

# Comparison of Quality of Life in Iranian Hemodialysis and Peritoneal Dialysis Patients

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## Abstract

**Background:** Patients' quality of life is affected by chronic diseases, including kidney failure. Hemodialysis and peritoneal dialysis are an important renal replacement methods in these patients.

**Objectives:** In this study, the quality of life in Iranian hemodialysis and peritoneal dialysis patients was compared.

**Methods:** This cross-sectional study was conducted between April and September 2021 on 84 hemodialysis and 31 peritoneal dialysis patients in a teaching hospital in Kerman, Iran. The data collection tool was the standard KDQOL-SF™ questionnaire. This questionnaire had 78 questions and measured the general and specific aspects of patients' quality of life. Data were compare between two groups by SPSS version 18 statistical software.

**Results:** The mean age of peritoneal dialysis and hemodialysis patients was  $52.1 \pm 18.8$  and  $56.8 \pm 15.6$  years, respectively. 54.8% of peritoneal dialysis patients and 61.9% of hemodialysis patients were men. In most dimensions, the score of quality of life of patients treated with peritoneal dialysis was better than other group. The most difference in specific dimensions of quality of life was related to the effect of kidney disease in peritoneal patients ( $69.97 \pm 24.46$ ) and hemodialysis patients ( $54.46 \pm 23.55$ ) ( $P \leq 0.05$ ). The most difference in general dimensions of quality of life was related to pain in peritoneal patients ( $59.52 \pm 23.55$ ) and hemodialysis patients ( $43.46 \pm 28.58$ ) ( $P \leq 0.05$ ).

**Conclusion:** Considering the better quality of life in peritoneal patients, it is recommended that physicians and nurses encourage patients to use peritoneal dialysis methods.

**Keywords:** Chronic Kidney Disease, Quality of Life, Peritoneal Dialysis, Hemodialysis.

## Introduction

Chronic renal failure is a progressive and irreversible disorder in which the kidney's ability to eliminate metabolic wastes and maintain fluid and electrolytes is lost, leading to uremia.<sup>1</sup> This is one of the common diseases that affects 2-3% of the world's population.<sup>2</sup> At the end of 2016, the prevalence of chronic renal failure in different countries varied from less than 100 people to more than 2000 people per million. Its highest prevalence was in Taiwan with 3500 people per million; then in Japan with 2,720 people per million and in the United States with 2,180 people per million, and the mean in the countries of the European Union was 2,160 people per

million. The mean prevalence of chronic renal failure in Iran is 680 people per million and higher than the global average of 510 people per million.<sup>3</sup>

Currently, a kidney is transplanted to the patient for definitive treatment of the disease, but if the patient does not succeed in receiving a kidney for any reason, patients can be saved from death by using dialysis. The process of dialysis is the use of an artificial kidney device to remove waste materials from the blood, which is used to purify the blood of patients suffering from kidney failure and is performed in various ways such as hemodialysis and peritoneal dialysis.<sup>4</sup> Hemodialysis is performed in hospital centers with the presence of medical staff. In this method,

the patient's blood is introduced into a device and after purification, it is placed in the flow of the patient's body.<sup>5</sup> Peritoneal dialysis is also performed in most cases by the patient at home after receiving the necessary training. In peritoneal dialysis, the abdominal membrane or peritoneal membrane is used for blood purification with a device that is embedded by a surgery inside the patient's abdomen. These two types of dialysis have differences in their use, which the physicians choose based on the examination and history of the patient.<sup>5</sup>

According to the latest report, 95% of patients prefer the hemodialysis method and the rest prefer the peritoneal method.<sup>3</sup> Patients who are treated with these methods, in spite of the increase in life expectancy, suffer from various problems that ultimately lead to a decrease in their quality of life.<sup>6,7</sup> In these patients, the presence of mental and physical disorders can play a significant role in the low quality of life, because although dialysis allows these patients to survive longer, it only leads to a reduction in the symptoms of advanced chronic kidney failure, but does not completely replace the kidney, and as a result, the patient suffers some problems and complications.<sup>8</sup>

