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Effects of Self-efficacy Development Program on Self-Care Behavior in the Elderly with Chronic Kidney Disease Stage 3 - 4, Surat Thani Province

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Abstract

This quasi-experimental research aimed to study the effects of a self-efficacy enhancement program on self-care behavior and the glomerular filtration rate (GFR) of elderly patients with chronic kidney disease (CKD) stages 3 - 4 in Surat Thani Province. The sample size was determined using the G*Power program, with 42 experimental and control group participants. The experimental group received the self-efficacy enhancement program, while the control group received standard care. The research instruments included a self-efficacy enhancement program with a content validity index (CVI) of 0.94, a self-efficacy perception assessment with a reliability of 0.91, and a self-care behavior questionnaire with a reliability of 0.83. Data were analyzed using Chi-square. The results indicated significant differences in the mean scores of self-efficacy and self-care behaviors before and after the program in the experimental group, with both measures showing statistically significant increases ($p < 0.001$). Additionally, when comparing the mean scores of self-efficacies, self-care behaviors, and eGFR between the experimental and control groups after program implementation, the experimental group demonstrated significantly higher mean values ($p < 0.001$ for self-efficacy and self-care behaviors; $p < 0.05$ for eGFR). This quasi-experimental study was conducted to examine changes in self-care behavior and GFR levels of the elderly persons with CKD in CKD stages 3 - 4 in Surat Thani, and to examine the impact of a self-efficacy reinforcement program for them. Sample size was computed using the G*Power program and was set at 42 participants of experimental and control groups. The intervention group was assigned the self-efficacy promotion program and the control group was given routine treatment. The research tools were as follows: the self-efficacy promoting program (CVI = 0.94) and the self-efficacy perception scale (CVI = 0.91); and the self-care behavior questionnaire (r = 0.83). The data was statistically analyzed using chi-square. Results revealed significant improvement in the mean scores of the experimental group in self-efficacy and self-care behaviors after the program, which was statistically significant ($p < 0.001$). Post-program comparisons between the groups also demonstrated that the experimental group had higher mean scores in self-efficacy and self-care behaviors ($p < 0.001$) and higher estimated glomerular filtration

rate (eGFR) ($p < 0.05$). These findings demonstrate that the program effectively enhanced self-efficacy, knowledge, and understanding, thereby improving the confidence of elderly CKD patients in managing their health. This resulted in clinical outcomes that slowed the decline in GFR and reduced the progression to end-stage renal disease.

Keywords: Chronic kidney disease, Self-efficacy, Estimated glomerular filtration rate

Background and importance of the problem

Chronic Kidney Disease (CKD) is a condition caused by kidney dysfunction, leading to an inability to filter toxins and waste from the blood, resulting in toxin and waste accumulation in the body (Kidney Disease Improving Global Outcomes, 2023). The International Society of Nephrology (2023) reported that CKD became the most significant health issue of the past decade, with approximately 850 million cumulative cases worldwide as of 2023, accounting for 10 % of the global population. This implies that for every 10 people globally, one has CKD. The global average mortality rate is 2.4 %. When examining CKD prevalence and mortality rates, it has been found that this disease poses a significant public health challenge in low- to middle-income regions, where mortality rates are higher than in high-income countries (Kovesdy, 2022). In developing countries, such as Thailand, the disease has become more severe compared to developed nations, as CKD is among the top 10 leading causes of death (Division of Non-Communicable Disease, Department of Disease Control, 2022).

The Situation of Chronic Kidney Disease in Thailand, according to the Health Data Center (HDC) report, over the past three years (2021 - 2023), the average number of cumulative CKD cases in Thailand was approximately one million per year. The prevalence rates were 1,521, 1,478, and 1,554 per 100,000 population, respectively. The mortality rates were 17.74, 16.69, and 18.17 per 100,000 population, respectively. When comparing CKD distribution across age groups, the prevalence among the elderly aged 60 and above was 5,606.84, 5,469.15, and 5,021.84 per 100,000 population, respectively—significantly higher than the prevalence rates among the 15–59 age group, which were 519.40, 522.20, and 509.23 per 100,000 population, respectively. The mortality rates for the elderly aged 60 and above were 78.16, 73.16, and 77.48 per 100,000 population, respectively, much higher than the rates for the 15 - 59 age group, which were 14.85, 13.09, and 13.74 per 100,000 population, respectively (Health Data Center, Ministry of Public Health, 2023). These figures indicate that the prevalence among the elderly is 10 times higher than that of other groups, and the mortality rate is 5.3 times higher Strategy and Planning Division (Ministry of Public Health, 2022). The proportion of CKD Cases and Regional Distribution, most CKD cases in Thailand remain in stage 3. The disease is prevalent across all regions, with the highest prevalence found in the Southern region, particularly in Health Region 11, where the rate is 1,848 per 100,000 population. Surat Thani province has the highest number of cumulative cases, with a prevalence of 2,295 per 100,000 population (Health Information System Development Office, 2023). Additionally, 59.48 % of CKD patients showed a decline in glomerular filtration rate of less than or equal to 5 mL/min/1.73 m² per year (eGFR < 5 mL/min/1.73 m²), which is below the target benchmark set by the Ministry of Public

