

Factors Influencing Self-management in End-stage Renal Disease (ESRD) Patients Undergoing Hemodialysis in Bhutan

นิพนธ์ต้นฉบับ

Original Article

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บทคัดย่อ

Abstract

วัตถุประสงค์: เพื่อศึกษาการจัดการตนเองและศึกษาอำนาจการทำนายของ การรับรู้สมรรถนะของตนเอง การสนับสนุนทางสังคม และการรอบรู้ด้านสุขภาพต่อการจัดการตนเองของผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ล้างไตในประเทศไทย วิจัย การศึกษา: กลุ่มตัวอย่าง คือ ผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ล้างไตจำนวน 81 ราย ที่มารับบริการ ณ โรงพยาบาลแห่งชาติดิโกมี ดอจี วังชุก ประเทศภูฏาน เก็บข้อมูล จากกลุ่มตัวอย่างตามสะดวกในเดือนมีนาคม 2561 โดยใช้ชุดแบบสอบถามและแบบบันทึกข้อมูลทางการแพทย์ ซึ่งประกอบด้วยแบบสอบถามข้อมูลส่วนบุคคล แบบวัดการออกกำลังกายนานาชาติ (แบบสั้น) แบบวัดการล้างไตต่อเนื่อง แบบวัด การรับรู้สมรรถนะของตนเองในการจัดการโรคเรื้อรัง 6 ข้อ แบบวัดการรับรู้การ สนับสนุนทางสังคม แบบวัดการรอบรู้ทางด้านสุขภาพและแบบประเมินภาวะ หลงลืม วิเคราะห์ข้อมูลโดยสถิติพรรณนา สถิติไคยร์สกีและการวิเคราะห์ถดถอย พหุคูณ ผลการศึกษา: ผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ล้างไตมีการจัดการตนเองอยู่ ในระดับปานกลาง (2.17 ± 0.61) ปัจจัยที่สัมพันธ์กับการจัดการตนเองของผู้ป่วย ไตเรื้อรังระยะสุดท้ายที่ล้างไต ได้แก่ การรับรู้สมรรถนะของตนเอง ($r = 0.496, P\text{-value} < 0.01$) และการสนับสนุนทางสังคม ($r = 0.447, P\text{-value} < 0.01$) แต่ไม่ สัมพันธ์กับการรอบรู้ด้านสุขภาพ ($r = 0.116, P\text{-value} = 0.301$) ผลการวิเคราะห์ ถดถอยพหุคูณ พบว่าปัจจัยที่สามารถทำนายการจัดการตนเองของผู้ป่วยไตเรื้อรัง ระยะสุดท้ายที่ล้างไต ได้แก่ การรับรู้สมรรถนะของ ($\beta = 0.37, P\text{-value} < 0.001$) และการสนับสนุนทางสังคม ($\beta = 0.30, P\text{-value} < 0.05$) โดยร่วมกันทำนายความ แปรปรวนของการจัดการได้ร้อยละ 32 ($R^2 = 0.320, P\text{-value} < 0.001$) สรุป: การรับรู้สมรรถนะของตนเอง และการสนับสนุนทางสังคม เป็นปัจจัยสำคัญที่ทำนาย การจัดการตนเองของผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ล้างไต ดังนั้นบุคลากรด้าน สุขภาพจึงควรนำการรับรู้สมรรถนะของตนเองและการสนับสนุนทางสังคม ไปร่วม การพัฒนาโปรแกรมเพื่อส่งเสริมการจัดการตนเองของผู้ป่วยไตเรื้อรังระยะสุดท้ายที่ ล้างไตในประเทศไทยต่อไปในอนาคต

คำสำคัญ: ผู้ป่วยไตเรื้อรังระยะสุดท้าย, ล้างไต, การจัดการตนเอง, ปัจจัยทำนาย, การรับรู้สมรรถนะของตนเอง, การสนับสนุนทางสังคม, การรอบรู้ด้านสุขภาพ

