นิพนธ์ต้นฉบับ

ผลของการเข้าร่วมโปรแกรมก่อนการบำบัดทดแทนไตต่อการชะลอความเสื่อมของโรคในผู้ป่วยโรคไตเรื้อรังโรงพยาบาลชุมชนในภาคกลาง

เจตสุภา ธนกิจจารุ[1], สุธาสินี ไผทสรวง[1], พรโสภา แก้วแดงดี[2], ธิดากาญจน จันทร[2] และ วิศิษฐ์ แก้วพุด[3]
[1]นักศึกษาแพทย์ทหารชั้นปีที่ 6 วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า
[2]โรงพยาบาลท่าหลวง จังหวัดลพบุรี
[3]ภาควิชาเวชศาสตร์ทหารและชุมชน วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า

บทคัดย่อ

ความเป็นมา: โรคไตเรื้อรังเป็นปัญหาสาธารณสุขที่สำคัญทั้งในระดับโลกและประเทศไทย แนวโน้มความชุกและอุบัติการณ์ของโรคที่เพิ่มขึ้นสะท้อนถึงภาระโรคที่ส่งผลต่อสุขภาพของประชากรไทย การชะลอการดำเนินของโรคตั้งแต่ระยะก่อนบำบัดทดแทนไตจึงเป็นประเด็นสำคัญโดยเฉพาะการได้รับคำปรึกษาทางโภชนาการที่เหมาะสมและความรู้เรื่องการรักษา จะช่วยเตรียมความพร้อมให้แก่ผู้ป่วยในการวางแผนการรักษาและส่งผลต่อคุณภาพชีวิตที่ดีขึ้น

วัตถุประสงค์: เพื่อศึกษาผลของโปรแกรมโภชนาการก่อนการบำบัดทดแทนไตต่อการชะลอการเสื่อมของโรคไตเรื้อรัง การเปลี่ยนแปลงของความดันโลหิต และการตัดสินใจเลือกแนวทางการรักษาในผู้ป่วยโรคไตเรื้อรัง ณ โรงพยาบาลท่าหลวง จังหวัดลพบุรี

วิธีการวิจัย: การวิจัยเชิงวิเคราะห์แบบย้อนหลัง (Retrospective Cohort Study) ในผู้ป่วยโรคไตเรื้อรังที่เข้ารับการรักษาในโรงพยาบาลท่าหลวง ระหว่างวันที่ 1 มกราคม พ.ศ. 2563 ถึง 15 กันยายน พ.ศ. 2567 โดยวิเคราะห์ข้อมูลจากเวชระเบียนย้อนหลัง รวมถึงค่าอัตราการกรองของไต (eGFR) และความดันโลหิตในช่วงเวลา 12, 6, 3 เดือนก่อน และ 3, 6, 12 เดือนหลังการเข้าร่วมโปรแกรมโภชนาการ วิเคราะห์ข้อมูลด้วย STATA โดยใช้สถิติเชิงพรรณนา การทดสอบไคสแควร์ และ Paired t-test รวมถึงการวิเคราะห์แบบ Interrupted Time Series (ITS) ด้วยแบบจำลองถดถอยพหุคูณปรับค่าปัจจัยแทรกซ้อน เช่น อายุ เพศ ระยะของโรคไต การใช้ยาและโรคร่วม

ผลการวิจัย: หลังปรับค่าปัจจัยร่วม พบว่าอัตราการลดลงของ eGFR ชะลอลงจากก่อนเข้าร่วมโปรแกรม (3.765 ± 0.355 mL/min ต่อ 3 เดือน/คน) ความดันโลหิตเพิ่มขึ้นเล็กน้อยแต่ไม่มีนัยสำคัญทางสถิติ นอกจากนี้ผู้ป่วยร้อยละ 6.5 เปลี่ยนแปลงการตัดสินใจมาเลือกรับการบำบัดทดแทนไตหลังได้รับข้อมูลจากโปรแกรม

สรุป: การเข้าร่วมโปรแกรมโภชนาการก่อนการบำบัดทดแทนไตช่วยชะลอความเสื่อมของโรคและส่งเสริมการตัดสินใจวางแผนการรักษาในผู้ป่วยโรคไตเรื้อรังอย่างมีประสิทธิภาพ.

