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Analysis Of The Effect Of Hemodialysis Frequency On Hemoglobin, Ureum, Creatinine And Albumin Levels In Chronic Kidney Failure Patients At Praya Hospital

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ABSTRACT

Chronic Kidney Disiase (CKD) is a progressive loss of kidney function characterized by the inability of the kidneys to excrete waste and maintain metabolic balance. When kidney function declines, erythropoietin production decreases, resulting in anemia. other complication, such a hypoalbuminemia, are also common. Urea and creatinine levels are vital parameters of assessing kidney function. Hemodialysis is a common therapy for CKD patients; therefore, evaluating laboratory parameters such as haemoglobin, urea, creatinine, and albumin levels according to the frequency of hemodialysis is essential to determine treatment effectiveness. This analytical observational study with a cross-sectional design evaluated the effectiveness of bi-weekly hemodialysis among 32 chronic kidney disease patients at Praya General Hospital in May 2025. The results indicated that while routine hemodialysis significantly reduced urea levels from 137.9 mg/dL to 17.6 mg/dL and creatinine from 10.7 mg/dL to 2.5 mg/dL, these metabolic waste parameters tended to increase slightly after six months. In contrast, hemoglobin levels remained relatively stagnant at approximately 8.2–8.3 g/dL, signifying persistent moderate anemia despite regular treatment. Notably, albumin levels showed a steady and gradual improvement over the six-month period, rising from 3.4 g/dL to 4.0 g/dL, which suggests an enhanced protein status in patients adhering to the prescribed hemodialysis frequency.

INTRODUCTION

Chronic Kidney Failure (CKF) remains a major health issue globally, affecting approximately 10% of the population. In Indonesia, CKF prevalence among adults reaches 3.8%. The kidneys play a vital role in waste excretion, electrolyte regulation, and erythropoietin production. When kidney function declines, patients develop anemia and hypoalbuminemia due to reduced erythropoietin synthesis and protein loss. Elevated urea

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and creatinine levels indicate reduced filtration capacity. The accumulation of these uremic toxins not only signifies declining renal function but also contributes to systemic complications that diminish the patient's quality of life.

Hemodialysis (HD) is the main therapy for CKF patients to remove metabolic waste and excess fluid. While the clinical goal of dialysis is to replace renal filtration, the adequacy of this process is highly dependent on the regularity and frequency of the sessions. The frequency of HD may influence biochemical markers such as hemoglobin, urea, creatinine, and albumin. In many regional settings, such as in Indonesia, a twice-weekly schedule is the standard protocol; however, its long-term impact on maintaining stable laboratory parameters requires localized evaluation to ensure treatment effectiveness. Therefore, this study aimed to analyze the effect of hemodialysis frequency specifically twice per week on these laboratory parameters in CKF patients treated at Praya Hospital.

MATERIALS/METHOD

This analytical observational study employed a cross-sectional design and was conducted at the Clinical Pathology Laboratory of Praya General Hospital in May 2025. The study population consisted of 32 chronic kidney failure (CKF) patients who had been undergoing routine hemodialysis twice weekly for a minimum of six months, selected through purposive sampling based on specific inclusion criteria. Utilizing secondary data sourced from patient medical records, the research focused on hemodialysis frequency as the independent variable and its effect on dependent variables, including hemoglobin, urea, creatinine, and albumin levels. The collected data were analyzed descriptively to evaluate longitudinal changes in these laboratory parameters before, during, and after the six-month treatment period.

RESULTS AND DISCUSSION

The following results were obtained from the research conducted:

Table 1. Hemoglobin levels in CKD patients before HD, after the first HD and after hemodialysis in months 1-6 with a frequency of HD twice a week.

Hemoglobin Level before HD	Hemoglobin Level after HD	Hemoglobin Level in the 1st Month	Hemoglobin Level in the 2nd Month	Hemoglobin Level in the 3rd Month	Hemoglobin Level in the 4th Month	Hemoglobin Level in the 5th Month	Hemoglobin Level in the 6th Month
8,4	8,2	8,4	8,2	7,7	8,5	8,1	8,2

The average hemoglobin before hemodialysis was 8.3 g/dL and after six months remained around 8.2 g/dL, indicating mild-to-moderate anemia. This suggests that hemodialysis twice a week helps stabilize hemoglobin levels but does not normalize them, possibly due to persistent erythropoietin deficiency.

Table 2. Urea levels in CKD patients before HD, after the first HD and after HD in the 3rd and 6th months with a frequency of HD twice a week.

Urea levels before the first HD	Urea levels after the first HD	Urea levels in the 3rd month after undergoing HD	Urea levels in the 6th month after undergoing HD
137,9	17,6	22,6	24,6

Urea levels significantly decreased from a mean of 137.9 mg/dL before HD to 17.6 mg/dL after HD, and then slightly increased to 24.6 mg/dL at six months. Similarly, creatinine levels decreased from 11.4 mg/dL to 2.1 mg/dL after HD, followed by a mild rebound at later stages. These results demonstrate the efficacy of HD in toxin removal but highlight the need for consistent sessions to maintain biochemical stability.

Table 3. Creatinine levels in CKD patients before HD, after the first HD and after HD in the 3rd and 6th months with a frequency of HD twice a week.

Creatinine levels before first HD	Creatinine levels after first HD	Creatinine levels in the 3rd month after undergoing HD	Creatinine levels in the 6th month after undergoing HD
9,06	1,51	1,46	2,04

Based on the data presented in Table 3, the mean creatinine levels in patients with Chronic Kidney Disease (CKD) showed a dramatic reduction from 9.06 mg/dL before the first hemodialysis (HD) session to 1.51 mg/dL immediately afterward. Subsequent monitoring in the 3rd month indicated a relatively stable trend with a slight decrease to 1.46 mg/dL. However, by the 6th month, there was a noticeable increase in creatinine levels to 2.04 mg/dL, despite patients maintaining a routine twice-weekly hemodialysis schedule. This phenomenon suggests that while twice-weekly hemodialysis is highly effective for the immediate removal of creatinine as a metabolic waste product, there is a tendency for "rebound" or gradual accumulation over a longer six-month period, highlighting the necessity for consistent dialysis sessions and regular monitoring of biochemical parameters to ensure long-term patient stability.

Table 4. Albumin levels in CKD patients after the first HD and after HD in the 3rd and 6th months with a frequency of HD twice a week

Albumin levels after first HD	Albumin levels in the 3rd month after undergoing HD	Albumin levels in the 6th month after undergoing HD
3,7	4,1	4,4

Based on the data presented in Table 4, the average albumin levels in Chronic Kidney Disease (CKD) patients showed a steady and positive improvement over the six-month observation period. The mean albumin level started at 3.7 g/dL after the first hemodialysis (HD) session and increased to 4.1 g/dL by the 3rd month. By the 6th month, the levels continued to rise, reaching an average of 4.4 g/dL, which falls within the normal physiological range

CONCLUSIONS

This study concludes that a twice-weekly hemodialysis frequency is effective in reducing urea and creatinine levels and maintaining stable albumin concentrations, but does not significantly improve hemoglobin levels. To address the persistent anemia observed in these patients, clinical management should include regular hemoglobin monitoring and the consideration of adjunct erythropoietin therapy to supplement the dialysis process.

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