ปัจจัยที่มีผลต่อพฤติกรรมสุขภาพเพื่อชะลอไตเสื่อมของผู้ป่วยโรคไตเรื้อรังระยะที่ 3 - 4 โรงพยาบาลคลองขลุง จังหวัดกำแพงเพชร

Factors Influencing Patient Health Behaviors for Delaying the Progress in Stage 3 - 4 Chronic Kidney Disease Patients at Khlongkhlung Hospital, Khampangphet Province

นิพนธ์ต้นฉบับ

กังสดาล หาญไพบูลย์[1]* และ ชญานินท์ ประทุมสูตร[2]

[1] โรงพยาบาลคลองขลุง จ.กำแพงเพชร

[2] กลุ่มสาขาวิชาการแพทย์แผนไทยประยุกต์ คณะสาธารณสุขศาสตร์ มหาวิทยาลัยนเรศวร จ.พิษณุโลก

* ติดต่อผู้นิพนธ์: tao.kungsadan@gmail.com

วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ 2562;14(2):53-61.

Original Article

Kungsadan Hanpaiboon [1]* and Chayanin Pratoomsoot [2]

[1] Khlongkhlung Hospital, Khampangphet Province, Thailand

[2] Department of Applied Traditional Thai Medicine, Faculty of Public Health, Naresuan University, Thailand

* **Corresponding author:** tao.kungsadan@gmail.com

Thai Pharmaceutical and Health Science Journal 2019;14(2):53-61.

บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาระดับพฤติกรรมสุขภาพเพื่อชะลอไตเสื่อม ความแตกฉานด้านสุขภาพขั้นพื้นฐาน การรับรู้สมรรถนะแห่งตน การได้รับแรงสนับสนุนทางสังคม และปัจจัยที่มีผลต่อพฤติกรรมสุขภาพเพื่อชะลอไตเสื่อมของผู้ป่วยโรคไตเรื้อรังระยะที่ 3 - 4 **วิธีการศึกษา:** การวิจัยหาความสัมพันธ์เชิงทำนาย (Predictive correlation research) มีกลุ่มตัวอย่างคือ ผู้ป่วยโรคไตเรื้อรังระยะที่ 3 - 4 ที่มารับบริการที่คลินิกโรคไตเรื้อรัง โรงพยาบาลคลองขลุง จังหวัดกำแพงเพชร จำนวน 240 ราย เครื่องมือวิจัยเป็นแบบสอบถามที่ตอบด้วยตนเอง วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน (Step-wise multiple regression analysis) **ผลการศึกษา:** กลุ่มตัวอย่างมีระดับความแตกฉานด้านสุขภาพขั้นพื้นฐาน การรับรู้สมรรถนะแห่งตน การได้รับแรงสนับสนุนทางสังคม และพฤติกรรมสุขภาพเพื่อชะลอไตเสื่อมโดยรวมอยู่ในระดับสูงมากที่สุด ผลการวิเคราะห์ถดถอยพหุคูณแบบขั้นตอน พบว่าการรับรู้สมรรถนะแห่งตน การได้รับแรงสนับสนุนทางสังคม รายได้เฉลี่ยต่อเดือน และความแตกฉานด้านสุขภาพขั้นพื้นฐานสามารถร่วมกันทำนายพฤติกรรมสุขภาพเพื่อชะลอไตเสื่อมได้ร้อยละ 27.00 (R^2 = 0.270) อย่างมีนัยสำคัญทางสถิติ (P-value < 0.001) โดยการรับรู้สมรรถนะแห่งตนสามารถทำนายพฤติกรรมสุขภาพเพื่อชะลอไตเสื่อมได้ดีที่สุด (β = 0.321, P-value < 0.001) รองลงมา ได้แก่ การได้รับแรงสนับสนุนทางสังคม (β = 0.177, P-value = 0.006) รายได้เฉลี่ยต่อเดือน (β = -0.158, P-value = 0.006) และความแตกฉานด้านสุขภาพขั้นพื้นฐาน (β = 0.143, P-value = 0.023) ตามลำดับ **สรุป:** การส่งเสริมพฤติกรรมสุขภาพเพื่อชะลอไตเสื่อมของผู้ป่วยโรคไตเรื้อรังระยะที่ 3 - 4 สามารถทำได้โดยเพิ่มการรับรู้สมรรถนะแห่งตนในผู้ป่วย ส่งเสริมให้ครอบครัวมีส่วนร่วมในการดูแลผู้ป่วย และสร้างความแตกฉานด้านสุขภาพในกลุ่มผู้ป่วยโรคไตเรื้อรังเพื่อให้มีการปรับเปลี่ยนพฤติกรรมสุขภาพอันจะนำไปสู่การชะลอไตเสื่อมต่อไป