Objective: To determine self-management and examine its predictive relationships with self-efficacy, social support, and health literacy in Bhutanese end-stage renal disease (ESRD) patients undergoing hemodialysis. **Methods:** A sample of 81 ESRD people undergoing hemodialysis at the dialysis center of Jigme Dorji Wangchuk National Referral Hospital (JDWNRH) of Bhutan was recruited with the convenience sampling technique. Data were collected in March 2018 using a package of questionnaires and medical reviews sheet. The package of questionnaires consisted of demographic data, the International Physical Activity Questionnaire Short-Form, ESRD Adherence questionnaire, Self-efficacy for Managing Chronic Disease 6-Item Scale, Multidimensional Scale of Perceived Social Support, Brief Health Literacy Screen, and Saint Louis University Mental Status (SLUMS) examination questionnaire. Descriptive statistics, Pearson's product moment correlations, and standard multiple regressions were used to analyze data. **Results:** Self-management of ESRD people undergoing hemodialysis in Bhutan was at a moderate level (2.17 ± 0.61). Self-management was significantly positively associated with self-efficacy ($r = 0.496, P\text{-value} < 0.01$) and social support ($r = 0.447, P\text{-value} < 0.01$), but not with health literacy ($r = 0.116, P\text{-value} = 0.301$). Regression analysis revealed that self-management was predicted by self-efficacy ($\beta = 0.37, P\text{-value} < 0.001$) and social support ($\beta = 0.30, P\text{-value} < 0.05$). The total variance of self-management explained was 32% ($R^2 = 0.320, P\text{-value} < 0.001$). **Conclusion:** Self-efficacy and social support played an important role in self-management of ESRD patients undergoing hemodialysis. The findings of the study could be used to develop future self-management interventions for ESRD patients undergoing hemodialysis in Bhutan.

Keywords: end-stage renal disease, ESRD, hemodialysis, self-management, predicting factors, self-efficacy, social support, health literacy

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Introduction

End-Stage Renal Disease (ESRD) is the last stage of chronic kidney disease (CKD) which is irreversible and permanent. ESRD has become a public health challenge worldwide due to increasing prevalence and burden on health sectors.¹ An estimate of more than 1.4 million ESRD patients receive renal replacement therapy (RRT) with an annual

growth rate of 8% globally.² It was reported that the number of ESRD requiring hemodialysis cases increased dramatically in developing countries. It was found that 80% of financial burden was due to the treatment of ESRD in low to middle-income countries.⁴ According to Bhutan, the prevalence was reported from 8 cases in 1998 to more than 140 cases in

2015.^{2,3} Data of the Dialysis Unit of Jigme Dorji Wangchuk National Referral Hospital (JDWRH) projected 610 ESRD patients requiring RRT from 1998 to 2015.⁵ Evidence showed prevalence of ESRD across the country; 35% in southern, 35% in eastern, 23% in western, and 7% in central region of Bhutan.⁵

Incorporating self-management in taking care of ESRD patients helps reduce financial burden, minimize negative disease effects, and delay disease progression.⁶ Self-management focuses on 1) medical and/ or behavioral management, 2) role management, and 3) emotional management⁹ for the daily control or reduction of disease impacts.^{7,8} Medical or behavioral management has been considered as an important task for ESRD patients. This is because it focuses on physical activity, hemodialysis adherence, fluid restriction, diet restriction, and medication adherence. Evidences have indicated that self-management of ESRD patients on hemodialysis has been low since ESRD is a long-term illness that needs the patients to permanently take care of their conditions.^{10,11} As a result, low level of self-management in ESRD patients could lead to an increased risk of co-morbidity, complications, and premature death.^{11,12} An adequate self-management helps maintain serum creatinine level and glomerular filtration rate (GFR), and improve individual physiological functioning, wellbeing, and quality of life.^{12,13} The level of self-management of ESRD patients varies in all aspects including physical activity, medication adherence, diet restriction, fluid restriction and hemodialysis attendance.¹¹⁻¹⁵ It also changes over time and varies according to individual experience and culture.⁸

