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PROVIDING SNACKS TO IMPROVE DIETARY ADHERENCE, ADEQUACY OF NUTRITION INTAKE AND QUALITY OF LIFE FOR HEMODIALYSIS PATIENTS

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PROVIDING SNACKS TO IMPROVE DIETARY ADHERENCE, ADEQUACY OF NUTRITION INTAKE AND QUALITY OF LIFE FOR HEMODIALYSIS PATIENTS

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ABSTRACT

This study aims to determine the effect of high-energy-protein interlude on increasing dietary compliance, nutritional intake adequacy and quality of life of hemodialysis patients. This research is a pre-experimental study with a one group pre-test and post-test design. The number of samples in this study was 71. All research subjects were patients undergoing hemodialysis treatment at Dr. Sardjito Hospital Yogyakarta. Patients will be given high-energy and protein snacks twice a day for 21 days. The sample it self was selected by using the consecutive sampling method. Data analysis using McNemar test and Multiple Logistics Regression. The results showed that there was a significant increase in dietary compliance and nutrient intake during the intervention, but after the intervention was completed, decreased compliance and nutritional intake. So that there was no significant difference in dietary adherence between before and after the intervention (p = 0.32) and there was no significant increase in the adequacy of nutrient intake between before and after the intervention. There was a significant difference between the quality of life scores before and after being given a snack (p = 0.01). Multivariate analysis showed that energy intake, fat intake, and length of hemodialysis period could be used to predict poor quality of life of hemodialysis patients (R2 = 0.125; AIC = 72). The provision of snacks can help to increase the average intake of nutrients to meet the intake of nutrients and the quality of life of hemodialysis patients.

Keywords: nutritional intake, hemodialysis, dietary compliance, quality of life

PRELIMINARY

The number of kidney failure patients undergoing hemodialysis therapy in Indonesia is increasing every year. Based on the data of *Report Indonesia Registry* 2017 (IRR) Report shows an increase in the

number of hemodialysis patients every year. In 2015 there were 21,050 new patients and 30,554 old patients who were still actively undergoing hemodialysis. Then it increased in 2016 to 25,446 new patients and 52,835 old patients. This figure also increased again in 2017 to 30,831 new patients and 77,892 old patients. In 2017 of the number of patients who stopped undergoing hemodialysis for more than 3 months, 30% of them dropped out and the cause was unknown and the remaining 70% died.(1).

In hemodialysis conditions, nutrition is an important factor that must be considered. Lack of food intake is a problem that can harm patients(2). Lack of nutritional intake in hemodialysis patients often occurs on the day of hemodialysis. On non hemodialysis days, it is known that the patient's intake is better than on the day when they are undergoing hemodialysis. But even so, the energy and protein intake of hemodialysis patients at that time was still less than the recommended one(3–6).

Another problem that was also found was that hemodialysis patients were less compliant with diets related to restrictions on certain nutrients such as sodium, potassium and phosphorus(7). In the elderly hemodialysis patients, it was also found that they consumed more processed foods or industrial food products, which had received a lot of high sodium additives, and especially occurred on the day the patients underwent hemodialysis.(8).

In hemodialysis patients, chronic kidney disease experienced greatly affects the patient's physical and mental status(9). Their dependence on dialysis machines throughout their lives caused many changes in their lives. In addition, the length of time undergoing hemodialysis is also related to the patient's quality of life(10). The longer the patient undergoes hemodialysis does not necessarily guarantee that the patient's quality of life is good. There are other factors that can also play a role in helping improve the patient's quality of life. As well as improving the nutrition taken to improve the nutritional status of the patient or also providing effective education during hemodialysis(11,12).

Providing of proper food or food intake in hemodialysis patients has been shown to be associated with quality of life factors for patients. This is related to reducing the risk of mortality in hemodialysis patients(13).

Oral supplementation 1-2 times per day on the day the patient is undergoing hemodialysis and at home is strongly recommended to help improve the patient's intake(14).

Through the provision of snacks or additional food, it is estimated that it can be an alternative to help meet the intake of hemodialysis patients as well as provide education related to eating patterns and

choosing good foods to consume. So it is hoped that it can help improve patient's dietary compliance to improve the adequacy of nutritional intake and improve the patient's quality of life.

