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Comparison of quality of life (QoL) in patients undergoing hemodialysis and peritoneal dialysis

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Abstract
The growing incidence of chronic kidney disease (CKD) suggests a surge in the number of patients undergoing dialysis and experiencing the problems associated with this treatment, one of which is low quality of life (QoL). The present study was conducted to compare QoL among patients undergoing peritoneal dialysis (PD) and hemodialysis (HD). This descriptive cross-sectional study was conducted among 77 HD patients and 46 PD patients who were admitted to Imam Reza and Ghaem hospitals, Tehran, Iran, in 2018. QoL was assessed using the Short Form (36) Health Survey (SF-36). The resulting data were analyzed using descriptive statistics, independent *t*-test, and ANOVA. Urinary tract infection and income level had a significant impact on QoL. In addition, QoL differed significantly between HD and PD patients, such that PD patients enjoyed a greater QoL score. Similarly, there was a significant difference between HD and PD patients in terms of general health, social functioning, energy and vitality, emotional health, as well as objective and mental aspects of quality of life. In fact, PD patients showed higher scores in all these domains. In addition, bodily pain was higher in HD patients than PD patients. Based on the findings, the overall QoL in PD patients was higher than that of HD patients. Thus, considering the advantages of PD, patients should be encouraged to choose this treatment method

Keywords: Chronic kidney disease, Hemodialysis, Peritoneal dialysis, Quality of life QoL.

Introduction

With the control of infectious diseases over the past decades and the increase in life expectancy, chronic diseases have emerged as a major health problem (1). Among these, chronic kidney failure has a special place as an irreversible defect of renal function with progressive

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deterioration eventually necessitating dialysis or kidney transplantation (2). Patients with end-stage renal disease undergo dialysis to filter their blood (1).

The most common kidney replacement therapies are hemodialysis and peritoneal dialysis. Hemodialysis is the most common dialysis method (3). Although hemodialysis does not cure renal disease and does not compensate for the endocrine and metabolic activities of the kidneys and the patient is exposed to some problems and complications, it prevents the patient from dying and reduces his pain (4). On the other hand, the role of peritoneal dialysis (PD) as a kidney replacement therapy has been proven. Peritoneal dialysis has been widely used in the treatment of renal failure since the 1980s (United States Department of Health, 2006). The acceptance of PD has increased due to its ease of access and cost-effectiveness (5).

Depending on the patient's condition, one of the dialysis methods is selected (3). According to the statistics available in Iran, 49% of dialysis patients undergo transplantation, 48% use hemodialysis, and 3% undergo PD (6).

Chronic kidney disease is one of the diseases that endanger not only physical health but also other aspects of health including the quality of life (7, 8). In renal disease patients, problems caused by deficiencies, lifestyle changes, financial issues, lack of employment, restriction of fluids and food consumption, feeling of powerlessness, lack of control over the disease and treatment, implementation of coercive therapies, restrictions following treatment regimens, change in mental image, and sexual issues impose a heavy burden on patients and their families and ultimately reduce their quality of life (9, 10).

The study of quality of life in chronic diseases, especially renal disease patients, is increasingly becoming a clinically interesting topic (11), and the publication of more than a thousand articles in this area support this argument (12-14). Some studies have even identified quality of life as a strong independent predictor of the likelihood of hospitalization as well as the risk of death in patients undergoing hemodialysis and PD (15, 16)

There have been many studies on the quality of life in patients undergoing hemodialysis and PD, in some of which the quality of life was better in hemodialysis patients, in some peritoneal dialysis has been proven to be superior, and in some there was only a slight difference between the two groups (17). The result of a meta-analysis

of 81 articles showed the relationship between the study location and the type of dialysis (18). Ferreira and Silva Filho (2011) blamed hemodialysis for significant deterioration of the quality of life in chronic kidney disease patients (14).

A study conducted in Greece also showed a lower quality of life in hemodialysis patients (19), while in Brazil patients undergoing hemodialysis and peritoneal dialysis did not differ in different aspects of quality of life (20). In Iran, studies have shown that the quality of life of patients undergoing peritoneal dialysis (21) and kidney transplantation (22) is better than patients undergoing hemodialysis. In patients undergoing PD, the family, as the most important and first source of support, plays an essential role in the acceptance of treatment and makes PD in these patients less worrying, which in turn, improves QoL in these patients (23).