Previous studies have found that ESRD patients had poor self-management in all aspects. The exercise capacity and performance was also poor.^{13,16,17} It was also found that estimated glomerular filtration rate (eGFR) was highly increased in inactive patients as compared to those active counterparts.¹³ Furthermore, non-adherence to fluid restrictions and diet restrictions along with intradialytic weight gains were found in previous studies.^{18,19} Rambod and colleagues found 30 to 70% of dialysis patients were not concerned about fluid restrictions and 10 to 60% had inappropriate interdialytic weight gain.²⁰ Furthermore, hemodialysis patients reported difficulty controlling foods high in phosphorus, such as chocolate, cola drinks, meat, fish, eggs, and milk and other dairy products. They also reported poor self-management about medication adherence because

of high pill burden of the prescribed medications.^{20,21} Rifkin and colleagues found that complex medication regimens with 5 to 14 prescribed medications led to a low medication adherence.²² They usually developed multiple comorbid conditions which further resulted in skipping medications they considered less important.²² ESRD patients were more likely adhere to hemodialysis as they feel more important than other treatment modalities.²³ This was because they knew that skipping at least 1 dialysis session per month was associated with 25 to 30% of increased risk for death and shortening dialysis three times or more a month was associated with an increased mortality.²⁴ With the crucial impact of the self-management skills, certain factors that could influence the skills are worth understanding especially those modifiable factors.

From literature review, important factors influencing self-management include self-efficacy, social support, and health literacy.^{6,11,26-31} Self-efficacy is positively associated with various self-management activities¹⁰ and contributes in initiating and adhering to self-management behavior.⁶ Individuals require self-confidence to achieve a task successfully. Self-efficacy is a cognitive phenomenon based on self-confidence of an individual which aids in developing new pattern of cognitive and emotional behavior and enables oneself to monitor the developed self-management behavior.²⁵ Incorporating self-efficacy in self-management shows significant improvement in self-management.²⁴ Curtin and co-workers found that self-efficacy was positively associated with self-management.¹¹ Higher self-efficacy is positively associated with improved control of intradialytic weight gain, better fluid restrictions, better diet restrictions, and better adherence to hemodialysis. Furthermore, adequate physical activity decreases hospitalization and complications, and improves quality of life of ESRD patients.^{12-15, 22, 25, 26}

Social support was found significantly associated and had great impact on self-management of patients on hemodialysis.²⁷ Previous studies found that social support improved compliance of treatment regimens and ESRD health outcomes. Family members, friends, and health care team were the main source of social support for ESRD patients. Cohen and colleagues found that patients with a lower level of social support had 4.5 times of noncompliance to treatment than those with greater levels of social support.²⁸ Patients with high support for self-management had a higher GFR than those without social support.

Previous studies reported that 9 to 32% of people on hemodialysis were limited on health literacy and had a significantly low level of self-management.²⁹ Studies found that a higher level of health literacy was associated with better self-management.³⁰ People who advance in health literacy would make better decisions and self-management from better obtaining and processing health information; while low health literacy in people leads to difficulty in understanding health information, making decisions, and practicing self-management. The study by Ibelo found that health literacy improved self-management in ESRD patients.³¹

In Bhutan, there has been limited information on self-management of ESRD patients undergoing hemodialysis. However, a survey of general population revealed that Bhutanese had a low level of physical activity, consumed high-salt diet, and had an increased incidence of hypertension and diabetes mellitus which could lead to chronic kidney disease.³² It was reported that Bhutanese people consume about 9 grams of salt per day in their daily meals which exceeds WHO's recommendation of a daily intake of less than 5 grams per day.³² Since there has been a lack of evidence about self-management of ESRD patients and the trend of ESRD patients in Bhutan, this study aimed to explore self-management level and examine the predictive factors of self-management of Bhutanese ESRD patients undergoing hemodialysis. The hypothesis was that self-efficacy, social support, and health literacy would predict self-management of Bhutanese ESRD patients undergoing hemodialysis.

Methods

This study applied a predictive correlational design and was carried out at the dialysis center of Jigme Dorji Wangchuk National Referral Hospital (JDWNRH), Bhutan from March through April 2018.