คำสำคัญ: พฤติกรรมสุขภาพ, โรคไตเรื้อรัง, ความแตกฉานด้านสุขภาพ, สมรรถนะแห่งตน, แรงสนับสนุนทางสังคม

Abstract

Objective: To determine level of health behaviors for delaying chronic kidney disease (CKD), functional health literacy, self-efficacy perception and social support acquisition, and factors that influenced the health behaviors for delaying CKD progression in patients with CKD stage 3 and 4. **Method:** This predictive correlation research included a sample of 240 stage 3 and 4 CKD patients, who were treated at CKD Clinic, Khlongkhlung Hospital, Khampangphet province. The study instrument was self-administered questionnaire. The obtained data were analyzed by descriptive statistics and step-wise multiple regression analysis. **Results:** The study population possessed functional health literacy, self-efficacy perception, social support acquisition and health behaviors for delaying CKD progression at the highest level. Results from the step-wise multiple regression analysis revealed that factors of self-efficacy perception, social support acquisition, mean monthly income and functional health literacy together could predict 27.00% (R^2 = 0.270) of the health behaviors for delaying CKD progression with statistical significance (P-value < 0.001). The best factor that could predict health behaviors for delaying CKD progression was perceived self-efficacy (β = 0.321, P-value < 0.001), social support acquisition (β = 0.177, P-value = 0.006), mean monthly income (β = -0.158, P-value = 0.006) and functional health literacy (β = 0.143, P-value = 0.023). **Conclusion:** Public health professionals should promote the increase in the level of perceived self-efficacy and health literacy in CKD patients, as well as encourage families to be part of patient care, to better health behavior change for delaying CKD progression.

Keywords: health behavior, chronic kidney disease, health literacy, self-efficacy, social support

Introduction

Chronic kidney disease (CKD) has been a major health problem worldwide including Thailand with increasing rates of morbidity and mortality. In 2010, prevalence of CKD in Thailand was 17.50%.[1] In 2014, morbidity rate of CKD was 813.95 per 100,000 population which was the 4th morbidity of Thai population.[2] Such rate in 2014 was 1.27 times of that in 2011.[2] CKD could not be reversed but gradually progress to end stage renal disease (ESRD) which requires renal replacement therapy (RRT) by means of peritoneal dialysis (PD), hemodialysis (HD), or kidney transplantation (KT).[3] Since all three RRT modalities are costly, this CKD problem has posed a huge financial burden for Thailand. In 2016, the

National Health Security Office (NHSO) of Thailand provided a budget of 6,294 million Baht for RRT which was 1.22 times of that in 2014.[4,5]

CKD is comprised of 5 stages according to glomerular filtration rate (GFR) and the presence of albumin protein in the urine. Patients with early CKD stages (i.e., stage 1, 2 and 3) are usually asymptomatic or with some unobvious symptoms which could cause unawareness and delayed access to care. As a result, more patients with late and severe stages of CKD (i.e., stage 4 and 5) have been detected and more expensive and complicate RRT modalities have been required.[3]

The causes of CKD are multi-facet ranging from metabolic disorder-related such as diabetes mellitus (DM), hypertension, and hyperlipidemia, and drug-related such as non-steroidal anti-inflammatory drugs (NSAIDs).[6,7] Non-modifiable risk factors of CKD include genetic disorders[7], and increasing age.[8] In addition, external risk factors could be sedentary lifestyle (poor diet and lack of exercise), improper medication use, alcohol consumption, cigarette smoking, and stress.[9-14]