Health's success evaluation criteria of 66.00 %. The impact on elderly CKD patients is particularly severe. According to the report, 9 out of 10 CKD patients are elderly, and the mortality rate for this group is 5.5 times higher than that of other age groups (Health Information System Development Office, 2023). The transition from stage 4 to stage 5 accounted for 24.88 % of cases. Health Data Center (2022) patients with chronic kidney disease (CKD) stages 3 - 4 are in the progressive phase of the disease, which is characterized by a decline in renal function. The management of these stages focuses on delaying disease progression to the terminal stage, which can significantly improve the patients' quality of life. Preventing progression to end-stage renal disease (ESRD) is crucial, as it reduces the need for dialysis or transplantation, minimizes associated complications, and enhances overall health outcomes. Therefore, interventions aimed at slowing disease progression in this patient population are of paramount importance for optimizing their long-term health and well-being.

Stage 4 to 5 transition was observed in 24.88 % of the patients. Health Data Center (2022), in progressive phase in patients with CKD stages 3 - 4 in the eGFR decrease process. The treatment of these stages is aimed at preventing progression of disease to the terminal stage rather than cure, but cannot be overemphasized as this would greatly enhance the patients' quality of life. Slowing progression to ESRD is important because it will decrease the rate of dialysis and transplant need, avoid dialysis and transplant complications, and improve overall health outcome. Thus, the development of treatments that dampen the pace of disease progression in this patient epidemic is crucial for their long-term health.

This situation also has significant social and economic repercussions. The National Health Security Office has had to allocate a considerable budget for comprehensive medical services for CKD patients under a flat-rate payment system. The development of self-efficacy among elderly patients with chronic kidney disease (CKD) serves as a tool to support their self-care. By applying the Self-Efficacy Theory, this approach aims to enhance patients' self-care capabilities by fostering perceived self-efficacy and outcome expectations, which in turn encourage behaviors that achieve desired goals. Methods for cultivating self-efficacy include mastery experiences (successful achievements), vicarious experiences (observing others' experiences) through modeling, verbal persuasion, and emotional arousal. Therefore, elderly CKD patients with high self-efficacy and strong outcome expectations are more likely to engage in behaviors that lead to positive results (Bandura, 1997).

A review of relevant literature revealed that most studies primarily focus on general patient care, lacking coverage on the health care needs of dependent elderly individuals with stage 3 - 4 chronic kidney disease (CKD) (Phaiphat et al., 2021). which is the phase where the disease becomes chronic as kidney tissues undergo significant damage (Kidney Disease Association of Thailand, 2023). There is a lack of modern technological applications, such as video calls and Line application, as communication tools for consultation, follow-ups, and patient empowerment. Additionally, there is insufficient support for educational media, such as video demonstrations on patient care, that can be conveniently accessed online. Previous programs have largely emphasized outcomes related to behavioral changes or enhanced self-efficacy among participants. However, clinical outcomes,

particularly the glomerular filtration rate, have not been adequately assessed. Studies that measured this parameter over only eight weeks found no significant differences between groups due to the short observation period. Furthermore, these studies lacked consistency in weekly activities. The absence of a holistic care approach, integrating physical and psychological competency development, underscores the need to identify the most effective methods for improving glomerular filtration efficiency.

As a professional nurse responsible for managing chronic non-communicable diseases, the researcher recognizes the significant health impact of chronic kidney disease (CKD) in Thailand, which urgently requires solutions, improvements, and development to reduce its prevalence, severity, and impact. This can be achieved by promoting or enhancing self-care behaviors among elderly CKD patients in stages 3 - 4 to slow kidney deterioration and manage the complications resulting from reduced kidney function. The goal is to prevent the disease from progressing to stage 5, which requires renal replacement therapy. The researcher hopes that the findings from this study will provide guidance that contributes to reducing the government's financial burden for CKD care at the national level. Therefore, this research aims to investigate the effects of a self-efficacy development program on self-care behaviors and glomerular filtration rate among elderly CKD patients in Surat Thani province.

Research objectives

1) To compare the perceived self-efficacy, self-care behaviors, and glomerular filtration rate of elderly CKD patients before and after participating in a self-efficacy development program the experimental group**.**

2) To compare self-efficacy perception, self-care behaviors, and glomerular filtration rate after the intervention between the experimental group and the control group.

Research framework

This research applies Bandura’s (1997) Self-Efficacy Theory, which consists of four components:

1) Mastery experience — enhancing learning experiences through successful achievements,

2) Vicarious experience — learning by observing others’ experiences,

3) Emotional arousal — stimulating emotional engagement, and

4) Verbal persuasion — encouraging through spoken communication.

These components influence perceived self-efficacy, self-care behaviors, and kidney filtration rates, as illustrated in **Figure 1**.

