

## Preliminary Study on Dietary Behavior and Nutrition-related Problems in Patients with Renal Disease

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### ABSTRACT

This preliminary study aimed to determine dietary behavior and detect nutrition-related problems in patients with renal disease trying to control the disease progression. One hundred and one patients with renal disease (57 women and 44 men) in NakornNayok and Srinakharinwirot University Hospital were recruited. All patients were interviewed face to face by the same nutritionist to answer the questionnaires that include general characteristics, renal disease information and dietary behavior and related problems. The data showed that majority (51%) of these patients were working age (35–65 years). A total of 23% of the patients was overweight (BMI 23.0-24.9 kg/m<sup>2</sup>) while 48% was obesity (BMI ≥ 25.0 kg/m<sup>2</sup>). The mean (± SD) values of blood urea nitrogen and serum creatinine from laboratory report of these patients were 29.1 ± 18.8 and 2.1 ± 1.6 mg/dl, respectively. Patients with renal disease had the risk of comorbidities with other chronic diseases, such as diabetes mellitus equaled to 67.3%, coronary heart disease 24.8%, hypertension 87.1%, dyslipidemia 37.6%, and gout 13.9% by chart review. There were 91% of total patients showing limited knowledge and skill about food and nutrition to apply for meal planning and disease management. The knowledge and understanding deficits of dietary restriction of protein, salt & sodium, fat, phosphorus, potassium, and water and mineral-water were found 78%, 39%, 84%, 93%, 97% and 99% of total patients, respectively. In conclusion, patients with renal disease had lacking knowledge and skill about food and nutrition for controlling the disease. Therefore, there is a need for the efficient nutrition approaches to patients for good dietary pattern and lifestyle change while improving renal progression.

**Key words:** renal disease, nutrition, dietary behavior, diabetes, knowledge

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### Introduction

The results of the DEMAND (*Developing Education on Microalbuminuria for Awareness of ReNal and Cardiovascular Risk in Diabetes*) campaign conducted under the collaboration of the International Diabetes Federation (IDF) and the International Society of Nephrology (ISN) shows that more than 40% of patients with type 2 diabetes worldwide have abnormal amount of protein in the urine (microalbuminuria), an early sign of kidney disease.<sup>1</sup> A total of 32,248 diabetic patients from

34 countries including 691 from Thailand were recruited in this DEMAND project. The results are particularly alarming because diabetic kidney disease frequently progresses silently from the early stage of microalbuminuria to the more advanced proteinuria, and ultimately to end-stage renal disease. This finally means dialysis therapy or renal transplantation which become a tremendous burden in healthcare system. Based on Thailand Renal Replacement Therapy Registry (TRT Registry) data in 1997, the prevalence rate of kidney failure among people aged 40 - 70 years was 30 per

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million population (pmp) and increased to 123 pmp in 2001.<sup>2-3</sup> In addition, based on the 2003 survey by the TRT Registry subcommittee, there were 15,004 people with kidney failure which required dialysis or kidney transplant. Their causes of kidney failure were diabetes mellitus (34%), hypertension (26%), and chronic glomerulonephritis (14%).<sup>2</sup> The estimated total health care cost of hemodialysis and continuous ambulatory peritoneal dialysis (CAPD) from many studies in Thailand since 1998 to 2003 were 270,000 and 412,000 baht/person/year, respectively.<sup>4</sup> For kidney transplantation, the estimated total health care cost in the first year was 260,000 baht/person/year and 100,000 baht/person/year in the next year.<sup>4</sup> These indicated clinical and economic burden on the country. Moreover, Bureau of Health Policy and Plan, Ministry of Public Health (MOPH) of Thailand reported that the mortality rate from renal disease in Thai elderly aged over 60 has climbed from 38.3 in 1991 to 89.6 per 100,000 population in 2001.<sup>5</sup> Consequently, discovery and implementation of effective strategies to prevent progression of diabetic nephropathy is the important priority.