It has been shown that life-style modification programs to modify the modifiable factors are effective in slowing CKD progression from stage 3 and 4 to ESRD as seen in the research and development at Khlongkhlung Hospital, Khampangphet province.[15] As a consequence, the program of Khlongkhlung Hospital has been used as a model to make a current policy of the Ministry of Public Health.[16] In addition to the life-style modification program itself, certain factors could also influence the life-style changes which could further result in an effective delay of CKD progression.[17] The life-style changes could be affected by various factors including demographic characteristics, health literacy[18], self-efficacy perception[19,20], and social support acquisition.[21]

Even with a success in developing the life-style modification program to delay the CKD progression, we had not had examined certain health behavior factors potentially affecting the life-style changes among patients in Khlongkhlung Hospital. Therefore, this study aimed to determine (1) levels of **health behaviors** potentially benefiting the delay of CKD progression including diet, exercise, medication use, smoking, alcohol intake, and stress management in stage 3 and 4 CKD patients, (2) levels of **health-related psychological factors** including health literacy, perceived self-efficacy for health promoting behaviors, and acquired social support, and (3) associations of the overall all health behavior score as dependent variable with its potential predictors (i.e., independent variables) including health literacy, perceived self-efficacy, acquired social support, and demographic characteristics (gender, age, education level, monthly income, duration of CKD, and number of co-morbidity). We hypothesized that all predicting factors could either enforce beneficial health behavior or lessen harmful behaviors among stage 3 and 4 CKD patients.

Methods

In this predictive correlation research, predictive factors including health literacy, perceived self-efficacy, acquired social support, and demographic characteristics (gender, age, education level, family monthly income, duration of CKD, and number of co-morbidity) were tested for effects on the overall health behaviors with potential to delay stage 3 and 4 CKD progression to ESRD. These heath behaviors consisted of diet, exercise, medication use, smoking, alcohol intake, and stress management. Study population was patients with CDK stage 3 and 4 receiving care at the CKD clinic of Khlongkhlung Hospital, Khampangphet province, Thailand.

With a total of 1,400 target patients in 2016 and based on significance level of 0.05, a power of a test of 0.99 and an effect size of 0.15, a sample size of 218 patients was required. This sample size was estimated using G * Power analysis version 3.1.9.2.[22] To compensate for participants with incomplete data, a 10% of participants was added and a total of 240 participants were needed.

To be eligible, prospective participants had to be able to communicate in Thai, willing to participate, and having a GFR within a range of 15 - 59 ml/min/1.73 m[2]. Based on exclusion criteria, ESRD patients were excluded if they required RRT, had severe complications that caused dramatic symptomatic changes or hospitalization, or were unable to participate because of acute illness.

Since the higher the age, the higher the risk of CKD, participants were selected using the age-ranged stratified random sampling. The number of participants in each age group was proportional to the total number of patients in the respective groups. From the registry of the patients with stage 3 and 4 CKD, participants in each age group were selected using the systemic random sampling based on the calculated sampling interval. For a given age group, the sampling interval was estimated by dividing the total number of the patient (N)

by the desired number of the participants in the age group (n). Once the first participant was randomly selected, the other participants respective to the sampling interval were further determined. As a result, a total of 24, 82, 96 and 38 participants for the age groups of 35 – 59, 60 – 69, 70 – 79, and 80 years or older, respectively were obtained. Data collection was conducted in a duration of 3 months, from March 1 to May 31, 2017.

Instruments

The data collection questionnaire consisted of 5 parts. The first section collected demographic information including gender, age, marital status, education level, monthly income, duration of CKD and number of co-morbidity. The second part assessed the levels of health literacy which was modified from the functional health literacy in adults scale of Parker and colleagues.[23] The third part evaluated the perceived self-efficacy for health promoting behaviors which was modified from the work of Pbumankhean.[24] the fourth section examined the acquired social support which was modified from the work of Jitchan[25] which was developed based on the concept coiled by House and colleagues.[26] The last part of the questionnaire evaluated the health behaviors to delay CKD progression which was modified from the " Clinical practice recommendation for the evaluation and management of chronic kidney disease in adults 2015" of the Nephrology Society of Thailand.[3] The questions on health behaviors were comprised of diet, alcohol intake, exercise, medication use, and stress management.

