

# NUTRITIONAL STATUS PROFILE OF CKD PATIENTS THAT ARE REGULARLY HEMODIALYSIS IN UNIVERSITAS AIRLANGGA HOSPITAL

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## Abstract

CKD patients, especially those undergoing hemodialysis, often have poor nutritional status. This condition can increase morbidity and mortality and decrease the patient's quality of life, therefore an assessment of nutritional status in hemodialysis patients is important. This study aims to determine the nutritional status of CKD patients undergoing hemodialysis at the Universitas Airlangga Hospital. This research is a quantitative research using a descriptive method. The sample was taken by total sampling technique and obtained from a sample of 50 people who are regular hemodialysis patients at the Universitas Airlangga Hospital. The nutritional status of patients was assessed based on Body Mass Index (BMI), serum albumin levels, body fat percentage and skeletal muscle percentage. The data obtained were analyzed descriptively and presented in the form of a table containing the percentage, mean, and standard deviation. The results showed the characteristics of the subjects such as gender, age, BMI, serum albumin levels, body fat percentage, and skeletal muscle percentage. From the results of this study, it was found that the characteristics of the research subjects were the same between the sexes of male (50%) and female (50%) with the highest age group between 50-59 years (36%). The largest proportion of subjects had a normal BMI (56%), 36% of subjects had hypoalbuminemia, the majority of body fat percentages were high (34%) and the majority of subjects had low muscle mass (52%).

Keywords: CKD; Hemodialysis; Nutritional Status

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## 1. Introduction

Chronic kidney disease (CKD) is a global health problem with increasing prevalence. Based on data from the Global Burden of Disease Study 2017, the prevalence of CKD is estimated to reach 9.1% of the entire population in the world (GBD Chronic Kidney Disease Collaboration, 2020). In the United States, it is estimated that more than 1 in 7 people or 15% of the entire adult population suffers from CKD (CDC, 2021). Meanwhile in Indonesia, the prevalence of CKD diagnosed by doctors has increased from year to year, 0.2% in 2013 and increased to 0.38% in 2018 (Kemenkes, 2013; Kemenkes, 2018).

CKD is a clinical spectrum associated with impaired function and a progressive decrease in the glomerular filtration rate (GFR) (Jameson & Loscalzo, 2013). CKD was defined if there was kidney damage for more than 3 months or there was a decrease in GFR less than 60 ml/min/1.73 m<sup>2</sup> for more than 3 months with or

without kidney damage. Based on GFR criteria, the course of chronic kidney disease can be divided into 5 stages. CKD that has reached the final stage or grade 5 is characterized by progressive renal failure and requires renal replacement therapy (KDIGO, 2012).

One option for renal replacement therapy in patients with end-stage CKD or end-stage renal disease (ESRD) is hemodialysis. According to United States Renal Data System (USRDS) in 2019, 85% of all ESRD incidents in the United States started hemodialysis therapy. The overall population of hemodialysis patients is also increasing, USRDS data shows an increase in the hemodialysis population in the United States, which is 34.5% from 2009 to the end of 2019 (USRDS, 2022). Meanwhile in Indonesia, at the end of 2018, there were 132,142 active hemodialysis patients, this number increased by 85.3% compared to the previous year (IRR, 2018).

In CKD patients, especially those undergoing hemodialysis, poor nutritional status is a frequent complication (Okuno, 2021). The multicenter cross-sectional study conducted by Akhlaghi et al. showed a fairly high malnutrition rate in hemodialysis patients, which was between 33.3 – 36.1% depending on the parameter score used (Akhlaghi et al., 2021). Another study also showed the prevalence of groups that had a moderate to high risk of malnutrition was 31.1% in the hemodialysis patient population (Kurajoh et al., 2022). Poor nutritional status can increase morbidity and mortality and reduce the quality of life of patients undergoing hemodialysis. Therefore, the evaluation of clinical nutritional status is very important to improve the quality of life and clinical outcomes of hemodialysis patients (Epifânio, Balbino, Ribeiro, Franceschini, & Hermsdorff, 2018). Assessment of nutritional status can be done by several methods, anthropometric, biochemical, clinical, and physical examination (Taberna, Navas-Carretero, & Martinez, 2019).