คำสำคัญ: *● โรคไตเรื้อรัง ● การบำบัดทดแทนไต ● การชะลอความเสื่อมของโรค ● การให้คำปรึกษาทางโภชนาการ*

เวชสารแพทย์ทหารบก. 2568;78(2):157-70.

ได้รับต้นฉบับ 24 พฤษภาคม 2568 แก้ไขบทความ 27 มิถุนายน 2568 รับลงตีพิมพ์ 30 มิถุนายน 2568

ต้องการลำเนาต้นฉบับติดต่อ เจตสุภา ธนกิจจารุ นักศึกษาแพทย์ทหารชั้นปีที่ 6 วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า โรงพยาบาลท่าหลวง จังหวัดลพบุรี ภาควิชาเวชศาสตร์ทหารและชุมชน วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า

Original article

Effectiveness of Pre-renal Replacement Therapy Program on Chronic Kidney Disease Progression in Community Hospital, Central Thailand.

Jaedsupa Thanakitcharu[1], Suthasinee Phathaisuang[1], Pornsopa Kaewdangdae[2], Thidakarn Janthon[2] and Wisit Kaewput[3]

[1]6th year Medical Cadet Students, Phramongkutklao college of medicine

[2]Tha Luang hospital, Lopburi, Thailand

[3]Department of Military and Community Medicine, Phramongkutklao college of medicine, Bangkok, Thailand

Abstract

Background: Chronic kidney disease (CKD) is a growing health burden, particularly as it progresses to end-stage renal disease (ESRD). In Thailand, early intervention is vital. This study evaluated the impact of a pre-renal replacement therapy nutritional program on disease progression, blood pressure, and treatment decision-making among CKD patients.

Methods: A retrospective cohort study was conducted using medical records of CKD outpatients at Tha Luang Hospital, Lopburi Province, between January 1, 2020, and September 15, 2024. Patients aged ≥18 years who received nutritional counseling were included. Data on estimated glomerular filtration rate (eGFR) and blood pressure were collected at 3-, 6-, and 12-month pre-intervention, and at 3-, 6-, and 12-month post-intervention. Multivariable regression analysis adjusted for age, sex, CKD stage, comorbidities, medications, and lifestyle factors. Treatment decision changes regarding RRT were also analyzed.

Results: After adjustment, the rate of eGFR decline decreased post-intervention (from −3.765 ± 0.355 mL/min/1.73 m² per 3 months). Changes in systolic and diastolic blood pressure were not statistically significant. Notably, 6.5% of patients altered their treatment decision to opt for RRT after receiving program information.

Conclusion: The pre-kidney replacement therapy nutritional program contributed to slowing CKD progression and supported informed treatment decisions. Incorporating such programs into routine CKD care is recommended.

Keywords ● *Chronic kidney disease,* ● *Renal replacement therapy* ● *Disease progression* ● *Nutritional counseling*

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Correspondence should be addressed to Jaedsupa Thanakitcharu year Medical Cadet Students, Phramongkutklao college of medicine Tha Luang hospital, Lopburi, Thailand Department of Military and Community Medicine, Phramongkutklao college of medicine, Bangkok, Thailand

Introduction

Chronic kidney disease (CKD) is a major public health issue. Global studies have shown that in 2019, CKD caused approximately 1.4 million deaths, marking a 20% increase since 2010, making it one of the leading causes of death worldwide.[6] In Thailand, data from the 2009 Thai Nephrology Society study revealed that about 17.6% of the Thai population[1,3,4,7] suffers from CKD, translating to around 8 million patients, with 80,000 in the end-stage renal disease (ESRD). The prevalence of CKD increases with age, with the highest concentration found in Bangkok and surrounding areas[1,7]