All parts of the questionnaire were examined for content validity by three experts consisting of a head of the department non- communicable disease of Khampangphet provincial health administration office, a lecturer from the Faculty of Public Health, Naresuan University, and a registered nurse of CKD clinic from Khlongkhlung Hospital. Parts 2 to 5 the questionnaire had an acceptable content validity with the indexes of item-objective congruence (IOC) in a range of 0.67 - 1.00 against a criterion of 0.5.[27] The questionnaire also had an acceptable internal consistency reliability with a Kuder-Richardson coefficient (KR-20) of 0.836 for health literacy, and Cronbach's alpha coefficients of 0.823, 0.775 and 0.858 for perceived self- efficacy, acquired social support, and health behaviors to delay CKD progression, respectively. A level of 0.80 was used as a criterion for internal consistency reliability for parts 2 to 5 of the questionnaire.[27]

For **basic health literacy** questionnaire, it was defined as the understanding on health provided by healthcare providers verbally and/ or with learning materials such as leaflets on health promoting behaviors to delay CKD progression including diet, exercise, medication use, medication label reading, stress management, and medication adherence advice. Since it was knowledge evaluation oriented, the response of health literacy was in correct/incorrect format with 1 point for a correct answer and 0 point for an incorrect one. With a total of 15 points for 15 questions, the total score was categorized into insufficient, moderate and sufficient level of health literacy for 0 – 8, 9 – 11, and 12 – 15 points, respectively.

Perceived self-efficacy was defined as the CKD patients' perception on how confident in their capacity to perform health behaviors on self- care once having chronic illness. The questionnaire contained 9 questions with a 4-point Likert-type rating scale ranging from 1- not at all confident to 4- highly confident. With a possible total score of 36 points, three levels of self- efficacy were categorized, specifically low, moderate and high (9 – 17, 18 – 26 and 27 – 36 points, respectively).

The **acquired social support** was defined as assistance received and participation in problem- solving from others including emotional support, information support, evaluation support, and resource support. The questionnaire contained 10 questions with a 4- point Likert- type rating scale ranging from 1- not at all true to 4- highly true. With a possible total score of 40 points, three levels of acquired social support were categorized, namely low, moderate and high (10 – 19, 20 – 29 and 30 – 40 points, respectively).

For **health behaviors** to delay CKD progression, the concept was defined as behaviors CKD patients performed regularly for 5 to 6 days a week. The behaviors were referred to diet, exercise, medication use, smoking, alcohol intake and stress management. The questionnaire consisted of 24 questions with a 4- point Likert- type rating scale ranging from 1- not at all practicing to 4- regularly practicing where scores for negative questions were reversed. With a possible overall total score of 96 points, three levels of health behaviors were categorized, specifically low, moderate and high (24 – 47, 48 – 71 and 72 – 96 points, respectively).

The questionnaire was self-administered; however, it could read out and filled in by the researchers for participants who were reading and/ or writing illiterate or visually impaired. Based on the criterion- referenced method, scores of all

sections of the questionnaire, both predictive factors and behaviors, were classified into three levels as described above. The total score of each of all factors and behaviors was also calculated as the percentage to its possible total score.

Human right protection

The study was approved by the Ethic Committee for Human Study of Naresuan University (Approval No. : 725/2559; Approval date: November 2, 2016).

Statistical analysis

Descriptive statistics including mean with standard deviation and frequency with percentage were used to describe demographic characteristics, health literacy, perceived self-efficacy, acquired social support, and health behaviors to slow CKD progression. Step-wise multiple regression analysis was performed to determine relationships between the overall health behavior score as an dependent variable with predictive factors as independent variables. All assumptions of linear regression were tested and found acceptable. All statistical analyses were performed using SPSS Statistics for Windows (Version 17.0, Release 2008, SPSS Inc., Chicago). Statistical significance for all tests was set at a P-value of < 0.05.

