ปัจจัยที่สัมพันธ์กับความกลัวการหกล้มของผู้ป่วยสูงอายุไตวายเรื้อรังระยะสุดท้ายที่ฟอกเลือดด้วยเครื่องไตเทียม
Factors Related to Fear of Falling among the Elderly with End-stage Renal Disease Undergoing Hemodialysis

นิพนธ์ต้นฉบับ

Original Article

วรชาติ อุไกรหงษา[1], นัยนา พิพัฒน์วณิชชา[2]* และ พรชัย จุลเมตต์[2]

[1] นิสิตหลักสูตรพยาบาลศาสตรมหาบัณฑิต สาขาวิชาการพยาบาลผู้สูงอายุ
[2] สาขาวิชาการพยาบาลผู้สูงอายุ
[1,2] คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา อ.เมืองชลบุรี จ.ชลบุรี 20131

* Corresponding author: naiyana@buu.ac.th

วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ2565;17(3):278-286.

Worachat Ukraihongsa[1], Naiyana Piphatvanitcha[2]* and Pornchai Jullamate[2]

[1] Student in Master's of Nursing Science, Department of Gerontological Nursing
[2] Department of Gerontological Nursing
[1,2] Faculty of Nursing, Burapha University, Muang Chonburi, Chonburi, 20130, Thailand

* Corresponding author: naiyana@buu.ac.th

Thai Pharmaceutical and Health Science Journal 2022;17(3):278-286.

บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาทดสอบความสัมพันธ์ระหว่างการรับรู้ความสามารถของตน (หรือความมั่นใจที่จะทำกิจกรรมโดยไม่กลัวการหกล้ม ซึ่งเป็นส่วนกลับของความกลัวการหกล้ม) กับการรับรู้ภาวะสุขภาพ ความสามารถในการปฏิบัติกิจวัตรประจำวัน ความพร่องในการมองเห็น การควบคุมระดับครีเอตินีนในเลือดได้ การควบคุมระดับฮอร์โมนพาราไทยรอยด์ในเลือดได้ และภาวะความดันโลหิตต่ำขณะฟอกเลือด ในผู้สูงอายุโรคไตวายเรื้อรังระยะสุดท้ายที่รับการรักษาโดยการฟอกเลือดด้วยเครื่องไตเทียม **วิธีการศึกษา:** การศึกษาแบบเชิงความสัมพันธ์ มีกลุ่มตัวอย่างคือผู้สูงอายุโรคไตวายเรื้อรังระยะสุดท้ายที่รับการรักษาโดยการฟอกเลือดด้วยเครื่องไตเทียม ที่โรงพยาบาลศูนย์ในเขตภาคตะวันออก ที่ได้จากการสุ่มอย่างง่าย 115 คน ใช้แบบสัมภาษณ์ข้อมูลส่วนบุคคล แบบสัมภาษณ์การรับรู้ภาวะสุขภาพ แบบประเมินความสามารถในการปฏิบัติกิจวัตรประจำวัน แผ่นวัดสายตาระบบตัวเลขระยะใกล้ และแบบประเมินความกลัวการหกล้มฉบับภาษาไทย วิเคราะห์ความสัมพันธ์โดยใช้ค่าสัมประสิทธิ์สหสัมพันธ์สเปียร์แมน แรงค์ ออเดอร์ (r_s) และสัมประสิทธิ์สหสัมพันธ์พอยท์ไบซีเรียล (r_{pb}) ตามความเหมาะสม **ผลการศึกษา:** กลุ่มตัวอย่างมีความมั่นใจที่จะทำกิจกรรมร้อยละ76.53 พบว่าความมั่นใจสัมพันธ์ทางบวกกับความสามารถในการทำกิจวัตรประจำวัน การรับรู้ภาวะสุขภาพ และการควบคุมระดับครีอะตินินในเลือดได้ที่ระดับปานกลาง (r_{pb} = 0.489, r_s = 0.321, และ r_{pb} = 0.308 ตามลำดับ, *P*-value < 0.001 ทั้งหมด) กับการควบคุมระดับพาราไทรอยด์ในเลือดได้ที่ระดับต่ำ (r_{pb} = 0.178, *P*-value = 0.030) และสัมพันธ์ทางลบกับความพร่องในการมองเห็นที่ระดับต่ำ (r_{pb} = -0.261, *P*-value = 0.002) **สรุป:** ในผู้สูงอายุโรคไตวายเรื้อรังระยะสุดท้ายที่รับการรักษาโดยการฟอกเลือดด้วยเครื่องไตเทียม ความมั่นใจที่จะทำกิจกรรมสัมพันธ์ทางบวกกับความสามารถในการทำกิจวัตรประจำวัน การรับรู้ภาวะสุขภาพ การควบคุมระดับครีอะตินินและระดับฮอร์โมนพาราไทยรอยด์ในเลือด และสัมพันธ์ทางลบกับความพร่องในการมองเห็น