A 2007 meta-analysis showed that there was no significant difference between the quality of life of patients receiving either hemodialysis or peritoneal dialysis (24, 25). In a 2007 study of dialysis patients (644 hemodialysis patients and 408 peritoneal dialysis patients), the quality of life in PD patients was higher than in HD patients (26).

The results of studies are different and indicate the effect of race, economic status, body mass index, nutritional status (15), and cultural context (18) on the quality of life of patients with end-stage kidney disease. The aim of this study was to evaluate and compare the quality of life in HD and PD patients in Tehran Dialysis Center.

Methods

Study population: In this descriptive cross-sectional study, all patients with chronic renal failure admitted to Imam Reza and Ghaem hospitals (Tehran) between April and September, 2018, were chosen as the participants of the study. But some of the research samples were excluded for reasons such as migration, death, and unwillingness to participate in the study. In total, 77 HD patients and 46 PD patients were enrolled in this study. The inclusion criteria included a minimum age of 15 years, minimum of 6 months of dialysis experience, diagnosis of end-stage renal disease, willingness to participate, and giving signed consent form. The exclusion criteria, on the other hand, were active infection in the peritoneum in the last three months and history of kidney transplantation.

Once participants' informed consent was acquired, their clinical information and history were collected by reviewing medical records and filling out a questionnaire. The recorded data included age, gender, marital status, occupation, duration of dialysis, level of education, and income status. HD patients received a regular dialysis program (three times a week), and PD patients underwent a standard CAPD program.

Measurement tools: The standardized Persian version of the Short Form (36) Health Survey (SF-36) questionnaire was utilized to measure QoL in patients. This questionnaire is comprised of eight domains: physical functioning (10 questions), bodily pain (2 questions), general health (5 questions), physical role functioning limitations (4 questions), emotional role functioning limitations (3 questions), social role functioning (2 questions), vitality (4 question), and mental health (5 questions). These domains could be classified into the physical and mental components. The physical component includes physical functioning, limitations because of physical problems, and bodily pain. The mental component is comprised of mental health, social role functioning, and limitations because of emotional problems. The two domains of vitality and general health are covered in both components. Therefore, each of the two components consists of five domains. The total score ranges from 0 to 100, with higher scores indicating a better quality of life.

In Iran, Nejat et al. (2007) translated and standardized SF-36. They confirmed its structural validity based on exploratory factor analysis. The Cronbach's alpha coefficient of the entire scale and its subscales was 0.84. In this study, Cronbach's alpha coefficient was 0.88 for the whole questionnaire and 0.57-0.83 for its subscales, indicating its acceptable reliability.

Statistical analysis: The descriptive data are summarized as mean, standard deviation, and/or percentage. The normality of the data was examined prior to data analysis using the Kolmogorov–Smirnov test. Independent *t*-test and one-way ANOVA were run to analyze the data. All the analyses were performed using SPSS, version 25. A *P*-value of less than 0.05 was considered statistically significant.

Ethical considerations: The study protocol was reviewed and approved by the Ethics Committees of Tehran University of Medical Sciences. Furthermore, all the patients had been knowledgeable of

their rights to refuse or discontinue participation in the study according to the ethical standards.

Results

In this study, 123 (male: 82, female: 41) patients were enrolled, 77 of whom were in the HD group (male: 51 [66.2%], female: 26 [33.8%]) and 46 (male: 31 [67.4%], female: 15 [32.6%]) were in the PD group. The two groups were comparable in terms of demographic characteristics (Table 1). Most patients (43 cases, 36.13%) were within the age range of 51 to 60 years. The level of education in most patients was below high school diploma (47 [40.86%]) followed by high school diploma (46 [38.33%]). The majority of the patients were married (102 [89.47%]) and had 1 to 3 children.

Table 1. The demographics data

Variable	Dimension	Number	Percentage	*P*-value
Gender	Male	82	66.66	0.609
	Female	41	33.33	
Marital Status	Married	102	89.47	0.263
	Single	12	10.52	
Occupation	Employed	68	59.13	0.292
	Unemployed	47	40.86	
Level of Education	Below High School Diploma	48	40	0.147
	High School Diploma	46	38.33	
	Associate Degree	8	6.66	
	Bachelor's Degree	12	10	
	Master's Degree	6	5	
	PhD.	2	1.66	
Age (Year)	15-20	2	1.68	0.394
	26-30	10	8.40	
	31-35	2	1.68	
	36-40	14	11.76	
	41-45	13	10.92	
	46-50	10	8.40	
	51-60	43	36.13	
	61-70	17	14.28	
	Above 70	8	6.72	
Number of Children	1	14	18.66	0.123
	2	19	25.33	
	3	19	25.33	
	4	8	10.66	
	5	5	6.66	
	6	8	10.66	
	8	2	2.66	
Income Status	Less than 5000,000 rials	10	11.23	0.011