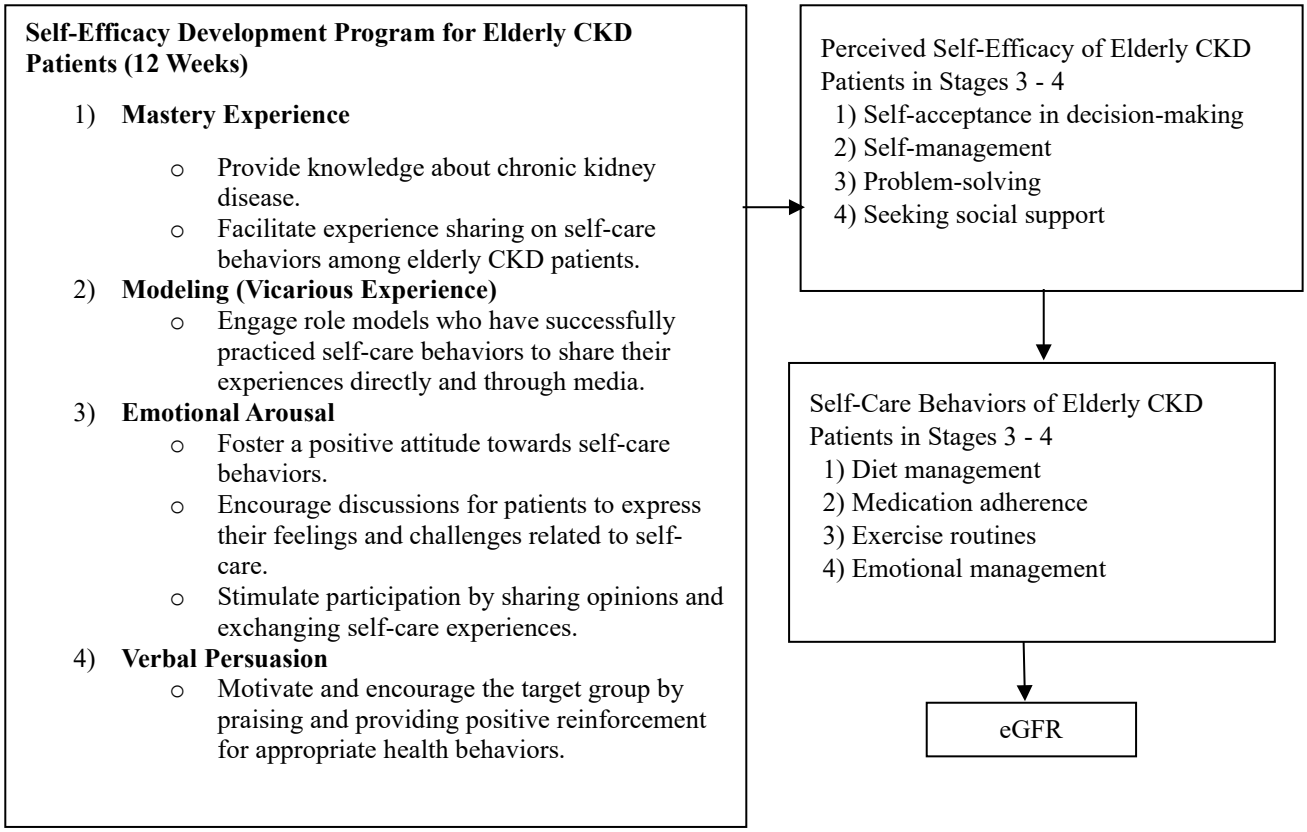

Figure 1 Research framework.

Research methodology

Research design

This study employed a quasi-experimental research design, specifically utilizing a two-group pretest-posttest design. The sample was divided into two groups: one group received the self-efficacy enhancement program, while the other group received standard care.

Population

The population consisted of 4,377 elderly individuals with chronic kidney disease stages 3 - 4 residing in Surat Thani Province (Health Data Warehouse, Ministry of Public Health, 2023).

Sample group

The sample was obtained through simple random sampling, with the sample size determined using the G*Power program (Cohen, 1988) based on similar previous research. The average care behavior scores and standard deviations of the control group were 72.47 (SD = 5.59), while the experimental group had a mean score of 4.34 (SD = 4.34) (Arunsaengsod & Songwattana, 2023). The calculated effect size (f^2) was 0.76, resulting in 42 participants for both the experimental and control groups.

Inclusion criteria for elderly participants with chronic kidney disease

1) Elderly individuals with chronic kidney disease stages 3 - 4, aged 60 - 90 years.

2) Willingness and cooperation to participate in the study.

3) Ability to speak, read, and write in Thai.

4) No complications that hinder activity participation, such as visual, mobility, or hearing impairments.

5) Ability to understand and communicate well, with access to a smartphone capable of using the LINE application in areas with internet service.

Exclusion criteria

1) Participants unable to attend all sessions.

2) Participants who develop complications during the research period.

Data collection tools

The data collection tools were divided into four parts as follows: General information.

Health information. Self-efficacy perception questionnaire, which had a Cronbach's alpha coefficient of 0.91. Self-care behavior questionnaire, which had a Cronbach's alpha coefficient of 0.83.

Before the start of the program, participants completed questionnaires as a pre-assessment. The experimental tool was a 12-week self-efficacy enhancement program aimed at improving self-care behaviors in elderly individuals with chronic kidney disease. The details of the program are as follows:

Week 1: The researcher provided a handbook for the elderly and guided participants to scan a QR code to add a coach via the LINE application. An explanation of the application’s use and group follow-up visits was given using participatory lecture methods. The program emphasized self-efficacy perception, experience sharing, and learning from successful role models. Emotional stimulation was also provided to raise participants' awareness of their health self-care.

