

underwent hemodialysis for every 6 months, starting from January 2020 until June 2022. The results of the examination were analyzed using the Statistical Package for Social Sciences (SPSS) software version 25.

3. RESULTS

Profile of CKD patients undergoing regular hemodialysis at UMM General Hospital can be seen in the table below.

TABLE 1: Profile of CKD Patients undergoing Hemodialysis at UMM General Hospital.

Variabel	Kategori	Jumlah
Age	<20	1 (0,6%)
	20-29	6 (3,8%)
	30-39	12 (7,5%)
	40-49	31 (19,4%)
	50-59	54 (33,8%)
	60-69	47 (29,4%)
	70-79	9 (5,6%)
Gender	Male	85 (53,1%)
	Female	75 (46,9%)
Etiology	Primary Glomerulopathy	6 (3,8%)
	Diabetic Nephropathy	47 (29,4%)
	Hypertensive Kidney Disease	92 (57,5%)
	Polycystic Kidney Disease	8 (5%)
	Gout Nephropathy	4 (4%)
	Obstructive Nephropathy	2 (1,3%)
	Chronic pyelonephritis	1 (0,6%)
Vascular Access	Manual	2 (1,3%)
	CDL	51 (31,9%)
	AV Shunt	107 (66,9%)
Duration of Hemodialysis	<1 Year	48 (30%)
	1-5 Years	107 (66,9%)
	>5 Years	5 (3,1%)

The proportion of CKD patients who underwent regular hemodialysis at UMM Hospital showed that the highest proportion of demographics was found in the 50-59 year age group (33.8%). There were more males than females, as many as 85 patients (53.1%) were male. The most common etiology of CKD at UMM General Hospital was caused by hypertension, which was 92 (57.5%). Vascular access mostly used AV shunt with a total of 107 patients (66.9%). 107 (66.9%) patients had undergone hemodialysis for 1-5 years.

Hepatitis B and Hepatitis C laboratory examination for all CKD patients undergoing hemodialysis from January 2020 to June 2022 can be seen in the table below,

TABLE 2: Number of CKD Patients with Hepatitis B and Hepatitis C Comorbid.

Period	CKD Patients with Hepatitis B (%)	CKD Patients with Hepatitis C (%)	Total CKD patients
January - December 2020	0	12 (9,52%)	126
January - December 2021	1 (0,72%)	7 (5,07%)	138
January - June 2022	2 (1,25%)	8 (5,%)	160

CKD patients undergoing hemodialysis at UMM General Hospital in 2020 were 126 patients. CKD patients undergoing hemodialysis at UMM General Hospital in 2021 were 138 patients. CKD patients undergoing hemodialysis at UMM General Hospital were 160 patients from January to June 2022. There was no CKD patients with hepatitis B in 2020. In 2021, there was 1 (0,72%) CKD patient with hepatitis B. This patient was referred to another hospital. In January - June 2022 there were 2 (1,28%) CKD patients with hepatitis B (1 patient passed away and 1 patient still undergoing hemodialysis).

CKD patients with hepatitis C in 2020 were 12 patients (9.52%). There are 2 (1.58%) CKD patients with hepatitis C from the previous year, 9 (7.14%) additional patients from the January until June 2020 screening results and an additional 1 (0.79%) patient screened in July-December 2020. 5 (3.96%) CKD patients with hepatitis C died in 2020. CKD patients with hepatitis C in 2021 were 7 (5.07%) patients. There is 1 (0.72%) additional patient were screened in January – June 2021 and an additional 1 (0.72%) transferred patients from other hospitals. The number of CKD patients with hepatitis C who died in 2021 was 1 (0.72%) patient.

Meanwhile, in January until June 2022, the number of patients with Hepatitis C was 8 (5.12%) patients. There are 7 (4.48%) patients from 2021 and an additional 3 (4.68%) patients transferred from other hospitals. 1 (0.64%) patient died and 1 (0.64%) patient recovered. There is no additional hepatitis C patient from the results of the screening in 2022.