METHOD

This type of research is pre-experimental with one treatment group without a control group seen pre and post intervention. The study population was all patients undergoing hemodialysis at Dr. Sardjito Yogyakarta Hospital. The study was conducted in February-March 2020. The inclusion criteria of this research subjects were patients aged 19-65 years, had undergone hemodialysis for at least 3 months, underwent hemodialysis 2 times per week, and were willing to participate in the study. Exclusion criteria for this study were patients who did not suffer from infectious diseases and malignancies, post-hospitalization <7 days and patients who were pregnant. *Drop out* criteria were patients who underwent kidney transplantation, Inpatient, consumption of snacks during the intervention <80% and died. Based on the inclusion criteria, a sample of 75 patients was obtained.

All research subjects were given an intervention in the form of giving snacks (snacks and/or special milk for hemodialysis patients) high in energy and high in protein 2 times a day for 3 consecutive weeks. Milk and/or snacks are given taking into account energy and protein as well as several other important nutrients in it, respectively, energy and protein range from 400-600 kcal and 15-20 grams per day.day.

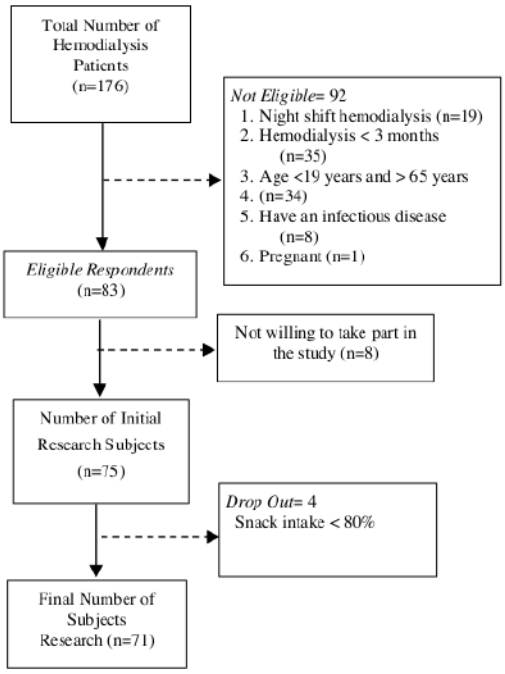

Figure 1. Subject Determination Flow

The dependent variables in this study were dietary compliance, nutritional intake adequacy and quality of life. Dietary compliance is assessed from the adequacy of energy and protein intake which is compared with the recommended intake per day, namely energy 30-35 kcal / kg and protein 1.2 g / kg.(15).Adequacy of nutrient intake was assessed from the adequacy of macronutrient intake (energy, protein, fat, and carbohydrates) and micronutrients (sodium, potassium, phosphorus, magnesium, and calcium) of the subjects

compared with the recommended daily intake of energy 30-35 kcal/kg, protein 1.2 g/kg, fat 25-35%, carbohydrates 50-60%, sodium 750-2000 mg, potassium 2000-3000 mg, phosphorus 800-1000 mg, magnesium 200-300 mg, calcium 800 -1500 mg(15–20).The external variables of this study were gender, age, education, employment status, income, duration of hemodialysis, and comorbidities.

The instruments used in this study were the sociodemographic questionnaire, the food record form and the SF-36 quality of life questionnaire. Each patient was collected data before the intervention in the form of measurements of height and weight, sociodemographic information, recording of meals for 3 days before the intervention, as well as an assessment of quality of life. At the time of the intervention, data collection was also carried out for recording meals for 3 days. Then at the end of the intervention, data was collected after the intervention, namely weight measurement, recording of meals 3 days after the intervention ended and an assessment of quality of life.

Data analysis carried out in this study included: univariate analysis to determine the distribution of the characteristics of the research sample, bivariate analysis was carried out to determine the effect of interlude feeding intervention on the dependent variable. The statistical test used was the McNemar test which was considered significant if $p<0.05$ with a 95% confidence level. In this study, the dependent variable analyzed was the quality of life after intervention with the independent variable being nutrient intake. The independent variables and external variables analyzed were variables that had *p-value* <0.25 in the bivariate test, means energy intake, fat intake and duration of hemodialysis. The multivariate statistical test used is multiple logistic regression by considering the best model which has the highest *Determinant Coefficient* (R2) and the smallest *Akaike's Information Criterion* (AIC).

RESULTS

Primary data in this study were obtained through interviews and filling out questionnaires by research subjects. The results showed that the subjects in this study were dominated by male patients, aged 46-65 years, had low education, were still actively working and had a high income or more than the Regional Minimum Wage (RMW). Most of the respondents in this study had undergone hemodialysis therapy for more than 12 months and most of them also had co-morbidities other than the current kidney disease. A complete description of the distribution of respondents' characteristics can be seen in the table. 1.