Week 2: The researcher distributed educational materials on nutrition and medication management through the LINE application, titled “12 Weeks to Slow Kidney Decline,” to enhance learning experiences and encourage consistent health behavior practices. Nutritional and medication advice was provided via knowledge materials, accompanied by Q&A sessions and experience sharing through the LINE application, taking approximately 5 min. The researcher served as a consultant to address obstacles encountered during health behavior practices, offering praise and encouragement. Infographic-based educational content on nutrition and medication was also shared.

Week 3: Educational materials on exercise and emotional management were distributed through the LINE application as part of the “12 Weeks to Slow Kidney Decline” program to enhance learning experiences and promote continuous health behavior practices.

Week 4: The researcher conducted home visits for the experimental group. These visits included greetings, discussions, and inquiries about health care issues, lasting approximately 20 min.

Weeks 5 - 12: Infographic-based health care review content was sent via the LINE application to reinforce learning and build confidence. These automatic messages, taking 5 - 10 min to review, aimed to provide reminders and reinforce learning experiences.

Data collection

After completing the experiment, participants were assessed for self-efficacy perception and self-care behavior using questionnaires. Additionally, glomerular filtration rate (GFR) values were monitored after 12 weeks.

Ethical protection of participants

The research was approved by Walailak University (Project Code: WU-EC-NU-2-121-67) with approval granted on May 1, 2024, and ending on May 6, 2024. The human research ethics approval number was WUEC-24-175-01. The sample participants were required to have a stable disease progression with no occurrence of complications throughout the duration of the study.

Research findings

Part 1: General Information: Experimental Group: The experimental group consisted of 22 women (52.4%), with most participants aged between 71 - 83 years (29 participants, 69.0%, $\bar{x}$ = 72.74, SD = 6.73). A total of 25 participants (59.5 %) had completed primary education.

Control Group: The control group had an equal number of men and women (21 each). Participants aged 71-83 years numbered 22 (52.4%, $\bar{x}$ = 70.7, SD = 6.13), and 25 participants (59.5 %) had completed primary education.

Occupations and Income: In the experimental group, 30 participants (71.4 %) were unemployed, and 27 participants (64.6 %) earned less than 10,000 baht per month ($\bar{x}$ = 10,095, SD = 4,206.90).

In the control group, 20 participants (47.6 %) were unemployed, and 28 participants (66.7 %) earned less than 10,000 baht per month ($\bar{x}$ = 11,404, SD = 6,324.78).

Family Members, Marital Status, and Primary Caregivers: In the experimental group, 23 participants (54.8 %) had 2 family members, 25 participants (59.5 %) were married, and 30 participants (71.4 %) had their primary caregivers as children, adopted children, or relatives.

In the control group, 27 participants (64.3 %) had 2 family members, 34 participants (81.0 %) were married, and 27 participants (64.3 %) had their primary caregivers as children, adopted children, or relatives.

Statistical analysis using the Chi-square test and Fisher's Exact Test showed no statistically significant differences in general information between the experimental and control groups, as presented in **Table 1**.

Table 1 Comparison of number, percentage, mean, and standard deviation of the sample group classified by general information.

General information	Number (%)			t/χ^2	*p*-value
	Total group (n = 84)	Experimental group (n = 42)	Control group (n = 42)		
Sex				0.48[b]	1.00
Male	41 (48.8)	20 (47.6)	21 (50.0)		
Female	43 (51.2)	22 (52.4)	21 (50.0)		
Age	(min - max = 60 - 83)	(min - max = 60 -78)	(min - max = 60 - 83)		
Mean (SD) year	71.34 (6.55)	72.74 (6.73)	70.0 (6.13)	2.45[b]	0.18
Age 60 - 70	33 (39.3)	13 (31.0)	20 (47.6)		
Age 71 - 83	51 (60.7)	29 (69.0)	22 (52.4)		
Education				2.61[a]	0.27
No Formal Education	8 (9.5)	6 (14.3)	2 (4.8)		
Primary Education	50 (59.5)	25 (59.5)	25 (59.5)		
Secondary Education	26 (31.0)	11 (26.2)	15 (35.7)		
Occupation				5.14[a]	0.16
Unemployed	50 (59.5)	30 (71.4)	20 (47.6)		
Housework	14 (16.7)	5 (11.9)	9 (21.4)		
Agriculture	18 (21.4)	6 (14.3)	12 (28.6)		
Etc.	2 (2.4)	1 (2.4)	1 (2.4)		
Monthly household income	(min - max = 5,000 - 40,000)	(min - max = 5,000 - 40,000)	(min-max = 5,000 - 20,000)		
Mean (SD) Baht	10,750 (5,379.3)	10,095 (4,206.9)	11,404 (6,324.8)	0.05 [b]	1.00
< 10,000 Baht	55 (65.5)	27 (64.6)	28 (66.7)		
10,001 - 30,000 Baht	29 (34.5)	15 (35.7)	14 (33.3)		
Number of family members				0.79 [b]	0.505
2 people	50 (59.5)	23 (54.8)	27 (64.3)		
≥ 3 people	34 (40.5)	19 (45.2)	15 (35.7)		
Marital status				5.04 [b]	0.080
Pair	59 (70.2)	25 (59.5)	34 (81.0)		
Separated/Divorce/Widow	24 (29.8)	17 (40.5)	8 (19.0)		
Care giver				1.41 [b]	0.495
Husband/Wife	27 (32.1)	12 (28.6)	15 (35.7)		
Child/Protege/Relatives	56 (67.9)	30 (71.4)	27 (64.3)		

