

## Analysis of Energy and Protein Intake with Nutritional Status of Chronic Kidney Failure Patients with Hemodialysis at Harapan and Doa Regional Hospital, Bengkulu City

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### ABSTRACT

**Background:** Chronic kidney disease is a global public health priority that continues to grow and is associated with high morbidity rates and is the third fastest growing cause of death in the world and the fifth leading cause of death. Malnutrition often occurs in end-stage renal disease patients undergoing hemodialysis (HD). Malnutrition is caused by catabolic events during the hemodialysis process.

**Objective:** The aim of the study was to analyze energy intake, protein and nutritional status of chronic kidney failure patients on hemodialysis at Harapan and Doa Regional Hospital, Bengkulu City.

**Materials/Methods:** Explanatory research type, with a cross sectional approach. The study population was all chronic kidney failure sufferers who underwent hemodialysis at Harapan and Doa Hospital, Bengkulu City in June-July 2023. Data were collected by interviews and anthropometric measurements, 3x24 hour recall forms and SGA forms and from patient medical records. Data processing was carried out using univariate tests.

**Result:** This study shows that 98% of respondents' energy intake before hemodialysis had insufficient energy intake (< 80%) and 2% had sufficient energy intake ( $\leq 80$ ), protein intake before hemodialysis 92% protein intake is less (< 80%) during hemodialysis and after hemodialysis 85% with less protein intake (< 80%), nutritional status of chronic kidney failure patients with hemodialysis good nutritional status (SGA score A), namely (54%) lack of protein intake, poor/moderate nutritional status (SGA B score), namely (43%), poor nutritional status (SGA C score), namely (3%).

**Conclusion:** The conclusion of this study is that energy intake, protein and nutritional status in chronic kidney failure patients on hemodialysis are still lacking. Therefore, increasing intake needs to be done by paying attention to the patient's nutritional status

**KEYWORDS:** Energy and protein intake, Kidney Failure.

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### INTRODUCTION

Chronic kidney disease is a condition where there is a serious decline in kidney function over time. If the glomerular filtration rate (GFR) value is less than 15 ml/minute, the patient is in serious decline in kidney function. In the last three decades globally there has been an increase in chronic kidney failure with end stage disease amounting to 77.5% and 43.1% of patients undergoing hemodialysis. Basic health research data in 2018, the prevalence of chronic kidney failure based on doctor's diagnosis in the aged population  $\geq 15$  years old in Indonesia is 0.38% of the 179.13 million Indonesian population aged  $\geq 15$ . With a mapping map of chronic kidney failure patients undergoing hemodialysis

therapy, there were 132,142 people or only 20.2% as of December 31 2018<sup>1</sup>.

In Bengkulu province, the prevalence of chronic kidney failure is based on doctor's diagnosis in the elderly population  $\geq 15$  years old is in 11th place out of 34 provinces in Indonesia with a percentage of 0.44% with a proportion of patients undergoing hemodialysis of 20.26%<sup>1</sup>. Data from the Bengkulu City Health Service shows that there were 639 patients with chronic kidney failure with hemodialysis, 165 patients (25.90%)<sup>2</sup>

Based on the hemodialysis installation register book at Harapan and Doa Hospital, Bengkulu City, the number of chronic kidney failure sufferers is increasing from year to year, in 2021 the number of chronic kidney failure patients

## Analysis of Energy and Protein Intake with Nutritional Status of Chronic Kidney Failure Patients with Hemodialysis at Harapan and Doa Regional Hospital, Bengkulu City

undergoing hemodialysis is 55 people, the highest in May, namely 69 people. From November 2021 to February 2022, the number of hemodialysis patients was 55 people. There were 60 patients undergoing hemodialysis from March 2022 until the time the research was conducted.

Food intake for people with chronic kidney failure is relatively low. Patients with chronic kidney failure experience protein energy deficiency due to uremia syndrome, which causes nausea, vomiting and decreased appetite. Hemodialysis carried out by CKD patients can cause loss of nutrients, such as protein, so that the protein given must be high, namely 1.2 mg/kg ideal body weight/day as compensation for protein loss due to hemodialysis. It is recommended that 50% of the protein given be protein with high biological value to ensure adequate iron intake<sup>3,4</sup>

Monitoring the nutritional status of hemodialysis patients regularly is considered important and can detect the emergence of malnutrition early. Subjective Global Assessment (SGA) assessment in chronic kidney failure patients undergoing hemodialysis can be used as an indicator of nutritional status to predict death<sup>5</sup>.

Monitoring of energy intake, protein and nutritional status in chronic kidney failure patients with hemodialysis at Harapan and Doa Hospital, Bengkulu City so that researchers are interested in seeing a picture of energy and protein intake and nutritional status of chronic kidney failure patients with hemodialysis at Harapan and Doa Hospital, Bengkulu City. 2023. The aim is to determine the energy intake, protein and

nutritional status of chronic kidney failure patients with hemodialysis at the Harapan and Doa Regional Hospital, Bengkulu City in 2023.