Table 1. Distribution of Research Subject Characteristics

Variable	Total (n)	Percentage (%)
Gender		
Man	40	56.34
Woman	31	43.66
Age		
19 – 45 years old	27	38.03
46 – 65 years old	55	61.97
Education		
Low	46	64.79
Tall	25	35.21
Job status		
Doesn't work	28	39.44
Working	43	60.56
Income		
Low	31	43.66
Tall	40	56.34
Hemodialysis duration		
< 12 months	7	9.86
12 months	64	90.14
Co-morbidities		
There is	68	95.77
There isn't any	3	4.23

Table 2 shows that there was no significant improvement in the subject's dietary compliance after the interlude p-value = 0.32. However, practically it showed an increase in the number of subjects who adhered to the diet from 12 to 16 subjects after the interlude feeding intervention. Meanwhile, when viewed from dietary compliance between before and during the intervention, there was a significant change in the subject's dietary

compliance when given the interlude feeding intervention compared to before the intervention (p-value = 0.00). This shows that there is an improvement in the subject's dietary compliance when given a snack, but the dietary compliance decreases again after the intervention ends.

The average intake of energy nutrients, protein, fat, carbohydrates, sodium, potassium, phosphorus, magnesium, and calcium increased after the interlude. Despite an increase in the nutrients sodium, potassium and phosphorus, the increase in these nutrients is still within the range of dietary recommendations. Based on the increase in the average intake of these nutrients, there was an increase in the number of subjects who had adequate intake of nutrients, namely the adequacy of nutrient intake of energy, protein, fat, carbohydrates, sodium, potassium, phosphorus, magnesium and calcium. In practice, there has been an increase in the number of subjects whose nutritional intake is adequate, and there is a significant increase in the adequacy of several nutrients including energy, protein, fat, sodium and phosphorus intake statistically did not show a significant increase (p>0,05).

Table 2. Results of Statistical Analysis of Dietary Compliance and Adequacy of Nutrient Intake Before and After Intervention

	Before Intervention n(%)	When Intervention n(%)	*p-value	Before Intervention n(%)	After Intervention n(%)	**p-value	Average±SD		
Diet Compliance	12 (16.90)	28 (39.44)	0.00	12 (16.90)	16 (22.54)	0.32	Before Intervention	When Intervention	After Intervention
Adequacy of Nutritional Supplement									
Energy	15 (21.13)	32 (45.07)	0.00	15 (21.13)	19 (26.76)	0.37	1544.67±395.89	1974,93±769,73	1648.68±442.39
Protein	16 (22.54)	42 (59.15)	0.00	16 (22.54)	23 (32.39)	0.11	54.45±15.89	74.25±22.57	58.64±16.42
Fat	37 (52.11)	63 (88.73)	0.00	37 (52.11)	38 (53.52)	0.84	54.05±16.86	71.99±16.42	57.94±20.41
Carbohydrate	14 (19.72)	20 (28,17)	0.11	14 (19.72)	16 (22.54)	0.53	217.05±64.76	248.07±63.00	224.66±65.99
Sodium	32 (45.00)	42 (59.15)	0.04	32 (45.00)	39 (54.93)	0.13	698.21±316.87	1112.36±1050.39	788.54±337.59
Potassium	5 (7.04)	9 (12.68)	0.16	5 (7.04)	7 (9.86)	0.41	1272.15±477.27	1467.52±562.71	1336.17±452.33
Phosphor	5 (7.04)	21 (29.58)	0.00	5 (7.04)	7 (9.86)	0.48	630.69±152.89	768,071±96.14	666.81±169.29
Magnesium	21 (29.58)	29 (40.85)	0.10	21 (29.58)	26 (36.62)	0.35	188,49±69,28	198.33±56.23	191.49±61.35
Calcium	0 (0.00)	3 (4.23)	0.08	0 (0.00)	1 (1.4)	0.32	230.67±136.38	280.31±153.59	231.87±120.95

McNemar test;p-value:meaningful/significant (α<0.05)
*:p-value before and during intervention;**:p-value before and after intervention

The quality of life variable in Table 3 shows that there are significant differences in the quality of life of respondents before and after the provision of snacks. This shows that there is a significant difference in the total score of the SF-36 assessment before and after the intervention is given and the respondent's quality of life is included in the good quality of life category. In the two assessment components, namely the categories of Physical Health and Mental Health, it can be seen that all sections show a difference in the average score before and after the intervention was given.