Results

Of a total of 240 participants, about two-thirds were women (160 patients or 66.70%) (Table 1). Their age was 70.54 years by average with a minimum of 46 and a maximum of 93 years. The majority was married (140 patients or 58.30%) while only 1.70% were single. Once those divorced/widowed/separated (96 patients or 40.0%) were considered, 41.70% of the participants lived alone. The majority had elementary education (191 patients or 79.59%). Once 39 participants with no formal education were considered, 230 participants (95.83%) had an education lower than high school. This finding was critical for developing education program suitable for their education level to improve health literacy.

Table 1 Demographic characteristics of stage 3 and 4 CKD patients (N = 240).

Characteristics	N	%
Gender		
Male	80	33.30
Female	160	66.70
Age (yrs) (mean = 70.54 ± 9.19; min = 46; max = 93)		
35 – 59	24	10.00
60 – 69	82	34.20
70 – 79	96	40.00
☐ 80	38	15.80
Marital status		
Single	4	1.70
Married	140	58.30
Divorced/widowed/separated	96	40.00
Education		
None	39	16.25
Elementary	191	79.59
Junior high school	3	1.25
Senior high school	5	2.08
Bachelor's degree or higher	2	0.83
Occupation		
None	135	56.25
Government employee	1	0.42
Small business	10	4.17
Labor	21	8.75
Farmer	66	27.50
Housekeeper	4	1.66
Others	3	1.25
Monthly income (Baht) (mean = 2,772.08 ± 4,415.80; min = 0; max = 50,000)		
< 1,000	86	35.80
1,000 - 5,000	125	52.10
5,001 - 10,000	20	8.30
> 10,000	9	3.80
Duration of CKD (yrs) (mean = 2,49 ± 1.57; min = 1; max = 6)		
1	92	38.30
2	44	18.30
3	52	21.70
4	9	3.80
5	32	13.30
6	11	4.60
Number of co-morbid diseases (mean = 2.40 ± 0.858; min = 1; max = 5)		
1	38	15.83
2	88	36.67
3	97	40.42
4	15	6.25
5	2	0.83

More than half of the participants did not have job or were retired (135 patients or 56.25%); while 27.50% were farmers and 8.75% were labors. Most of the participants had no income since they were older than 60 years old and did not have job or were retired. The majority had a monthly income of 5000 Baht or less (87.92%). Their monthly income was 2,772 Baht by average.

A lightly higher than three-quarters of the participants had been with CKD for less than 3 years (188 patients or 78.33%) with 38.30% having CKD for less than 1 year. It was found that the longest duration of CKD was 6 years which was found in 4.60% of the patients. Since the CKD clinic of Khlongkhlung Hospital had been operated since 2010, the longest duration

of CKD patients registered with the clinic could be only 6 years. The majority of the participants had 3 co-morbid diseases (40.42%) since metabolic diseases such as diabetes, hypertension and hyperlipidemia could be the underlying disease of CKD. However, there were 15 (15.00%) and 2 (2.00%) participants with 4 and 5 co-morbid diseases, respectively (Table 1). Even though few participants with a high number of co-morbid illnesses, the care for this group of patients was not be ignored.

Health literacy, perceived self-efficacy, acquired social support, and health behaviors to delay CKD progression were in high levels with the overall total scores that were 86.20%, 86.19%, 86.73% and 90.80% of their possible scores, respectively (Table 2). For health behaviors to delay CKD progression, the behaviors of alcohol intake, medication use, smoking, exercise, stress management, and diet were in high levels with the overall total scores that were 98.58%, 98.35%, 94.25%, 89.38%, 85.19% and 84.67%, of their possible scores, respectively in a descending order.

Table 2 Health related psychological factors and health behaviors to delay CKD progression (N = 240).