In the previous studies, it has been confirmed that the quality of life in dialysis patients is lower than that of healthy people,<sup>9</sup> but the quality of life of these two groups in different geographical regions and cultural situations has been reported in some different dimensions.<sup>10</sup> The results of the studies conducted in South Korea and Malaysia indicate that the quality of life in peritoneal dialysis patients is better than hemodialysis patients, but the result of another study in Brazil considers the quality of life of these two categories of patients was almost equal.<sup>11-13</sup> Different results have been obtained in Iran. In a study by Zeraati et al., in Mashhad, the quality of life of peritoneal dialysis patients was better than other group,<sup>14</sup> but in AghaKhani's study conducted in Urmia, it was found that hemodialysis patients have a better quality of life than peritoneal patients.<sup>15</sup>

Considering that obtaining data on the quality of life of these two groups of patients can be used to choose the appropriate treatment method by the patient and the provider, and also that the results of previous studies are different, conducting research in this regard seemed

necessary. For this reason, Kerman city was studied as a health center in the southeast of Iran.

## Objectives

Therefore, in this study, the quality of life in Iranian hemodialysis and peritoneal dialysis patients was compared.

## Methods

This cross-sectional research was conducted between April and September 2021 on 92 hemodialysis and 37 peritoneal dialysis patients at the Renal Disease Treatment Center in Kerman (Shafa Hospital), Iran. The inclusion criteria were dialysis treatment for at least 3 months and willingness to participate in the study. The exclusion criteria were patients' unwillingness to continue study. Due to the limited number of patients, to increase the accuracy of the study, all these patients were studied by census. Finally, 84 of the hemodialysis and 31 of the peritoneal patients completed the questionnaire. The reason for the lower response rate of patients treated with peritoneal dialysis was the less access of researchers to them because they went through their treatment process at home and visited the hospital monthly.

To collecting data, the KDQOL-SF™ standard questionnaire was used. This questionnaire was designed in 1997 by Research and Development Institute. This questionnaire consists of two parts: the first part contains the patient's demographic data (age, gender, marital status, type of insurance, employment status, and the reason of the disease from the patient's point of view) and the second part contains 24 questions (78 items) which general dimensions (8 dimensions) and specific dimensions (11 dimensions) measure the quality of life of patients.<sup>16</sup> The general dimensions are physical function (10 items), physical role (4 items), pain (2 items), general health (5 items), vitality (5 items), emotional role (3 items), social function (2 item), energy/fatigue (4 items). Specific dimensions are symptoms and problems (12 items), effect of kidney disease (8 items), burden of kidney disease (4 items), work status (2 items), cognitive function (3 items), quality of social interactions (3 items), sexual performance (2 items), sleep (4 items), social support (2

items), encouragement of dialysis department staff (2 items), patient satisfaction (1 item). The minimum and maximum score in different dimensions as well as the whole questionnaire is 0 and 100, respectively. A score of 0 means the worst quality of life and 100 indicates the best quality of life for patients.

The validity of this questionnaire was approved by experts in USA and the Cronbach's alpha coefficient of the entire questionnaire was 0.84.<sup>16</sup> Yakaninejad et al., confirmed the reliability and validity of this questionnaire for use in Iranian society. The validity of this questionnaire was confirmed by experts. The minimum and maximum Cronbach's alpha coefficients for different dimensions of this questionnaire were 0.71 and 0.93.<sup>17</sup>

The questionnaire was completed by a trained interviewer who was familiar with the conditions and mood of patients. In this way, coordination was made with the supervisor of the dialysis department and one of the nurses was given the necessary training to give the necessary explanations to the patients and help them in completing the questionnaire if needed. Some of the questionnaires were completed at the same time of the patient's visit with the help of the nurse, and some of the patients took the questionnaire home with them and delivered it to the department in the next visits.

### Statistical analysis

Independent t-test, chi-square and Fisher's exact test were used to describe the data. Also, in order to compare the structures of quality of life between the two groups by controlling demographic variables, multivariate analysis of covariance (MANCOVA) and multiple linear regression were used. All statistical analyses were performed with SPSS (version 18.0, SPSS Inc, Chicago, IL, USA). A "P-value" less than 0.05 was considered significant.