4. DISCUSSION

The number of CKD patients who underwent hemodialysis at UMM General Hospital was higher in males than females patients. This is in accordance with the 2018 Riskesdas report which shows the prevalence rate of CKD in Indonesia is 0.41% for men and 0.39% for women.(2) This seems to be associated with a higher rate of comorbidity with other

systemic diseases, and males are more likely to have acquired risk factors, such as smoking, alcohol consumption, or inherited factors.(7)

The majority of CKD patients who underwent hemodialysis at UMM General Hospital were 50-59 years old (33.8%). This is in accordance with the 2013 Riskesdas report which shows the prevalence of CKD increases with age. The high proportion in this age group is due to a decline in physiological kidney function that begins to occur at the age of over 40 years. In the age range of 40-60 years, stage 5 CKD patients are still classified as productive age so that the desire to undergo treatment is still high (7)

Most of the CKD patients (57.5%) who underwent hemodialysis at UMM General Hospital were caused by hypertension and had undergone hemodialysis for 1-5 years (66.9%). This is in accordance with research data conducted at Cipto Mangunkusumo Hospital Jakarta, where most of CKD patients (40.7%) were caused by hypertension and most patients (49%) had undergone hemodialysis for 1-4 years.(8). Hypertension is both a cause and effect of CKD and contributes to its progression. As eGFR declines, the incidence and severity of hypertension increase. Controlling hypertension in those with chronic kidney disease (CKD) not only slows progression of renal damage but reduces the risk of cardiovascular disease (9)

Majority of CKD patients (66.9%) who underwent hemodialysis at UMM General Hospital used Arteriovenous Shunt (AV Shunt) vascular access. AV Shunt is an operation to connect (anastomose) arteries and veins in the arm or other body parts to make the access connection for hemodialysis. AV shunt is the gold standard in establishing vascular access for hemodialysis in patients with CKD. AV shunts are designed to increase the effectiveness of hemodialysis, and to reduce risks and complications that can occur with other vascular accesses. (10)

UMM General Hospital is a type C hospital located in Malang regency, East Java, which was established in 2013. In 2022, There are 24 hemodialysis machines, consist of 21 regular hemodialysis machines, 2 hepatitis B hemodialysis machines, and 1 COVID-19 infectious hemodialysis machine. Every patient who undergoes regular hemodialysis at UMM General Hospital gets 2 times hemodialysis in 1 week with an average time of 5 hours in 1 hemodialysis session per day according to the schedule that has been organized by the Hemodialysis team at UMM General Hospital (Monday and Thursday, Tuesday and Friday, and Wednesday and Saturday). The Schedule divided into 2 sessions in 1 day, except Tuesday - Friday divided into 3 sessions.

In this study, in the first semester of 2022, the prevalence of hepatitis B infection in CKD patients was 2.5%. This is lower than the percentage of CKD patients with hepatitis B at Cipto Mangunkusumo Hospital, Jakarta with 3.4% hepatitis B patients.(8) While in

cases of hepatitis C as much as 5% of all CKD patients undergoing hemodialysis. This number is lower than CKD patients with hepatitis C at Cipto Mangunkusumo Hospital, Jakarta (40%).(8) There was no incidence of dual infection with hepatitis B and hepatitis C in this study, the absence of dual infection in this study may be due to the number of patients included in this study.