All assessment components have an average score of > 50 in each assessment component except in the Physical Health category where there is one assessment that shows a score of <50, means in the physical role section.

Table 3. SF-36 Scores of Research Subjects Before and After Intervention

SF-36	Mean ± SD . Score		p-value
	Before	After	
Total SF-36	59.05±17.22	62.33±15.81	0.01a
PCS	56.50±19.86	60.74±18.94	0.00
Physical Function	64.79±24.24	64.79±24.24	-
Physical Role	30.99±38.84	44.72±36.57	0.00
Pain	77.22±26.58	79.37±25.32	0.05
General Health	53.03±12.99	54.08±12.85	0.02
MCS	64.48±19.07	67.79±17.21	0.00
Emotional	64.45±15.96	64.50±15.93	0.32
Emotional Roles	64.33±42.64	75.59±35.17	0.00
Social Function	75.88±21.16	76.94±20.88	0.03
Energy/Fatigue	52.24±19.46	54.15±19.86	0.01

[a]McNemar Test;Wilcoxon Signed Rank Test;Confidence Interval 95%;meaningful/significant (α<0.05);PCS:Physical Component Summary'MCS;Mental Component Summary

The independent variables and external variables included in the multivariate analysis were variables with p-value <0.25 from the results of bivariate analysis using the chi-square test with the dependent variable being the quality of life after the intervention. Based on the results of the bivariate analysis, the variables with p-value <0.25 were energy

intake, fat intake, and duration of hemodialysis, respectively 0.08; 0.09; 0.03.

Table 4. Multivariate Analysis of Multiple Logistics Regression

Variable	Model 1		Model 2	
	OR (95% CI)	p	OR (95% CI)	p
Energy		0.18		0.14
Enough	4.8 (0.51-45.27)		5.6 (0.56-55.36)	
Not enough	1		1	
Fat		0.40		0.78
Enough	1.7 (0.48-6.41)		1.05 (0.25-4.38)	
Not enough	1		1	
Old HD			0.06	0.06
<12 months			1	
>=12 months			5.6 (0.94-32.9)	
N	71		71	
R^2	0.076		0.125	
AIC	73.7		720	

p:p-value;OR: Odds Ratio; 95% CI: 95% Confidence Interval; AIC: Akaike's Information Criterion; significant/significant (<0.05)

In Table 4. it is known that Model 2 is a model that contains variables that are estimated to have the most influence on the quality of life of hemodialysis patients. There was a change in the p-value of the hemodialysis duration variable from significant to insignificant after being associated with energy intake and fat intake. The probability that patients who underwent hemodialysis for more than 1 year had a good quality of life was 5.6 times higher than patients who underwent hemodialysis for less than 1 year. Model 2 also has an R2 value that is greater than model 1, which is 0.125 which indicates that through food intake in this study, especially energy and fat, it can predict the incidence of finding a good quality of life in hemodialysis patients by 12.5%. The rest can be influenced by other factors.

DISCUSSION

The provision of high energy and protein snacks twice per day which was carried out every day for 21 days to hemodialysis patients was statistically not significant to improve patient's dietary compliance. However, practically there is an improvement in the average intake of each nutrient which is getting better according to the recommendations. Giving snacks to hemodialysis patients for 6 weeks while patients are undergoing hemodialysis (intradialytic) along with routine counseling every hemodialysis is indeed able to increase energy and protein intake according to needs.(21). In addition, it is also effective for increasing the interaction between the patient and the dietitian which makes the patient's adherence to the diet for hemodialysis increase(22). The focus of the intervention given should also be not only during hemodialysis (intradialytic) but also in the interdialytic interval period, especially day 3 because non-compliance with diet does not only occur during intradialytic but also in the *interdialytic* period.(23).

In this study, the length of the intervention period was short, namely 3 weeks. So the change is only seen practically as seen from the change in the average

increase in food intake. The provision of interlude food which is intended as an educational medium to change patient habits in order to improve dietary compliance does require a long time, which is more than 3 to 12 months and is coupled with further monitoring.(24.25). Changes in dietary habits in a person takes at least 1 to 6 months to be able to evaluate or see changes in behavior after being given an intervention. If you want long-lasting behavioral changes, then at least intervention and evaluation monitoring can be seen after 12 months(26–28). In addition, most of the respondents in the study were male and still actively working. These factors may also influence the assessment of dietary compliance. Dietary non-compliance usually occurs in male patients. Especially for patients who are still working, and have recently undergone hemodialysis(29–31).