คำสำคัญ: ปัจจัย, ความกลัวการหกล้ม, ความมั่นใจที่จะทำกิจกรรมโดยไม่กลัวการหกล้ม, การรับรู้ความสามารถแห่งตน, ผู้สูงอายุ, โรคไตวายเรื้อรังระยะสุดท้าย, การฟอกเลือดด้วยเครื่องไตเทียม

Abstract

Objective: To examine correlations between self-efficacy or confidence in performing activities without fear of falling with perceived health status, performance level in activities of daily living, poor visual acuity, having serum creatinine and parathyroid hormone under control, and hypotension while on hemodialysis in elderly patients with end-stage renal disease (ESRD) undergoing hemodialysis (HD). **Method:** In this correlational study, 115 ESRD elderly patients undergoing HD at tertiary hospitals in the eastern region of Thailand were selected by simple random sampling. Data were collected using demographic questionnaire, perceived health status interview form, Barthel ADL index, timed up & go test, Near Snellen chart and the Thai Modified Fall Efficacy Scale. Correlations were tested using Spearman rank order and point biserial correlation coefficients. **Results:** The majority of participants had confidence to perform activities without fear of falling (76.53%). The confidence was significantly, positively correlated with performance level, perceive health status, and having creatinine under control at a moderate level (r_{pb} = 0.489, r_s = 0.321, and r_{pb} = 0.308, respectively, *P*-value < 0.001 for all) and having parathyroid hormone under control at a low level (r_{pb} = 0.178, *P*-value = 0.030). The confidence was significantly, negatively correlated with poor visual acuity at a low level (r_{pb} = -0.261, *P*-value = 0.002). **Conclusion:** In ESRD elderly patients undergoing HD, their confidence in performing activities without fear of falling was positively correlated with performance level, perceive health status, and having creatinine and parathyroid hormone under control, and negatively correlated with having poor visual acuity.

Keywords: factors, fear of falling, confidence in performing activities without fear of falling, self-efficacy, older adults, end-stage renal disease, hemodialysis

Editorial note
Manuscript received in original form: April 26, 2021;
Revised: February 19, 2022;
Accepted in final form: March 4, 2022;
Published online: September 30, 2022.

Journal website: http://ejournals.swu.ac.th/index.php/pharm/index

Introduction

Thailand has entered the aging society for quite sometimes. In 2021, 18% or about 12 millions of Thais were those who are 60 years old or older.[1] With an increasing number of the elderly, health risks and problems have been increasing accordingly especially chronic diseases. Changes in the elderly could be in physical, psychological, social and

spiritual aspects. Aging is a complicate process which differs among individuals. One of the diseases of aging body among the elderly is chronic kidney disease.

Chronic kidney disease (CKD) is a major health burden worldwide with increasing incidence, worse treatment outcomes, and skyrocketing cost of treatment. CKD is the 12nd leading cause of death and 17th cause of disability.[2] In Thailand, the annual number of CKD cases has been increasing continuously. In 2018, with a total of 8 millions of CKD cases, more than 100,000 of them were with end-stage renal disease or ESRD. Once reaching ESRD, the patients need renal replacement therapy with the three options of hemodialysis (HD), continuous ambulatory peritoneal dialysis (CAPD) and renal transplantation. Upward trends of ESRD incident cases were found with 35,944 and 117,377 cases in 2013 and 2014, respectively.[3]

In addition to chronic illnesses such as CKD, one of the prevalent health problems in the elderly is falling. Those 60 years old or older experienced falling at least once a year. With the prevalence of falling of 20.00 – 50.00%, the incidence of falling was 30.00 – 60.00% among community-dwelling elderly 60 years old or older.[4] In addition to physical, social, and economic burdens, falling also causes psychological burden. The elderly with falling lose their confidence in walking, self-isolate from society, and become depressed. In addition, about 30 – 73% of the elderly with falling experience have so much fear of repeated falling that they lose the ability to self-care, need more helps from others, and lose their quality of life.[5]

Long-standing fear of falling limit activities of daily living of the elderly both basic and advanced activities. After falling, some elderly need to move to live in nursing homes or assisted living facilities.[6] A 12-year prospective cohort study revealed that the elderly with a history of falling with or without injury had lower well-being when compared with those without history of falling.[7] However, a study indicated that the elderly without a history of falling showed the fear of falling.[8]

In ESRD patients undergoing HD, fear-driven limited activities could detrimentally affect various systems of the body from the immobilization syndrome. With the long-standing immobilization syndrome, circulatory system and cardiovascular system risk the venous thrombosis and clotting. In ESRD, there are more resorption of calcium from the bone to the blood circulation, higher chance of venous circulation congestion, and heart overload with more venous return according to long reclining position. For respiratory system, there are more limited expansion of the lung and mucus congestion. In digestive system, ESRD patients face more frequent constipation, restricted intestinal movement, loss of appetite, and malnutrition. In HD process, the patients experience hypotension with symptoms of lightheadedness, dizziness, weak, fainting, and loss of consciousness. The symptoms could lead the elderly with ESRD to falling more frequently than the elderly with other illnesses. In addition, the accumulation of waste products and/or electrolyte imbalance especially calcium or phosphorous could cause more porous bone and bone fracture which could further lead to more chance of falling among ESRD patients. These could cause more fear of falling among the elderly with ESRD than the elderly with other illnesses.

