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Health-related Quality of life in Patients on Hemodialysis Compared to Peritoneal Dialysis: A cross-sectional Study

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Abstract

Background & Objective: Health-related quality of life (HRQoL) in patients with chronic renal diseases is an important factor for physicians to select a dialysis modality. The present study aimed to compare the HRQoL in hemodialysis (HD) and peritoneal dialysis (PD) patients.

Materials & Methods: In this cross-sectional study, a sample of HD patients and a sample of age- and sex-matched PD patients with at least six months dialysis were recruited. Then, the quality of life was assessed using the Short Form Health survey (SF-36). Demographic and disease-related information was also recorded. Then, data were analyzed using the SPSS software (ver. 21).

Results: Totally, 172 HD patients and 86 age- and sex-matched PD controls were entered into the study. Overall the PD patients had more dialysis per week ($P < 0.001$). Comparing quality of life between two groups showed significant differences in physical functioning, role-physical, role-emotional and physical component summary observed ($P < 0.05$). In addition, role physical in HD patients and bodily pain in PD were the worst and best dimensions of quality of life, respectively.

Conclusion: The findings suggest that patients undergoing peritoneal dialysis had a better quality of life in most measures. It seems that we need to educate and encourage patients to choose peritoneal dialysis in order to enjoy a better quality of life.

Keywords: Hemodialysis, Peritoneal dialysis, Health-related quality of life, End Stage Renal Diseases, The Short Form Health survey (SF-36)

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Introduction

Modern societies comprise a large proportion of elderly people, thereby resulting in an increase in the incidence and duration of chronic illnesses (1). Chronic kidney disease and end-stage renal disease (ESRD) are growing public health problems worldwide (1). ESRD is a severe and irreversible impairment in kidney function, resulting in inability of the body to maintain fluid, electrolyte balance and metabolism (2). The prevalence of chronic kidney disease is about 1 in 10 adults and it is the cause of millions of premature deaths. In recent decades, it has been identified as the third leading cause of death globally and is predicted to be the fifth most common cause of years of life

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lost due to premature mortality by 2040 (3, 4).

In 1949, the World Health Organization (WHO) noted that health is "a state of complete physical, mental, and social well-being and not merely an absence of disease and infirmity" (5). Because chronic diseases impact health-related quality of life (HRQoL), they are key outcome measures in disease management (6, 7).

HRQoL includes assessing one's health status, healthcare status, and activities that improve one's health so that one can pursue one's life goals (8). There is considerable agreement that HRQoL is a multidimensional concept that includes functional status and well-being related to physical, emotional, mental, and social health, as well as symptoms of illness or health status and treatment side effects (9, 10). It is believed that quality of life (QoL) is an important criterion that can be used to demonstrate the effectiveness of the healthcare and predict the possible occurrence of disability and death. Evaluating the QoL helps to assess the patient's problem (11), aids the treatment and supportive care, and can determine the predictive factors of a sense of well-being (12).

Patients with ESRD require renal replacement therapy (RRT) including three treatment methods: hemodialysis (HD), peritoneal dialysis (PD), and kidney transplantation (13). Patients can perform PD at home or in any clean setting, whereas HD is often carried out three times a week in outpatient dialysis centers. Patients who receive PD report superior HRQoL outcomes and greater autonomy (14).

There are major differences between hemodialysis (HD), which is usually performed in a hospital or daycare center, and peritoneal dialysis (PD), which is usually performed at home. For instance, HD must be done three times per week with each session lasting 4 hours. However, peritoneal dialysis can be performed at home using two systems: 1) continuous ambulatory PD with four exchanges a day and 2) continuous cyclic PD with exchanges occurring at night for 8-9 hours (15).

Evidence suggests that this type of therapeutic interventions causes changes in the quality of life of patients with kidney disease. These therapies, however, are associated with stressful factors such as psychological and social factors, and the sense of insecurity of the future is often a disconcerting issue to the patients. Therefore, the quality of life of these people is of considerable importance (16, 17).