### Ethical considerations

This research was registered in Kerman Medical Sciences Research Center with ethics code IR.KMU.REC.1394.355. The present study did not interfere with the process of diagnosis and treatment of patients and all participants signed an informed consent form. The patients were assured that their data will remain completely confidential.

## Results

Out of 115 patients participating in this study, 84 were on hemodialysis and 31 were on peritoneal dialysis. 61.9% of hemodialysis patients and 54.8% of peritoneal dialysis patients were male. The mean age in hemodialysis and peritoneal dialysis patients were  $56.8 \pm 15.6$  and  $52.1 \pm 18.8$  years, respectively. 21.4% (n=18) of hemodialysis patients and 16.1% (n=5) of peritoneal dialysis patients were single. 45.2% (n=35) of hemodialysis patients and 48.4% (n=15) of peritoneal dialysis patients had educational qualifications below diploma. 40.5% (n=34) of hemodialysis patients considered blood pressure as the reason of their disease. While 32.3% (n=10) of peritoneal patients considered blood pressure as the reason of their disease. 35.7% (n=30) of hemodialysis patients were retired and 29% (n=9) of peritoneal dialysis patients were housewives (Table-1).

Using MANCOVA analysis, there is a significant difference between the specific dimensions of quality of life in the two groups ( $P=0.002$  and  $F=9.63$ ). Next, in order to determine which dimensions have significant differences between the two groups, linear regression (which is equivalent to ANCOVA) were used by controlling all demographic variables (age, gender, marital status, education, insurance status, employment status and reason of illness). The regression results showed that among the 11 specific dimensions of quality of life, only the dimension of social support in patients treated with hemodialysis ( $74.2 \pm 26.3$ ) and in patients treated with peritoneal dialysis ( $74.2 \pm 26.8$ ) are almost equal in both groups. Quality of life in three dimensions of symptoms and problems, effect of kidney disease, encouragement of dialysis staff between two groups of hemodialysis and peritoneal dialysis patients was statistically significant. The quality of life of these two groups of patients differed in seven dimensions, but this difference was not statistically significant. The highest quality of life score in hemodialysis patients ( $86.46 \pm 15.79$ ) and in peritoneal dialysis patients ( $92.34 \pm 12.36$ ) was related to the encouragement of dialysis staff. The lowest quality of life score in hemodialysis patients ( $30.36 \pm 37.24$ ) and peritoneal patients ( $25.81 \pm 28.49$ ) was related to the work status (Table-2).

**Table-1.** Demographic characteristics of patients treated by hemodialysis (n=84) and peritoneal dialysis (n=31)

		Peritoneal dialysis (n=31)	Hemodialysis (n=84)	P value
Age		52.1±18.8	56.8±15.6	0.17
Sex	Male	17 (54.8)	52 (61.9)	0.49
	Female	14 (45.2)	32 (38.1)	
Marital status	Single	5 (16.1)	18 (21.4)	0.53
	Married	26 (83.9)	66 (78.6)	
Education	Illiterate	3 (9.7)	12 (14.3)	0.18
	High school	15 (48.4)	38 (45.2)	
	Diploma	13 (41.9)	25 (29.8)	
	University graduated	0	9 (10.7)	
Reason of kidney disease	I do not know	7 (22.5)	11 (13.1)	0.56
	High blood pressure	10 (32.3)	34 (40.5)	
	Diabetes	10 (32.3)	27 (32.1)	
	Polycystic kidney disease	2 (6.5)	2 (2.4)	
	Chronic glomerulonephritis	1 (3.2)	3 (3.6)	
	Other	1 (3.2)	7 (8.3)	
Job status	Employed	5 (16.1)	19 (22.6)	0.28
	Retired	6 (19.4)	30 (35.7)	
	Disabled	7 (22.6)	13 (15.5)	
	Housewife	9 (29)	14 (16.7)	
	Other	4 (12.9)	8 (9.5)	

**Table-2.** Comparison of the mean score of specific dimensions of quality of life in patients treated with hemodialysis (n=84) and peritoneal dialysis (n=31)