The target population for the study was Bhutanese ESRD patients undergoing hemodialysis at the dialysis center of JDWNRH, recruited by using the convenience sampling technique. The study sample consisted of 81 participants who fulfilled following inclusion criteria: 1) age of 20 years or older, 2) being diagnosed with ESRD, 3) currently receiving hemodialysis for at least one month, 4) having a normal to mildly impaired cognitive function, 5) not having dementia as screened by the Saint Louis University Mental Status Examination (SLUMS questionnaire), and 6) having no

physical limitations. Sample size for this study was estimated by using G* Power based on an effect size (f^2) of 0.10, an alpha (α) level of 0.05, and a power of 0.80. The total number was 81 participants.

Research Instruments

Data were collected using a package of questionnaires and a screening test for dementia. Following are the details of questionnaires.

The Demographic Data Questionnaire (DDQ) developed by researcher was used to collect participant's demographic data and medical records. DDQ consisted of two sections. Section I collected the general patient characteristics such as age, gender, marital status, education level, occupation, monthly family income, living situation. Section II collected health information such as duration of diagnosis, frequency of hemodialysis per week, duration of hemodialysis (hours and minutes), comorbid condition(s), laboratory records for the latest serum creatinine level in mg/dl, and estimated GFR (eGFR) in ml/ min/ 1.7 m² (by Cockcroft and Gault equation).

Questionnaires for measuring self- management consisted of the International Physical Activity Questionnaire Short Form (IPAQ-SF) to measure physical activity and the End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ) to measure adherence to medication, hemodialysis, fluid restriction, and diet restriction. Each item was rated on a scale of 1 to 5. The higher summed scores, the higher self-management. The mean score was categorized and interpreted as 1 - 1.7 points for low, 1.8 - 3.3 points for moderate, and 3.4 - 5 points for high level of self-management.

The International Physical Activity Questionnaire Short Form (IPAQ- SF) was used to measure physical activity.³³ The IPAQ-SF consists of 7 questions which collects information about three specific types of physical activities as well as sedentary behavior in the last 7 days. Three types of physical activities include time spent in vigorous intensity activity (P1 - P2), moderate intensity activity (P3 - P4), and time spent walking (P5 - P6). The researchers modified the scoring by using only days of physical activity per week (P1, P3 and P5). Based on the number of days of physical activity per week, the modified physical activity score was achieved by a categorization as follows: ≤ 1.9 days/week was scored

as 1, 2 to 2.9 days/week as 2, 3 to 3.9 days/week as 3, 4 to 4.9 days/week as 4, and ≥ 5 days/week as 5 points. The internal consistency based on a test-retest reliability was high with an interclass correlation coefficient of 0.93.

The End- Stage Renal Disease Adherence Questionnaire (ESRD-AQ) was used to measure treatment adherence in ESRD patients.³⁵ It measured adherence to hemodialysis attendance, medication, fluid restrictions, and diet restrictions in the ESRD patients undergoing hemodialysis. However, only directly related questions were scored and thirteen items were chosen to be scored. There were three questions for each of the domains including hemodialysis attendance (11, 13, 14), medication (22, 25, 26), and diet restriction (35, 44, 46), and four questions for fluid restriction (31, 32, 35, 37). The response was on a 5-point rating scale (1 to 5). The total score of each domain was summed, and an average of adherence was obtained. Higher scores indicated better adherence. The internal consistency using a test-retest reliability high with an interclass correlation coefficient of 0.99.

The Self-Efficacy for Managing Chronic Disease 6 Item Scale (SEMCD-6)³⁶ was used to measure the self-efficacy of the participants in the study. It is a 6-item scale which assesses the confidence of the patient in performing various activities of daily living and preventing complications. On a scale of 1 to 10, patients chose the score that best described their confidence level in performing their daily activities, where 1 meant "not at all confident" and 10 "totally confident." The summed score ranged from 6 - 60, where scores of 6 - 24 points were interpreted as low, 25 - 43 points as moderate, and 44 - 60 points as high self-efficacy. The internal consistency reliability was high with a Cronbach's alpha coefficient of 0.92.