5000,000-10,000,000 rials	29	32.58
10,000,000-105,000,000 rials	20	22.47
105,000,000-20,000,000 rials	10	11.23
20,000,000-205,000,000 rials	8	8.98
205,000,000-30,000,000 rials	6	6.74
Above 30,000,000 rials	6	6.74

The clinical information of patients shows in table 2. The mostly patients were no have diabetes 98 (79.67%), and urinary tract infection 101 (84.87%). But blood pressure was show in mostly patients 89 (72.35%).

Table 2. The clinical information among dialysis patients

Variable		N	%	P-Value
Diabetes	No	98	79.67	0.501
	Yes	25	20.32	
Blood Pressure	No	34	27.64	0.987
	Yes	89	72.35	
Urinary Tract Infection	No	101	84.87	0.003
	Yes	18	15.12	

According to Table 3, comparison of quality of life in HD and PD patients shows that the total QoL score in PD patients was significantly higher than HD patients ($p<0.05$). Also, the scores of general health, social functioning, vitality, emotional health, and objective quality of life differed significantly between HD and PD patients, with the latter group showing greater scores in all of these domains ($p<0.05$). A significant difference was also observed between the two groups in terms of bodily pain, such that HD patients experienced a greater degree of bodily pain than did PD patients ($p<0.05$). The two groups were not significantly different with regards to physical functioning limitations and mental health ($p>0.05$).

Table 3. Comparison of quality of life in hemodialysis and peritoneal dialysis patients

Variable	Peritoneal dialysis		Hemodialysis		T	*P*-value
	Mean	SD	Mean	SD		
Physical functioning	58.86	12.74	49.93	13.82	3.56	0.001
Bodily pain	51.63	23.51	61.85	22.57	2.39	0.018
General health	54.02	12.45	47.92	11.42	2.77	0.006
Limitations because of physical problems	35.19	18.70	32.87	19.85	0.64	0.523
Confines because of Mental disorder,	15.04	18.53	20.78	19.71	1.54	0.126
Social Functioning	44.29	19.31	29.38	20.15	4.03	0.001
Vitality	47.55	11.29	35.23	11.6	5.76	0.001
Mental health	43.26	11.36	36.82	11.41	3.03	0.003
Objective quality of life	54.61	7.68	46.14	8.76	5.43	0.001
Mental quality of life	52.52	7.39	43.73	7.30	6.43	0.001
Total score of QoL	55.29	6.52	47.10	6.43	6.8	0.001

The statistical analyses showed no significant relationship between total score of QoL and gender and occupation ($p>0.05$). Similarly, level educational, age, number of children, diabetes, hypertension, and time elapsed since disease onset were not significantly associated with total score of QoL ($p> 0.05$). However, the income status of dialysis patients significantly influenced their total score of QoL, such that total score of QoL improved as income was higher ($F=2.97$, $p> 0.05$). What's more, urinary tract infection had a significant negative impact on the total score of QoL in these patients ($t=3.04$, $p<0.05$).

Discussion and Conclusion

The findings of this study suggest that general health, social functioning, vitality, emotional health, objective and mental quality of life, and the overall quality of life are greater in PD patients. In terms of bodily pain, however, hemodialysis patients were in a better condition. Meanwhile, there was no significant difference between the two groups with respect to physical functioning limitation and mental problems.

Dialysis causes a wide range of changes in patients' lives that affect their mental and social functioning and quality of life (27). Dąbrowska-Bender's research (2018) is one of the most important works regarding the quality of life in dialysis patients (28). According to that study, peritoneal dialysis patients had a better status in terms of bodily pain, physical functioning, and limitations due to emotional functioning, while hemodialysis patients had higher scores solely in

terms of vitality (21, 29, 30). The results of studies by Zeraati et al. (2010) and Ferreira et al. (2011) also demonstrated that QoL was higher in PD patients than in HD patients (21, 31). Merkus et al. (1997) observed that PD patients had higher QoL scores in terms of bodily pain, physical functioning, limitation due to emotional functioning, and mental health as compared to HD patients (32).