Problems of deprivations, changing lifestyle, unemployment, restrictions in specific food and fluid intake change the patients' lives and ultimately reduce their quality of life (18). In this situation, promoting the quality life is the basic principle and goal of health care. Currently, patients undergoing hemodialysis require increase in their quality of life, besides the dialysis which increases their life span (19, 20). In order to achieve this demand, it is essential to invest on the field of social, physical and psychological protection (17).

Some studies consider assessing the quality of life as a strong independent predictor for estimating the risk of hospitalization and even death in patients undergoing hemodialysis and peritoneal dialysis (19, 21).

Several studies have been conducted on patients with ESRD undergoing renal replacement therapy to compare treatment modalities and their effects on HRQoL. The results of these studies have been diverse. Some of these studies have reported that HRQoL is better in PD or HD, while others have found no significant difference in HRQoL between HD and PD (4, 7, 22-26). Studies conducted in Iran also show different results in the QoL of the two groups of patients receiving HD and PD (27, 28). Existing international evidence suggests that HD has the highest cost, while kidney transplantation and PD have the lowest cost among kidney replacement therapy modalities (29-34). The results of a new research comparing the psychological distress of patients undergoing PD and HD during the COVID-19 pandemic revealed that patients undergoing HD had more severe psychological distress symptoms than PD patients (24).

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The analysis of the QoL of patients on HD and PD has not led to a unanimous conclusion, and this issue remains controversial. Thus, further studies on this subject are necessary, on the other hand considering Iran's policy where patients on hemodialysis are driven to peritoneal dialysis, the present study is aimed at comparing the quality of life in patients with renal failure under hemodialysis and peritoneal dialysis in dialysis centers of Shiraz and Isfahan, since the knowledge of quality of life of these patients is a contributing factor in the selection of the therapy.

It has been reported that although global QoL levels are comparable between the two treatment regimens, there are treatment-related differences in dialysis-specific aspects of QoL (1). Therefore, in the present study, we aimed to evaluate the HRQoL of patients on HD and compare it with that of PD.

Materials and Methods

Design

This cross-sectional study was conducted among samples on HD and PD patients attending to the Dialysis Centers of Shiraz and Isfahan, Iran from October 2017 to March 2018. The study was approved by the Ethics Committee of Jahrom University of Medical Sciences.

Sampling

A total of 258 patients participated in the study [172 hemodialysis (HD) patients and 86 age- and sex-matched 86 peritoneal dialysis (PD) controls were entered into the study: two hemodialysis patients were selected for each peritoneal patient]. We included all patients with chronic renal failure treated with (PD) and referred to a PD clinic in Shiraz and two teaching centers affiliated to Isfahan University of Medical Sciences. We also included patients treated with hemodialysis (HD) at Shiraz and Isfahan Dialysis Centers. Inclusion criteria were: patients with renal failure on HD or PD for at least six months, aged over 18 years, and living in Shiraz and Isfahan. After presenting necessary explanations to research units and completing the informed consent sheet for the study, questionnaires were completed through interviews by the main investigator. In case the participants preferred a self-report questionnaire, the duty was assigned to them.

Instruments

Data collection tool included a questionnaire consisting of two parts.

1. The first part contained items on demographic and disease information (i.e., age, sex, education, job, income, marital status, number of dialysis sessions per week, and underlying diseases).

2. The second part contained the Short Form Health Survey (SF-36), which was used to measure QOL (11). Validity and reliability of the Persian version of the questionnaire are well reported (11). The SF-36 is a general QOL instrument that measures eight health-related concepts: physical functioning (PF-10 items), role limitations due to physical health problems (RP-4 items), bodily pain (BP-2 items), general health perception (GH-5 items), vitality (VT-4 items), social functioning (SF-2 items), role limitations due to emotional problems (RE-3 items), and perceived mental health (MH-5 items). The SF-26 also includes a single item on perceived change in general health status over a one-year period (health transition) (12). The 8 subscales as introduced above together provide two component summary: Physical Component Summary (PCS) and Mental Component Summary (MCS).The score for each dimension ranges from 0 (best) to 100 (worse) conditions.