Chronic kidney disease refers to a condition where kidney tissue is damaged, leading to reduced kidney function.[1-,4,7] Causes include existing kidney disease, diabetes, hypertension, urinary tract infections, urinary obstructions, genetic disorders, or untreated acute kidney failure that leads to permanent kidney damage.[1-3,7] Evidence of kidney damage includes markers such as proteinuria, urine sediment, or abnormalities from kidney imaging. Diagnosis can also be confirmed by a GFR of less than 60 ml/min/1.73 m² for over three months.[1]

Early-stage CKD patients often show no symptoms and may only be diagnosed through urine or blood tests. However, as kidney function declines, symptoms may appear, including nausea, vomiting, loss of appetite, fatigue, swelling in the feet and ankles, sleep problems, changes in urination, and uncontrollable high blood pressure.[1,2]

Based on the KDIGO guidelines, CKD is classified into 5 stages based on GFR, with additional classifications for albuminuria (A1, A2, A3). These classifications help predict disease progression.[1]

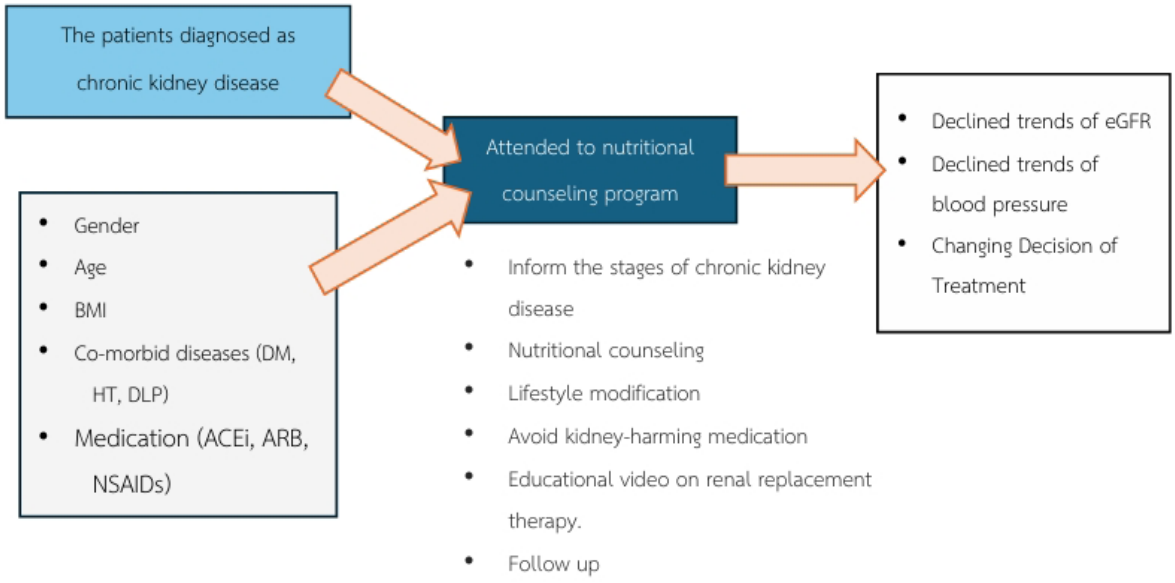
As of now, there are around 47,987 patients receiving kidney replacement therapy in Thailand, and the numbers continue to rise.[1] Alongside standard clinical treatments for CKD, patient education, lifestyle changes, nutritional counseling, and avoiding kidney-harming medications like NSAIDs have shown to improve patient preparedness for kidney replacement therapy, reducing hospitalization rates and mortality.[3,8]

A study on patients with CKD stages 3 and 4 at Takfa Hospital's CKD clinic found that after one-year, average serum creatinine levels decreased (mean difference 0.04; 95% CI 0.02 to 0.07; P<0.001), and the estimated GFR (eGFR) increased (mean difference -1.39; 95% CI -2.11 to -0.67; P<0.001) significantly. The rate of eGFR decline was less than 4 ml/min/1.73 m² per year in 82.4% of patients, with disease progression remaining stable in 89.8%, improving in 8.3%, and worsening in only 2%. This suggests that attending a CKD clinic can effectively slow kidney disease progression.[4]

Another study on early-stage CKD patients who participated in a nursing and education support program showed that post-intervention, the experimental group had significantly higher self-care knowledge and self-care behavior scores compared to pre-intervention and the control group at 6- and 10-weeks post-intervention.[5]

Early screening and diagnosis of CKD, followed by counseling, lifestyle modification, and appropriate treatment, are crucial for slowing the progression of kidney disease and improving patient outcomes (Figure1).