Intermittent feeding in hemodialysis patients can help to control sodium, potassium, phosphorus and fluid intake. By providing interlude when the patient is undergoing hemodialysis by a dietitian, it can help to form interactions between the dietitian and the patient in addition to providing standard counseling that is routinely received by the patient.(22). In addition, the provision of high-protein snacks also has an influence on the intake of other nutrients, especially potassium and phosphorus(32). Foods high in protein tend to be high in phosphorus and potassium which should be limited in hemodialysis patients. However, to control potassium and phosphorus intake, it is recommended not to reduce protein intake because the risk of death from protein deficiency is greater than hyperphosphatemia.(33). The more recommended way is through limiting the consumption of additional foods and foods high in phosphorus and potassium and through processing foodstuffs by soaking and boiling.(34.35).

In the quality of life variable, significant changes occurred in the assessment related to physical and mental, especially on the physical role and emotional role of the respondents. Emotional conditions such as stress levels in hemodialysis patients affect the length of healing and affect the patient's quality of life(36.37). Physical and emotional conditions in hemodialysis patients can indirectly be influenced by the adequacy of nutrient intake. In this study, it was found that the percentage of patients whose nutritional intake was in accordance with the recommendation was more likely to have a good quality of life compared to respondents whose nutritional intake was not as recommended. Lack of food intake is one of the factors that will affect albumin levels in the body. Albumin levels can affect the level of depression and fatigue in hemodialysis patients through changes that occur in the levels of Interleukin-6 (IL-6)(38). Decreased levels of albumin and hemoglobin can trigger

a decrease in the quality of life of hemodialysis patients(39.40).

The provision of oral food or nutrition that is given together with counseling related to nutrition and diet compliance, physical activity and about patient compliance with hemodialysis therapy can indeed help prevent a lack of protein energy intake and help in increasing biochemical indicators such as albumin and hemoglobin levels which will help in improving health. physically and mentally on a better quality of life assessment(8,41,42).

Although statistically in this study did not show a relationship between quality of life and age. However, in this study, the age of the respondents was dominated by the pre-elderly age category who had a good quality of life. In hemodialysis patients, it is known that the quality of life assessment score on the mental health component is better in older age respondents compared to younger age category patients. Meanwhile, at a younger age, physical health scores are better than those of older age respondents. This is because at an older age they are likely to feel disturbed in carrying out daily activities due to chronic kidney disease suffered much lower than younger patients.(43).

The factors that may affect poor quality of life in this study are 10.6% due to energy and fat intake. The rest can be influenced by other factors, namely the length of time undergoing hemodialysis. The risk of death in hemodialysis patients has a relationship with an increase in the duration of hemodialysis, especially patients with diabetes mellitus(44). In hemodialysis patients, it is known that the length of time undergoing hemodialysis each year is associated with a 6% increase in the risk of death(45). In addition, hemodialysis patients undergoing hemodialysis for more than 5 years are known to have anthropometric parameters indicating impaired nutritional status compared to patients undergoing hemodialysis for less than 5 years.(46). This may be related to studies showing that hemodialysis patients aged > 50 tend to have lower records of energy and protein intake and serum albumin than patients aged <50 years.(47.48).

Several things related to the limitations in this study were the absence of a control group to compare with the intervention group. So it cannot be ascertained whether the changes or differences that occur are really caused by the intervention given. In addition, the length of the intervention period or the short duration of the intervention caused the effect of the intervention given that changes in the subject's behavior could not be observed for further monitoring. Then changes through biochemical indicators to ensure changes that occur in the dependent variable in this study have also not been observed.

CONCLUSION

The provision of snacks to hemodialysis patients in this study showed a significant increase in dietary compliance and adequate intake of energy, protein, fat, sodium, and phosphorus nutrients between before the intervention and when the intervention was given. However, there was a decrease again after the intervention was completed as indicated by no significant increase in dietary compliance and adequacy of nutritional intake between before the intervention and after the intervention. Changing the patient's habits in complying with dietary recommendations takes a long time with various other influencing factors. Meanwhile, the patient's quality of life assessment score showed a significant improvement from before the interlude compared to after the interlude.

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