Evaluating the Psychometric Properties of the Persian Self-Management Scale for Kidney Transplant Recipients

Somayeh Khezerloo[1], Hosein Mahmoudi[2]*, Zohreh Vafadar[3]

Purpose: There was no appropriate instrument for assessing the self-management of Iranian kidney transplant recipients. This study was done to translate the Self-Management Scale for Kidney Transplant Recipients into Persian and evaluate its psychometric properties.

Material and Methods: This cross-sectional methodological study was done from October 2016 to March 2017. The psychometric properties of the scale were evaluated in the following four steps: forward-backward translation, face and content validity assessments, construct validity assessment via exploratory factor analysis, and reliability assessment via internal consistency and test-retest techniques.

Results: The means of item impact score, content validity ratio, and simplicity, clarity, and relevance content validity indices were 3.94, 0.73, 0.96, 0.93, and 0.98, respectively. Exploratory factor analysis revealed a four-factor structure for the scale which explained 70.75% of the total self-management variance. The four factors of the scale were "self-monitoring", "self-care behaviors", "early detecting and coping with abnormalities", and "drug management". The Cronbach's alpha and the test-retest intraclass correlation coefficient of the scale were 0.73 and 0.90, respectively.

Conclusion: The Persian Self-Management Scale for Kidney Transplant Recipients has acceptable validity and reliability. It can be used in educational and clinical environments and also in research studies for measuring kidney transplant recipients' self-management.

Keywords: self-management; kidney transplant recipient; validity; reliability; instrument development

INTRODUCTION

Treatment modalities for ESRD include hemodialysis, peritoneal dialysis, and kidney transplantation[1]. The treatment of choice is kidney transplantation[2]. Despite great advances in the area of kidney transplantation and immunosuppressive therapies[3], the risk for transplant rejection is still high[4]. Moreover, transplant recipients are at risk for the side effects of immunosuppressive therapies, particularly infection. A study showed that during the first post-transplantation months, recipients are frequently hospitalized mainly due to different types of infection [5]. Moreover, compared with other chronically-ill patients, transplant recipients suffer from higher levels of stress, anxiety, depression, and emotional problems[6,7].

A significant factor behind transplantation success or transplant rejection is self-management[8,9]. By definition, self-management is the ability to personally manage the outcomes of chronic conditions [9,10]. According to Strauss and Corbin, self-management has three main dimensions, namely medical, role, and emotional managements. Medical management includes adherence to treatment and dietary regimens as well as to the permitted level of physical activity. Role management deals with managing the new post-transplantation roles. In other words, transplant recipients need to significantly change their behaviors, habits, and activities in order to cope with their new roles. Emotional management refers to learning how to manage emotions, such as anger, fear, despair, and depression, which are usually experienced by chronically-ill patients [11]. Self-management significantly affects the effectiveness of healthcare services; promotes treatment adherence, engagement in physical activities, independence in doing activities [12,13], and general health; and helps prevent disease recurrence[14].

Post-transplantation self-management includes a wide range of activities such as engagement in adequate physical activity, adherence to dietary regimen and immunosuppressive therapies, infection prevention, self-supervision, medication side effect management, and regular medical visits[15-18]. Self-management is of greater importance during the first post-transplantation months. In this period, patients need to take greater

[1] Ph.D. student of nursing, trauma Research Center and Faculty of nursing, Baqiyatallah University of Medical Sciences, Tehran, IR Iran.
[2] Associate Professor, trauma Research Center and Faculty of nursing, Baqiyatallah University of Medical Sciences, Tehran, IR Iran.
[3] Assistant Professor, Faculty of nursing, Baqiyatallah University of Medical Sciences, Tehran, IR Iran.
*Correspondence: Associate Professor, trauma Research Center and Faculty of nursing, Baqiyatallah University of Medical Sciences, Tehran, IR Iran.
Tel:+98 21 88620880. Fax: +98 21 26127237. E-mail: h.mahmoudi@bmsu.ac.ir,
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responsibility for managing their treatment regimen, undergo different laboratory tests, and supervise the symptoms of transplant rejection and systemic infection [19]. Otherwise, they may experience severe problems such as infection and transplant rejection[20-23].