Based on the International Classification of Functioning Disability and Health (ICF) of the World Health Organization (WHO)[9], fear of falling among the community-dwelling elderly could be influenced by various factors[10] including body function and structure, personal factors and participations in activities as an environmental factor. This present study aimed to use these factors to explain fear of falling among the elderly with ESRD undergoing HD.

At present, the understanding about fear of falling among the elderly with ESRD undergoing HD has been unclear. From clinical practice, we have found that the elderly with ESRD undergoing HD tried to avoid activities that they actually could do or were able to do before, for example, weighing, and standing up from wheelchair or bed. They usually asked for help from healthcare providers or caregivers. From our random interviews, these patients were feared of falling especially after HD session, so they avoided most activities or choirs. The patients with the help of caregivers performed most activities on the bed.

At present, the only study about the fear among the Thai elderly is the one in community-dwelling elderly in Kanchanaburi province.[11] The study found that factors potentially influencing fear of falling may include perceived health status, blood levels of parathyroid hormone and creatinine, hypotension while on HD, visual acuity, and ability to perform daily activities.[11] Based on the International Classification of Functioning Disability and Health (ICF) of the World Health Organization (WHO)[9], related studies[10,11], and our clinical practice experience, this present study proposed the conceptual frame work of factors potentially influencing

fear of falling among the elderly with ESRD undergoing HD as follows. For the factor of body function and structure, visual acuity was considered the potential factor. For personal factors, the potential ones included perceived health status, blood levels of parathyroid hormone and creatinine, and hypotension while on HD. Lastly for the environmental factor, the ability to carry out daily activities was considered the potential factor. These individual factors were hypothesized to independently affect the fear of falling.

Specifically, this study aimed to determine the proportion of the elderly with ESRD undergoing HD who had the fear of falling, and to examine the associations between fear of falling and its influencing factors including visual acuity, perceived health status, blood levels of parathyroid hormone and creatinine, hypotension while on HD, and ability to carry out daily activities.

It was hypothesized that visual acuity, perceived health status, and performance level to carry out daily activities were positively associated with self-efficacy of carrying out activities without fear of falling; while parathyroid hormone level, creatinine level and hypotension while on HD were negatively associated with self-efficacy in performing activities without fear of falling. The findings from the study could be useful as basic information for planning nursing care for the elderly with ESRD undergoing HD to promote their confidence in carrying out activities which could lessen dependence on others, prevent complications, and improve their quality of life.

Methods

In this correlational study, study population was the elderly of 60 years old or older diagnosed with ESRD and had been undergoing 2 – 3 4-hour HD sessions weekly in medical centers in the eastern region of Thailand. The sample size was estimated using G*power 3.1.9.2.[12] With pre-specified bivariate normal model, one-tailed test, an effect size of 0.23[11], a confidence level of 0.05, and a power of test of 0.80, a sample size of 115 participants was required. The participants were selected using the simple random sampling from 3 of 5 medical centers. The size of sample from each of the 3 medical centers were proportional to the actual number of the study population in each center. As a result, 60 participants of 86 patients at Rayong Hospital, 47 participants of 66 patients at Prapokklao Chanthaburi Hospital, and 8 participants of 11 patients at Chao Phraya Abhaibhubate Hospital in Prachinburi province were selected.

To be eligible, the patients had to be able communicate in Thai language, and adequately perceive time, place and person as indicated by a score of 15 points by the Chula Mental Test (CMT) for the elderly with dementia.[13] They also were able to stand up and walk independently. They had to have stable signs and symptoms with no worsening diseases both acute and chronic ones. Lastly, they were willing to participate in the study.

Research instruments

The instrument to screen for eligibility was the Chula Mental Test (CMT) for the elderly with dementia.[13] CMT was used to evaluate mental status of the potential participants. CMT has 13 questions including questions about thought, perception of time, place and person, and decision making. With its total score of 0 to 19 points, a score of 15 or higher is considered adequate. CMT was tested in 212 elders in Bangkok Metropolitan Area. It was found to have a test-retest kappa coefficient of 0.65, and an acceptable internal consistency reliability with a Cronbach's alpha coefficient of 0.81.

In this study, having hypotension while on HD or intradialytic hypotension (IDH) was defined as the drop of systolic blood pressure of at least 20 mmHg after HD compared with before HD with at least one of these symptoms: dizziness, yawning, nausea, vomiting, palpitation, shortness of breath, light pulse, sweating, cold sweat, sprain, hot flush, seizure or loss of consciousness.[14] Data of blood pressure one year before the data extraction date were used for judging the history of intradialytic hypotension.

For serum creatinine level, normal level or level under control was defined as lower than 6 mg/dL for patients undergoing HD. The latest data of creatinine level were used to judge the control of waste product.[15] For serum parathyroid hormone level, normal level or level under control was defined as lower than 300 pg/ml for patients undergoing HD. The latest data of parathyroid hormone level were used to judge the control of parathyroid hormone.[16]

Instruments for the evaluation of study variables

The questionnaire consisted of 5 sections. The first section asked about demographic and clinical characteristics of the participants. These included age, gender, weight, height,

religion, marital status, education level, occupation, income, payment schemes, serum creatinine level, serum parathyroid hormone level, and blood pressure while on HD.