The Multidimensional Scale of Perceived Social Support (MSPSS)³⁷ was used to measure perception of support by individuals from mainly 3 sources namely family, friends, and significant others. The scale comprises of 12 items with a 7-point Likert-type response format ranging from 1 (very strongly disagree) to 7 (very strongly agree) with the lowest possible score of 12 and the highest possible score of 84. A score of 12 - 35 points indicated a low, 37 - 60 points a moderate, and 61 - 84 points a high level of perceived social support. The internal consistency reliability was acceptable with a Cronbach's alpha coefficient of 0.78.

The BRIEF Health Literacy Screen (BHLS) was used to measure health literacy.³⁸ It consists of four questions about reading ability and understanding capacity of the participants with a five-point Likert-type response ranging from 1 (always), 2 (often), 3 (sometimes), 4 (occasionally), and 5 (never). A score of 4 - 9 points indicated a low, 10 - 15 points a moderate, and 16 - 20 points a high level of health literacy. The internal consistency reliability was acceptable with a Cronbach's alpha coefficient of 0.71.

The Saint Louis University Mental Status (SLUMS) examination questionnaire³⁹ was used to rule out dementia. SLUMS is an 11-item questionnaire with scores ranging from 0 to 30. It is designed to identify individuals with mild or early dementia by measuring orientation, memory, attention, and executive functions. In patients with high school education, a score of 1 - 19 points is considered as dementia, 20 - 27 points as mild cognitive impairment, and 27 - 30 points as normal cognitive function; while in patients with less than high school education, a score of 1 - 14 points is considered dementia, 14 - 19 points as mild cognitive impairment, and 20 - 30 points as normal cognitive function. SLUMS was evaluated and found comparable to the Mini-Mental State Examination (MMSE).³⁹

Data collection procedure

The study approval was granted by the Institutional Review Board for Graduate Studies, Faculty of Nursing, Burapha University, Thailand (IRB Approval Number 12-01-2561). Furthermore, it was also reviewed and approved by the Research Ethics Board of Health, Bhutan (REBH/Approval/2018/005). Permission for data collection was sought from the medical superintendent of the hospital (JDWNRH) and the chief nurses of the hospital dialysis center. Patients who met the inclusion criteria and were willing to participate in the study were recruited on a voluntary basis. Participants were informed about the study objectives and data collection procedure. Informed consent was obtained prior to data collection. The data were collected from 8:30 am till 5:30 pm every day, till a total of 81 participants were obtained.

Data Analysis

Descriptive statistics were used to describe demographic characteristics including mean with standard deviation (mean \pm standard deviation) and frequency with percentage. Data were tested for normality and assumptions of multiple

regression. Pearson's product correlation analysis was performed to examine the relation of self-management with self-efficacy, social support, and health literacy. Standard multiple regression analysis was performed to predict factors influencing self-management. A statistical significance of alpha level of 0.05 was set. Data were analyzed using SPSS statistical software.

Results

Of 81 participants, there were slightly more women (48 patients or 59.3%) than men (33 patients, or 40.7%). Their age was in a range of 20 - 77 years with a mean of 47.96 ± 15.03 years. Majority of the participants were young adults (38.3%) and middle-aged adults (34.6%) (Table 1).

Table 1 Demographic characteristics of participants (N = 81).

Characteristics	Number	%
Gender		
Male	33	40.7
Female	48	59.3
Age (yrs) (mean = 47.96 ± 15.03 ; Min = 20, Max = 77)		
20 - 39	31	38.2
40 - 59	28	34.6
≥ 60	22	27.2
Marital status		
Single	8	9.9
Married	66	81.5
Divorced	4	4.9
Widowed	3	3.7
Occupation		
Unemployed	69	85.2
Government employee	9	11.1
Private sector employee	2	2.5
Business owner	1	1.2
Education		
Non/Informal education	51	63.0
Primary	14	17.3
Higher secondary	13	16.1
College or above	3	3.6
Monthly family income (Ngultrum, where Nu.68.3 = \$1 US) (mean = 15553.09 ± 14942.04 ; Min = 2000, Max = 120000)		
< Nu. 5000	22	27.2
Nu. 5000 - 10000	16	19.8
Nu. 10001 - 20000	18	22.2
> Nu. 20000	25	30.8
Living situation		
Lives with family	62	76.54
Lives alone	19	23.46
Cognitive function (points*)		
Normal cognitive function (27 - 30 for \geq high school; 20 - 30 for < high school)	55	67.9
Mild cognitive impairment (20 - 26 for \geq high school; 14 - 19 for < high school)	26	32.1

* Scores of the Saint Louis University Mental Status (SLUMS) examination questionnaire.