Factors and health behaviors (possible scores)	Min - Max	Mean ± SD	% of possible total score	Level
1. Basic health literacy, basic (0 – 15 points)	5 - 15	12.93 ± 2.14	86.20	Sufficient
2. Perceived self-efficacy (9 - 36 points)	21 - 36	31.03 ± 3.86	86.19	High
3. Acquired social support (10 - 40 points)	20 - 40	34.69 ± 4.79	86.73	High
4. Health behaviors to delay CKD progression, overall (24 - 96 points)	69 - 96	87.17 ± 5.09	90.80	High
- diet (6 - 24 points)	13 - 24	20.32 ± 2.34	84.67	High
- alcohol intake (3 - 12 points)	7 - 12	11.83 ± 0.63	98.58	High
- smoking (2 - 8 points)	2 - 8	7.54 ± 0.89	94.25	High
- exercise (4 - 16 points)	8 - 16	14.30 ± 2.18	89.38	High
- medication use (5 - 20 points)	15 - 20	19.67 ± 0.66	98.35	High
- stress management (4 - 16 points)	8 - 16	13.62 ± 1.51	85.13	High

Based on the criterion-referenced method, majority of the participants had a sufficient health literacy (186 patients or 77.50%), high perceived self-efficacy (211 patients or 87.91%), and high acquired social support (214 patients or 89.20%) (Table 3). In addition, no participants had a low perceived self-efficacy or low acquired social support. In terms of health behaviors to delay CKD progression, 238 participants (99.20%) had a high level of the behaviors and no one had a low level of the behaviors.

Table 3 Frequency of participants in each level of health related psychological factors and health behaviors to delay CKD progression (N = 240).

Factors and health behaviors (possible scores)	N	%
Basic health literacy (15 points)		
Insufficient (0 – 8 points)	8	3.30
Moderate (9 - 11 points)	46	19.20
Sufficient (12 - 15 points)	186	77.50
Perceived self-efficacy (36 points)		
Low (9 - 17 points)	0	0.00
Moderate (18 - 26 points)	29	12.10
High (27 - 36 points)	211	87.90
Acquired social support (40 points)		
Low (10 - 19 points)	0	0.00
Moderate (20 - 29 points)	26	10.80
High (30 - 40 points)	214	89.20
Overall health behaviors (96 points)		
Low (24 - 47 points)	0	0.00
Moderate (48 - 71 points)	2	0.80
High (72 - 96 points)	238	99.20
Diet		
Low (6 - 11 points)	0	0.00
Moderate (12 - 17 points)	31	12.90
High (18 - 24 points)	209	87.10
Alcohol intake		
Low (3 - 5 points)	0	0.00
Moderate (6 - 8 points)	5	2.10
High (no intake) (9 - 12 points)	235	97.90
Smoking		
Low (2 - 3 points)	3	1.30
Moderate (4 - 5 points)	4	1.70
High (no smoking) (6 - 8 points)	233	97.08
Exercise		
Low (4 - 7 points)	0	0.00
Moderate (8 - 11 points)	22	9.20
High (12 - 16 points)	218	90.80
Medication use		
Low (5 - 9 points)	0	0.00
Moderate (10 - 14 points)	0	0.00
High (15 - 20 points)	240	100.00
Stress management		
Low (4 - 7 points)	0	0.00
Moderate (8 - 11 points)	0	0.00
High (12 - 16 points)	240	100.00

Based on the step-wise linear regression analysis, significant predictors of the health behaviors to delay CKD progression included perceived self-efficacy, acquired social support, monthly income, and health literacy with an ascending order of coefficients of prediction (R^2) of 0.212, 0.234, 0.253 and 0.270, respectively, once sequentially added into the regression (Table 4). This means that these four factors altogether could explained 27.00% of variance of the health behaviors (R^2 = 0.270) with statistical significance (*P*-value < 0.001).

Table 4 Association of health behavior scores with predictive factors (N = 240).

Predictive factors	R^2	R^2 Change	b	Beta	t	P-value
Perceived self-efficacy	0.212	0.212	0.416	0.321	4.652#	< 0.001
Acquired social support	0.234	0.023	0.185	0.177	2.785*	0.006
Monthly income	0.253	0.019	-0.000179	-0.158	-2.795*	0.006
Health literacy	0.270	0.016	0.334	0.143	2.285*	0.023

Regression model: constant (a) = 64.067, R^2 = 0.270, adjusted R^2 = 0.257, F = 21.607, P-value < 0.001.