Figure 1: Conceptual Framework and Research Process



Operational Definitions: Chronic Kidney Disease is a condition characterized by kidney tissue damage, which can be identified by:

1) Indirect markers such as proteinuria, abnormal urine sediment, or abnormalities from imaging studies.

2) A reduced Glomerular Filtration Rate (GFR) of less than 60 ml/min/1.73 m² for more than 3 months.

Stages of CKD based on GFR:

CKD is classified into 5 stages according to the kidney's filtration rate:

Stage 1: eGFR > 90 ml/min/1.73 m ²— There is kidney abnormality (e.g., protein leakage in urine), but the filtration rate is normal.

Stage 2: eGFR 60-89 ml/min/1.73 m² — There is kidney abnormality (e.g., proteinuria), with a slight decrease in filtration rate.

Stage 3a: eGFR 45-59 ml/min/1.73 m² —Mild to moderate decrease in filtration rate.

Stage 3b: eGFR 30-44 ml/min/1.73 m² — Moderate to severe decrease in filtration rate.

Stage 4: eGFR 15-29 ml/min/1.73 m² —Severe reduction in filtration rate.

Stage 5: eGFR < 15 ml/min/1.73 m² — End-stage renal disease (ESRD).

CKD stages based on albuminuria:

Albuminuria, indicating protein in urine, is classified into 3 stages:

A1: Albumin < 30 mg/g or < 3 mg/mmol.

A2: Albumin 30-300 mg/g or 3-30 mg/mmol.

A3: Albumin > 300 mg/g or > 30 mg/mmol.

Methods

This study is an analytical observational study using a retrospective cohort design. It aims to evaluate the effect of a pre-kidney replacement therapy nutritional program on disease progression, blood pressure changes, and treatment decision-making in chronic kidney disease (CKD) patients.

The target population includes patients diagnosed with CKD who received outpatient care at Tha Luang Hospital, Lopburi Province, and attended the nutrition clinic or received nutritional counseling between January 2022 and September 15, 2024. Data collection will commence following ethical approval from the Institutional Review Board of the Royal Thai Army Medical Department.

Inclusion Criteria:

