Factors Affecting Quality of Life in Patients Receiving Hemodialysis

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Abstract

Background: We aimed to identify the factors affecting the quality of life in patients with hematologic disorders.

Methods: The sample group of 150 participants was randomly selected from among those who received hemodialysis at three public hospitals in Jeonju and Gwangju provinces and two private hospitals in Seoul, Korea. Among the 150 questionnaires retrieved, 143 were used for analysis, while 7 incomplete questionnaires were excluded. An independent *t*-test, one-way analysis of variance, Pearson correlation coefficient, and multiple regression analysis were performed to verify the effect on quality of life according to general characteristics such as implementing self-care, stress, and depression in patients receiving hemodialysis.

Results: General characteristics of participants accounting for differences in the quality of life were residential area ($P<0.001$), sex ($P=0.031$), monthly income ($P=0.007$), and frequency of dialysis ($P=0.023$). Moreover, quality of life was significantly and positively correlated with implementing self-care ($P<0.001$) and significantly and negatively correlated with stress ($P<0.001$) and depression ($P<0.001$). The variables affecting quality of life were depression ($P<0.001$), frequency of dialysis (two times a week) ($P=0.008$), monthly income (USD \$2,000) ($P=0.007$), implementing self-care ($P=0.004$), and stress ($P=0.010$). The explanatory power (R^2) of quality of life was 51.3%.

Conclusion: This study suggests providing self-nursing education to improve the quality of life of patients receiving hemodialysis. It also seeks ways to improve the patient's self-efficacy and reduce stress and depression among hemodialysis patients.

Keywords: Depression; Patients receiving hemodialysis; Implementing self-care; Quality of life; Stress

Introduction

In recent years, despite rapid advancements in medicine and global economic growth, the number of patients with end-stage renal disease has increased annually (1). Indeed, the number of patients with chronic renal failure in Korea doubled from 51,989 in 2008 to 103,984 in 2018; among them, 84% were receiving hemodialysis as of 2017 (2). Quality of life is not just a matter of how happy an individual is and whether they are leading a satisfying life. It is also, about how well an individual functions as a member of society (3). Hemodialysis treatment has developed in re-

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cent years as an alternative to kidney transplantation, improving the survival rate of patients with chronic kidney disease. However, their quality of life is much lower than that of the general population (4).

In hemodialysis, patients receive dialysis 2–3 times a week for 4–5 hours per session, during which time wastes are filtered outside of the body to relieve symptoms (5). It is difficult to maintain a normal work and social life when undergoing hemodialysis (6). To minimize the side effects or complications of hemodialysis, self-management—such as following the drug use plan, proper diet management, and adhering to the dialysis schedule—is important (7). Patients with hematologic disorders are chronically exposed to higher levels of stress compared to patients with other diseases. Their physical stress manifests as fatigue, muscle cramps, nausea, and vomiting. The life of a patient receiving hemodialysis can be extremely stressful (8). High levels of stress and depression negatively affect the quality of life of patients receiving hemodialysis. Moreover, owing to the need to receive continuous hemodialysis following an end-stage renal disease diagnosis, the concerned patient is of-ten subjected to social, psychological, and physical stress due to disease progression (9,10).

Continuous hemodialysis is also related to a high prevalence of depression in patients (11,12), suggesting that depression may have a negative impact on their survival; depression is also associated with increased mortality and hospitalization (13-15). In fact, among patients with chronic renal failure receiving hemodialysis, the prevalence of depression is 33%–50%, which is more than 3 times higher than that in the general population (16).

Despite recent research trends related to the quality of life of patients receiving hemodialysis based on previous studies about depression (17) and acceptance of illness (18), in Korea, no study has investigated the relationship between implementing self-care, stress, depression, and quality of life. Accordingly, we examined the factors affecting the quality of life of patients receiving hemodialysis, for a multi-faceted approach to improving their quality of life.

Methods

Participants

This descriptive study aimed to identify the relationships between quality of life, implementing self-care, stress, and depression in patients receiving hemodialysis, and to identify the factors affecting these patients' quality of life. The participants were 150 patients receiving hemodialysis at three public hospitals located in Jeonju and Gwangju provinces and two private hospitals in Seoul, Korea. The G*power program (G*Power 3.1.9.2, Heinrich Heine University, Düsseldorf, Germany) was used for calculations.