An absolute requirement for self-management assessment is valid and reliable assessment tools. Such tools help easily and quickly identify and overcome patients' problems in the area of self-management. One of these tools is the Self-Management Scale for Kidney Transplant Recipients (KTR-SMS). Developed in 2013 by Kosaka et al.[14], KTR-SMS is a specific tool for the assessment of self-management among kidney transplant recipients. However, the psychometric properties of the scale have not yet been evaluated in many countries, including Iran. Given the lack of a specific valid and reliable tool for assessing the self-management of Iranian kidney transplant recipients, this study was done to translate KTR-SMS into Persian, cross-culturally adapt it to the Iranian culture, and evaluate its psychometric properties.

MATERIAL AND METHODS

Study design

This cross-sectional methodological study was done from October 2016 to March 2017 in the following four steps: forward-backward translation, face and content validity assessments, construct validity assessment via exploratory factor analysis, and reliability assessment via internal consistency and test-retest techniques.

Instrument

KTR-SMS is a specific tool for the assessment of self-management among kidney transplant recipients. It contains twenty items in four subscales in addition to four single items. KTR-SMS subscales include "self-monitoring of vital signs" (six items), "self-care behaviors in daily living" (7 items), "early detecting and coping with abnormalities after kidney transplantation" (4 items), and "stress management" (three items). The remaining four single items deal with the management of treatment regimen and dehydration prevention and are called "items with high clinical importance". KTR-SMS items cover all aspects of kidney transplantation self-management including appropriate use of immunosuppressant agents, medication side effect assessment, self-supervision, self-care activities, infection prevention, stress and emotional management, adherence to prescribed dietary regimen, and regular medical visits[16,24]. Possible responses to each item include "Not applied", "Barely applied", "Fairly applied", and "Strongly applied", which are scored from 1 to 4, respectively.The scale has 24 items, so the total score of KTR-SMS is 24–96.

Forward-backward translation of KTR-SMS

After obtaining necessary permissions from KTR-SMS developers (Shiho Kosaka et al) to use the scale, the scale was translated from English into Persian based on the four-step instrument translation method proposed by World Health Organization. The four steps of this method are forward translation, expert panel back-translation, pre-testing and cognitive interviewing, and final version[25]. In the present study, forward English-Persian translation was done by two independent translators. The first translator was a nursing doctorate with a clinical work experience of more than ten years while the second had no expertise in healthcare areas but was experienced in text translation. A nursing faculty member compared their translations with the original KTR-SMS and produced a single Persian translation. Then, the translation was back-translated into English by two bilingual translators who held nursing degrees and had lived in an English-speaking country for more than five years. Thereafter, a panel of experts compared the generated English KTR-SMS with its original version and confirmed their similarity. After that, the Persian KTR-SMS was provided to thirty transplant recipients and they were invited to read and evaluate the difficulty, clarity, and appropriateness of each item. Their comments were sought through face-to-face personal interviews. Finally, the scale was amended based on their comments and thereby, the final Persian version of KTR-SMS was generated. Due to cross-cultural differences, translation of an instrument is usually associated with inevitable changes in the characteristics of its items[26]. Yet, we did our best to minimize discrepancies between the original and the Persian KTR-SMS and to produce a cross-culturally appropriate scale for the assessment of Iranian kidney recipients' self-management.

Face validity assessment

Face validity was assessed using qualitative and quantitative techniques. Qualitative face validity assessment was done in the "pre-testing and cognitive interviewing" step of the translation (see the above paragraph). Quantitative face validity was assessed through calculating item impact score. Accordingly, thirty transplant recipients were asked to comment on the importance of KTR-SMS items using the following five-point scale: "Not important", "Slightly important", "Moderately important", "Important", and "Very important". First the percent of patients who scored 4 or 5 to item importance (frequency) was calculated, and the mean importance score of item (importance) and then item impact score of instrument items was calculated by following formula: Item Impact Score= frequency×Importance. Item impact scores 1.5 and greater are considered acceptable (which corresponds to a mean frequency of 50% and an importance mean of 3 on the 5-point Likert scale)[27].

Content validity assessment

Content validity was also assessed using both qualitative and quantitative techniques. In qualitative content validity assessment, five instrument development specialists, five nephrologists, and twenty nurses with a work experience of more than fifteen years in the area of kidney transplantation (thirty in total) were invited to provide detailed written comments on the clarity, simplicity, wording, and grammar of the items. Their comments were used to amend items. On the other hand, quantitative content validity was assessed via content validity ratio (CVR) and content validity index (CVI). For CVR, the experts were asked to assess the essentiality, while for CVI, they were asked to assess the relevance, clarity, and simplicity of each item on a four-point scale. Lawshe determined that for a panel of thirty experts, the minimum acceptable CVR and CVI values are 0.33 and 0.79, respectively[28].