About 68% of the participants were found to have a normal cognitive function; while the rest (32%) had a mildly impaired cognition but not dementia. Most of them were married (81.5%) and lived with family members (61.7%). Almost two-thirds of the participants had education less than primary level (63%) and as high as 85.2% were unemployed. The average monthly family income was Nu. $15,553.09 \pm 14942.04$, approximately US\$228.31.

Health status of the participants

The duration of being on hemodialysis ranged from 1-240 months (\bar{X} = 38.95, SD = 47.44). Almost 67% had hemodialysis 2 times per week (\bar{X} = 1.72, SD = 0.5) with having time duration of 4 hours per hemodialysis session (77.8%) and 75.3% of the sample has associated comorbid conditions in which hypertension and diabetes mellitus. The average serum creatinine was 9.2 mg/dl with a range of 2.4 to 21.3 mg/dl (SD = 3.63). The mean of estimated glomerular filtration rate (eGFR) by Cockcroft Gault formula was 8.35 ml/min per 1.73 m^2 (SD = 4.09) with 93.8% having $eGFR \leq 15 \text{ ml/min per } 1.73 \text{ m}^2$.

Table 2 Health status of participants (N = 81).

Health status	Number	%
Duration of Diagnosis (months) (mean = 38.95 ± 47.44 ; Min = 1, Max = 240)		
< 1 yr (12 months)	30	37.0
1 - 5 yrs (12 - 60 months)	36	44.5
6 - 10 yrs (72 - 120 months)	9	11.1
> 10 yrs (>120 months)	6	7.4
Frequency of dialysis (times per week) (mean = 1.72 ± 0.5 ; Min = 1, Max = 3)		
1	25	30.8
2	54	66.7
3	2	2.5
Duration of hemodialysis session (hours) (mean = 3.80 ± 0.37 ; Min = 3, Max = 4)		
3	13	16.0
3.5	5	6.2
4	63	77.8
Comorbid conditions		
Without comorbid conditions	20	24.7
With comorbid conditions	61	75.3
Hypertension	44	54.3
Diabetes mellitus	5	6.2
Diabetes mellitus + Hypertension	10	12.3
Other	2	2.5
Serum creatinine level (mg/dL) (mean = 9.20 ± 3.63 ; Min = 2.40, Max = 21.30)		
eGFR (Cockcroft and Gault's, in ml/min/ 1.73 m^2) (mean = 8.35 ± 4.09 ; Min = 3.00, Max = 27.00)		
≤ 15	76	93.8
> 15	5	6.2

In these 81 ESRD participants undergoing hemodialysis, their overall self-management was in moderate level of which all four adherence aspects were in a moderate level and physical activity aspect in a low level (Table 3). Among potential influencing factors, self-efficacy and social support were in a moderate level while health literacy was in a low level.

Table 3 Scores of self-management and potential predicting factors (N = 81).

Factors	Possible score	Actual score		Level Interpretation
		mean	SD	
Self-management	1 – 5	2.17	0.61	Moderate
Physical activity	1 – 5	1.64	1.17	Low
Medication adherence	1 – 5	2.39	0.26	Moderate
Fluid restriction adherence	1 – 5	2.16	0.58	Moderate
Diet restriction adherence	1 – 5	2.77	0.43	Moderate
Hemodialysis adherence	1 – 5	2.96	0.19	Moderate
Self-efficacy	6 - 60	30.00	13.48	Moderate
Social support	12 - 84	56.02	16.95	Moderate
Health literacy	4 – 20	9.28	4.12	Low

It was found that self-management was significantly positively correlated with social support and self-efficacy ($r = 0.447$ and 0.496 , respectively, P -value < 0.01 for both); while that with health literature was found but with no statistical significance ($r = 0.116$, P -value = 0.301) (Table 4).