The second section asked about **perceived health status**. The question was based on the work of Mossey and Shapiro[17] which were translated into Thai language by Yamchanchai.[18] The Thai version was further tested for test-retest reliability with a one-week interval and was found to have a high reliability with a Spearman rank-order correlation coefficient of 0.94.[19] This one question had a 4-point rating scale ranging from 1-poor, 2-fair, 3-good and 4-excellent health.

The third section, not a questionnaire, evaluated **visual acuity** using the Near Snellen chart. This chart has a 95% sensitivity and a 98% specificity.[20] In interpreting visual acuity, normal acuity is defined as being able to read at least 4 numbers on 7^{th} line correctly. This is interpreted as visual acuity (VA) = 6/6. For the elderly who read fewer than 4 numbers on the 7^{th} line correctly or who cannot reach the 7^{th} line, they are considered to have a defective visual acuity.

The fourth section evaluated the **performance level of activities of daily living** of the elderly using the Modified Barthel Activities Daily Living Index (BAI).[11] BAI asks how much the elderly feel they are dependent on others for each of the 10 activities of daily living such as feeding, toileting, bathing, dressing and undressing (i.e., grooming), sitting on the bed or standing up from the chair (transferring), and ascending and descending stairs. Response scales for each of all activities were somewhat different. For example, there were 0 - 1 for grooming, 0 - 2 for feeding, and 0 - 3 for transferring. With the total score of 0 – 20 points, dependence is categorized as totally, mostly, partially, and slightly dependent (0 – 4, 5 - 8, 9 – 11, and 12 or higher, respectively).

The last section assessed the **fear of falling** using the Thai Modified Falls Efficacy Scale (TMFES). TMFES assessed confidence in doing various activities without the fear of falling in the elderly. This means that higher scores indicate more confidence, or less fear, to do activities without falling. This Thai version[21] of TMFES was translated from the Modified Falls Efficacy (MFES)[22] which was modified from the Falls Efficacy Scale (FES).[24] TMFES has a comparability of language of 1.79 and similarity of interpretability of 1.63.[21] TMFES evaluates confidence of the elderly in doing activities inside and outside of household with 14 items such as bathing, dressing, preparing meal, using public transportation, and crossing the road. The response for each activity was a 10-point visual analog scale. With the total score of 10 points, the elderly could be classified as having fear of falling when doing activities (or having not much confidence) if they have a total score of 0.00 to 8.00 points, and not having fear (or having adequate confidence) for the scores of 8.01 or higher.

Instrument quality assurance

Reliability of the following instruments were tested in 30 individuals comparable to the participants. Perceived health status was tested with test-retest reliability with a 2-day interval and perfect reliability was found (Spearman's correlation coefficient of 1.0). Visual acuity was tested using inter-rater reliability. With the two raters employed, a high reliability was found with a Kappa's coefficient of 0.93. Finally, TMFES was found to have a high internal consistency reliability (Cronbach's alpha coefficient of 0.967).

Participant protection and data collection procedure

This study was approved by the Ethics Committee for Human Study of Burapha University (approval number: G-HS 075/2563), by the Ethics Committees for Human Study of Prapokklao Chanthaburi Hospital (approval number: 014/64), Rayong Hospital (approval number: RYH 003/2564), and Chao Phraya Abhaibhubate Hospital (approval number: IRB-BHUBEJHR-175). Once approved, the researcher approached the potential participants to introduce and provide details about the study objectives, process, benefits, and voluntary nature of the study. Once written informed consent was obtained, the participant was instructed to answer the questionnaire which took about 45 minutes to complete. The survey was conducted from March to April, 2021.

Data analysis

Descriptive statistics including mean with standard deviation (S.D.) and frequency with percentage were used to describe demographic and clinical characteristics and study variables of the participants. To test the correlation between self-efficacy or confidence of doing activities without fear of falling and each factor (perceived health status, having serum parathyroid hormone level under control, having serum creatinine level under control, having hypotension while on HD, visual acuity, and performance level of activities of daily living), point-biserial correlation (r_{pb}) and Spearman's rank

order correlation (r_s) analyses were used as appropriate. Statistical significance was set at a type I error of 5%. Normality of the data was tested using Kolmogorov Smirnov Test or Fisher's skewness coefficient. Levels of correlation were classified as high, moderate, low, and no correlation based the absolute value of correlation coefficient (r) of > 0.70, 0.30 – 0.70, < 0.30 and 0.00, respectively.[23]

Results

Of the 115 participants, about half of them were in their 60 – 69 years of age (51.30%). Their average age was 70.63 years. The majority were men (53.9%), married (69.60%), with primary school education (73.90%), with no job or retired (83.50%), Buddhist (100%), living with their spouse (69.60%), with a monthly income of 1,001 – 2,500 Baht (45.20%), and with universal coverage payment scheme (46.10%). In terms of their health, the majority did not fall in the last year (63.50%); for those who had experienced falling, the majority had one falling (23.50%). The majority were had fair perceived health status (52.20%), abnormal visual acuity (58.30%), and low dependence on others for activities on daily living (100.00%) (Table 1).