[a] Chi-square test, [b]Fisher's exact test, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Part 2: Health data

Experimental Group: The body mass index (BMI) of participants was evenly distributed between the ranges of 18.6 - 24.9 kg/m² (normal weight) and over 24.9 kg/m² (obese), with 20 participants (47.6 %) in each category ($\bar{x}$ = 25.28, SD = 5.05). Systolic blood pressure mostly ranged between 90 - 139 mmHg for 31 participants (75.6 %, $\bar{x}$ = 132.19, SD = 10.98). Diastolic blood pressure mostly ranged between 60 - 89 mmHg for 40 participants (95.2 %, $\bar{x}$ = 71.03, SD = 9.97).

Control Group: Most participants had a BMI above 24.9 kg/m² (obese) with 19 individuals (46.3 %, $\bar{x}$ = 25.71, SD = 5.14). Systolic blood pressure was mostly within 90 - 139 mmHg for 33 participants (82.5 %, $\bar{x}$ = 129.71, SD = 14.7). Diastolic blood pressure was predominantly within 60 - 89 mmHg for 37 participants (90.2 %, $\bar{x}$ = 73.43, SD = 8.75).

Chronic disease data

In the experimental group, the most common chronic conditions were diabetes, hypertension, and hyperlipidemia, affecting 15 participants (35.7 %). The majority had been diagnosed with chronic kidney disease for less than 5 years (24 participants, 57.1 %, $\bar{x}$ = 8.02, SD = 4.84). Most participants were in stage 3b kidney disease (GFR 30 - 44 mL/min/1.73 m²) with 23 individuals (54.8 %). In the control group, 18 participants (42.9 %) had diabetes, hypertension, and hyperlipidemia. Sixteen participants (38.1 %) had been diagnosed with chronic kidney disease for less than 5 years ($\bar{x}$ = 5.36, SD = 3.6), and 29 participants (69.0 %) were in stage 3b kidney disease (GFR 30 - 44 mL/min/1.73 m²). Use of Herbal Medicine: In both the experimental and control groups, 37 participants (88.1%) did not use herbal decoctions or traditional medicines. Dietary Habits: In the experimental group, 33 participants (78.6 %) prepared their meals themselves, compared to 39 participants (92.9 %) in the control group. Self-Efficacy Perception and Self-Care Behavior Scores: The experimental group had an average self-efficacy perception score of 3.07 (SD = 0.31) and an average self-care behavior score of 2.54 (SD = 0.21). The control group had an average self-efficacy perception score of 3.14 (SD = 0.27) and an average self-care behavior score of 2.57 (SD = 0.20). Statistical analysis using the Chi-square test, independent t-test, and Fisher's Exact Test indicated no statistically significant differences between the experimental and control groups. The results are presented in **Table 2**.

Table 2 Compares the number, percentage, mean, and standard deviation of the sample groups Classified by health information.

Health information	Number (%)			t/χ^2	*p*-value
	Total group (n = 84)	Experimental group (n = 42)	Control group (n = 42)		
BMI	(min - max = 15.23 - 43.04)	(min - max = 16.02 - 43.04)	(min - max = 15.23 -36.80)		
Mean (SD) Kg/m²	25.50 (5.07)	25.28 (5.05)	25.71 (5.14)	0.371[a]	0.83
< 18.5 Kg/m²	3 (3.6)	2 (4.8)	1 (2.5)		
18.6 - 24.9 Kg/m²	39 (47.0)	20 (47.6)	19 (46.3)		
> 24.9 Kg/m²	41 (49.4)	20 (47.6)	21 (51.2)		

