

CHAPTER I INTRODUCTION

A. Background

Chronic Kidney Disease (CKD) is one of the leading non-communicable diseases whose prevalence continues to increase worldwide each year. It is estimated that by 2030, more than 70% of patients with end-stage kidney disease (ESKD) will reside in low- and middle-income countries (Sajjadi *et al.*, 2025). In adults, CKD is defined by a glomerular filtration rate (GFR) of < 60 mL/min/1.73 m² persisting for more than three months (Nabila *et al.*, 2025). Globally, CKD affects more than 10% of the world's population, representing approximately 850 million individuals. Among these patients, the majority require dialysis therapy, while approximately 22% undergo kidney transplantation (Lok *et al.*, 2025).

According to the World Health Organization (WHO, 2024), CKD is currently among the ten leading causes of death worldwide, rising from the nineteenth to the ninth leading cause of mortality by 2024. In the United States, approximately 35.5 million people, representing 14% of the adult population, are reported to have CKD (Deng *et al.*, 2025; WHO, 2024). Furthermore, the International Society of Nephrology reported that the global prevalence of CKD reached 9.5% of the population, with approximately 18.18% of affected individuals receiving maintenance hemodialysis (International Society of Nephrology, 2023; Khoirunnisa *et al.*, 2024).

In Indonesia, the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia [SKI]) reported a CKD prevalence of 0.18%, equivalent to approximately 638,178 individuals, with the highest prevalence observed among older adults aged 65–74 years (8.23%) (Khoirunnisa *et al.*, 2024; SKI, 2023). Meanwhile, the Indonesian National Health Insurance Agency (BPJS Kesehatan) recorded 1,501,016 CKD cases in 2023 (BPJS, 2023; Mailani *et al.*, 2025).

In Bengkulu Province, the prevalence of CKD was reported to be 0.16%, corresponding to approximately 4,687 individuals (SKI, 2023). At the healthcare facility level, the Bengkulu City Health Office documented 639 CKD patients in 2021, of whom 165 (25.9%) were receiving maintenance hemodialysis (Anggini *et al.*, 2024; SKI, 2023).

Medical record data from Dr. M. Yunus Regional General Hospital, Bengkulu Province, demonstrated an increasing number of patients undergoing hemodialysis, from 161 patients in 2024 to 180 patients during the period of January–July 2025. A preliminary observational study conducted between 13 and 20 August 2025 identified 153 active hemodialysis patients, including 110 patients using an arteriovenous fistula (AVF) and 43 patients using a catheter double lumen (CDL) as vascular access (RSUD dr M. Yunus Bengkulu Province, 2025). Similarly, medical records from Harapan dan Doa Regional General Hospital, Bengkulu City, showed an increase in the number of hemodialysis patients from 63 in June 2024 to 82 in August 2025, comprising 47 patients with AVF and 35 with CDL. These numbers are expected to continue increasing in parallel with the growing prevalence of CKD requiring maintenance hemodialysis (RSUD Harapan dan Doa Bengkulu City, 2025).

Chronic kidney disease is characterized by progressive and irreversible deterioration of kidney function, resulting in impaired filtration of metabolic waste products and disruption of fluid and electrolyte homeostasis (Nabila *et al.*, 2025). Once patients reach Stage 5 CKD, in which kidney function declines to less than 15% of normal, kidney replacement therapy becomes necessary. Hemodialysis is the most commonly prescribed treatment modality and is generally performed two to three times per week, with each session lasting approximately three to six hours (Fauziah *et al.*, 2024).

Hemodialysis is not a curative treatment but rather a supportive therapy that partially replaces kidney function by removing metabolic waste products, maintaining fluid balance, and regulating electrolyte concentrations (Ana & Mufidah, 2021; Fitriani *et al.*, 2020). Despite its therapeutic benefits, hemodialysis may alter metabolic balance and negatively affect patients' body

image and overall quality of life. These adverse consequences contribute to the development of fatigue, one of the most common and debilitating symptoms experienced by patients with CKD (Sułkowski *et al.*, 2025).