In terms of fear of falling, the majority had no fear (76.53%) (Table 1). For each activity that could make the elderly feel feared of falling, the most fearful activity, or the activity with the least confidence, was crossing the road (mean = 7.20 points), followed by climbing stairs (mean = 7.23 points) and using public transportation (mean = 7.31 points) (Table 2). On the other hand, activities with the most confidence were dressing and undressing (9.83 points), followed by sitting on and standing up off the chair (mean = 9.58 points).

In terms of correlations, having no fear of falling was significantly, positively, moderately correlated with performance level in activities of daily living, perceived health status and having serum creatinine level under control (r_{pb} = 0.489, r_s = 0.321, and r_{pb} = 0.308, respectively, *P*-value < 0.001 for all) (Table 3). Poor visual acuity was significantly, negatively correlated with confidence in doing activities without fear of falling at a low level (r_{pb} = -0.261, *P*-value = 0.002). Having serum parathyroid hormone level under control was significantly, positively correlated with confidence in doing activities without fear of falling at a low level (r_{pb} = 0.178, *P*-value = 0.030). Finally, having hypotension while on HD was positively correlated with having confidence in doing activities without fear of falling, but with no statistical significance.

Table 1 Demographic and clinical characteristics (N = 115).

Characteristics	N	%
Age (years), mean = 70.63 ± 8.15		
60 – 69	59	51.30
70 – 79	38	33.04
80 or older	18	15.66
Gender		
Men	62	53.90
Women	53	46.10
Marital status		
Single	5	4.30
Married	80	69.60
Widowed/divorced/separated	30	26.10
Religion		
Buddhism	100	100
Education level		
No formal education	4	3.48
Primary school	85	73.91
Junior high school	8	6.96
Senior high school	8	6.96
Bachelor's degree	7	6.09
Higher than Bachelor's degree	3	2.60
Occupation		
No occupation or retired	96	83.50
Farmer	10	8.70
Small business	6	5.20
Labor	1	0.90
Others	2	1.70
Monthly income (Baht)		
≤ 1,000	33	28.70
1,001 - 2,500	52	45.21
2,501 - 5,000	21	18.26
5,001 - 10,000	8	6.96
> 10,000	1	0.87
Healthcare payment scheme		
Civil servant payment scheme	39	33.91
Universal coverage scheme	53	46.09
Social security scheme	4	3.48
Out-of-pocket/others	19	16.52
History of falling		
Never	73	63.50
Once	27	23.50
More than once	15	13.00
Serum parathyroid hormone level		
Normal (under control)	80	69.60
Abnormal	35	30.40
Serum creatinine level		
Low waste (under control)	22	19.10
High waste	93	80.90
Hypotension while on HD		
Yes	27	23.48
Never	88	76.52
Perceived health status		
Poor	12	10.43
Fair	60	52.18
Good	41	35.65
Excellent	2	1.74
Visual acuity		
Normal	48	41.74
Abnormal	67	58.26
Activities of daily living		
Low dependence	115	100.00
Fear of falling		
Yes (low confidence/efficacy to do activities)	27	23.47
No (high confidence/efficacy to do activities)	88	76.53

Table 2 Scores of falls efficacy scale (N = 115).

Activities	Mean*	S.D.
1. Dressing and undressing (grooming)	9.83	0.86
2. Preparing easy meal	9.40	1.92
3. Bathing/showering	9.63	1.56
4. Sitting on and standing up off the chair	9.58	1.52
5. Getting on and off the bed	9.50	1.68
6. Getting up to open the door or to answer the phone	9.47	1.73
7. Walking around the house	9.30	1.78
8. Reaching things in the cabinet	9.40	1.72
9. Light house cleaning	9.03	2.07
10 Handling light groceries	8.61	2.53
11. Using public transportation	7.31	3.51
12. Crossing the road	7.20	3.58
13. Light gardening or drying cloths	7.83	2.88
14. Climbing stairs	7.23	3.50

* Possible mean of 10 points with lower scores indicating more fear of falling, or less confidence/efficacy in performing activities without fear of falling.

Table 3 Correlation between not having fear of falling (or having confidence in doing activities without the fear of falling) and various factors ((N = 115).

Variables	Correlation coefficient	*P*-value	Level of correlation
Performance level in activities of daily living	0.489†	< 0.001	Moderate
Perceived health status	0.321*	< 0.001	Moderate
Serum creatinine level (normal)	0.308†	< 0.001	Moderate
Visual acuity (poor)	-0.261†	0.002	Low
Serum parathyroid hormone level (normal)	0.178†	0.030	Low
Hypotension while on HD	0.080†	0.362	Low

* Spearman's rank order correlation coefficient.

† r_{pb} = point biserial correlation coefficient.