Health information	Number (%)			t/χ^2	*p*-value
	Total group (n = 84)	Experimental group (n = 42)	Control group (n = 42)		
Systolic	(min - max = 100 - 160)	(min - max = 100 - 160)	(min - max = 104 - 60)		
Mean (SD) mmHg	130.95 (19.95)	132.19(10.98)	129.71 (14.7)	0.580[c]	0.59
90 - 139 mmHg	64 (79.0)	31 (75.6)	33 (82.5)		
140 - 159 mmHg	17 (21.0)	10 (24.4)	7 (17.5)		
Diastolic	(min - max = 60 - 95)	(min - max = 56 - 93)	(min - max = 60 - 95)		
Mean (SD) mmHg	72.21 (9.40)	71.03 (9.97)	73.40 (8.75)	0.580[c]	0.43
60 - 89 mmHg	77 (92.8)	40 (95.2)	37 (90.2)		
90 - 109 mmHg	6 (7.2)	2 (4.8)	4 (9.8)		
Co-morbidities disease					
Diabetes	5 (6.0)	2 (4.8)	3 (7.1)	3.33[a]	0.50
Hypertension	14 (16.7)	10 (23.8)	4 (9.5)		
Diabetes, Hypertension	18 (21.3)	9 (21.4)	9 (21.4)		
Hypertension and Hyperlipidemia	14 (16.7)	6 (14.3)	8 (19.1)		
Diabetes, Hypertension and Hyperlipidemia	33 (39.3)	15 (35.7)	18 (42.9)		
Period of illness with chronic kidney disease	(min - max = 1 - 22)	(min - max = 1 - 22)	(min - max = 1 - 22)		
Mean (SD) year	6.80 (4.7)	8.02 (4.8)	5.36 (3.6)		
≤ 5	40 (47.6)	24 (57.1)	16 (38.1)	7.30	0.06
6 - 10	29 (34.5)	15 (35.7)	14 (33.3)		
11 - 20	12 (14.3)	2 (4.8)	10 (23.8)		
> 20	3 (3.6)	1 (2.4)	2 (4.8)		
Glomerular filtration value					
Stage 3a (45 - 59 mL/min/1.73 m^2)	19 (22.6)	14 (33.3)	5 (11.9)	5.64[b]	0.06
Stage 3b (30 - 44 mL/min/1.73 m^2)	52 (61.9)	23 (54.8)	29 (69.0)		
Stage 4 (15 - 29 mL/min/1.73 m^2)	13 (15.5)	5 (11.9)	8 (19.1)		
Using herbal medicine, decoctions, potions					
Use	7 (8.3)	5 (11.9)	2 (4.8)	1.40[c]	0.43
Don't use	77 (91.7)	37 (88.1)	40 (95.2)		
Food eaten					
Do it yourself	72 (85.7)	33 (78.6)	39 (92.9)	3.50[c]	0.12
Buy and eat	12 (14.3)	9 (21.4)	3 (7.1)		
Perception of self-efficacy	(min - max = 2.47 - 3.62)	(min - max = 2.48 - 3.62)	(min - max = 2.38 - 3.67)		
Mean (SD) score	3.10 (0.29)	3.07 (0.31)	3.14 (0.27)	−1.08[b]	0.25
Self-care behavior	(min - max = 2.14 - 3.10)	(min - max = 2.14 -3.10)	(min - max = 2.14- 3.05)		
Mean (SD) score	2.54 (0.23)	2.54 (0.21)	2.57 (0.20)	−0.76[b]	0.45

[a] Chi-square test, [b] independent t test, [c] Fisher's Exact Test, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Part 3: Comparison of mean scores for self-efficacy perception, self-care behavior, and glomerular filtration rate before and after participation in the self-efficacy enhancement program

The findings are as follows: Self-Efficacy Perception: In the experimental group, the mean self-efficacy perception score before the experiment was 3.07 (SD = 0.31), which increased to 4.06 (SD = 0.10) after the experiment. The post-experiment score was significantly higher than the pre-experiment score (p-value < 0.001). Self-Care Behavior: The mean self-care behavior score in the experimental group was 2.54 (SD = 0.21) before the experiment, increasing to 3.66 (SD = 0.11) after the experiment. The post-experiment score was also significantly higher than the pre-experiment score (p-value < 0.001). Glomerular Filtration Rate (GFR): The mean GFR in the experimental group was 38.84 min/1.73 m² (SD = 10.64) before the experiment and 39.04 min/1.73 m² (SD = 11.03) after the experiment. Although the post-experiment GFR was slightly higher than the pre-experiment level, the difference was not statistically significant (p-value = 0.77) (**Table 3**).

Table 3 Comparison of mean scores for self-efficacy perception, self-care behavior, and glomerular filtration rate before and after participation in the self-efficacy enhancement program for the experimental group (n = 42).

Variables	Trial period	Mean	SD	95% Confidence interval of the difference		t	df	*p*-value
				Lower	Upper			
Perception of self-efficacy	Before	3.07	0.31					
	After	4.60	0.10	−1.63	−1.44	−32.72	41	< 0.001***
Self-care behavior	Before	2.54	0.21					
	After	3.66	0.11	−1.18	−1.05	−34.82	41	< 0.001***
Glomerular filtration rate	Before	38.84	10.64					
	After	39.04	11.03	−1.54	1.15	-0.30	41	0.77

*p < 0.05, **p< 0.01, ***p< 0.001

Part 4: Comparison of mean scores for self-efficacy perception, self-care behavior, and kidney filtration rate between the experimental and control groups after participation in the program among elderly individuals with chronic kidney disease stages 3 - 4 in Surat Thani Province

Self-efficacy perception: The experimental group had a mean score of 4.60 (SD = 0.09), while the control group had a mean score of 3.33 (SD = 0.28). The experimental group's mean score was significantly higher than that of the control group (p-value < 0.001). Self-Care Behavior: The experimental group had a mean score of 3.66 (SD = 0.11), while the control group had a mean score of 2.76 (SD = 0.22). The experimental group's mean score was significantly higher than that of the control group (p-value < 0.001). Kidney Filtration Rate (GFR): The experimental group had a mean GFR of 39.04 min/1.73 m² (SD = 11.03), while the control group had a mean GFR of 33.50 min/1.73

m^2 (SD = 9.06). The experimental group's mean GFR was significantly higher than that of the control group (p-value = 0.014). **Table 4**: Comparison of Mean Scores for Self-Efficacy Perception, Self-Care Behavior, and Glomerular Filtration Rate Between the Experimental and Control Groups After Program Participation.