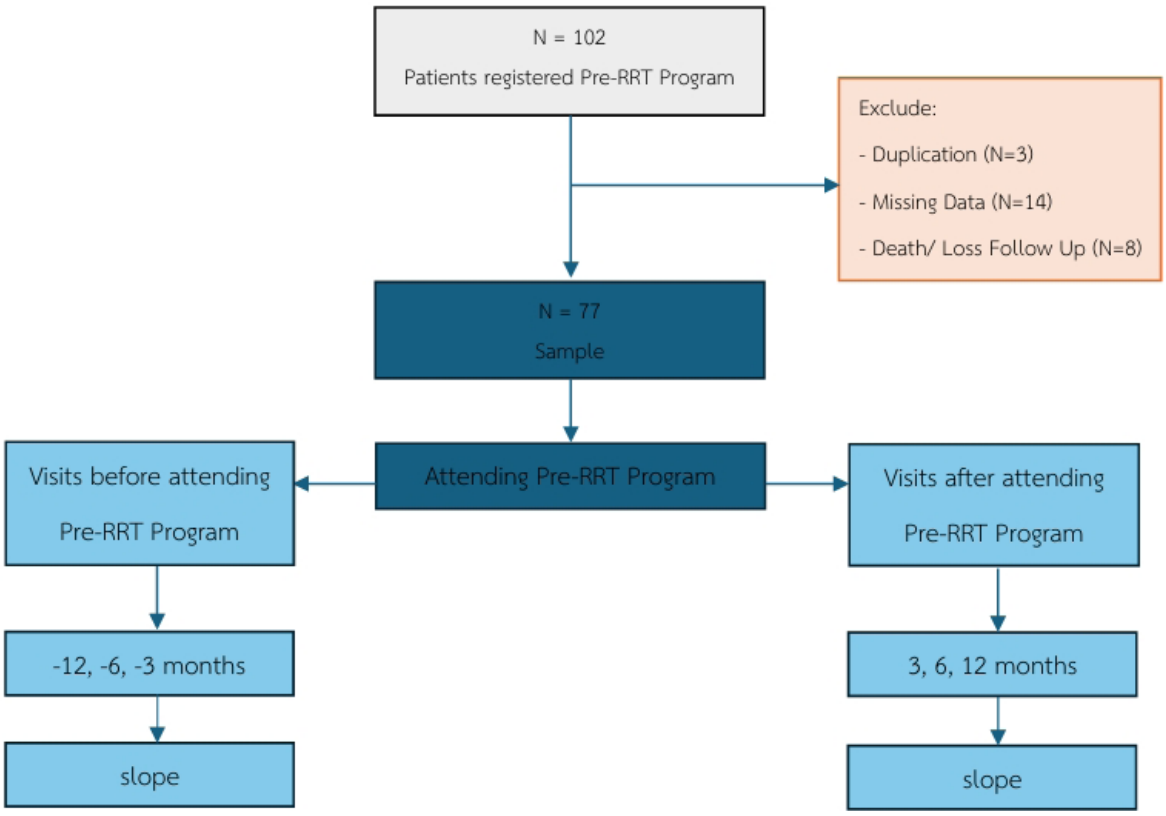
1. Patients registered at Tha Luang Hospital
2. Diagnosed with chronic kidney disease (CKD)
3. Received nutritional counseling or attended the hospital's nutrition clinic
4. Aged 18 years or older

Exclusion Criteria:

1. Patients who died or were lost to follow-up during the study period
2. Pregnant individuals

There will be no group allocation. All eligible patients will be included, and data will be retrieved retrospectively from the hospital database using anonymized patient codes to ensure confidentiality. The data collected will include estimated glomerular filtration rate (eGFR), urinary protein, blood pressure, blood glucose, and lipid profiles. These values will be extracted at 3- and 6-months prior to receiving nutritional counseling and at 3- and 6-months postcounseling **(Figure2).**

Figure 2: Participant Flow



Outcome Measurements:

Primary Outcome: The rate of progression of chronic kidney disease, assessed by the change in eGFR over time.

Secondary Outcomes: (1) Change in blood pressure before and after program participation; and (2) Change in patients' treatment decision-making regarding renal replacement therapy following nutritional counseling.

Statistical Analysis:

Data will be analyzed using STATA statistical software. Descriptive statistics will be used to summarize patient characteristics and clinical variables, including frequency, percentage, mean, standard deviation, minimum, and maximum values. For analytical statistics, the following methods will be applied: Chi-square test will be used to assess associations between categorical variables. Paired t-test will be employed to compare continuous variables such as glomerular filtration rate (eGFR) and blood pressure before and after participation in the pre-dialysis nutrition program. Additionally, an Interrupted Time Series (ITS) analysis will be conducted to evaluate changes in the trend and level of eGFR and blood pressure across specified time points (12, 6, and 3 months before vs. 3, 6, and 12 months after program participation). The ITS analysis will be performed using a multivariable multilevel mixed-effects linear regression model.

To adjust for potential confounding factors, the multivariable model will include the following covariates:

age, sex, stage of CKD, alcohol consumption, smoking status, use of ACE inhibitors (ACEi), angiotensin receptor blockers (ARBs), and nonsteroidal anti-inflammatory drugs (NSAIDs), as well as presence of type 2 diabetes mellitus (T2DM), dyslipidemia, hypertension, and body mass index (BMI). Model results will be reported as estimated coefficients, 95% confidence intervals (CIs), and p-values, with statistical significance set at $p < 0.05$.