Discussions and Conclusion

In this correlational study, almost one-quarter of the elderly with ESRD undergoing HD at medical centers in the eastern region of Thailand were found to fear of falling (23.47%). The activities of daily living that they had the most fear of falling or the least confidence were crossing the road, followed by climbing stairs, and using public transportation. This is because these activities need a lot of strength to do and. In addition, since these activities are not performed frequently by the elderly to be able to safely perform them. The elderly could get frustrated or not confident in performing them.

The elders with ESRD undergoing HD are highly, physically vulnerable with the imbalances in various systems caused by the kidney disease itself. The hemodialysis could also put more detrimental effects on the body especially cardiovascular system. This physical damage in turn causes the elderly to perceive less in their ability to perform daily activities. These elders therefore need a closer attention and encouragement from healthcare providers and family members to prevent fall which could make them bed-ridden or highly dependent on others prematurely or unnecessarily.

It was found that performance level in activities of daily living, perceived health status and serum creatinine level were significantly, positively correlated with having no fear of falling with a moderate level. It could be explained that all participants needed a low level of help from or dependence on others (100.00%). These participants were ambulatory and were able to perform most of the daily tasks. These participants were in their 60 – 69 years of age (51.30%), with an average age of 70.63 years. Therefore, they were more likely to be able to perform the activities of daily living. The positive correlation of = 0.489 means that the elderly with more performance level of activities of daily living were more likely to have no fear of falling when doing activities less like *P*-value < 0.001). This could be confirmed as the following. The elderly who are less dependent on others could carry out most of their activities of daily living which in turn could foster their self-efficacy level in performing these activities with no fear of falling. On the other hand, the elderly with immense dependence on others could perform fewer activities of daily living, which could in turn lead them to a low level of self-efficacy in performing these activities without fear of falling.

The positive association between self-efficacy of performing activities without fear of falling and performance level on activities of daily living was found as hypothesized. According to the ICF[10], performance level on activities is a factor that could affect the fear of falling among the elderly with limited range of activities of daily living such as having meals, dressing, and showering/bathing. Such fear of falling leads to more dependence on others.[9] Among the elderly with ESRD undergoing HD, the elderly need gait strength and coordination in standing, walking, and balancing. While on HD, adverse effects and complications could happen including body imbalance, depletion of reserved energy and strength, reduced ability in performing activities with no help, and longer bed-ridden status. These events could further deteriorate physical functions and more limited physical functions.[24] In addition to this psychological factor of self-efficacy of performing activities, physical deteriorations among the elderly such as muscle weakness, reduced muscle flexibility, and reduced co-ordinations of muscles and joints[25] could alarm the elderly for their lowered performance level, and diminish their confidence in or heighten their fear of performing the activities.[26] The elderly with ESRD undergoing HD thus

respond to the fear of falling by limiting their activities.[27] This finding is also consistent with the fear of falling among the elderly who were hospitalized and had their performance level on activities of daily living to be negatively associated with the fear of falling.[28,29]

For perceived health status, the majority of participants (52.20%) had a fair health status. Perceived health status was positively correlated with confidence in performing activities with no fear of falling at a moderate level (r_s = 0.321, *P*-value < 0.001). The elderly who perceived their health at a higher level were more likely to perceive higher self-efficacy to perform activities without the fear of falling. Based on the ICF[10], perceived health status as a personal factor could affect the fear of falling. As the illness name indicates relatively the end stage of life, patients with ESRD undergoing HD have the most severe illness which could alarm the patients of having the worst health. Such perception could limit confidence in performing activities by constant rest, restricted activities merely in bed, and limited mobility. Studies in the elderly receiving regular care at a community hospital[28] and a tertiary hospital[29] in Thailand revealed that the elderly with poor perceived health status reported a low confidence of doing activities without fear of falling, i.e., they were feared of falling than those with good perceived health status significantly.

Regarding serum creatinine level, about two-thirds of the elderly had their creatinine under control (67.83%). Having serum creatinine level under control was positively correlated with the confidence to do activities without fear of falling at a moderate level (r_{pb} = 0.308, *P*-value < 0.001). The elderly who could take care of themselves to be able to control their metabolic waste could be those who were confident enough to do activities without fear of falling. Serum creatinine level is an indicator of good metabolic control and self-care especially on the diet control. ESRD patients undergoing HD should limit their protein intake of 0.6 – 0.8 grams per kg per day. The accumulated serum creatinine as a waste could lead to uremia which is presented with headache, dizziness, nausea and vomiting.[30] The symptoms of urea could heighten the fear of falling among the elderly patients. Such association in this present study was found to be in accordance with the hypothesis. Based on the ICF[10], having serum creatinine level, as a personal factor, under control was associated with more confidence in doing activities without fear of falling. With symptoms of uremia associated with high level of metabolic waste such as headache, dizziness, nausea and vomiting, mobility and balance were impaired. As a result, the patients with high level of serum creatinine would perceive less confidence in their ability to do activities without the fear of falling.