This study aims to determine the nutritional status of CKD patients who are undergoing hemodialysis, and is expected to provide scientific information for the development of further research.

## 2. Methods

This study is a quantitative study using a descriptive method with a population of all CKD patients undergoing regular hemodialysis at Universitas Airlangga Hospital. Sampling was done by total sampling technique, that is, all populations that meet the inclusion criteria will be sampled in this study. Obtained a total sample of 50 people.

The nutritional status of hemodialysis patients was measured based on body mass index (BMI), serum albumin levels, body fat percentage, and skeletal muscle percentage. The data in this study were obtained from the patient's medical records. Measurements of BMI, body fat percentage and skeletal muscle percentage were performed using Karada Scan. Meanwhile, albumin levels in serum were obtained from the results of laboratory tests.

BMI is the relationship between weight and height. BMI is defined as the division of weight in kilograms by the square of height in meters.  $BMI = \text{weight (Kg)} / [\text{Height (m)}]^2$ . According to the grouping of BMI based on the BMI threshold limit of the Ministry of Health of the Republic of Indonesia (Kemenkes), BMI can be divided into thin ( $<18.5$ ), normal ( $18.5-25.0$ ) and obese ( $\geq 25.1$ ).

Serum albumin levels were grouped into normal and hypoalbuminemia. Normal serum albumin levels ranged from 3.8 to 5.8 g/dL, hypoalbuminemia if albumin  $<3.8$  g/dL. Body fat percentage is the percentage of total body fat weight compared to body weight.  $\text{Body fat percentage} = \text{body fat mass (Kg)} / \text{Body weight (kg)} \times 100\%$ . Body fat percentage categories were divided into low (female 19.9; male 9.9), normal (female 20-29.9; male 10-19.9), high (female 30-34.9; male 20-24, 9), and very tall (female 35; male 25). Skeletal muscle percentage or skeletal muscle ratio shows the percentage of total skeletal muscle mass compared to total body weight. The interpretation of muscle mass depends on age and gender.

All data obtained were analyzed descriptively and presented in the form of a frequency distribution table containing profiles of research subjects.

### 3. RESULT AND DISCUSSION

Table 1. Characteristics of subject

| no | Subject Characteristics | Subject (n=50) |    |
|----|-------------------------|----------------|----|
|    |                         | n              | %  |
| 1  | Gender                  |                |    |
|    | Male                    | 25             | 50 |
|    | Female                  | 25             | 50 |
| 2  | Age                     |                |    |
|    | <40 years               | 6              | 12 |
|    | 40-49 years             | 12             | 24 |
|    | 50-59 years             | 18             | 36 |
|    | ≥ 60 years              | 14             | 28 |

Table 2. Characteristics of research variables

| no | Subject Characteristics    | Subject (n=50) |    | Mean ±SD |
|----|----------------------------|----------------|----|----------|
|    |                            | n              | %  |          |
| 1  | BMI                        |                |    | 24,7±3,4 |
|    | Thin                       | 1              | 2  |          |
|    | Normal                     | 28             | 56 |          |
|    | Obese                      | 21             | 42 |          |
| 2  | Albumin serum              |                |    | 3,9±0,3  |
|    | Hypoalbuminemia            | 18             | 36 |          |
|    | Normal                     | 32             | 64 |          |
| 3  | Body fat percentage        |                |    | 24,9±8,3 |
|    | Low                        | 5              | 10 |          |
|    | Normal                     | 15             | 30 |          |
|    | High                       | 17             | 34 |          |
|    | Very High                  | 13             | 26 |          |
| 4  | Skeletal muscle percentage |                |    | 29,0±4,3 |
|    | Low                        | 26             | 52 |          |
|    | Normal                     | 19             | 38 |          |
|    | High                       | 4              | 8  |          |
|    | Very High                  | 1              | 2  |          |

The characteristics of the subjects in this study consisted of gender and age. Table 1 shows that the comparison between male and female subjects is the same, namely male as many as 25 people (50%) and female subjects as many as 25 people (50%). The most age range of research subjects is between 50-59 years, which is 36%.