Results

The majority of the sample group were female, accounting for 66.23% of the total sample, with an average age of 71.17±12.49 years. Most participants, 88.31%, were covered by the Universal Health Coverage Scheme. The average body mass index (BMI) was 24.67±4.71 kg/m², with the majority falling in the BMI range of 18.5–22.9 kg/m². Most of the sample group did not smoke or consume alcohol, accounting for 87.01% and 89.61%, respectively (Table1). Before joining the kidney replacement therapy program, the majority of the sample group, 58.44%, were in stage 4 chronic kidney disease. The most common comorbidities were diabetes, dyslipidemia, and hypertension, accounting for 42.86%. Additionally, most of the participants declined the use of ACEi, ARB, and NSAIDs medications, with 58.44% opting out.

Table 1: Demographic Data of Sample Population

		n (%)
Data		
Male		26 (33.77)
Female		51 (66.23)
Age		
Min - Max	28 - 96	
Mean±SD	71.17±12.49	
18-49		3 (3.90)
50-59		9 (11.69)
60-69		25 (32.47)
70-79		19 (24.68)
80-89		16 (20.78)
90-99		5 (6.49)

Table 1: Demographic Data of Sample Population (cont.)

Health Coverage		
Universal Coverage		68 (88.31))
Civil servant medical benefit		5 (6.49)
Social Security		3 (3.9)
Self-Paid		1 (1.3)
Body mass index (kg/m2)		
Mean±SD	24.67± 4.71	
< 18.5		5 (6.49)
18.5 - 22.9		28 (36.36)
23.0 - 24.9		9 (11.69)
25.0 - 29.9		26 (33.77)
≥ 30		9 (11.69)
Smoking		
nonsmoker		67 (87.01)
current smoker		3 (3.90)
ex-smoker		7 (9.09)
Alcohol drinking		
Never		69 (89.61)
Used to drink		9 (10.39)
CKD stage at beginning		
stage 3B		8(10.39)
stage 4		45(58.44)
stage 5		24(31.17)
Underlying Disease		
Only HT		9 (11.69)
T2DM & HT		12 (15.58)
DLP & HT		21 (27.27)
T2DM & DLP & HT		33 (42.86)
None of above		2 (2.60)
Drug Use		
Only NSAIDs		6 (7.79)
Only ARB		9 (11.69)
Only ACEi		13 (16.88)
NSAIDs & ARB		2 (2.60)
NSAIDs & ACEi		2 (2.60)
None of above		45 (58.44)

The data were analyzed by using multilevel mixed-effects linear regression, adjusting for age, gender, stage of chronic kidney disease, alcohol consumption, smoking, use of ACE inhibitors (ACEi), angiotensin II receptor blockers (ARB), NSAIDs, diabetes, dyslipidemia, hypertension, and body mass index (BMI) through standardized regression. It was found that the rate of change in the glomerular filtration rate (GFR) decreased after participating in the pre-renal replacement therapy program. The GFR change before entering the program declined by 3.765 ± 0.355 mL/min/3 months/person, while the GFR change after participating in the program decreased by 1.894 ± 0.176 mL/min/3 months/person. This reduction in GFR after program participation was statistically significant ($p < 0.001$) (Table2).

Table 2: Comparison of the Rate of Change in Kidney Filtration Rate and Blood Pressure Before and After Participation in the Pre-Renal Replacement Therapy Program in Chronic Kidney Disease