Slightly more than half of the elderly participants had poor visual acuity (58.30%) and the poor visual acuity was significantly, negatively associated with the confidence in doing activities without fear of falling at a low level (r_{pb} = -0.261, *P*-value = 0.002). As hypothesized, patients with poor visual acuity would have a low confidence in performing activities without fear of falling. Based on the ICF[10], visual acuity is a crucial physical function and structure which could affect the fear of falling. Poor visual acuity could result from biologically physical decline and illnesses such as diabetes, and eye and visual diseases. In addition, while on HD, blood pressure could drop, especially a drop in intraocular pressure could also cause blurred vision and poor visual acuity. Such poor visual acuity in these elderly patients could further weaken confidence in carrying out activities without fear. As confidence is lessened, more fear of falling is heightened and activities are more limited. Studies of the elderly patients hospitalized in a tertiary hospital[26] and of elderly patients with diabetes[31] showed that the elderly patients with poor visual acuity had a low confidence to perform activities without fear of falling.

For parathyroid hormone, having serum parathyroid hormone under control was significantly, positively associated with the confidence in carrying out activities without fear of falling at a low level (r_{pb} = .178, *P*-value = 0.03). The elderly patients who had their parathyroid hormone under control were more likely to perceive more ability to perform activities as hypothesized. Based on the ICF[10], ESRD patients lose their control on calcium and phosphorous balance resulting a high level of serum parathyroid hormone. With overt symptoms of hyperparathyroidism including dry skin, brittle bone, bone fracture, porous teeth, muscle weakness, and muscle atrophy, the patients could lose their confidence in doing activities and face more fear of falling.

Lastly, it was found that having hypotension while on HD was not significantly associated with confidence in carrying out activities without fear of falling (r_{pb}= 0.080, *P*-value = 0.36). In this study, most patients had no hypotension while on HD (76.50%). Our finding suggests that patients had confidence of doing activities or fear of falling regardless of having hypotension while on HD or not. In a 4-hour HD session, as

excessive water is eliminated from the body, patients respond to such change differently. Certain patients have a rapid blood pressure drop; while others do not. With hypotension, symptoms ranging from dizziness, palpitation, cold sweat, fainting and loss of consciousness. These symptoms prompt urgent medical attentions such as decrease in or discontinuation of water elimination while HD progression. The patients on HD are in a reclining position to lower the head so more blood circulation to the brain.[29] At the end of HD session, patients experiencing hypotension and fluid imbalance would feel unsafe to stand up or to perform activities because of fear of fainting. They avoid activities and prolong staying in the bed, which could in turn lead to more fear of falling. Our finding suggests that ESRD patients undergoing HD who never had hypotension could also have fear of falling. In HD, the elimination of waste products from the blood could cause an overt difference in blood concentrations between cerebrospinal fluid and the brain which could cause imbalance, headache, and dizziness.[27] With the existing physical deteriorations, these elderly patients could face more intense circulatory imbalance than those younger. Regardless of the experience of hypotension while on HD, these elderly ESRD patients undergoing HD could face fear of falling.

Our study had certain limitations. Since participants in our study were in their early elderly age, i.e., 60 – 69 years, they had adequate physical strength to perform activities of daily living. Therefore, to represent a wider range of the elderly was limited. More studies recruiting more participants of mid- to late-elderly age should be conducted.

In conclusion, most ESRD elderly patients undergoing HD had confidence in performing activities of daily living without fear of falling (76.53%). Such confidence in carrying out activities was significantly, positively correlated with perceived health status, performance level in activities of daily living, and having serum creatinine and parathyroid hormone levels under control, and significantly, negatively correlated with having poor visual acuity. In daily practice, ESRD elderly patients undergoing HD should be encouraged to lessen their fear of falling and fostering the confidence in carrying out activities of daily living by health promotion program on diet control and screening for visual acuity.

Acknowledgement

The authors would like to show our great gratitude to Professor Dr. Edwin Rosenberg of the Department of Sociology, Appalachian State University, NC, USA, for the Rosenberg Gerontological Nursing Scholarship for the support on this study.