Table 2 shows that based on BMI, 1 subject was thin (2%), 28 subjects were normal (56%) and 21 subjects were obese (42%). Meanwhile, the serum albumin concentration in 32 subjects was in the normal category (64%) and 18 subjects had hypoalbuminemia (36%). 5 subjects had a low body fat percentage (10%), 15 subjects had normal body fat (30%), 17 subjects had high body fat (34%), and 13 subjects had very high body fat (26%). Based on the percentage of skeletal muscle, 26 subjects had a low percentage of skeletal muscle (52%), 19 subjects had a normal percentage of skeletal muscle (38%), 4 subjects had a high percentage of skeletal muscle (8%), and 1 subject had a very high percentage of skeletal muscle (2%).

The results of this study showed that the majority of subjects had a normal BMI with an average of  $24.7 \pm 3.4$ , this result is in line with research conducted by AlSahli et al. which shows the largest proportion of samples have normal weight and obesity. The study showed that only 6.5% of the sample were underweight, 34.4% had normal weight, 24.8% were overweight, and 34.4% were obese (AlSahli et al., 2021). Meanwhile, in another study that differentiated between male and female subjects, the majority of female subjects had normal BMI (70.6%) while the largest proportion of male subjects was overweight (51.1%) (Bogacka, Sobczak-Czynsz, Kucharska, Madaj, & Stuck, 2018). Various studies have consistently reported that a higher BMI is associated with better survival in hemodialysis patients or so-called "obesity paradox" (Park et al., 2014).

The results of measuring serum albumin levels showed that 36% of the subjects in this study had hypoalbuminemia. Meanwhile, data obtained from the Dialysis Outcomes and Practice Patterns Study (DOPPS) showed a higher number, around 60% of CKD patients undergoing hemodialysis had serum albumin levels  $< 4$  g/dL (DOPPS, 2021). In the research conducted by Hamid et al. The average serum albumin level in long-term hemodialysis patients was  $3.66 \pm 0.39$  mg/dL (Hamid, Dhrolia, Qureshi, Imtiaz, & Ahmad, 2019). Hypoalbuminemia in hemodialysis patients is caused by an imbalance between the rate of albumin synthesis and the process of catabolism or loss of albumin from the body. The decrease in albumin synthesis is caused by inadequate nutritional intake, while the loss of albumin from the body is caused by inflammatory conditions that cause albumin hypercatabolism and albumin loss in the dialysate through the dialyzer during the hemodialysis process (Kalantar-Zadeh, Ficociello, Bazzanella, Mullon, & Anger, 2021). Besides being able to reflect the nutritional status and inflammatory conditions, initial albumin levels can also predict the prognosis of hemodialysis patients (Tang et al., 2021).

Data regarding the percentage of body fat in this study showed that the largest proportion of samples had a high percentage of body fat (34%) with an average  $24.9 \pm 8.3$ . This result is lower when compared to one of the multicenter studies conducted in Taiwan, where the average body fat percentage in hemodialysis patients was  $28.3 \pm 9.8$  (Duong et al., 2019). In another study, the average percentage of body fat was even higher, which was  $30 \pm 10$  (Delgado et al., 2017). Several factors that can affect changes in fat mass are nutritional intake, initiation of hemodialysis, inflammatory conditions and comorbidities such as diabetes (Okuno, 2021). As with a higher BMI, a higher percentage of body fat is also reported to have protective properties against hemodialysis patients (Park et al., 2014).

Skeletal muscle percentage shows the ratio of total skeletal muscle mass to total body weight. The results of this study showed that the largest proportion of hemodialysis patients had a low percentage of skeletal muscle (52%). Research conducted by Kittiskulnam et al. stated that the prevalence of low muscle mass in hemodialysis patients ranged from 8-32% depending on the standard criteria used (Kittiskulnam et al., 2017). Decreased muscle mass often occurs in hemodialysis patients, the exact mechanism of this muscle mass loss is multifactorial and still unclear (Koyun, Nergizoglu, & Kir, 2018).

## 4. CONCLUSION

From the results of this study, it was found that the characteristics of the research subjects were almost the same between the sexes of male (50%) and female (50%) with the most age groups between 50-59 years. The nutritional status of the subjects was seen from BMI, serum albumin levels, body fat, and muscle mass. The largest proportion of subjects had a normal BMI, 36% of subjects had hypoalbuminemia, the majority of body fat percentages were high (34%) and the majority of subjects had low skeletal muscle percentages (52%).

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