* P-value < 0.05; # P-value < 0.001

Regarding the unstandardized regression coefficient (or b), a one-point increase in perceived self-efficacy, acquired social support, and health literacy would result in an increase of 0.416, 0.185, and 0.334 points, respectively, of the score of health behaviors to delay CKD progression (Table 4). In contrast, an increase of 1,000 Baht of monthly income would result in a decrease of 0.179 points of the score of the health behaviors. Based on the standardized coefficient (or Beta), the most predictive factor for the health behaviors to delay CKD progression was perceived self-efficacy (Beta = 0.321, P-value < 0.001), followed by acquired social support (Beta = 0.177, P-value = 0.006), monthly income (Beta = -0.158, P-value = 0.006), and health literacy (Beta = 0.143, P-value = 0.023), respectively. With all significant unstandardized regression coefficients (or b), a linear predictive equation for health behaviors to delay CKD progression among stage 3 and 4 CKD patients of Khlongkhlung Hospital, Khampangphet province could be as follows:

Health behaviors = 64.067 + 0.416(perceived self-efficacy) + 0.185*(acquired social support) - 0.000179*(monthly income) + 0.334*(health literacy).*

Discussions and Conclusion

This study demonstrated that perceived self-efficacy, acquired social support and health literacy positively influenced health behaviors to delay CKD progression among stage 3 and 4 CKD patients of Khlongkhlung Hospital, Khampangphet province. This finding was consistent with the study hypothesis and certain previous research including the works of Qobadi and colleagues in dialysis patients[18], Petprayoon and co-workers in type 2 diabetes patients[28], Hongkrajok et al in hypertension patients in primary care setting[29], and Ginggeaw and Prasertsri in patients with two or more chronic illnesses.[30] These studies found that patients with a sufficient health literacy could achieve understanding self-care and further better their self-care behaviors.[18,28-30]

This finding was also consistent with self-efficacy concept of Bandura[31] where perceived self-efficacy reflects the capacity of a person to manage and carry out the desirable health behaviors successfully. Our finding also agreed with the work of Bohanny and colleagues where type 2 diabetes patients with high perceived self-efficacy performed acceptable self-care behaviors.[32] Concept of social support of House and colleagues[26] was also proved in our study where interactions between patients and their significant others generated bond, care, trust and assistance which could enforce better health behaviors.

In terms of demographic characteristics, only monthly income was the only one significantly related with the health behaviors to delay CKD progression. This could be attributable to the fact that younger patients usually had jobs and worked to take care of their family. Such job burden could put detrimental effect on performing health behaviors including poor diet and exercise, work-related stress. Patients still working were more likely to expose to factors that accelerate the CKD progress such as smoking and alcohol intake than those retired or not having jobs. In addition, recently, like other parts of the world, patients still working were also more likely to develop metabolic diseases such as hypertension, diabetes and hyperlipidemia. Such incidences could lead to more access to care and awareness and chance of self-care.

The negative association of monthly income with health behaviors to slow CKD progression was consistent with the study of Unaphak and Rattanamanee where they found that a negative relationship between monthly income and self-care behaviors to prevent complications among CKD patients awaiting RRT.[19] However, it was inconsistent with the work of Arammuang and co-workers where monthly income positively affected the behaviors to limit water intake in ESRD patients undergoing hemodialysis.[20]

Our study also found that level of health literacy was sufficient, and levels of perceived self-efficacy, acquired social support and health behaviors including diet, alcohol intake, smoking, exercise, medication use, and stress management were high. The finding could reflect a relatively adequate experience about diabetes, hypertension, hyperlipidemia, and CKD, as well as life-style modification over at least one-year follow-up. This could be in part by the service of CKD clinic of Khlongkhlung Hospital to provide knowledge and a regular 2-month follow-up. The patients could be more knowledgeable and more likely to modify their life-style and health behaviors

in all aspects. As a result, they were able to answer the questionnaire more confidently and scores of all factors and behaviors were high.