References

1. National Statistical Office. Demographic and household statistics. 2021. (Accessed on Jan. 15, 2021, at http://statbbi.nso.go.th/staticreport/ page/sector/th/01.aspx) (in Thai)
2. Pitugtan S. Nursing care end stage renal disease of anesthesia for kidney transplantation: cases series. *Reg 11 Med J* 2019;33(3):589-600. (in Thai)
3. Strategy and Planning Division, Ministry of Public Health. Data of kidney disease service plan. 2015. (Accessed on Jan. 10, 2021, at http://bps.ops.moph.go.th) (in Thai)
4. Phongphanngam S, Nawai A. Falls, fear of falling, and activity avoidance due to fear of falling among Thai community-dwelling older adults living in suburban Chiang Mai Thailand. *J Health Nurs Res* 2020;36(1):22-28. (in Thai)
5. Cumming RG, Salkeld G, Thomas M, Szonyi G. Prospective study of the impact of fear of falling on activities of daily living, SF-36 scores, and nursing home admission. *J Gerontol A Biol Sci Med Sci* 2000;55:299-305.
6. Daniels R. Nursing fundamentals: Caring & clinical decision making, 2nd ed. New York. Delmar Cengage Learning, 2008.
7. Peeters GM, Jones M, Byles J, Dobson AJ. Long-term consequences of noninjurious and injurious falls on well-being in older women. *J Gerontol A Biol Sci Med Sci* 2015;70(12):1519-1525.
8. Lavedan A, Viladrosa M. Fear of falling in community-dwelling older adults: a cause of falls, a consequence, or both? *PLoS One* 2018;13(3):e0194967. (doi: 10.1371/journal.pone.019496)
9. World Health Organization. International classification of functioning, disability and health: ICF. Geneva. World Health Organization, 2001.
10. Pohl P, Ahlgren C, Nordin E, Lundquist A, Lundin-Olsson L. Gender perspective on fear of falling using the classification of functioning as the model. *Disabil Rehab* 2015;37(3):214-222.
11. Wongpanitkul K. Factors related to fear of falling among community-dwelling older adults in Kanchanaburi province. Master of Nursing Science thesis. Chonburi. Burapha University, 2012. (in Thai)
12. Faul F, Erdfelder E, Lang A, Buchner A. G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods* 2007;9(2):175-191.
13. Jitapunkul S, Kamolratanakul S, Chandraprasert S, Bunnag S. Disability among Thai elderly living in klong Toey slum. *J Med Assoc Thai* 1994;77(5):231-238.
14. The Kidney Society of Thailand. Recommendations for the care of patients with chronic kidney disease. Bangkok. The Kidney Society of Thailand, 2012. (in Thai)
15. Kantachuvesiri S. Patient with chronic kidney diseases. Faculty of Medicine, Ramathibodi Hospital. (Accessed on Jan. 15, 2019, at https://www.rama.mahidol.ac.th/med/sites/default/files/public/pdf/medicinebook1/Patient%20with%20chronic%20kidney%20disease.pdf?fbclid=IwAR0L

_wjEHaDcIUJAMcbZcgn4dfo7QNpJAMUbNFKZ6syq_2itt5D0yCmZD0M) (in Thai)
16. Barreto FC, Barreto DV, Moysés RMA, et al. K/DOQI-recommended intact PTH levels do not prevent low-turnover bone disease in hemodialysis patients. *Kidney Int* 2008;73(6):771-777.
17. Mossey JM, Shapiro E. Self-rated health: A predictor of mortality among the elderly. *Am J Pub Health* 1982;72(8):800-808.
18. Yamchanchai W. Relationship between perceived self-efficacy, perceived health status and health promoting behavior among the older adults. Master's of Nursing Science thesis. Bangkok. Graduate School, Mahidol University, 1995. (in Thai)
19. Muthuramalingam N, Swaminathan M, Jaggernath J, Surendran TS. Screening efficacy of a simplified log MAR chart. *Afr Vision Eye Health* 2016;75(1):a323.
20. Mettapracharak Hospital. Manual for ophthalmologic examination. Nakhonpathom. Petkasem Printing Group, 2015. (in Thai)
21. Sperber AD. Translation and validation of study instruments for cross-culture cultural research. *Gastroenterology* 2004;26:S124-S128.
22. Hill KD, Schwarz JA, Kalogeropoulos AJ, Gibson SJ. Fear of falling revisited. *Arch Phys Med Rehab* 1996;77:1025-1029.
23. Srisatidnarakul B. Research methodology in nursing, 3rd ed. Bangkok. You and I Intermedia, 2004. (in Thai)
24. Tinetti ME, Richman D, Powell L. Falls efficacy as a measure of fear of falling. *J Gerontol* 1990;45(6):239-243.
25. Arunsaeng P. Health status assessment in adult and gerontology nursing, 3rd ed. Bangkok. Klannanavithaya Printing, 2012. (in Thai)
26. Bandura A. Self-efficacy: The exercise of control, 4th ed. New York. W. H. Freeman, 1997.
27. Boltz M, Resnick B, Capezuti E, Shuluk J. Activity restriction vs. self-direction: Hospitalised older adults' response to fear of falling. *Inter J Older People Nurs* 2012;9(1):44-45.
28. Prommapong N, Piphatvanitch N, Jullamate P. Factors related to fear of falling among older adult patients. RTUNC The 3rd National Conference, May 28, 2018. Ubonratchathani. Ubonratchathani University, 2018. (in Thai)
29. Treekham K, Piphatvanitch N, Jullamate P. Factors related to fear of falls in older adult patients admitted to the inpatient department in the hospital. National Conference, April 29, 2019. Pathumthani. Rangsit University, 2019. (in Thai)
30. Satirapoj B. Complications in hemodialysis: New frontiers in dialysis. Bangkok. Text and Journal Publication, 2008. (in Thai)
31. Piphatvanitch T, Piphatvanitch N, Jullamate P. Relationships of walking, balancing, peripheral neuropathy and fall history with fear of falling among older patients with diabetes. National Conference, 2018. Phayao. University of Phayao, 2018. (in Thai)
32. Mongkolsittikul W. The nursing care of chronic renal failure patients after hemodialysis: case study. *Mahasarakham Hosp J* 2018;15(2):164-172. (in Thai)