Data analysis

The data were presented by mean and standard deviation for the quantitative variables. For categorical variables, however, frequencies and percentages were used. Comparison between two groups (i.e., treated with PD and HD) were made using the chi-square ($\chi 2$) test and t-test as appropriate. The probability value of less than 0.05 was considered as the significance level. All calculations were performed using the SPSS software.

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Results

Patients

In this study, 172 renal patients undergoing hemodialysis (HD) and 86 renal patients undergoing peritoneal dialysis (PD) were examined. Only 162 HD patients responses to the questions were completely filled out and found acceptable for statistical and analytical interpretation.

Of these, 76 patients (46.9%) in the HD group and 44 patients in the PD group (51.2%) were females (P = 0.406). The mean age of HD patients was 52.9 ± 14.2 years and the mean age of PD patients was 52.0 ± 14.5 (P = 0.630). The characteristics of the two groups are presented in Table 1. As shown, there were no significant differences between two groups in most characteristics. Only two groups were different in the number of dialysis sessions per week (P < 0.001).

Table 1. The characteristics of patients on hemodialysis and peritoneal dialysis

	Hemodialysis (n = 162)	Peritoneal dialysis (n = 86)	
	No. (%)	No. (%)	P
Gender			0.406
Male	86 (53.1)	42 (48.8)	
Female	76 (46.9)	44 (51.2)	
Educational level			0.405
Illiterate	36 (22.2)	11 (12.8)	
Elementary	43 (26.5)	22 (25.6)	
Secondary	60 (37.1)	40 (46.5)	
Higher	23 (14.2)	13 (15.1)	
Employment			0.144
Employed	32 (19.8)	24 (27.9)	
Unemployed	130 (80.2)	62 (72.1)	
Marital status			0.226

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Single	17 (10.5)	4 (4.7)	
Married	115 (71.0)	64 (74.4)	
Divorced	5 (3.1)	6 (7.0)	
Widowed	25 (15.4)	12 (14.0)	
Income			0.054
Low	46 (28.4)	13 (15.1)	
Intermediate	52 (32.0)	36 (41.9)	
High	64 (39.5)	37 (43.0)	
Housing status			0.483
Personal property	102 (63.0)	58 (67.4)	
Rent	60 (37.0)	28 (32.6)	
Chronic diseases			0.320
No	148 (91.4)	75 (87.2)	
Yes	14 (8.6)	11 (12.8)	
Age (Mean, SD)	52.9 (14.2)	52.0 (14.5)	0.630
Number of dialysis sessions per week (Mean, SD)	3.0 (2.1)	28.6 (4.0)	< 0.001

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Quality of life

Chart 1 shows quality of life scores for patients undergoing dialysis (bars) compared with the quality of life of the Iranian community (line), extracted from the study by Montazeri et al (11).

The comparison of quality of life showed that there were significant differences between HD group and PD group in physical functioning (40.05 vs. 60.0) and role-physical. 16.67 vs. 30.81 ± 37.51) in HD group and PD group, respectively. The bodily pain score was 60.22 ± 32.45 in the HD group and 65.50 ± 26.95 in the PD group.