Table 4 Compares the mean scores of self- efficacy perceptions. self- care behavior and Glomerular filtration rate values between the experimental group and the control group after program (n = 84).

Variables	Group	Mean	SD	F	95% Confidence Interval of the Difference		t	df	*p*-value
					Lower	Upper			
Perception of self-efficacy	Control	3.33	0.28						
	Experimental	4.60	0.10	34.38	−1.36	−1.18	−27.99	50.37	< 0.001***
Self-care behavior	Control	2.76	0.22						
	Experimental	3.66	0.11	11.21	−0.97	−0.82	−23.81	61.39	< 0.001***
Glomerular filtration rate	Control	33.50	9.06						
	Experimental	39.04	11.03	0.64	−9.92	−1.16	−2.51	82	0.014*

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Research discussion

1) Comparison of self-efficacy perception scores before and after participation in the program: The study found that after participating in the self-efficacy enhancement program, elderly individuals with chronic kidney disease stages 3 - 4 had significantly higher mean self-efficacy perception scores compared to before the intervention at a significance level of 0.05. This result can be explained by the program's approach, which included providing knowledge about chronic kidney disease through group sessions, online follow-ups at home, learning from role models, persuasive communication, and emotional stimulation. These elements encouraged participants to develop self-efficacy and adopt appropriate health behaviors. The program's emphasis on experiential learning, both from knowledgeable individuals and successful role models, allowed participants to observe effective behaviors, fostering expectations and imitation. This process ultimately boosted their confidence in their abilities and led to positive changes in health behaviors (Rodriguez et al., 2021). This finding aligns with previous studies that demonstrated the effectiveness of learning from real-life role models who shared their experiences of living with chronic kidney disease. Such exposure motivated elderly participants to adopt better disease management practices (Ali et al., 2021; Arunsaengsod & Songwattana, 2023; Inruspong, 2023). Additionally, emotional stimulation and persuasive communication contributed to participant satisfaction and helped alleviate fears and concerns about health issues. Providing encouragement and praise promoted positive thinking, fostering expectations of success and decisions to adopt healthier self-care behaviors (Hladek et al., 2020). These findings

are consistent with the study by Arunsaengsod and Songwattana (2023), which showed that motivational conversations and counseling positively influenced self-care behavior. The benefits of emotional stimulation and persuasive communication included not only enhancing motivation and reducing anxiety but also building self-confidence.

2) Comparison of mean self-care behavior scores before and after participation in the program: The study revealed that elderly individuals with chronic kidney disease stages 3 - 4 had significantly higher mean self-care behavior scores after participating in the self-efficacy enhancement program compared to before the intervention at a significance level of 0.05. This finding can be explained by the theory of perceived self-efficacy and outcome expectations, which posits that individuals are more likely to engage in behaviors to achieve desired goals when they believe in their ability to perform such behaviors (Bandura, 1997). This result aligns with the research by Wangsri et al. (2016), which found that a self-efficacy enhancement program improved kidney disease management behaviors among patients with type 2 diabetes.

Additionally, the study by Curtin et al. (2008) on self-efficacy perception and self-management behaviors among patients with chronic kidney disease supports this finding. Elderly participants demonstrated improvements in dietary behaviors, such as controlling food types and portions, avoiding excessive sweets, high-fat foods, and high-sodium intake, while maintaining a balanced diet from five food groups. They also adhered to medication regimens, selected appropriate exercise routines, and managed emotions, stress, and problem-solving while identifying suitable support sources. When elderly individuals with chronic kidney disease consistently practiced these health care activities, they developed habits that ultimately led to noticeable clinical improvements.

3) Comparison of the average glomerular filtration rate (GFR) before and after the intervention in elderly patients with chronic kidney disease stages 3 - 4 Participating in a Self-Empowerment Program for Self-Care Behavior: The findings revealed that the post-intervention mean GFR was higher than the pre-intervention value, though not statistically significant at the 0.05 level. This result can be interpreted as follows: GFR is an indicator reflecting kidney function. The decline in GFR is associated with the aging process, abnormalities in kidney function, age-related hormonal changes, and complications stemming from the pathological progression of the disease, which cannot fully restore kidney function (Merchant & Ling, 2023). This finding aligns with the Ministry of Public Health's evaluation of chronic kidney disease management, where the trend indicates a decrease in the GFR decline rate to less than or equal to 5 mL/min/1.73 m^2 per year (eGFR < 5 mL/min/1.73 m^2) (Health Data Center, Ministry of Public Health, 2022). Similarly, a study by Supraditaporn (2023) on the effects of a supportive educational nursing program on dietary behavior and clinical outcomes in elderly patients with chronic kidney disease stages 3 - 4 over an 8-week period found improved dietary behavior after the intervention. However, there was no statistically significant change in GFR. In conclusion, self-empowerment promotion increases awareness and fosters positive health management behaviors. Key variables influencing kidney function are blood pressure and blood sugar levels, where effective control of these factors contributes to long-term kidney function maintenance