	Crude			Adjusted*		
	Coefficient	p-value	95% CI	Coefficient	p-value	95% CI
Trend of eGFR (mL/min/3 months/person)						
Before intervention	-3.765	<0.001	-4.461, -3.069	-3.757	<0.001	-4.452, -3.061
During intervention	-1.901	<0.001	-2.247, -1.555	-1.894	<0.001	-2.240, -1.550
Trend of Systolic Blood Pressure (mmHg/3 months/person)						
Before intervention	0.0591	0.937	-1.410, 1.528	0.064	0.932	-1.405, 1.533
During intervention	0.338	0.364	-0.391, 1.068	0.342	0.358	-0.387, 1.072
Trend of Diastolic Blood Pressure (mmHg/3 months/person)						
Before intervention	0.080	0.86	-0.809, 0.969	0.096	0.832	-7.922, 0.984
During intervention	0.118	0.6	-0.323, 0.560	0.131	0.559	-0.310, 0.572

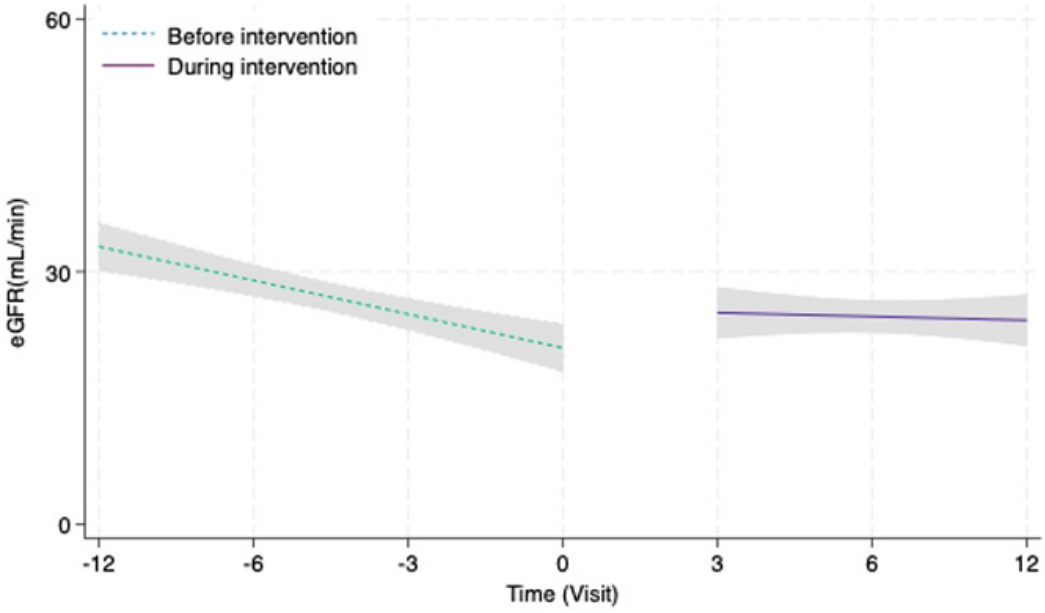
*Adjusted for age, sex, CKD stage, alcohol drinking, smoking, ACEi use, ARB use, NSAIDs use, T2DM, Dyslipidemia, Hypertension, BMI

For the rate of change in systolic and diastolic blood pressure, after adjusting for the same factors, the systolic blood pressure change increased from 0.064 mmHg/3 months/person to 0.342 mmHg/3 months/person, and diastolic blood pressure change increased from 0.096 mmHg/3 months/person to 0.131 mmHg/3 months/person. However, these changes in both systolic and diastolic blood pressure were not statistically significant (p-values 0.932, 0.385, 0.832, and 0.559, respectively).

Focusing on slowing disease progression in chronic kidney disease (CKD) patients at a community hospital in central Thailand, it can be observed that the dashed line on the left, representing the period before joining the program, has a steeper slope compared to the solid line on the right, which represents the period after participating in the program. This suggests a slower rate of kidney

function decline post-program participation. The gray shaded area in the chart represents the 95% confidence interval, indicating the range within which the true trend is likely to fall (Figue3).

Figure 3: The line chart comparing the trend in the rate of change of the estimated glomerular filtration rate (eGFR) at 12, 6, and 3 months before, and 3, 6, and 12 months after participating in the pre-renal replacement therapy program.



The majority of the sample group, before participating in the program accounting for 53.25%, opted for conservative treatment approaches. After receiving educational information on renal replacement therapy, 6.5% of the participants changed their decision from conservative treatment to opting for renal replacement therapy (Table3).