### METHODS

Explanatory research type, with a cross sectional approach. The study population was all chronic kidney failure sufferers who underwent hemodialysis at the Outpatient Hemodialysis Unit at Harapan and Doa Hospital, Bengkulu City in June and July 2023, totaling 60 people. Primary data collection was taken by interviews and anthropometric measurements, 3x24 hour recall form and SGA form. Secondary data from patient medical records. Data processing was carried out using univariate analysis with independent variables (energy intake, protein and nutritional status), with dependent variables (chronic kidney failure patients on hemodialysis)

The assessment results from SGA include category A (normal nutrition) if the score is "A"  $\geq$  50% of the category, category B (malnutrition) if the score is "B"  $\geq$  50% of the category, and C (poor nutrition) if the score is "C"  $\geq$  50% or there are significant physical signs<sup>6</sup>

### RESULTS

Energy and protein intake before, during and after hemodialysis Chronic Kidney Failure Patients with Hemodialysis at Harapan and Doa Hospital, Bengkulu City in 2023 can be seen in table 1.

**Table 1. Energy and Protein Intake in Chronic Kidney Failure Patients with Hemodialysis at the Harapan and Doa Hospital, Bengkulu City**

Intake	Frequency					
	Before Hemodialysis		During Hemodialysis		After Hemodialysis	
	N	%	n	%	N	%
Energy						
Not enough	59	98	60	100	56	93
Enough	1	2	0	0	4	7
Total	60	100.0	60	100.0	60	100.0
Proteins						
Not enough	55	92	51	85	51	85
Enough	5	8	9	15	9	15
Total	60	100.0	60	100.0	60	100.0

Based on Table 1, it is known that the description of the energy intake of respondents before hemodialysis in CKD sufferers shows that the majority were 59 people with a percentage of 98% with insufficient energy intake and 1 respondent with sufficient energy intake with a percentage of 2%. The description of energy intake when respondents underwent hemodialysis in CKD sufferers showed that 60 respondents had a 100% percentage of low energy intake. The description of energy intake after respondents underwent hemodialysis among CKD sufferers showed that the majority

were 56 people with a percentage of 93% who had insufficient energy intake and 4 people had sufficient energy intake with a percentage of 7%.

It is known that the description of protein intake before HD in CKD sufferers shows that the majority of 55 people with a percentage of 92% had insufficient protein intake and 5 people had sufficient protein intake with a percentage of 8%. The description of protein intake during HD in CKD sufferers shows that the majority of 51 people with a percentage of 85% had insufficient protein intake and 9 people had sufficient protein intake with a percentage of 15%. The description of

# Analysis of Energy and Protein Intake with Nutritional Status of Chronic Kidney Failure Patients with Hemodialysis at Harapan and Doa Regional Hospital, Bengkulu City

protein intake after HD in CKD sufferers shows that the majority of 51 people with a percentage of 85% had

insufficient protein intake and 9 people had sufficient protein intake with a percentage of 15%.

**Table 2. Description of Nutritional Status (SGA) in Chronic Kidney Failure Patients**

Variables	Characteristics	Frequency	
		n	%
SGA	A (Good Nutrition)	32	53.4
	B (Mild/Moderate Nutrition)	26	43.3
	C (Bad Nutrition)	2	3.3
Total		60	100.0

Based on Table 2, it is known that the description of the nutritional status of CKD sufferers shows that 32 people with a percentage of 54% have good nutritional status (SGA Score A), 26 people with a percentage of 43% have poor/moderate nutritional status (SGA B Score), and 2 people with 3% percentage of poor nutritional status (SGA Score C).

## DISCUSSION

### 1. Energy Intake of Chronic Kidney Failure Patients with Hemodialysis

Energy is a result of the metabolism of carbohydrates, proteins and fats which function as energy substances for metabolism, growth, temperature regulation and physical activity. Excess energy will be stored in the form of glycogen as a short-term energy reserve and in the form of fat as a long-term reserve. Pernefri recommends that energy consumption for chronic kidney patients undergoing hemodialysis be around 30-35 kcal/kg BB/day<sup>7</sup>

Based on the research results, it is known that the overall energy intake of chronic kidney failure patients with hemodialysis at Harapan and Doa Hospital, Bengkulu City in 2023 is still less than the requirements, both when the patient is undergoing hemodialysis, when the patient is undergoing hemodialysis and after the patient is undergoing hemodialysis. In line with research at Panembahan Senopati Hospital, Bantul and at RSU UKI Jakarta, the average energy intake of hemodialysis patients is still less than the recommended needs<sup>7,8</sup>.