Table 4 Correlations between self-management and potential predicting factors (N = 81) as Pearson's Product Moment Correlation coefficients (r).

	Health literacy	Social support	Self-efficacy
Health literacy	-		
Social support	-0.006	-	
Self-efficacy	0.229*	0.403 [#]	-
Self-management	0.116	0.447 [#]	0.496 [#]

* P -value < 0.05

[#] P -value < 0.01 .

Even though health literacy was not significantly correlated with self-management, it was also included in the multiple regression analysis. The three predicting factors together significantly correlated with self-management ($R^2 = 0.32$, $F_{3,77} = 12.08$, P -value < 0.001) (Table 5). Self-management was significantly predicted by self-efficacy ($\beta = 0.37$, P -value = 0.001) and social support ($\beta = 0.30$, P -value = 0.005) but not by health literacy ($\beta = 0.03$, P -value = 0.729). Self-efficacy, social support, and health literacy together explained 32% of the variance of self-management

among ESRD patients undergoing hemodialysis ($R^2 = 0.32$).

The predictive equation could be shown as follows:

$$Z_{\text{Self-management}} = 0.37(Z_{\text{Self-efficacy}}) + 0.30(Z_{\text{Social support}}) + 0.03(Z_{\text{Health literacy}})$$

Table 5 Relationships between self-management and potential predicting factors by multiple regression analysis (N = 81).

Predicting factors	B	SE	β	t	P-value
Self-efficacy	0.18	0.05	0.37	3.46	0.001
Social support	0.12	0.04	0.30	2.90	0.005
Health literacy	0.05	0.15	0.03	0.35	0.729

$R^2 = 0.32$, $F_{3,77} = 12.08$, P -value < 0.001 .

Discussions and Conclusion

The findings of the study revealed that self-management of ESRD patients undergoing hemodialysis in Bhutan was moderate (2.17 ± 0.61 points). For each of the self-management, the results showed a moderate level of medication adherence (2.39 ± 0.26 points), fluid restriction (2.16 ± 0.58 points), diet restriction (2.77 ± 0.43 points), and hemodialysis adherence (2.96 ± 0.19 points), and a low level of physical activity (1.64 ± 1.17 days of physical activity/week). The findings of this study were consistent to that of previous studies.^{12,24} The possible reasons for moderate level of self-management in this sample could be due to more female participants in the sample. Especially in Bhutan, this may be due to the fact that the traditional role of women in Bhutan is the primary caregiver of the household. This role may leave them too busy and preoccupied resulting in forgetting to take their medicines. Previous studies suggested that relative to men, women were less adherent to medication.⁴⁰

Low level of physical activity could possibly be due to fatigue which acted as a barrier to physical activity in dialysis patients.⁴¹ Participants were skeptical about damaging their arteriovenous fistula due to fluctuation in blood pressure when they performed physical activity. This could be another contributing factor towards a low level of physical activity. High level of serum creatinine also reflected a moderate self-management in the aspect of diet restrictions. Our study revealed that 100% of participants had an extremely high serum creatinine level (9.20 ± 3.63 mg/dL). Non-adherence to diet restriction could be due to the dietary culture which includes mainly rice, cheese, and meat with salt used as

seasoning followed by butter used in cooking. A survey on general Bhutanese population revealed that 66% of the participants consumed very less amount of fruits and vegetables.³²

Majority of the participants in this study had no informal education, were unemployed, and had low family incomes. These could be reasons for a moderate self-management level. A high level of education and incomes might be important to ensure that people are able to access information and resources required for self-management. Concomitant presence of comorbid conditions was associated with a low level of daily tasks of self-management.⁴² Moderate adherence to hemodialysis could be explained by the findings of the study which revealed that 97.6% of the participants received hemodialysis 2 times per week, which was less than the recommended 3 times/week by the US National Kidney Foundation. Our finding was consistent with the study of Naalweh et al.²³

The presence of mild cognitive impairment in 32.1% of the participants could yet be another reason for moderate self-management of ESRD patients in Bhutan. Changes in cognitive function were reported to have a negative impact on self-management tasks along with an increased need for assistance in daily tasks of self-management, and reduced quality of life.⁴³

