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Assessing the Effect of Dietary Nursing Intervention on Nutritional Status of Diabetes and Kidney Disease Patients Who Are Treated by Hemodialysis

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Abstract: Objective: To assess the Effect of dietary nursing intervention on nutritional status of diabetes and kidney disease patients who are treated by hemodialysis. Methods: 80 patients who are diagnosed as diabetes or kidney disease and are treated by hemodialysis are invited to join our study. all participants were randomly assigned to two groups. In control group, the participants receive the common nursing intervention service. In intervention group, expect of common nursing intervention service, we provide additional dietary nursing intervention service. We record some index of participants that include water electrolyte index, nutritional status indicator, blood glucose levels and renal function index. Additionally, we use World Health Organization Quality of Life Brief Version (WHOQOL-BREF) to collect quality of life assessment. Result: In water electrolyte index research, the intervention group has lower index that that of control group in blood calcium, blood phosphorus and blood potassium. In assessment of nutritional status, intervention group participants have better performance than that of control group. In the assessment of blood glucose levels and renal function, intervention group participants have better blood glucose levels and renal function than that of control group. In quality of life assessment, the quality of life of the intervention group was significantly higher than that of the control group ($p \leq 0.05$). Conclusion: the dietary nursing intervention can effectively improve some physiological aspects during the maintenance hemodialysis treatment of patients with diabetic nephropathy, that include: correct the disorder of water and electrolyte, reduce the risk of malnutrition, control blood sugar, improve renal function and improve the quality of life.

Keywords: Dietary Nursing Intervention, Hemodialysis, Diabetes, Kidney Disease

1. Introduction

In worldwide, diabetes mellitus not only is the leading cause of end-stage kidney disease, but also approximately one-third of diabetic patients develop diabetic nephropathy [1]. Base on the report of 2016 European Renal Association, approximately 25% of kidney disease patients were affected by diabetes [2]. In fact, the quality of life of people with diabetes is much lower than that of people without diabetes [3]. In some researches, in 2017, diabetes cased 4 million deaths and the total cost of diabetes patient was about USD 727 billion [4]. In initial stages of diabetes, the patients control glycemic by lifestyle modification along with one or two oral anti-diabetes medication. But they need insulin injections to control diabetes as other intervention cannot stop declining of cell mass and increasing of insulin deficiency [5-7].

The patients with kidney disease often use hemodialysis to treat or improve their disease, hemodialysis is remove excess waste products and water from the blood by an external machine and a special type of filter [8]. Base on the report about patients with diabetes and on hemodialysis, the patients have poor nutritional status and reduced quality of life (QoL) problems in

their life and treatment process [9, 10]. Because protein-energy depletion and muscle wasting of patient are very frequent when they undergoing hemodialysis, that poor nutritional status can lead to malnutrition so that worse quality of life [11]. Therefore, malnutrition is common in patients on maintenance hemodialysis, it contributes to increased morbidity and mortality. Although etiology of malnutrition is complex and multifactorial, it does not prevent us from paying attention to dietary nursing intervention. The aim of this study is to assess the Effect of dietary nursing intervention on nutritional status of Diabetes and kidney disease patients who are treated by hemodialysis.

2. Methods

2.1. Participants Enrollment and Study Methods

We build this study from January 2018 to December 2019, that 80 patients with diabetes or kidney disease who are treated by hemodialysis are invited to join our study. In the beginning stage of this study, all participants were randomly assigned to either intervention group or control group, each group had 40 participants. In study process, patients in both groups received hemodialysis with a flow rate of 200~250ml per minute for 4h each time. In addition, hemodialysis was lasting a period of time, that performed three times a week for 12 weeks. In control group, the participants receive the common nursing intervention service, the common nursing intervention service include providing relevant education to patients and their families, reassuring patients, and monitor the patient's vital signs. In intervention group, expect of common nursing intervention service, we provide additional dietary nursing intervention service, the dietary nursing intervention service include diet intervention in hospital and diet interventions at home. In research result, we use the World Health Organization Quality of Life Brief Version (WHOQOL-BREF) to assess the quality of life of patient. The additional research result includes water electrolyte index, nutritional status indicator, blood glucose levels and renal function index. In finally, we evaluated the effect of dietary care by comparing the indicators and quality of life scores of the two groups.