4) Comparison of the average self-efficacy scores between the experimental and control groups: The results showed that the experimental group had a significantly higher mean score than the control group at the 0.05 level of statistical significance. This can be interpreted as follows: the development of self-efficacy plays a crucial role in enhancing the confidence of elderly patients with chronic kidney disease (CKD) stages 3 - 4. In the experimental group, participants underwent a self-efficacy promotion program that incorporated various strategies, such as setting achievable goals, providing group and individual counseling, offering encouragement, and fostering social support (Bandura, 1997). These measures resulted in increased confidence among elderly CKD patients in their ability to manage their own health. This finding is consistent with the study by Kercher et al. (2024), which explored the relationships among psychological needs, self-efficacy, motivation, and resistance training. The study found that training programs addressing psychological needs contributed to enhanced self-efficacy and motivation, enabling participants to more effectively apply knowledge to behavior change. Furthermore, it aligns with the findings of Hosseini et al. (2022) and Lee et al. (2021), which highlighted the role of health applications in fostering self-efficacy for self-care. Patients using such applications demonstrated greater confidence in their ability to manage their health compared to those receiving standard care.

5) Comparison of the average self-care behavior scores between the experimental and control groups: The results showed that the experimental group had a significantly higher mean score than the control group at the 0.05 level of statistical significance. This finding suggests that the self-efficacy development program had a positive impact on improving the self-care behavior of elderly patients with chronic kidney disease (CKD). Participants in the experimental group demonstrated increased self-perception of their ability and heightened outcome expectations, which motivated them to engage in behaviors aimed at achieving their goals. When individuals have high expectations for positive outcomes, they are more likely to perform behaviors that lead to those outcomes. This aligns with the studies by Arunsaengsod & Songwattana (2023) and Inraspong (2023), which found that participants who underwent a self-efficacy development program showed improvements in disease knowledge, dietary behaviors, and physical activities. Additionally, the study by Saenglert (2021) on the effects of a dietary behavior modification program to slow kidney function decline in CKD stage 3 patients at Sibuang Ruang Hospital revealed that participants reduced their consumption of sugary, fatty, and salty foods compared to the control group receiving standard care. Similarly, studies by Ahn et al. (2022) and Safi et al. (2024) found a positive correlation between self-efficacy development and self-care behavior in CKD patients.

6) Comparison of Glomerular filtration rate Between the Experimental and Control Groups: The results showed that the experimental group had a higher mean filtration rate than the control group, but the difference was not statistically significant at the 0.05 level. The study indicated a trend toward improved kidney function in the experimental group that received the program; however, no significant difference compared to the control group was observed. This may be attributed to several factors influencing the outcome. It can be observed that there is an upward trend in eGFR in the experimental group. Changes in glomerular filtration rate typically require a longer period to yield

clear results, while this study had a follow-up period of only 12 weeks, which may have been too short to detect meaningful differences (Kidney Disease Improving Global Outcomes, 2023).

Additionally, there were uncontrolled factors in both groups that directly affected kidney filtration rates, such as aging and comorbidities. Despite the self-efficacy development program provided to the experimental group, these factors could not be managed, leading to no statistically significant differences between the groups (Schulman-Green et al., 2016). This finding aligns with the research by Supraditaporn (2023), which found improved dietary behavior following a supportive educational nursing program, yet no statistically significant difference in glomerular filtration rate after an 8-week study period. However, it contradicts the study by Arunsaengsod & Songwattana (2023).

Summary

The effects of the self-efficacy development program on self-care behavior in elderly patients with chronic kidney disease (CKD) stages 3 - 4 in Surat Thani province were evaluated over a 12-week experimental period. The experimental group that participated in the program had significantly higher scores for self-efficacy perception, self-care behavior, and glomerular filtration rate compared to the control group. Although there was no statistically significant difference in glomerular filtration rate before and after the experiment, the program contributed to slowing the decline in kidney filtration in the experimental group compared to the control group. Long-term follow-up and control of other influencing factors on glomerular filtration rate may be necessary.

Research recommendations

1) Nursing practice: Healthcare personnel should encourage elderly community leaders, health volunteers, and caregivers to play a role in enhancing the self-efficacy of elderly individuals for self-care. This would help elderly patients adapt to a healthy aging society and be integrated into nursing practices to foster self-confidence, enabling them to face inevitable challenges using self-efficacy development processes.

2) Research: Future research should focus on developing self-efficacy promotion programs with a greater emphasis on family involvement to enhance self-efficacy in elderly self-care. Additionally, programs should target high-risk groups for chronic diseases to improve their understanding of these diseases and foster a sense of self-efficacy in preventing progression to chronic illness.

Application of research findings

The self-efficacy development program for promoting self-care behavior in elderly CKD patients can be used as a guideline for slowing kidney deterioration and preventing disease complications. It encourages appropriate self-care behaviors in elderly patients. Healthcare personnel can apply this program to improve care for elderly CKD patients in stages 3 - 4.

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