Table 3: The decision-making process regarding treatment options for chronic kidney disease (CKD) patients, both before and after participating in the pre-renal replacement therapy program.

	n (%)
Pre-RRT decision of treatment	
Conservative	41 (53.25)
Undecided	36 (46.75)
Post-RRT decision of treatment	
Conservative	40 (51.95)
Hemodialysis	3 (3.90)
Peritoneal dialysis	2 (2.60)
Undecided	32 (41.56)

Discussion

This research demonstrates that the rate of change in glomerular filtration rate (GFR) before and after participation in the pre-renal replacement therapy program to slow the progression of chronic kidney disease (CKD) showed a statistically significant decrease after joining the program. This result is consistent with research on the slowing of kidney deterioration in CKD patients in stages 3 and 4 at the Chronic Kidney Disease Clinic at Takfa Hospital, which found that after one year of attending the clinic, kidney deterioration could be delayed[4]. This indicates the effectiveness of participating in the pre-renal replacement therapy program for CKD patients, as well as the benefits of joining the program in other aspects, such as providing education on renal replacement therapy, which led some participants to change their treatment decision to opt for renal replacement therapy.

The components of the pre-renal replacement therapy program such as notifying the stage of the disease, providing nutritional guidance, watching educational videos about kidney disease, self-care and treatment guidance, educational documents and teaching materials, and monitoring treatment through online discussion groups—contributed to the rate of change in GFR, which may have varied effects. However, the study found no statistically significant changes in blood pressure before and after joining the pre-renal replacement therapy program, which could be influenced by other factors affecting blood pressure, such as strict adherence to prescribed medication, daily lifestyle habits, and stress.

Despite the limitations inherent to its retrospective cohort design, this study provides important preliminary evidence supporting the implementation of pre-RRT programs. Future prospective studies, particularly randomized controlled trials, are recommended to validate these findings, identify program components most strongly associated with improved renal outcomes, and further elucidate patient-level factors influencing treatment decisions.

Recommendations: first this research indicates the effectiveness and benefits of participating in the pre-renal replacement therapy program for chronic kidney disease (CKD) patients. Therefore, promoting such programs in community hospitals will be increasingly beneficial to patients, particularly those with CKD. Second, early participation in the pre-renal replacement therapy program for patients with early-stage CKD will help slow kidney deterioration, prolonging the need for renal replacement therapy, reducing complications, and improving the quality of life for patients. Third, in community hospitals with limited medical resources, introducing a pre-renal replacement therapy program that includes nutritional counseling and renal replacement therapy education through supplementary learning materials is an effective method to help slow disease progression and is feasible at the community hospital level. Fourth, a patient monitoring system enables continuous follow-up on treatment, where the rate of change in GFR serves as an indicator of disease

prognosis and guides appropriate treatment options for patients. Fifth, an improved patient data recording system for those participating in the pre-renal replacement therapy program, such as electronic records, enhances efficiency. Lastly, further studies are needed on the components of the pre-renal replacement therapy program that affect GFR, the relationship between GFR and blood pressure, and the reasons or factors that lead patients to change their treatment choices.

CONCLUSION

The participation in a pre-renal replacement therapy (pre-RRT) nutritional and educational program is associated with a statistically significant reduction in the rate of glomerular filtration rate (GFR) decline among patients with chronic kidney disease (CKD). The findings support the effectiveness of such programs in slowing disease progression, particularly in patients with stage 3 and 4 CKD. Although changes in systolic and diastolic blood pressure were observed, they did not reach statistical significance, suggesting the need for further investigation into factors influencing blood pressure in this population. In addition to clinical outcomes, the study also highlights the impact of pre-RRT education on treatment decision-making, with a subset of patients opting for renal replacement therapy after receiving targeted information. These findings suggest the value of structured, multidisciplinary interventions, especially in resource-limited community hospital settings where integrated care strategies can be feasibly implemented to support CKD management.

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