Dimension	Group	Mean±SD	Adjusted regression coefficients (95% confidence interval)	P value
Symptoms and problems	Hemodialysis (n=84)	59.5±22.7	11.12 (2.58, 19.66)	0.011
	Peritoneal dialysis (n=31)	70.4±22.3		
Effect of kidney disease	Hemodialysis (n=84)	54.5±23.5	12.04 (3.1, 20.57)	0.006
	Peritoneal dialysis (n=31)	70±24.5		
Burden of kidney disease	Hemodialysis (n=84)	36.4±37.2	4.36 (-5.53, 14.25)	0.39
	Peritoneal dialysis (n=31)	43.1±27.9		
Job status	Hemodialysis (n=84)	30.4±37.2	0.16 (-12.54, 12.86)	0.98
	Peritoneal dialysis (n=31)	25.8±28.5		
Cognitive function	Hemodialysis (n=84)	63.2±24.8	1.54 (-7.9, 10.98)	0.75
	Peritoneal dialysis (n=31)	69±21.8		
Quality of social interactions	Hemodialysis (n=84)	67.7±20.7	4.8 (-3.4, 12.95)	0.25
	Peritoneal dialysis (n=31)	70.3±18		
Sexual function	Hemodialysis (n=84)	62.1±40.4	-6.35 (-30.47, 17.76)	0.61
	Peritoneal dialysis (n=31)	70.5±27.5		
Sleep	Hemodialysis (n=84)	54.8±23.6	4.75 (-4.35, 13.86)	0.31
	Peritoneal dialysis (n=31)	60.2±19.4		
Social support	Hemodialysis (n=84)	74.2±26.3	2.18 (-8.5, 12.87)	0.69
	Peritoneal dialysis (n=31)	74.2±26.8		
Encouraging dialysis department staff	Hemodialysis (n=84)	86.5±15.8	6.30 (0.28, 12.32)	0.04
	Peritoneal dialysis (n=31)	92.3±12.4		
Patient satisfaction	Hemodialysis (n=84)	57.1±25.1	-3.87 (-14.51, 6.94)	0.49
	Peritoneal dialysis (n=31)	54.3±24.3		

Using MANCOVA analysis, it can be seen that there is a significant difference between the general dimensions of quality of life in the two groups ( $P=0.002$  and  $F=10.27$ ). Next, in order to determine which dimensions have significant differences between the two groups, linear regression (which is equivalent to ANCOVA) were used by controlling all demographic variables (age, gender, marital status, education, insurance status, employment status and reason of illness). The regression results showed that among the 8 general dimensions of quality of life, the mean quality of life in the two groups of hemodialysis patients ( $44.52\pm26.10$ ) and peritoneal dialysis patients ( $44.68\pm26.23$ ) were almost equal in the dimension of physical performance. The quality of life of hemodialysis and peritoneal dialysis patients was statistically significant in terms of physical role, pain, emotional role, general health and social function. Despite that the mean quality of life in these two groups of patients was different in terms of vitality and energy/fatigue, this

difference was not statistically significant. The highest quality of life score in hemodialysis patients ( $55.65\pm27.63$ ) and peritoneal dialysis patients ( $73.66\pm24.10$ ) was related to the emotional role. The lowest quality of life score of hemodialysis patients ( $21.43\pm27.75$ ) and peritoneal dialysis ( $38.71\pm29.47$ ) was related to the physical role (Table-3).

It should be mentioned that the Variance Inflation Index (VIF) for all regressions performed and for each variable in the regression model was between 1 and 2 and is lower than the cut-off value of 10, therefore, co-linearity between the variables is not seen. Also, the skewness and kurtosis indices of all the residuals of the fitted regression models are between -1 and 1, which is acceptable for the assumption of normality. All Durbin-Watson index values are close to 2 and the independence of the errors is confirmed. Therefore, the important presuppositions of regression for comparing two groups with the control of other variables are established and acceptable.