Zhang et al. (2007) evaluated QoL in 1062 dialysis patients using SF-36. The QoL scores in bodily pain, social functioning, limitation due to emotional functioning, and general health were better in PD patients, whereas HD patients scored higher in terms of physical functioning and limitation due to physical functioning (26). Mao et al. (2008) studying 244 patients undergoing dialysis reported higher levels of QoL among PD patients with respect to bodily pain, vitality, physical functioning, limitations due to physical and emotional problems, and mental health; nevertheless, this difference was significant only in the two domains of bodily pain and limitation due to emotional problems (33). In the present study, the mean scores of general health, social functioning, vitality, objective and mental quality of life, and emotional health in PD patients was significantly higher than those of HD patients. This may be associated with the HD complications and the stressful environment of hemodialysis ward (31, 34). In addition, PD patients assume a more active role in various aspects of their treatment process compared to HD patients. This more active participation in the treatment and care process is due to the greater awareness-raising of these individuals before the onset of dialysis (35).

The strong bond between couples is the primary source of social support (36). Rambod et al. (37) and Zhang et al. (26) demonstrated that married people have a higher level of perceived social support than non-married people; therefore, they enjoy a better quality of life. However, the present study did not show a significant relationship between QoL and marital status, which may be due to the fact that most patients were married and the frequency of single, divorced, or widowed patients was low. We also found no significant relationship between patients' age and QoL. This is in contrast to the results of some previous studies which have found an inverse relationship between age and quality of life (20).

Occupational status has been reported to be one of the main factors affecting QOL. Workplace discriminations or job loss because of repeated hemodialysis, difficulty in finding a suitable job, and career interruptions have been shown to have an impact on the income status of these patients. However, in this study, occupational status and QoL did not show a significant relationship. This is in line with the results reported by Mercus et al. (32). Given that 41 patients were unemployed or disabled in the present study, this lack of a significant relationship is justifiable.

In addition, we did not find a significant correlation between QoL and level of education, which could be due to the fact that our patient were not diverse in this regard. However, it should be noted that knowledge and education increase a person's potential ability to deal with disturbances and stressors and cause the patient to succeed in performing self-care behavior, thus affecting the patient's quality of life (38). Also, people with higher levels of education establish more social relationships and access information more easily, which can improve adaption with the disease (39).

The results of this study showed that the income level of dialysis patients significantly influenced their total QoL score, such that total score of QoL improved as income was higher. Smaeli et al. reported the low income in dialysis patients directly affects the quality of life during treatment (40). Poor economic status does not allow patient to complete treatment programs, which reduces the QoL in this patient.

In terms of gender, the present study found that male patients had a higher QoL. Similarly, in some other studies performed in North America (41) and Europe (42), men reported a higher QoL than women did. This could be related to the higher resilience and tolerance of men than women.

Unlike most other studies (26, 43), in this research the mean QoL in diabetic patients was not significantly different from that of non-diabetic individuals. Additionally, QoL did not significantly differ between patients with hypertension and those without hypertension. This could be because of the relatively low number of patients with hypertension. Nonetheless, we noted that patients with urinary tract infections had lower QoL scores, which may be related to the fact that urinary tract infection clearly reminds the patient of his/her disease

Considering that QoL in dialysis patients is not generally high, it is essential to identify the level of QoL of these patients and adopt

different strategies to improve it. Furthermore, the healthcare system along with its policy-makers and directors should take practical measures to promote the well-being of these individuals by paying attention to financial and educational issues such as nutrition and self-care methods, deploying social workers, incentivizing physicians and nurses as well as other healthcare providers, paying more attention to physical, mental, and emotional requirements of patients, improving the treatment environment, and giving appropriate instructions to patients' families. Future studies are suggested to examine the relationship between various domains of QoL and demographic characteristics of patients undergoing dialysis.

One of the limitations of this study was its limited sample size as we could only access two centers for sampling. Another limitation is that due to the cross-sectional design of this study, long-term effects of current dialysis treatment on QoL and mental health cannot be understood. Future longitudinal studies with larger sample sizes are recommended.

The findings of this study establish that the overall QoL along with most of its domains including general health, social functioning, vitality, emotional health, and objective and mental quality of life are better in PD patients than in those undergoing HD. In addition, PD patients experience lower degrees of bodily pain than do patients receiving HD. However, a limited percentage of patients choose PD for their treatment. Given the superiority of PD in most areas of QoL and the shortage of hemodialysis centers, it is strongly recommended to encourage patients to use PD.

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