The evidence from clinical studies suggests that early dietary intervention may delay or prevent the rapid progression of renal disease. A recent meta-analysis by Pedrini and colleagues evaluated 10 randomized controlled trials that tested the effects of dietary protein restriction on chronic renal disease in patients with or without diabetes.<sup>6</sup> It was determined that dietary protein restriction reduces the risk of renal failure or death in nondiabetic renal patients. A delay in the progression of nephropathy, as noted by a decline in GFR or creatinine clearance level, was observed in diabetic subjects. Moreover, clinical trials on human subjects have found that not only protein restriction but also modification in types of protein consumed has important implication in renal disease.<sup>7</sup> A number of studies showed that consumption of soy-based protein confers a protective effect on kidney function in experimental animals and in human with different types of chronic renal disease.<sup>8-12</sup>

The aim of this preliminary study is to determine dietary behavior and detect nutrition-related problems among patients with renal disease in the effort to preserve kidney function. The results from this descriptive study will be used for planning further study to evaluate the effects of nutrition counseling and dietary modification with soy-rich diet on kidney function in patients with early diabetic nephropathy and microalbuminuria.

## Subjects and methods

Patients with renal diseases in Nakornnayok Hospital and Srinakarinwirot University Medical Center were recruited into using convenience sampling method during February – March, 2005. All patients were interviewed face to face by the same nutritionist by means of a questionnaire that included patient general and clinical characteristics, renal disease status and dietary behavior. All patients were also asked about consumption of soy foods. Patients were asked whether they were facing problems in meal planning and disease management in various aspects including economic burden, lack in caregiver, transportation problem (such as traveling a long distance to the market), individual problem (such as having difficulty chewing or swallowing), and lack of knowledge and skill about food and nutrition. There were also asked about nutrition-related problems that might have troubled the progression of renal disease. These issues included difficulties dealing with restriction in dietary intake of protein, salt and sodium intake, fat, phosphate, potassium, water and water-minerals. Their latest clinical data including blood urea nitrogen, serum creatinine, co-morbidities, blood pressure, BMI, albuminuria and GFR were collected and/or calculated from information in medical records by means of chart review. Descriptive analysis was performed using the Statistical Package for the Social Sciences (SPSS) for Windows software, version 12.0.

## Results and discussions

A total number of 101 patients with renal disease were recruited and their general characteristics are summarized in Table 1. There were slightly more women (57) than men (44). This group of patients had an average age of  $64.6 \pm 13.1$  years. The majority of the patient (51%) was in working age (35 – 65 years). About 23% of the patients was overweight (BMI 23.0 - 24.9  $\text{kg/m}^2$ ) while 48% was obese (BMI  $\geq 25.0 \text{ kg/m}^2$ ). The mean ( $\pm$ SD) values of blood urea nitrogen and serum creatinine of these patients were  $29.1 \pm 18.8$  and  $2.1 \pm 1.6 \text{ mg/dL}$ , respectively. Data from chart review revealed that hypertension was the most common co-morbidity in these patients (87.1%), followed by diabetes mellitus (67.3%), coronary heart disease (24.8%), dyslipidemia 37.6%, and gout 13.9%.

Table 2 shows various problems the patients were facing in the process to slow the progression of renal disease. Most importantly, 91% of patients stated a lack of knowledge and skill about food and nutrition to apply for meal planning and disease management. Deficits in knowledge and understanding about dietary intake restriction on protein, fat, phosphate, potassium, and water and mineral-water were found in large proportions of patients (78.2% - 99.0%), whereas only 38.6% lack knowledge in sodium intake restriction. These data indicated that patients with renal diseases need appropriately nutritional counseling for controlling the disease. The effective nutrition counseling in changing dietary habits could have important health benefits and also reduced medication costs.<sup>13,14</sup> Therefore, there is a need for more efficient nutrition approaches to modify lifestyle while improving renal progression in chronic kidney disease patients. The manual of food and nutrition, including the nutrition strategies for slow the progression of renal disease, food group and food exchange lists for meal planning, and examples of food menu, is an essential tool for renal disease patients.