This lack of food intake is the same as what happened in research in Brazil, where the average patient spent less than 80% of their food requirements during the 3-day recall.

Achieving adequate energy and protein intake remains a challenge for chronic renal failure patients on hemodialysis. A recent review including eight studies with more than 100 HD patients reported that dietary energy deficiency (<35 kcal/kg BB/day) was found in 52 to 92% of patients<sup>9</sup>.

Dietary restrictions are an aspect that can cause a decrease in intake in patients. Uremic toxins such as indoxyl sulfate and hippuric acid due to decreased kidney function are important factors causing gastrointestinal damage. On the one hand, chronic renal failure patients experience more urea excretion through the gastrointestinal tract, resulting in a significant increase in ammonia and carbonate which are broken down by bacteria, which can result in widespread

inflammation and erosion of the mucosa. On the other hand, studies suggest that accumulation of uremic toxins may lead to gastrointestinal motor dysfunction, suggesting increased production/absorption of uremic toxins originating from the colon and altered water and electrolyte reabsorption. Thus uremic toxins in the large intestine develop<sup>10</sup>.

The results of research on patients who were recalled for 3x24 hours showed that the patient's energy intake was inadequate. From the results of interviews conducted during food recall, 40 respondents (66.7%) stated that they experienced various kinds of gastrointestinal disorders such as decreased appetite, nausea, vomiting, difficulty swallowing, difficulty defecating, gastritis and coughing.

Increased levels of urea and creatinine can stimulate the production of stomach acid, causing symptoms of gastritis, namely nausea, vomiting, heartburn, flatulence, and reduced appetite. Inflammation of the gastrointestinal mucosa caused by inconsistent eating habits in terms of frequency, type, and the amount can cause gastritis<sup>11,12</sup>

Continuous hemodialysis can also cause PSC (Gastrointestinal Inflammation), iatrogenic iron loss, causing patients to experience anemia<sup>13</sup>

Research at RSU Royal Prima in 2021, patients suffering from chronic kidney failure had different complaints. The main complaint most often experienced by CKD sufferers is nausea. The nausea and vomiting found in CKD patients is thought to be due to gastroparesis or delayed emptying of the stomach.<sup>14</sup>

Santoso, Bagus R., Yiyin Manatean, and Asbullah (2016) reported that of the 174 respondents studied, 31 people (79.5%) had new patients undergoing hemodialysis (< 1 year) with a mild decrease in appetite. 79 people (82.3%) who underwent hemodialysis for a long time (1 - 3 years) experienced a severe decrease in appetite, and 35 people (89.7%) who underwent hemodialysis for a very long time (> 3 years) experienced a severe decrease in appetite. A decrease in appetite that lasts for a long period of time will of course have an impact on the patient's nutritional status<sup>15</sup>.

Changes in taste experienced by chronic kidney failure patients with hemodialysis cause decreased appetite. Lack of appetite for protein-rich foods such as meat is significantly associated with poor patient appetite. Changes in taste in patients with chronic kidney failure so that the

## **Analysis of Energy and Protein Intake with Nutritional Status of Chronic Kidney Failure Patients with Hemodialysis at Harapan and Doa Regional Hospital, Bengkulu City**

patient's appetite is less will reduce the overall quality of food, thereby contributing to malnutrition.

### **2. Protein Intake of Chronic Kidney Failure Patients with Hemodialysis**

One of the nutrients that is wasted a lot during hemodialysis is protein, during hemodialysis the amino acids that are wasted are 1-2 grams/hour of dialysis or it is estimated that 10-12 grams of protein will be lost per hemodialysis, so the need for 1-1.2 grams/kg BW is ideal / day is expected to replace lost protein and it is better to get it from animal protein because the amino acids obtained are more complete<sup>16</sup>.

Based on the results of interviews with respondents using the 24-hour Food Recall form, it is known that chronic kidney failure sufferers on hemodialysis at the Harapan and Doa Hospital, Bengkulu City in 2023 mostly had less than needed before undergoing hemodialysis, during hemodialysis and after undergoing hemodialysis.

Based on the results of research conducted at Panembahan Senopati Hospital, Bantul and RSU UKI Jakarta, most of them are still less than the recommended recommendations.<sup>7,8</sup>

The dialysis process plays an important role in chronic nutritional loss, especially amino acid protein, around 7-8 grams of protein is lost during hemodialysis. Inadequate protein intake in long-term dialysis patients can result in decreased muscle mass reserves, decreased body weight, poor nutritional status. optimal and improve inflammation<sup>9,17</sup>

Patients with chronic renal failure have protein requirements that tend to increase compared to patients without uremia. Protein consumption can be influenced by low protein intake in the diet, insufficient food intake is influenced by weakening the body's immunity. The influence of protein consumption plays an important role in overcoming the nutrition of chronic kidney failure sufferers, because the symptoms of uremic syndrome are caused by the accumulation of protein catabolism in the body, therefore the better protein consumption, the better it is in maintaining nutritional status<sup>18</sup>.