Because of selecting a fixed-effect linear multiple regression model, R^2 deviation from zero by setting a significance level of 0.05, an effect size of 0.15, a power of 0.80, and considering numbers of independent variable, the ideal sample size was 131 participants. Based on this, 160 questionnaires were distributed, with a dropout rate of 7%. Among them, 150 copies were recovered, with a recovery rate of 93.8%, and 143 copies were used for analysis, after excluding questionnaires with missing answers (seven copies).

The inclusion criteria for the participants were as follows: 1) An adult patient aged 30 to 65 years diagnosed with end-stage renal failure by a kidney specialist and receiving hemodialysis for a period of 3 months or more. 2) A patient receiving hemodialysis 2–4 times a week. 3) A patient who can communicate sufficiently, understand the contents of the questionnaire, and respond. 4) A patient who had expressed their intention to participate in this study and provided written consent. The general characteristics of the participants are presented in Table 1.

Table 1: General characteristics of the participants (n=143)

Variable	Item	n	%	Mean±standard deviation
Residential area	Metropolitan area	53	37.1	
	Non-metropolitan area	90	62.9	
Age	Less 40 years	15	10.5	51.59±9.71
	40–49 years	39	27.2	
	50–59 years	45	31.5	
	Over 60 years	44	30.8	
Sex	Male	80	55.9	
	Female	63	44.1	
Religion	Yes	66	46.2	
	No	77	53.8	
Education level	Lower than elementary	23	16.1	
	Middle school	38	26.6	
	High school	53	37.2	
	Above college or university	29	20.1	
Marital status	Single	24	16.8	
	Married	92	64.3	
	Divorced or widowed	27	18.9	
Monthly income	Less than USD $1,000	85	59.4	
	USD $1,000–$2,000	45	31.5	
	USD $2,000	13	9.1	
Current job status	Employed	61	42.7	
	Unemployed	82	57.3	
Hemodialysis period	1–<3 years	37	25.9	4.99±3.33
	3–<5 years	39	27.3	
	5–<10 years	48	33.6	
	Over 10 years	19	13.2	
Frequency of dialysis	2 times a week	12	8.4	
	3 times a week	131	91.6	
Presence of other diseases	Yes	106	74.1	
	No	37	25.9	
Disease type (multiple selection)	Hypertension	64	60.9	
	Diabetes	64	60.3	
	Other disease	10	9.43	
Implementing self-care (points)	Diet management	143		2.97±0.72
	Blood vessel management	143		3.47±0.69
	Exercise and rest	143		2.97±0.67
	Taking medication	143		3.59±0.74
	Blood pressure and weight management	143		2.55±0.79
	Physical management	143		3.00±0.46
	Social activity	143		3.03±0.98
	Total average	143		3.07±0.44
Stress (points)	Physiological stress	143		2.42±0.45
	Social and psychological stress	143		2.66±0.62
	Total average	143		2.54±0.47
Depression (points)		143		1.32±0.47
Quality of life (points)		143		3.08±0.43

Data collection and ethical considerations

Written consent was obtained after explaining to participants the purpose and content of this study. We assured them of ethical data collection, confidentiality, and anonymous use of responses for research purposes. We took approximately 30 min to collect the data from each individual.

This study was approved by the Institutional Review Board of the Gwangju Women's University (1041485-201512-HR-001-02). To ensure honest responses and protect participants' privacy, symbols or signatures were used instead of the participants' names. The consent form included information on the purpose and procedure of the study, the fact that there was no risk or cost due to participation in the study, the fact that participation in the study was voluntary, the possibility of requesting a suspension of consent to participate in the study at any time, and assurances of confidentiality.

Research instruments

A quality of life instrument was developed by the recommendations of the WHO (19). The instrument has 26 items. Responses were scored on a 5-point Likert-type scale ranging from "not at all" to "strongly agree," with higher scores indicating a higher quality of life. Cronbach's α for this tool was 0.90 at the time of development (19), and 0.87 in this study.

The implementing self-care tool was developed by Song et al. (20), modified and supplemented by Cho and Choe (21), consists of 35 questions scored on a 5-point scale. Cronbach's α for this tool was 0.88 at the time of development (21) and 0.90 in this study.