Construct validity assessment

Construct validity of KTR-SMS was evaluated via exploratory factor analysis with varimax rotation[29]. The Kaiser-Meyer-Olkin (KMO) and the Bartlett's tests

Table 1. Self-management mean scores based on recipients' demographic characteristics.

Variable		N= 360	Self-management scores Mean ± Standard deviation	*P* value
Age groupa	20–40	140	60.85 ± 8.63	.000
	41–60	144	65.63 ± 5.7	
	61–80	76	60.71 ± 8.4	
Genderb	Male	160	64.16 ±6.54	.002
	Female	200	61.58 ±8.70	
Educational degreea	Diploma and lower	171	51.94 ± 7.16	.000
	Bachelor's	148	61.34 ± 8.2	
	Master's and higher	41	71.17 ± 2.8	
History of undergoing dialysisa	< 2 years	25	46.80 ± 3.27	.000
	2–4 years	156	63.14 ± 5.54	
	4–6 years	135	64.85 ± 7.73	
	> 6 years	44	63.84 ± 7.50	
Time from transplantationa	< 2 years	86	69.79 ± 3.90	.000
	2–4 years	140	66.85 ± 8.27	
	4–6 years	105	61.83 ± 7.59	
	> 6 years	29	58.72 ± 5.56	

[a] one-way ANOVA
[b] independent samples test

were used to examine sampling adequacy and factor analysis appropriateness. Eigenvalues greater than 1 and scree plot were used to determine the number of factors. The minimum factorial loading value was 0.4.

Participants and data collection

For construct validity assessment, a convenient sample of 360 kidney transplant recipients were selected. This sample size was determined based on the 5–10 cases per item method[30] and an attrition rate of 20%. Recipients were selected from different genders, ages, educational status, cities, and subcultures. Primarily, several cities in Iran were selected and then, study participants were selected from the kidney transplantation centers in those cities. Eligibility criteria were an age of eighteen or more, stable physical and mental health conditions, and basic literacy skills. Participants signed the informed consent form and then, completed KTR-SMS. A demographic questionnaire was also used to record their age, gender, educational status, history of undergoing hemodialysis, and time from kidney transplantation.

Reliability

KTR-SMS reliability was assessed through both internal consistency and test-retest techniques. For internal consistency assessment, the data obtained from 360 recipients in the construct validity assessment were used to calculate the Cronbach's alpha values of the scale and its subscales. Moreover, for test-retest stability assessment, thirty recipients were asked to complete the scale twice with a two week interval. Then, intraclass correlation coefficient (ICC) was calculated.

Statistical analysis

The SPSS software (v. 21.0) was employed for data analysis. The Bartlett's and the KMO tests were done for exploratory factor analysis. A KMO value of greater than 0.6 was considered acceptable. Eigenvalues and maximum explained variance were calculated for each

Table 2. Factor loading values of KTR-SMS items

KTR-SMS items	Factor 1	Factor 2	Factor 3	Factor 4
1.Daily measurement and recording of blood pressure	0.76			
2. Daily measurement and recording of body temperature	0.88			
3. Daily measurement and recording of body weight	0.70			
4. Daily measurement and recording of physical status	0.81			
5. Daily measurement and recording of frequency of urination	0.8			
6. I contact my doctor when the dada are deviated from the desirable values	0.66			
7. I eat balanced meals		0.59		
8. I keep my house clean		0.74		
9. I reduce sodium (salt) consumption		0.46		
10. I avoid high calories foods		0.68		
11. I eat fresh food		0.70		
12. I avoid compacting and compression of the abdomen	0.69			
13. I wash my mouth (gurgle) and hands		0.84		
14. I monitor the signs of kidney function decrease			0.6	
15. I touch transplant region and check for pain and hardness signs			0.61	
16. I check for adverse effects of immunosuppressive drugs			0.75	
17. I act precisely if forget to take immunosuppressive drugs			0.78	
18. I receive sufficient emotional support			0.73	
19. I consult with a Psychiatrist when I feeling depressed	0.42			
20. I have enough rest and sleep			0.42	
21. I take the dosage of immunosuppressive drugs as prescribed doses				0.48
22. I take immunosuppressive drugs on prescribed time				0.62
23. I check the remaining amounts of immunosuppressive drugs				0.77
24. I drink enough liquids to prevent dehydration				0.56