**Table-3.** Comparison of the mean scores of general aspects of quality of life in patients treated with hemodialysis (n=84) and peritoneal dialysis (n=31)

Dimension	Group	Mean $\pm$ SD	Adjusted regression coefficients (95% confidence interval)	P value
<b>Physical performance</b>	hemodialysis (n=84)	44.52 $\pm$ 26.1	0.35 (-10.1, 10.76)	0.95
	peritoneal dialysis (n=31)	44.68 $\pm$ 26.23		
<b>Role—Physical</b>	hemodialysis (n=84)	21.43 $\pm$ 27.75	18.86 (7.1, 30.63)	0.02
	peritoneal dialysis (n=31)	38.71 $\pm$ 29.47		
<b>Pain</b>	hemodialysis (n=84)	46.43 $\pm$ 28.58	15.31 (4.38, 26.23)	0.006
	peritoneal dialysis (n=31)	59.52 $\pm$ 23.55		
<b>General health</b>	hemodialysis (n=84)	42.56 $\pm$ 15.34	7.51 (1.37, 13.66)	0.017
	peritoneal dialysis (n=31)	50 $\pm$ 15.66		
<b>Vitality</b>	hemodialysis (n=84)	52.57 $\pm$ 22.22	5.62 (-2.7, 13.94)	0.18
	peritoneal dialysis (n=31)	57.81 $\pm$ 18.21		
<b>Role emotional</b>	hemodialysis (n=84)	55.65 $\pm$ 27.63	13.56 (3.7, 23.41)	0.007
	peritoneal dialysis (n=31)	73.66 $\pm$ 24.1		
<b>Social Performance</b>	hemodialysis (n=84)	52.23 $\pm$ 25.01	11.63 (1.84, 21.42)	0.02
	peritoneal dialysis (n=31)	62.9 $\pm$ 20.8		
<b>Energy/fatigue</b>	hemodialysis (n=84)	43.33 $\pm$ 20.7	6.77 (-1.67, 15.21)	0.12
	peritoneal dialysis (n=31)	29.84 $\pm$ 21.54		

## Discussion

Renal replacement treatments such as hemodialysis and peritoneal dialysis can greatly improve the quality of life of patients. Quality of life is an important outcome after starting renal replacement therapy.<sup>18</sup> Therefore, it is

necessary to examine the quality of life of kidney failure patients and take the necessary measures to improve the living conditions of these patients.

The results of the present study showed that hemodialysis patients had a poor quality of life than



peritoneal dialysis patients, which was consistent with the results of Amirkhani et al., in Iran<sup>19</sup> and Sathvik et al., in India.<sup>20</sup> However, the results of De Abreu et al.,'s study in Brazil<sup>21</sup> showed that peritoneal dialysis patients, despite being older and having more diabetic diseases, had the same quality of life as hemodialysis patients in most aspects related to health. Probably, the worse quality of life of hemodialysis patients in the present study can be justified to a large extent due to their older age and problems such as frequent visits and dependence on dialysis machines.

The results show that peritoneal dialysis patients have a better quality of life than hemodialysis patients in most of the specific dimensions, but these results were statistically significant only in the three dimensions of symptoms and problems, effects of kidney disease and encouragement of dialysis staff. Among these 3 dimensions, the favorable condition of the dimensions of symptoms-problems and effects of kidney disease in peritoneal dialysis patients is probably due to the fact that they visit treatment departments less often and actually interact and connect less devices to them, because hemodialysis patients are forced to be connected to the device 3 times and each time for 4 hours, which can cause some side effects and cause pain in these patients. The low score of the pain dimension in hemodialysis patients proves this claim. Regarding the higher motivation index of the dialysis staff in peritoneal patients, perhaps one of the reasons is the special treatment conditions of these patients, which means that because these patients are less dependent on the medical staff and are largely responsible for their own care, the caregivers are probably more motivated to train these patients, they had to be able to rely on themselves. Study results de Abreu et al., showed in Brazil that peritoneal patients have a higher score than hemodialysis patients in this dimension.<sup>21</sup>

In the present study, almost both groups had the same social support, but the results of Czyżewski's study, which used this tool, showed that peritoneal patients had more social support.<sup>22</sup> But this index in Okpechi's study et al., even though it was not significant, indicated that hemodialysis patients have better social support to some extent.<sup>23</sup>