For stress measurement, we used the tool developed by Kim and Kim (22) for patients receiving hemodialysis, modified and supplemented by Choi (23). The responses were scored on a 4-point Likert-type scale ranging from 1 ("not at all") to 4 ("very severe"). Cronbach's α for this tool was 0.96 at the time of development (23) and 0.91 for this study.

The depression measurement tool (Center for Epidemiologic Studies Depression Scale) was developed by Radloff (24). Twenty questions were measured on a 4-point (0–3) Likert-type scale, and the higher the total score, the higher the depression. On the 60-point scale, a score less than 16 points was considered normal, those who had scored 16–20 points were categorized as suffering from depression, those scoring 21-24 were categorized as having heavy depression, while those with a score of 25 points or more were diagnosed with severe depression. Cronbach's α for this tool was 0.89 at the time of development (24), and 0.90 in this study.

Statistical Analysis

Data analysis was performed using SPSS/WIN 21.0 program (IBM Corp., Armonk, NY, USA). An independent *t*-test and one-way analysis of variance analysis were conducted to verify the difference in quality of life according to participants' general characteristics, implementation of self-care, and stress and depression scores. Moreover, the relationships between the quality of life, implementing self-care, stress, depression were analyzed using the Pearson correlation coefficient, and a multiple regression analysis was conducted to analyze the factors affecting the quality of life. Cronbach's α coefficient was also used to evaluate the reliability of the tools. Statistical significance was set at $P<0.05$.

Results

The characteristics that accounted for differences in the overall quality of life were in Table 2. Residential area, sex, monthly income, and frequency of dialysis. Quality of life was higher when participants lived in metropolitan areas than in non-metropolitan areas ($P<0.001$). In terms of sex, males had a higher quality of life compared to females ($P=0.031$). Those with a monthly income of more than USD \$2,000 had higher quality of life compared to those with an income of less than USD \$1,000 or those with an income USD \$1,000–\$2,000 ($P=0.007$). Finally, those with a frequency of dialysis of twice a week had a higher quality of life compared to participants receiving dialysis three times a week ($P=0.023$).

Table 2: Differences in quality of life according to the general characteristics of the participants (n=143)

Variable	Item	n	Average of quality of life score	t of F	P
Residential area	Metropolitan area	53	3.33±0.42	5.83	<0.001***
	Non-metropolitan area	90	2.94±0.37		
Age	Less than 40 years	15	3.19±0.48	1.32	0.272
	40–49 years	39	2.99±0.40		
	50–59 years	45	3.07±0.34		
	Over 60 years	44	3.15±0.52		
Sex	Male	80	3.15±0.45	2.18	0.031*
	Female	63	3.00±0.40		
Religion	Yes	66	3.07±0.42	-0.32	0.748
	No	77	3.09±0.45		
Education level	Lower than elementary	23	3.05±0.51	0.38	0.769
	Middle school	8	3.12±0.42		
	High school	53	3.05±0.38		
	Above college or university	29	3.13±0.48		
Marital status	Single	24	3.17±0.58	0.57	0.570
	Married	92	3.06±0.41		
	Divorced or widowed	27	3.08±0.38		
Monthly income	USD $1,000	85	3.02±0.41	5.20	0.007**
	USD $1,000–$2,000	45	3.10±0.42		
	USD $2,000	13	3.43±0.48		
Current job status	Employed	61	3.08±0.42	-0.21	0.832
	Unemployed	82	3.09±0.45		
Hemodialysis period	1–<3 years	37	3.13±0.51	0.49	0.692
	3–<5 years	39	3.10±0.41		
	5–<10 years	48	3.02±0.38		
	Over 10 years	19	3.10±0.46		
Frequency of dialysis	2 times a week	12	3.36±0.59	2.30	0.023*
	3 times a week	131	3.06±0.41		
Presence of other diseases	Yes	106	3.11±0.44	1.06	0.290
	No	37	3.02±0.42		

Values are mean±standard deviation

*P<0.05, **P<0.01, ***P<0.001, tested by independent *t*-test or one-way analysis of variance

As a result of analyzing the correlation to understand the relationship between implementing self-care, stress, depression, and quality of life, as shown in Table 3. Quality of life was significantly and positively correlated with implementing self-care (P<0.001). Quality of life was significantly negatively correlated with stress (P<0.001) and depression (P<0.001). In other words, the higher the implementing self-care the higher the quality of life, and the lower the stress and depression the higher the quality of life.