Previous studies have reported that approximately 50%–75% of patients receiving hemodialysis experience various clinical complications, including hypotension, intradialytic hypertension, muscle cramps, pruritus, nausea and vomiting, headache, dyspnea, sleep disturbances, impaired concentration, anxiety, depression, and fatigue, all of which are associated with an increased risk of mortality (Al Naamani *et al.*, 2021; Alvarez *et al.*, 2020; Tan *et al.*, 2022). In Indonesia, the prevalence of fatigue among patients undergoing hemodialysis has been reported to range from 60% to 97% (Mailani *et al.*, 2025).

From a pathophysiological perspective, fatigue in patients receiving hemodialysis is multifactorial, involving anemia, accumulation of uremic toxins, sleep disorders, psychological distress, and fluid imbalance, all of which impair oxygen delivery to body tissues. Pulmonary congestion further compromises gas exchange, leading to dyspnea, reduced tissue oxygenation, and accumulation of metabolic waste products, thereby exacerbating fatigue (Gregg *et al.*, 2021; Kirkman *et al.*, 2021; Xia *et al.*, 2025). Fatigue generally occurs in two distinct forms *intradialytic fatigue* (IDF), which develops before or during dialysis treatment, and *post-dialysis fatigue* (PDF), which occurs after dialysis and may persist for several hours (Bossola *et al.*, 2023). Additional factors associated with fatigue include low hemoglobin levels, duration of hemodialysis treatment, intradialytic blood pressure changes, interdialytic weight gain (IDWG), comorbid conditions, patients' knowledge regarding disease management, and alterations in body image (Mailani *et al.*, 2025; Santoso *et al.*, 2022; Zu *et al.*, 2020).

Vascular access is a critical component of the hemodialysis procedure. The three principal vascular access modalities include arteriovenous fistula (AVF), arteriovenous graft (AVG), and central venous catheter (CVC) (Nousis *et al.*, 2025). The Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines recommend AVF as the preferred vascular access because of its

superior long-term patency and lower infection risk compared with CDL. Appropriate vascular access selection is essential because it provides the primary route for blood circulation between the patient's body and the dialysis machine. In clinical practice, AVF and CDL are the two most frequently utilized vascular access types (Lok *et al.*, 2025).

Recent evidence suggests that fatigue severity among patients undergoing hemodialysis is associated with the type of vascular access used. Patients with AVF generally demonstrate longer vascular access patency and lower infection rates, resulting in lower fatigue severity and better quality of life than patients using CDL (Nousis *et al.*, 2025). Conversely, patients with CDL are more susceptible to recurrent infections, hospitalization, malnutrition, thrombosis, and loss of vascular access patency, all of which may aggravate fatigue and further impair quality of life (Maguire *et al.*, 2022; Venegas-Ramírez *et al.*, 2025).

Interviews with hemodialysis nurses at Dr. M. Yunus Regional General Hospital, Bengkulu Province, and Harapan dan Doa Regional General Hospital, Bengkulu City, revealed that most patients underwent hemodialysis twice weekly, with each session lasting four to five hours, and that the majority had been receiving long-term treatment. Preliminary observations and interviews conducted using the Indonesian version of the *Functional Assessment of Chronic Illness Therapy Fatigue Scale* (FACIT Fatigue Scale Version 4) between 13 and 20 August 2025 involved 20 patients at Dr. M. Yunus Regional General Hospital. Among these participants, 11 patients (55%) experienced severe fatigue, while 9 patients (45%) reported mild fatigue. Similar findings were observed among 12 patients at Harapan dan Doa Regional General Hospital, where 8 patients (67%) experienced severe fatigue and 4 patients (33%) experienced mild fatigue. Patients also reported persistent tiredness and difficulty initiating and completing daily activities, which substantially interfered with their routine functioning.