Finally, age could possibly explain the moderate level of self-management, as majority of the participants were young to middle aged adults with an age range of 20 - 59 years. This age group was associated with a low level of adherence to treatment regimen.⁴⁴ Forgetfulness and inconvenience in controlling diet and fluid were the main reasons for non-adherence. This could be supported by the fact that young adults were more engaged in taking care of their daily schedule. This poor adherence could also be intensified especially among women taking care of their children and family which might have led them to forget taking medicine on time. In addition, young people could have a relatively larger social circle than the older adults. As a result, to fit in the social circle, they could have diverted from their recommended dietary and fluid intake. Young people have the natural disposition to travel more than older people which might have caused them inconvenience to adhere to their medication, dietary, fluid, and hemodialysis attendance. On the other hand, people with older age could have had physical limitations that would not allow them to travel much. Their

family members could also have provided them the care and support. These could have led older patients to have a better adherence.

The regression model revealed that self-efficacy and social support had an important role in predicting self-management in ESRD patients. Self-efficacy is considered a vital component of health behavior cognition and acts as a foundation in developing and maintaining new behaviors for self-management, providing the person with confidence which aids them to develop and engage in self-management tasks.²⁶ The presence of social support boosts their confidence thus encouraging them to be more self-efficacious to participate more in self-management activities. Simultaneously supporting the objective of the study, self-efficacy was a significant predictor of self-management as self-efficacy directly impacted the behaviour development and maintenance.

A study by Nelson and colleagues was coherent with our study where most of the participants had low self-efficacy with low level of physical activity and were non-adherent to medication.⁴⁴ Participants in this study received a moderate level of social support from their significant others, family members and friends. Therefore, it could be seen that availability of social support directly influenced the level of self-management. It has been believed that having a strong social support enhances psychological wellbeing as social support is seen as a source of encouragement and resources in performing self-management tasks.⁴⁵ Living with family and having spouse indicated a good source of social support among the participants. According to Bhutanese culture, people mostly live with family where they depend on family member for their care. The findings of this study were consistent with Chen and colleagues.⁴⁰ A supportive environment encourages, promotes and, facilitates participation in self-management activities.

Contradicting the findings of previous studies^{11,40}, in our study, health literacy did not predict self-management. The potential reason could be that the support the participants received were from their social network. It has been believed that a low health literacy decreases self-management abilities, as patients with low health literacy usually would be shy to ask questions and have difficulty reading and gaining health related information; thus they need more assistance for gaining information.⁴⁰ However, in this study, despite having low health literacy, the participants did not have difficulty

gathering and understanding information due to the presence of support and assistance. These patients were always accompanied by a literate family member to the hospital or were helped by the healthcare staff in gathering information. Therefore, their self-management did not differ from those with adequate health literacy. This finding was consistent with Cheng and colleagues which stated that most patients relied on health care providers and family to manage their care.⁴¹ Another reason could be that the patient may not be able to comprehend the medical terminologies found on prescriptions even if they were able to read. This made no significant change in self-management whether adequately literate or not.

Another reason for no significant association and prediction of self-management by health literacy could be due to instrument used for measurement. Though BHLS has been used in previous studies of chronic kidney disease, it mainly focuses on reading and understanding the health information and does not include the concept of gathering health information, taking health related action, and decision making which our research intended to study. Therefore, these could make health literacy a non-significant predictor of self-management in ESRD patients undergoing hemodialysis in Bhutan.

In conclusion, self-management of ESRD patients undergoing hemodialysis in Bhutan was found to be in a moderate level and was predicted by self-efficacy and social support, but not by health literacy. Therefore, self-efficacy and social support could be suggested to develop interventions to enhance self-management of ESRD patients undergoing hemodialysis in Bhutan. Surprisingly, health literacy was not predicting self-management. This could be a limitation of this study because the items asked only reading and understanding ability, but did not capture overall health literacy essence. The recommendation of new measurement for measuring health literacy would be of great concern because some items of the measurement in this study might not capture the essence of health literacy.

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