Before 2022, there is no specific hemodialysis machine for hepatitis B patients, all CKD patients with hepatitis B who will undergo hemodialysis are referred to other hospitals with higher facilities. Meanwhile, for Hepatitis C patients, the Hemodialysis procedure does not need to be separated from the regular hemodialysis patients. Based on the national Hemodialysis service guidelines, Hemodialysis machine isolation is only required for people with hepatitis B virus, not for people with hepatitis C virus and HIV. The use of reprocessed dialyzers is only allowed in patients with Hepatitis C and HIV with special precautions, but is prohibited for people with Hepatitis B. (11)

The prevalence of CKD among HBsAg positive subjects tends to be higher among those with elevated ALT. HBV-associated nephropathy is more common when there is active replication of the virus or active inflammation in liver cells (immune tolerant or immune clearance phase) than when the viral burden and liver enzyme levels are low (inactive carrier phase) (12). The relationship between hepatitis B virus infection and CKD occurs in several ways, some forms of renal disease are induced by Hepatitis B infection and patients with chronic kidney disease are at increased risk for acquiring Hepatitis B(13).

The association between Hepatitis B infection and glomerular damage was first reported by Combes et al. in 1971 in a patient with nephrotic syndrome due to membranous nephropathy and CHB. Since then, further glomerular diseases such as minimal change disease, IgA nephropathy, membranoproliferative glomerulonephritis, and mesangial nephritis have been associated with chronic hepatic disease and some antigens such as HBsAg, HBeAg, and HBcAg. (12) The pathogenic mechanisms of HBV-related nephropathy have been uncertain, Serum of patients with chronic HBV infection was observed to induce renal tubular cells apoptosis. HBV antigens had been observed to express in kidney tissues, which may cause chronic immunologic injury and direct viral-induced pathological alterations. (14) The low molecular weight of HBV envelope antigen (HBeAg) has been reported to traverse into the glomerular basement membrane and eventually lead to the deposition of HBV immune complex in the formation of subepithelial membrane. (15)

As is known, the incidence of CKD during chronic HBV infection might be attributed to the kidney injury induced by HBV itself and/or the renal side effects of anti-HBV

drugs.(15) There are six oral agents of nucleos(t)ide analogues (NAs) which have been widely used for anti-HBV treatment, namely lamivudine, telbivudine and entecavir as nucleoside; adefovir dipivoxil (ADV), tenofovir disoproxil fumarate (TDF) and tenofovir alafenamide (TAF) as nucleotide analogues. (15)

Various mechanisms have been implicated in the adverse impact of HBV sero-positive status on chronic kidney disease, including an accelerated endothelial dysfunction at renal level. An atherogenic activity of HBV has been suggested to explain a five-fold increased risk of cardiovascular events in a selected cohort of HBsAg positive patients with type 2 diabetes and overt nephropathy over a median follow-up of 24 months (13). Development of CKD increases patient mortality and morbidity and puts a major strain on the health care system. The use of hemodialysis has led to the increased longevity of these patients, but it also predisposes them to some infections, especially blood born viruses like Hepatitis B and C, which represent a significant cause of morbidity and mortality.(16)

Non-specific prevention of Hepatitis B infection can be done by implementing good universal precautions and screening for high-risk groups. The principles of universal precautions, such as using gloves when working with patient's body fluids, proper handling of needles and syringes, sterilizing equipment in the right way before carrying out invasive procedures, and washing hands before handling patients can reduce the risk of transmission, especially to health workers. (17) Specific prevention of Hepatitis B transmission through the hemodialysis machine is by using a special machine that is separated from other patients, and using a single use (non-reusable) dialysate. (11) At UMM General Hospital, a special hemodialysis machine for hepatitis B patients is placed at the end of the room so that many people don't pass by hemodialysis machine specifically for CKD patients with hepatitis B is marked with a special marker. Nurses on duty have also been separated between nurses caring for CKD patients without comorbidities, and patients caring for CKD patients with comorbid hepatitis B or hepatitis C.

5. CONCLUSION

The majority of CKD patients undergoing hemodialysis at UMM General Hospital are male patients, aged 50-59 years, undergone hemodialysis for 1-5 years, using AV Shunt, and the most common cause is hypertension. The latest data in January-June 2022 there are 1,25% of patients with hepatitis B and 5% of patients with hepatitis C.

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