Based on the evidence presented above, fatigue represents a major clinical problem among patients undergoing maintenance hemodialysis, and the type of vascular access may influence its severity. However, to accurately determine this relationship, potential confounding variables including age, sex, duration of hemodialysis, comorbidities, sleep quality, hemoglobin level, and interdialytic weight gain (IDWG) should be controlled to ensure that any observed differences in fatigue are attributable to the type of vascular access rather than other contributing factors (Bossola *et al.*, 2023; Li *et al.*, 2023).

Therefore, this study aims to specifically examine differences in fatigue severity between patients with chronic kidney disease undergoing maintenance hemodialysis using arteriovenous fistula (AVF) and those using catheter double lumen (CDL) within the context of hemodialysis services.

B. Research Problem

Patients undergoing maintenance hemodialysis frequently experience symptoms that adversely affect their quality of life, with fatigue being one of the most prevalent and debilitating manifestations. Hemodialysis requires reliable vascular access, most commonly through an arteriovenous fistula (AVF) or a catheter double lumen (CDL). Each vascular access type has distinct advantages, limitations, and risks of complications, which may contribute to differences in patients' fatigue levels (Nousis *et al.*, 2025). Preliminary observations conducted at the hemodialysis units of the two Bengkulu Regional General Hospitals using the Indonesian version of the *Functional Assessment of Chronic Illness Therapy Fatigue* (FACIT Fatigue) Scale Version 4 involved 32 patients and revealed that the majority experienced fatigue. Of these, 19 patients (59%) reported severe fatigue, while 13 patients (41%) experienced mild fatigue.

Based on these findings, the research problem was formulated as follows: "Is there a significant difference in fatigue levels between patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis using an arteriovenous fistula (AVF) and those using a catheter double lumen (CDL) at the Hemodialysis Unit of Bengkulu Regional General Hospital in 2026?".

C. Research Objectives

The objectives of this study are as follows:

1. General Objective

To determine the difference in fatigue levels between patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis using an arteriovenous fistula (AVF) and those using a catheter double lumen (CDL) as vascular access at the Hemodialysis Unit of Bengkulu Regional General Hospital in 2026.

2. Specific Objectives

The specific objectives of this study are to:

- a. Describe the distribution and frequency of respondents' characteristics, including age, sex, duration of hemodialysis, comorbidities, sleep quality, hemoglobin (Hb) level, and interdialytic weight gain (IDWG) among patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis.
- b. Describe the distribution and frequency of vascular access types among patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis.
- c. Describe the distribution and frequency of fatigue levels among patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis.
- d. Determine the *mean* fatigue levels among patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis using an arteriovenous fistula (AVF) and those using a catheter double lumen (CDL) as vascular access.

- e. Analyze the difference in *mean* fatigue levels between patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis using an arteriovenous fistula (AVF) and those using a catheter double lumen (CDL) as vascular access.

D. Significance of The Research

1. Theoretical Significance

a. For the Researcher

This study provides the researcher with valuable scientific experience in applying the knowledge acquired during academic training while broadening understanding and practical insight in the field of medical-surgical nursing, particularly regarding differences in fatigue severity according to the type of vascular access used for hemodialysis.

b. For Patients with Chronic Kidney Disease Undergoing Hemodialysis

The findings of this study are expected to enhance patients' understanding of the influence of vascular access type on fatigue severity. Increased awareness may encourage patients to maintain their physical condition and actively participate in the management of their hemodialysis treatment.

2. Practical Significance

a. For Nurses and Healthcare Institutions

This study is expected to assist nurses in developing more targeted nursing interventions aimed at reducing fatigue and improving the quality of life of patients undergoing maintenance hemodialysis. In addition, the findings may serve as valuable evidence for healthcare institutions in improving the quality of clinical services, nursing care, and patient education for individuals with chronic kidney disease.

b. For Educational Institutions and Future Researchers

The findings of this study are expected to serve as an academic reference that enriches educational resources, particularly in the field of

nursing care for patients with chronic kidney disease undergoing maintenance hemodialysis. Furthermore, this study may provide a foundation for future research with broader populations and more comprehensive study designs, thereby contributing to a deeper understanding of fatigue among patients receiving maintenance hemodialysis.