The dietary nursing intervention, it contracts 2 parts: diet intervention in hospital and diet interventions at home. In the part of diet intervention in hospital, we establish health records for patients from the time of admission. Dietary cognition was assessed by doctors, nurses and dietitians. Then, according to the characteristics of diabetic nephropathy and the characteristics of maintenance hemodialysis treatment, dietary intervention plan was developed for the patients. We emphasized the importance of reasonable diet to the patients, and explained the diet related knowledge to the patients and their families in detail, with each lecture lasting 20 minutes. In the process of explanation, we passed the diet information to the patients, and then the patients retold the diet knowledge in their own words, and the nurses corrected and supplemented it. In addition, we provide dietary precautions for patients, strict restrictions on sodium, sugar, fat intake, smoking cessation alcohol, diet greasy, spicy food. At the same time, we warn that patients should keep an appropriate amount of food and eat regularly, and eating too much or too little is not conducive to blood glucose control.

In diet interventions at home, we require patients to add maintenance hemodialysis nutrition-related WeChat public account and WeChat group. We will publish articles related to diet knowledge in the public account and WeChat group at the frequency of one article per week. My investigator urged the patients to read the articles and asked them to record their diets for three consecutive days after reading the articles. In addition, we will use WeChat to communicate with patients in the second week of each article publishing. According to the patient's diet diary recording, we correct the non-standard eating behavior of the patient, and urge the patient to strictly control the diet.

Inclusion criteria:(1) the patient was diagnosed with diabetes or kidney disease; (2) The patient received maintenance hemodialysis (12 weeks); (3) The patient is in a normal mental state and can cooperate to complete the study. Exclusion criteria:(1) conscious or mental disorder; (2) The patient has malignant tumor and blood system disease; (3) The patients were lost to follow-up during the course of the study.

2.2. Statistical Analysis

We use SPSS 22.0 to analyze the data of this study. The analysis data include the P value, t-test and chi-square test. Besides, we use the mean standard deviation to statistical description.

3. Result

In Table 1, it shows water electrolyte index of participants of two group. Between the result of before nursing group and after nursing group, the indexes are statistical significance. In addition, between the result of control group and intervention group, they are also statistical significance. It means the usual nursing intervention has a significant effect on water electrolysis, but the dietary nursing intervention has a more significant effect on water electrolysis.

***Table 1.** Water electrolyte index (Mean ± SD).*

Projects	Period	Blood calcium (mmol/L)	Blood phosphorus (mmol/L)	Blood potassium (mmol/L)
Control group (n=40)	BN	2.58±0.72	2.34±0.24	6.17±0.94
	AN	1.76±0.39$^{\#}$	2.10±0.19$^{\#}$	5.20±0.71$^{\#}$
Intervention group (n=40)	BN	2.53±0.75	2.30±0.26	6.14±0.95
	AN	1.37±0.34$^{\#}$*	1.81±0.18$^{\#}$*	4.48±0.64$^{\#}$*

BN=Before Nursing
AN=After Nursing
Compared with the group of BN, #=P<0.05; Compared with the control group, *=P<0.05

In assessment of nutritional status, the assessment results which are before nursing group and after nursing group are statistical significance, the participants have better performance in nutritional status after nursing intervention (Table 2). In similar, the result is also statistical significance between control group and intervention group. Therefore, intervention group participants have better performance than that of control group in nutritional status.