**Table 1** General and clinical characteristics of 101 patients with renal disease.

Characteristics	Frequency (N = 101)
Gender	
Female	56.4%
Male	43.6%
Age (year): range (mean $\pm$ SD)	
< 35 years	2%
35 - 65 years	51%
> 65 years	47%
BMI <sup>1</sup> ( $\text{kg/m}^2$ ): range (mean $\pm$ SD)	
18.5 - 22.9	29%
23 - 24.9	23%
$\geq 25$	48%
SBP <sup>2</sup> (mmHg): range (mean $\pm$ SD)	
$\geq 140$	46%
< 140	54%
DBP <sup>3</sup> (mmHg): range (mean $\pm$ SD)	
$\geq 90$	14%
< 90	86%
Co-morbidities	
Diabetes mellitus	67.3%
Coronary heart disease	24.8%
Hypertension	87.1%
Dyslipidemia	37.6%
Gout	13.9%
BUN <sup>4</sup> (mg/dL): range (mean $\pm$ SD)	
	7 - 94 ( $29.1 \pm 18.8$ )
Serum creatinine (mg/dL): range (mean $\pm$ SD)	
	0.6 - 9.3 ( $2.1 \pm 1.6$ )
> 1.5	56%
$\leq 1.5$	44%
Albuminuria <sup>5</sup>	
1+ (30 mg/dl)	28.7%
2+ (100 mg/dl)	20.8%
3+ (300 - 500 mg/dl)	11.9%
4+ (1,000 mg/dl)	5.0%
No test	33.7%
GFR <sup>6</sup> (mL/min): range (mean $\pm$ SD)	
> 90	11.0%
60 – 89	13.2%
30 – 59	36.3%
15 – 29	23.1%
< 15	16.5%

<sup>1</sup> BMI = Body mass index

<sup>2</sup> SBP = Systolic blood pressure

<sup>3</sup> DBP = Diastolic blood pressure

<sup>4</sup> Blood urea nitrogen

<sup>5</sup> Albuminuria determined by a semi-quantitative urine dipstick test

<sup>6</sup> Glomerular filtration rate calculated from Cockcroft-Gault equation

**Table 2** General and nutrition-related problems in the process to slow the progression of renal disease.

Problems	No. of patients (%)
<b>General problems in meal planning and disease management</b>	
Economic burden	0.0
Lack of caregiver	1.0
Transportation problem, such as far market	2.0
Individual problem such having difficulty chewing or swallowing	5.9
Lack of knowledge and skill about food and nutrition	91.1
<b>Nutrition-related issues in the process of slowing the progression of renal disease</b>	
Dietary protein restriction	78.2
Dietary sodium restriction	38.6
Dietary fat restriction	84.2
Dietary phosphorus restriction	93.1
Dietary potassium restriction	97.0
Water and mineral-water restriction	99.0

In terms of types of dietary intake, 29% of the patients drank soy milk often or everyday whereas 9% and 7% ate soft and hard tofu, respectively (Table 3).

Our interview suggested that 68% of patients with renal disease would adopt soy food as their habitual diet if they knew health benefits of the food.

**Table 3** Eating behavior of soy foods and soy food products.

Types of soy food	Frequency (%) of eating		
	Never or < 1 time/month	Sometimes	Often or everyday
UHT soy milk	79.2	12.9	7.9
Non-UHT soy milk	56.4	22.8	20.8
Soft tofu	45.5	45.5	8.9
Hard tofu	47.5	45.5	6.9
Soy bean curd	93.1	4	3
Vegetarian meat	98	2	0
Textured soy protein	98	2	0
Soy protein powder beverages	98	1	1

A meta-analysis of controlled clinical studies looking at substitution of animal protein with soy protein found significant reductions of total cholesterol, LDL cholesterol and triglycerides.<sup>15</sup> This reduction in cholesterol is beneficial for the etiology of renal disease since high plasma cholesterol level leads to increment of LDL-C oxidation which may promote glomerular injury. Soy protein not only offers benefits by itself (benefit *เรื่องอะไร* be specific) but also prevents further damage induced by animal protein.<sup>9,16</sup> In addition, substantial data from

epidemiologic surveys and nutritional intervention studies in humans and animals suggest that soy foods are beneficial for human health, including menopausal symptoms, cardiovascular disease, cancer, hyperlipidemia, osteoporosis, diabetes and obesity.<sup>17-21</sup> The US Food and Drug Administration authorized the use on food labels of health claims associated with soy protein and the reduced risk of cardiovascular disease.<sup>22</sup>

Based on our recent findings and evidence from other studies mentioned, further study is undertaken to

determine the effects of nutrition counseling and diet modification with soy-rich diet compared with conventional healthy diet on kidney function in Thai patients with early diabetic nephropathy.

## Conclusion

Patients with renal disease lack in knowledge and skills in food and nutrition management to control their renal disease. Therefore, efficient approaches to patients for good dietary intake habit and lifestyle change should be created. Lack in skill in dietary intake restriction on most nutrients and minerals suggest dietary counseling program with the most relevant detail and practical training.

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