Only in two dimensions of specific dimensions, hemodialysis patients had relatively better scores than peritoneal patients. One of these dimensions was work status, which, however, was not statistically significant compared to peritoneal patients. This can be seen to a great extent from the frequency of answers given in Table-1. The results of a similar study conducted by Czyżewski et al., showed that hemodialysis patients have a better score than peritoneal patients in terms of the mentioned dimension.<sup>22</sup> However, in the study of Fructuoso et al., the score of quality of life in peritoneal patients was much better than hemodialysis patients in terms of this dimension. Hemodialysis patients had a better score than peritoneal patients in terms of patient satisfaction.<sup>24</sup> However, the results of a study conducted in Brazil showed that peritoneal patients had a better score than hemodialysis patients in this dimension despite being older.<sup>21</sup> Probably, one of the reasons for the difference between that study and the present study is the larger statistical population and also the cultural differences between the two societies.

Among the general dimensions, only in the dimension of physical performance, the two groups of patients had almost the same quality of life. And in other dimensions, the quality of life of peritoneal patients was higher, but only in 5 dimensions of social function, physical role, pain, general health and emotional role, this difference was statistically significant. Czyżewski et al.,<sup>22</sup> and Fructuoso et al.,<sup>24</sup> concluded that the quality of life of peritoneal patients is better than hemodialysis patients in these dimensions. But in a similar study conducted by Okpechi et al.,<sup>23</sup> it was found that there is no significant difference between the dimensions in Table 3. Since patients' assessment of their quality of life depends on their personality, cultural, religious and social characteristics and previous studies were conducted in different geographical, cultural and social areas, the observed differences can be justified to some extent.

In a similar study carried out by Noshad et al., using a questionnaire (GHQ-28), they concluded that the survival and quality of life of peritoneal dialysis patients was better than that of hemodialysis patients, but despite this, the survival and mortality of hemodialysis diabetic patients

was better than that of peritoneal dialysis patients.<sup>25</sup>

Despite the fact that the result of the present study shows that peritoneal patients have a better quality of life than hemodialysis patients, as well as the simplicity, convenience and low cost of peritoneal dialysis, many patients are treated by hemodialysis. According to statistics, 95% of patients in Iran are treated by hemodialysis and only the remaining 5% are treated by the peritoneal method. Probably the most important reasons for choosing the hemodialysis method are the frequency of hemodialysis centers, the convenience and mastery of physicians in the hemodialysis method, and the risk of peritonitis in peritoneal dialysis.<sup>26</sup> It is recommended to provide the necessary facilities and support to encourage patients to undergo peritoneal dialysis.

One of the policies that has been adopted in many European countries is to employ psychologists in the dialysis team to increase the quality of life of patients.<sup>27</sup> Since some of the factors affecting the quality of life of dialysis patients are psychological issues, psychologists can help increase their quality of life by establishing a friendly relationship with patients and psychoanalyzing them. It is recommended to use these specialists in Iranian dialysis centers so that they can relieve the pain of patients.

The high number of questions in the questionnaire, as well as the inappropriate condition of some patients on the visit day reasond the completion of the questionnaire to be postponed to the next visit day.

## Conclusions

Considering the higher quality of life in peritoneal patients, it is suggested that the providers, while providing the necessary training to the patients and considering their conditions, encourage susceptible patients to perform peritoneal dialysis. It is recommended that if for any reason patients or providers prefer to use the hemodialysis method, the necessary facilities should be provided for them so that the patients feel better about the treatment. Also, considering that the patient spends most of the time at home, it is better to give the necessary training to the family members of the patients to treat them properly.

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## Competing interests

The authors declare that they have no competing interests.

## Abbreviations

Multivariate analysis of covariance: MANCOVA;  
Variance Inflation Index: VIF;

## Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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## Availability of data and materials

The data used in this study are available from the corresponding author on request.

## Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval (IR.KMU.REC.1394.355) was obtained. The present study did not interfere with the process of diagnosis and treatment of patients and all participants signed an informed consent form.

## Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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