Table 2. *Nutritional status indicator (Mean ± SD, g/L).*

Projects	Period	Prealbumin	Transferrin	Albumin	Hemoglobin
Control group (n=40)	BN	0.20±0.08	31.04±1.35	35.66±1.80	104.15±1.72
	AN	0.30±0.09#	32.49±1.46#	38.09±2.31#	106.52±2.39#
Intervention group (n=40)	BN	0.21±0.10	31.17±1.41	35.83±1.85	104.31±1.76
	AN	0.42±0.12#*	33.98±1.37#*	40.95±2.74#*	109.94±2.87#*

BN=Before Nursing
AN=After Nursing
Compared with the group of BN, #=P<0.05; Compared with the control group, *=P<0.05

The Table 3 shows the assessment of blood glucose levels and renal function. The assessment of after nursing group is better than the assessment of before nursing group, it means they have been shown to improve blood sugar and kidney function in both commonly and dietary nursing intervention.

Additionally, intervention group participants have better blood glucose levels and renal function than that of control group, the result are statistical significance between control group result and intervention group result.

Table 3. *Blood glucose levels & renal function indicators (Mean ± SD).*

Projects	Period	Fasting blood glucose (Mmol /L)	2h postprandial blood glucose (Mmol /L)	Serum creatinine (mol/L)	Urea nitrogen (Mmol /L)
Control group (n=40)	BN	9.12±1.54	12.74±2.08	104.51±12.49	8.27±1.15
	AN	7.58±1.19#	10.69±1.65#	90.43±8.07#	7.03±0.97#
Intervention group (n=40)	BN	9.08±1.52	12.67±2.10	104.18±12.51	8.19±1.22
	AN	5.45±1.03#*	8.56±1.27#*	82.05±7.39#*	6.14±0.89#*

BN=Before Nursing
AN=After Nursing
Compared with the group of BN, #=P<0.05; Compared with the control group, *=P<0.05

In quality of life assessment, the quality of life assessment in intervention group was significantly higher than the control group (p ≤ 0.05) (Table 4). Between before nursing group and after nursing group, they have similar result, that the after nursing group have better performance than that of the before nursing group (p ≤ 0.05).

Table 4. *Quality of life assessment (Mean ± SD, score).*

Projects	Period	Physiological	Psychological	Environment	Social relations
Control group (n=40)	BN	69.56±5.09	70.38±5.20	69.27±4.81	70.09±5.18
	AN	77.09±6.53#	78.12±6.17#	76.35±5.03#	77.94±5.23#
Intervention group (n=40)	BN	69.68±5.04	70.52±5.13	69.38±4.75	70.20±5.04
	AN	83.45±6.37#*	84.39±6.28#*	82.46±5.14#*	83.57±5.69#*

BN=Before Nursing
AN=After Nursing
Compared with the group of BN, #=P<0.05; Compared with the control group, *=P<0.05

4. Discussion and Conclusion

The 2019 report of International Diabetes Federation (IDF), it indicates about 463 million adults who between 20 and79 years of age were diabetes patients in worldwide, 90% of type 2 diabetes mellitus are reported in those patients [12]. In addition, the reason is that patients have difficulty achieving treatment goals during treatment, despite the fact that hospitals offer multiple treatment intervention strategies [13-15]. The diabetes problems also are serious in China, so how to make diabetic patients recover more quickly is important. That is why we did this study to evaluate and discuss the effects of dietary care.

Base on the above survey results, the dietary nursing intervention can effectively improve some physiological aspects during the maintenance hemodialysis treatment of patients with diabetic nephropathy, that include: correct the disorder of water and electrolyte, reduce the risk of malnutrition, control blood sugar, improve renal function and improve the quality of life. In water electrolyte index research, the intervention group has lower index that that of control group in blood calcium, blood phosphorus and blood potassium, that means the intervention group participants have better dietary habit as dietary education of dietary nursing intervention change the dietary habit of participant. That is reason that the intervention group has better performance than

the control group in terms of electrolytic water index. In addition, intervention group participants have better blood glucose and kidney function as effect of dietary nursing intervention. In similar, intervention group provide better assessment in quality of life, Improvements in patients' physical health have improved their quality of life. Xiaofeng Xun provide similar research result in report, that suitable dietary nursing intervention have good effect in quality of life of patient. Additionally, his report also indicate dietary nursing intervention can improve the health of patients by improving their digestion [16].

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