Table 3. The eigenvalue and the amount of explained variance of KTR-SMS factors

The self-management factors	Factor 1	Factor 2	Factor 3	Factor 4
Eigenvalue	6.31	3.79	3.52	3.35
Explained variance (%)	26.32	15.79	14.67	13.96
Total explained variance (%)	70.75			

factor. Varimax rotation was used for the simpler interpretation of the factors[31]. ICC was calculated for the two-week test-retest stability. ICC values 0.75–0.9 and greater than 0.9 show moderate and strong test-retest correlations, respectively. Moreover, Cronbach's alpha was calculated for the purpose of internal consistency assessment. Alpha values greater than 0.7 indicate acceptable internal consistency[32]. The level of significance was below 0.05.

Ethical considerations

This study was part of a PhD dissertation in nursing in Baqiyatallah University of Medical Sciences, Tehran, Iran. The dissertation was approved by the Ethics Committee of the university with the code of IR.BMSU.REC.1395.304. Study aim was explained for participants and they filled out the informed consent form of the study. Participants retained the right to voluntarily withdraw from the study. All data were managed confidentially.

RESULTS

Descriptive statistics

Participants aged 47.01±11.79, on average. The mean of self-management score was 62.73±7.91. The independent samples test showed a significantly difference in self-management mean scores between male and female groups. **Table 1** shows self-management mean scores based on demographic characteristics.

Face and content validity assessments

Qualitative face validity assessment revealed that recipients had difficulties in understanding the KTR-SMS item 12, i.e. "I avoid abdominal compression". In other words, they wrongly perceived it as "avoidance from overeating" instead of "avoidance from applying pressure to the abdomen". Therefore, based on the comments of the experts and with the approval of KTR-SMS developers, this item was reworded as, "I avoid the compacting and the compression of the abdomen". Besides, item 18, i.e. "I receive sufficient support", was ambiguous for recipients in that they interpreted "support" as "financial support". Thus, it was also reworded as, "I receive sufficient emotional support". Quantitative face validity assessment also indicated that the item impact scores of all items were greater than 1.5 and the mean item impact score was 3.94. During qualitative content validity assessment, the experts confirmed that all items were appropriate. Moreover, quantitative content validity assessment showed that CVR and CVI values of all items were greater than 0.33 and 0.79, respectively. Moreover, the mean values of CVR, simplicity CVI, clarity CVI, and relevance CVI were 0.73, 0.96, 0.93, and 0.98, respectively.

Construct validity assessment

Construct validity was assessed via exploratory factor analysis. KMO value was 0.72 and the Bartlett's test was significant ($\chi 2 = 5737.807$; $P < .001$), confirming sampling adequacy. Four factors with factor loadings of greater than 0.4 were extracted. Scree plot (**Figure 1**) also confirmed the four-factor structure. The factor loadings of each item as well as the items of each factor are shown in **Table 2**. Based on their items and the names of the original KTR-SMS subscales, the four factors were nominated as "self-monitoring", "self-care behaviors", "early detecting and coping with abnormalities", and "medication management" (**Table 3**). The four extracted factors explained 70.75% of the total variance of self-management.

Reliability assessment

The Cronbach's alpha of the Persian KTR-SMS scale and its four subscales were 0.73, 0.87, 0.77, 0.72, and 0.6, respectively. Moreover, test-retest ICC values for KTR-SMS and its subscales were 0.90–0.96 (**Table** 4).

DISCUSSION

The aim of this study was to translate KTR-SMS into Persian and evaluate its psychometric properties. Findings revealed that the Persian KTR-SMS has acceptable validity and reliability and therefore can be used to assess the self-management of Iranian kidney transplant recipients. To the best of our knowledge, the Persian KTR-SMS is the first valid and reliable instrument for self-management assessment after kidney transplantation in the Iranian context.