Table 3: The correlation of participants' implementing self-care, stress, depression, and quality of life (n=143)

Variables	Implementing self-care	Stress	Depression	Quality of life
Implementing self-care	1.000	-0.114 (0.174)	-0.270 (0.001**)	0.344 (<0.001***)
Stress		1.000	0.692 (<0.001***)	-0.576 (<0.001***)
Depression			1.000	-0.642 (<0.001***)
Quality of life				1.000

**P<0.01, ***P<0.001, tested by Pearson correlation coefficient

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A regression analysis using a dummy variable was conducted to analyze the factors influencing the quality of life (Table 4). Among the characteristics of the participants, seven variables were analyzed, including self-care, stress, and depression, which were correlated with four categories: residential area, sex, monthly income, and frequency of dialysis. The tolerance and variance inflation factor (VIF) was calculated to determine whether there was multicollinearity between the independent variables before analysis. Both tolerances were 0.10 or higher, and all VIF values were less than 10.0, so there was no multicollinearity between independent variables. Moreover, because of conducting a case-by-case diagnosis to see if the distribution of residuals can be assumed to be a normal distribution, all standardized residuals were found to be within ±3.0, and the distribution of residuals could be assumed to be normally distributed. The analysis revealed that the variables affecting the quality of life were depression ($P<0.001$), frequency of dialysis (3 times a week) ($P=0.008$), monthly income (over USD \$2,000) ($P=0.007$), and implementing self-care ($P=0.004$), and stress ($P=0.010$). In other words, the lower the depression level, higher frequency of dialysis, higher monthly income, higher implementing self-care, and lower the stress level were affected quality of life. The explanatory power (R^2) by depression, frequency of dialysis, monthly income stress, implementing self-care, and depression was 51.3%.

Table 4: The multiple regression analysis of participants' quality of life (n=143)

Variables	Non-Standardized Coefficient (B)	Standard Error	Standardized Coefficient (B)	T	P	R^2 Variance	Accumulated R^2
(Constant)	4.25	0.38		11.34	<0.001***	-	-
Depression	-0.02	0.00	-0.420	-4.97	<0.001***	0.41	0.41
Frequency of dialysis (2 times a week)	-0.25	0.09	-0.161	-2.69	0.008**	0.03	0.44
Monthly income (Over USD \$2,000)	0.24	0.09	0.166	2.75	0.007**	0.03	0.48
Implementing self-care	0.18	0.06	0.183	2.96	0.004**	0.02	0.50
Stress	-0.20	0.08	-0.217	-2.60	0.010*	0.02	0.53
F=30.91, p<0.001***, R^2=0.53, Adj-R^2=0.513							

*$P<0.05$, **$P<0.01$, ***$P<0.001$, tested by multiple regression analysis

Discussion

This study was conducted to identify factors influencing the quality of life of patients receiving hemodialysis to improve their quality of life and provide basic data for nursing patients with chronic renal transmission.

In this study, the average score of implementing self-care was 3.07 points, which is slightly lower than the 3.46 points determined by Cho and Choe (21), who used the same tool. Moreover, the domain of implementing self-care is based on the analysis of seven sub-domains: diet management, blood vessel management, exercise and rest, taking medication, blood pressure and weight management, physical management, and social activity. Taking medication and managing blood vessel were performed well, with an average of 3.59 and 3.47 points for self-nursing. Social activity scored an average of 3.03 points; physical management, 3.00 points; diet management, 2.97 points; exercise and rest, 2.97 points; and blood pressure and weight management, 2.55 points, showing the lowest score. The taking medication

score was the highest among implementing self-care, and this result was similar to that of Choi (23) using the same tool. Blood pressure and weight management with the lowest scores were similar to those reported already (20). Implementing self-care was somewhat neglected in blood pressure and weight management, diet management, and exercise and rest. Although these results showed some differences among previous studies, self-nursing practices were well performed in taking medication and blood vessel management, which have high contact with medical staff, because patients had to visit the hospital regularly due to their characteristics. However, self-nursing had low scores in diet management, exercise and rest, and blood pressure and weight management, which differed according to knowledge level, age, and sex.