The participants were abstinent from alcohol (97.90%) and smoking (97.08) since CKD patients who smoked and/or drank alcohol would be transferred to special clinics to quite smoking and alcohol. Participants had an acceptable medication use behavior since these patients needed medical treatments for their underlying illnesses including diabetes, hypertension, and hyperlipidemia. As expected, the use of NSAIDs was found in labors and farmers which represented in a small proportion compared to those who did not work.

Stress management was found relatively difficult to perform since as high as 41.67% of the participants were single, widowed, divorced or separated which would make it more difficult to find spouse or significant others to talk to. Even though it is the most crucial behavior to delay CKD progression[3], diet was the behavior with the lowest score found in our participants compared with other behaviors. This could be in part due to the fact that these participants were elderly needing family members to cook for them. Hence, the choices of diet could sometimes not be made resulting in a relatively low score of diet behavior compared to other behaviors. Health promoting team should encourage more involvement from the family members to improve the patient's diet behavior.

Patients in CKD clinic at Khlongkhlung Hospital had an opportunity to observe the success of other patients' life-style modification. They also had chances to attempt such behavior modification until the success. Hence, a high level of perceived self-efficacy. Healthcare service to delay stage 3 and 4 CKD progression has been a crucial policy of the Ministry of Public Health since 2016.[16] As a result, social support from via official training as well as from relatives, neighbors, and health volunteers was enforced and the score of social support was in a high level.

Our study had certain limitations. Since only stage 3 and 4 CKD patients at the Khlongkhlung Hospital were included in the study, one should be cautioned when applying the results to other settings. As a pioneer hospital for CKD care, Khlongkhlung Hospital has been supported for CKD service training not only from the Ministry of Public Health but also from private sectors. This added one more context difference compared with other settings. Another limitation was the cross-sectional nature of the study design. Since CKD is a slowly progressing disease, the disease progression hence takes a long time. Hence life-style modification and behavioral changes could take a long time too. The one-time cross-sectional study could capture and present only a brief fact of ever-changing behavioral changes. Longitudinal studies could capture a more thorough understanding of the behavioral changes in stage 3 and 4 CKD patients.

Another limitation was that GFR was not included to represent CKD progression outcome in addition to levels of health behaviors. We also examined health literacy at a basic level; therefore a more thorough investigation on the matter is needed. In addition, self-efficacy was determined only with the perception dimension. The aspect of outcome expectation of self-efficacy which is crucial for behavioral changes is needed to understand in future studies. Since some of the participants were reading/writing illiterate or visually impaired, they needed the researchers to read and fill the questionnaire for them. Since they were familiar with the researcher who had been working in the CKD clinic, biased responses regarding social desirability from these participants could be expected. The last limitation was that only stage 3 and 4 CKD patients were included in our study, generalization to a larger group of CKD patients, i.e., stage 1, 2 and 5, should be cautious.

The conduct of and findings from our study offered some recommendations. Healthcare providers in CKD clinic should encourage more build-up of self-efficacy, social support and participation among family and community, and health literacy to achieve better health behaviors to delay CKD progression. To achieve such outcome, better programs for behavioral changes to delay CKD progression and better program evaluations are needed. For future research, we recommended that other factors potentially affecting behaviors in stage 3 and 4 CKD patients should be further explored and examined. We also recommended the delay in GFR progression with respect to behavior changes as another crucial outcome. For self-efficacy, expectation on the outcome should be also studied in addition to the perception aspect of the concept. For health literacy, three levels including basic, interactive, and critical, not only in CKD patients, but also caregivers, and health volunteers, should be thoroughly examined. All parties play an indispensable role in behavioral changes to delay CKD progression at the family and community level.

In conclusion, patients with stage 3 and 4 CKD at Khlongkhlung Hospital, Khampangphet province had a high

level of health behaviors to delay CKD progression. Basic health literacy, perceived self-efficacy and acquired social support were all in high level. These three health factors and monthly income together significantly explained 27.00% of variance of health behaviors to delay CKD progression. Healthcare service program to delay CKD progression should encourage more perceived self-efficacy build-up, urge the family and community to participate more in healthcare, and boost health literacy to a more sophisticate level.

Acknowledgement

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