### **3. Nutritional Status of Chronic Kidney Failure Patients with Hemodialysis**

Nutritional status is a measure of a person's body condition which can be seen from the food consumed and the use of nutrients in the body. Nutritional status is divided into three categories, namely undernutrition, normal nutrition and overnutrition<sup>19</sup>.

In this study, an anamnesis and physical examination for malnutrition were carried out using the Subjective Global Assessment (SGA) form. Based on the research results, there were 32 respondents (54%) with an SGA score of "A" (Good Nutrition), 26 respondents (43%) with an SGA score of "B" (Poor/Moderate Nutrition) and 2 respondents (3%) with an SGA score of "C" (Bad Nutrition). In accordance with the

research results, several respondents said that they experienced a decrease in appetite so that their eating frequency was irregular. Apart from that, the obstacles faced by respondents in fulfilling nutrition are digestive disorders and changes in appetite which can cause patients to experience weight loss.

When the body weight was measured, some patients were found not to have their actual body weight, because some patients experienced edema and there were even some patients whose urinary tract was no longer functioning, even though the patient said the patient's drinking frequency was very high, causing fluid to accumulate in the body. This research is in line with research conducted by Sherly (2021) which states that patients with good nutritional status experience excess fluid which is characterized by edema or ascites, while patients with poor and poor nutritional status do not experience ascites or edema<sup>20</sup>.

Insufficient nutritional intake in this study could be caused by a lack of food intake into the body. Malnutrition in chronic kidney failure patients can be caused by increased protein requirements in patients undergoing hemodialysis therapy which is not balanced with adequate intake which can be caused by uremic anorexia or high levels of urea in the body due to decreased kidney function to remove metabolic waste in the body, resulting in Patients with chronic renal failure usually experience anorexia due to nausea.

The diagnosis of malnutrition in chronic kidney failure patients can be done through anamnesis and physical examination using the Subjective Global Assessment (SGA) form. SGA nutritional screening is a screening tool used for all adult inpatients.

Factors related to the development of malnutrition can be categorized into: iatrogenic and non-iatrogenic origin. Iatrogenic factors are unintended consequences, such as dialysis for a patient. Iatrogenic factors are factors that develop spontaneously from factors that accompany the development of CKD and are not related to the main treatment. Malnutrition in hemodialysis patients can be caused by factors of iatrogenic and non-iatrogenic origin<sup>9</sup>.

SGA consists of 2 parts, namely medical history and physical examination. The health history includes 5 parameters, namely changes in body weight, changes in food intake, gastrointestinal symptoms, functional capacity, physical examination which focuses on nutritional aspects and the relationship between disease and nutritional needs. Physical examination includes evaluation of fatty tissue, muscle loss, edema and ascites. To categorize a patient's nutritional status during SGA screening, the results obtained from the medical history and physical examination are added up and categorized into good nutritional status (score A), moderate malnutrition (score B) and severe malnutrition (score C)<sup>21</sup>.

Protein consumption has a big influence in overcoming the nutritional status of CKD patients, because the symptoms

## Analysis of Energy and Protein Intake with Nutritional Status of Chronic Kidney Failure Patients with Hemodialysis at Harapan and Doa Regional Hospital, Bengkulu City

of uremic syndrome occur due to the accumulation of protein catabolism in the body, so the better the protein consumption, the better the nutritional status will be maintained. Protein intake is said to be good if it reaches 80-110% of requirements<sup>8</sup>

The longer a patient undergoes hemodialysis, the higher the risk of developing stress. Stress in some cases can cause fatigue and loss of appetite, especially in elderly patients who are less than optimal in maintaining their nutritional intake<sup>22,23</sup>.

Many things can influence the nutritional status of patients undergoing hemodialysis, but the duration of hemodialysis cannot be used as a reference to determine a patient's nutritional status because it again depends on the HD patient's level of adaptation ability. Apart from the patient's ability to adapt, there are many factors that can cause malnutrition in CKD patients, the most important of which are insufficient food intake, increased catabolism, and chronic inflammation. Another factor is inadequate hemodialysis procedures which can cause nausea and vomiting in patients

### CONCLUSION

Based on the research results, it can be concluded that energy and protein intake in chronic kidney failure patients on hemodialysis is still insufficient and there are still nutritional status of patients with poor nutritional status and poor nutrition. Therefore, it is necessary to increase energy and protein intake by paying attention to nutritional status in kidney failure patients on hemodialysis.

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**Analysis of Energy and Protein Intake with Nutritional Status of Chronic Kidney Failure Patients with Hemodialysis at Harapan and Doa Regional Hospital, Bengkulu City**

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