In this study, the stress score of participants was 2.54 points out of 4.00 points. Considering that the average stress score of previous studies using the same tool was 3.00 or higher (10,25), our study has a relatively low score. Social and psychological stress was found to be higher than physical stress, which is attributable to periodic visits to hospitals, resulting in social isolation due to social life restrictions (23,25). The average score for depression in this study was 1.32 points out of 4.00 points. This is at a lower level, as in another study (17). Depression, a common emotional problem in patients receiving hemodialysis, affects the quality of life and negatively affects the recovery and prevention of disease in the participants. As a result, a program that can mediate depression in patients receiving hemodialysis is necessary. In this study, the average score for the quality of life of patients receiving hemodialysis was 3.08 out of 5.00 points, which is lower than that found already (26) using the same tool. This difference is attributed to participants' age, sex, and duration of hemodialysis. A program that considers these circumstances is necessary.

In this study, based on multiple regression analysis, depression was found to be the most influential variable in the quality of life of patients receiving hemodialysis. In other words, the lower the depression score, the higher the quality of life,

corroborating Kring & Crane (26) who found that depression is a factor influencing the quality of life of dialysis patients. Thus, various efforts should be made to reduce depression. The second predictor of the quality of life of patients receiving hemodialysis was the frequency of dialysis. Less frequent dialysis, 2 times a week compared to 3 times a week, was associated with a higher quality of life. Since the frequency of dialysis is directly related to medical expenditure from the patient's point of view, it can be seen that the lower the frequency of dialysis, the less the economic burden and more leisure time, which directly affects the quality of life. The third predictor of the quality of life of patients receiving hemodialysis was monthly income. In other words, it can be said that the higher the patient's average monthly income, the higher the quality of life.

A previous study (27) found that monthly income did not affect the quality of life, but 99.0% of the participants from previous studies received full or partial support from the government, which is different from the results of this study. The fourth predictor was implementing self-care. It was difficult to find a study that directly compared implementing self-care and quality of life. In a study (28), there was a significant positive correlation between the amount of dialysis self-care and subjective well-being. We believe that there was a significantly positive correlation between implementing self-care and submissive well-being, thus supporting our results. The fifth predictor was stress. This is consistent with the findings of Bujang et al (29) that stress affects the quality of life. It is considered necessary to provide a program on how patients receiving hemodialysis can cope with stress. Briefly, we found that depression, frequency of dialysis; monthly income, implementing self-care, and stress were factors influencing the quality of life in patients receiving hemodialysis. Therefore, education or intervention programs should be developed to improve the quality of life of patients receiving hemodialysis in consideration of the impact variables predicted in this study.

However, this study had some limitations. First, the study participants were limited to patients from a few hospitals, so there is a limitation in generalizing the results of this study due to the small number of samples. Second, this study is limited due to the lack of consideration of the variety of affected quality of life in patients receiving hemodialysis. Future studies should examine various variables affecting quality of life. Third, even though we used a quantitative research method in this study, further studies involving qualitative research methods, such as in-depth interviews with patients receiving hemodialysis, are also necessary, as these may complement and aid in interpreting our results.

Conclusion

Higher quality of life is associated with a lower depression score, a lower stress score, a high degree of implementing self-care, a dialysis frequency of twice per week, and a monthly income of 2 million won (USD $2,000) or more. Therefore, this study recommends providing self-nursing education to improve the quality of life of patients receiving hemodialysis. Doing so can help improve their self-efficacy and reduce stress and depression among nurses and caregivers. The study can also be used to develop an intervention program. Although this study has academic value in that it empirically analyzes the factors affecting the quality of life of patients receiving hemodialysis, there are a few limitations, suggesting scope for future research. First, since this study was conducted only in hospitals within some communities, repeated studies with patients in various type or number of communities are needed. Second, to improve the quality of life of patients receiving hemodialysis, a nursing intervention program should be developed, and relevant nurse education should be implemented in the artificial kidney room.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or fal-

sification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors have no conflicts of interest to declare.

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