Face-to-face personal interviews with recipients for the purpose of face validity assessment revealed that they had difficulties in understanding items 12 and 18. Thus, these two items were amended based on experts' comments. Cultural discrepancies among different cultures can result in different understandings about healthcare issues[33]. Quantitative face validity assessment also revealed that item impact scores of all items were greater than 1.5, denoting that all items are important for

Table 4. reliability and stability of SMS-KTR in kidney transplant recipients

SMS-KTR	ICC (N=30)	CI=0.95		P Value	Cronbach's Alpha N=360
		Lower limit	Upper limit		
Factor 1 (self-monitoring)	0.93	0.87	0.96	.000	0.87
Factor 2 (self-care behavior)	0.96	0.93	0.98	.000	0.77
Factor3 (stress management, early detecting and coping with abnormalities)	0.96	0.92	0.98	.000	0.72
Factor 4 (drug management)	0.96	0.92	0.98	.000	0.6
total	0.90	0.81	0.95	.000	0.73

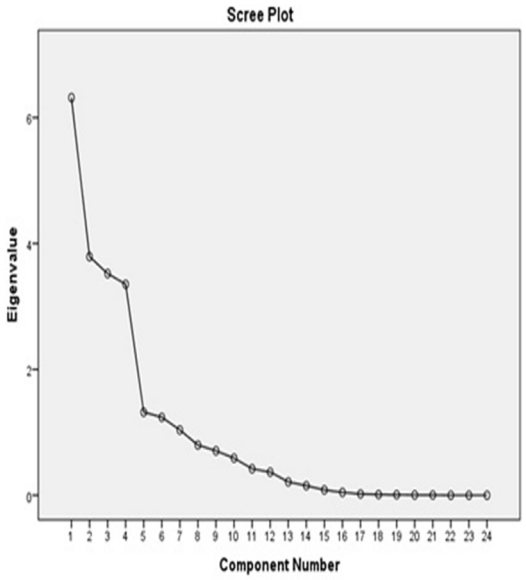

Figure 1. Scree plot

self-management assessment. Besides, qualitative and quantitative content validity assessments indicated that all items had been worded appropriately and were essential, clear, simple, and relevant to self-management. The Original KTR-SMS includes four subscales (with twenty items) and four single items. However, during exploratory factor analysis in the present study, the first twenty items were loaded on three factors and the four single items were loaded on the independent factor of "medication management", resulting in a four-factor structure for the scale. This discrepancy between the factor structures of the original and the Persian KTR-SMS can be attributed to the differences in the populations and the sample sizes in the original and the present studies.

Findings also indicated that the Cronbach's alpha values of KTR-SMS and all its subscales were 0.6–0.87. These values are almost the same as those of the original[14]. The lowest Cronbach's alpha value in the present study was related to the four-item "medication management" subscale. Similarly, the lowest Cronbach's alpha value of the original KTR-SMS subscales has been related to the subscale with the lowest number of items (i.e. stress management with just three items). Moreover, in line with the findings reported by Kosaka et al. for the original KTR-SMS[14], ICC values in the present study were 0.90–0.96. These values denote that the Persian KTR-SMS has acceptable stability over time.

Findings also showed that the mean of KTR-SMS score was 62.73 ± 7.91, which implies moderate self-management among Iranian kidney transplant recipients. This finding highlights the necessity of educational interventions for improving the self-management of this patient population. Moreover, findings revealed that male participants had higher self-management compared with their female counterparts. Recipients with higher educational status and longer history of undergoing hemodialysis had also higher self-management. However, the amount of time passed from transplantation was negatively correlated with self-management. Similarly, Lee et al. found that male recipients as well as those with higher educational status had closer adherence. Moreover, their findings showed that adherence reduced over time[34]. Hedayati et al. also found that treatment adherence was higher among male recipients and those with higher educational status[35]. A study reported that the side effects of post-transplantation treatments significantly reduce self-management among females[36]. In line with our findings, Shimaya et al. also reported significant decrease in post-transplantation treatment adherence over time[37]. These findings may be due to the greater fear and anxiety over transplant rejection during the first post-transplantation months.

Limitations

Study sample was selected from recipients who aged eighteen or more. Therefore, the Persian KTR-SMS is valid and reliable only for adult transplant recipients. Further studies are needed to test the psychometric properties of the Persian KTR-SMS among random samples of recipients with different demographic characteristics.

CONCLUSIONS

The findings of this study show that the Persian KTR-SMS has acceptable psychometric properties and thus, can be used for the assessment of self-management among Iranian kidney transplant recipients. The simple scoring system and the great validity and reliability of KTR-SMS make it more applicable and easier to use. The Persian KTR-SMS can be used in different studies and settings in order to assess recipients' self-management, their problems in self-management, and the effects of interventions on self-management.

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CONFLICT OF INTEREST

The authors declare that they have no Conflict of Interests.

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