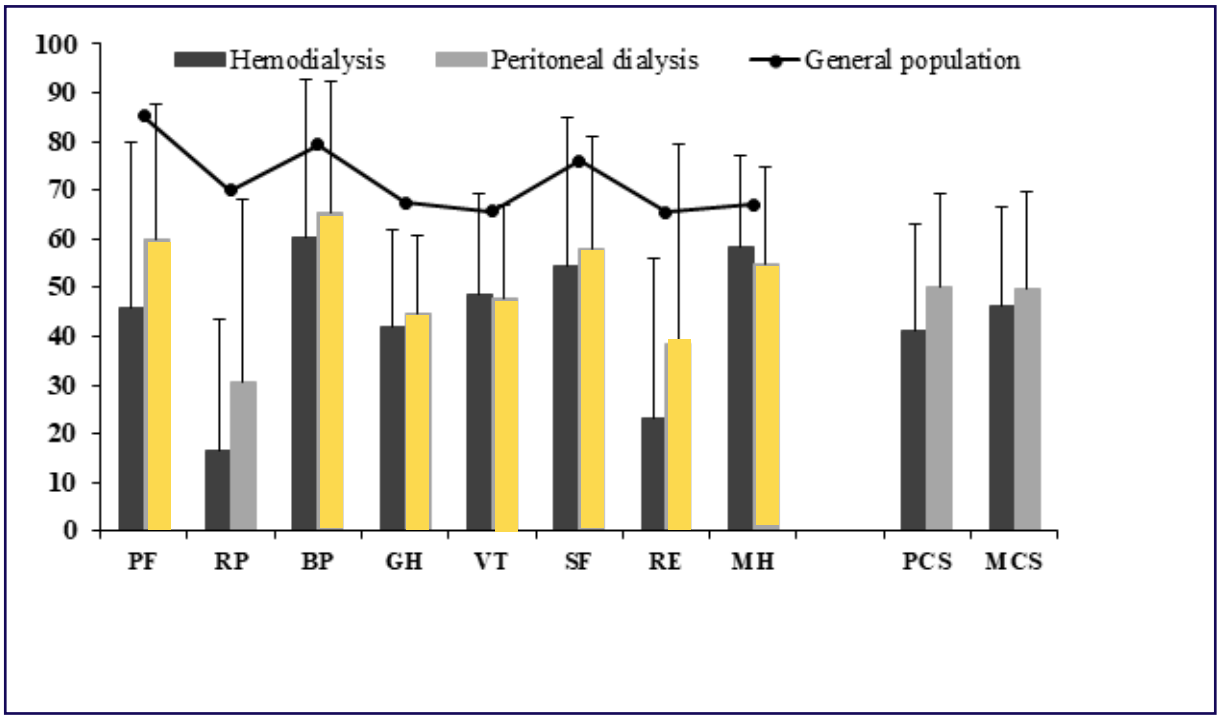


Chart 1. Comparing different aspects of quality of life in patients undergoing hemodialysis and peritoneal dialysis with the quality of life of Iranian society

Physical functioning (PF), Role physical (RP), Bodily pain (BP), General health (GH), Vitality (VT),Social functioning (SF), Role emotional (RE), Mental health (MH), Physical Component Summary (PCS), Mental Health Component Summary (MCS)

The overall mean physical component summary for the HD group was 41.21 ± 21.86, and for the the PD group it was 50.23 ± 19.17 (P = 0.001). The overall mean mental component summary for the HD group was 46.14 ± 20.57, and it was 51.12 ± 23.16 (P = 0.193) for the PD group. The results are shown in Table 2.

Table 2. Comparison of quality of life between patients on hemodialysis (HD) and peritoneal dialysis (PD)

	Hemodialysis (n = 162)	Peritoneal dialysis (n = 86)	
	Mean (SD)	Mean (SD)	P
Physical functioning (PF)	46.05 (33.90)	60.00 (27.87)	0.001

Role physical (RP)	16.67 (26.87)	30.81 (37.51)	0.002
Bodily pain (BP)	60.22 (32.45)	65.50 (26.95)	0.173
General health (GH)	41.91(19.83)	44.59 (16.31)	0.255
Vitality (VT)	48.49 (20.97)	47.85 (19.03)	0.814
Social functioning (SF)	54.63 (30.20)	57.85 (23.17)	0.351
Role emotional (RE)	23.05 (32.87)	38.37 (41.07)	0.003
Mental health (MH)	58.40 (18.72)	54.74 (20.04)	0.155
Physical Component Summary (PCS)	41.21 (21.86)	50.23 (19.17)	0.001
Mental Health Component Summary (MCS)	46.14 (20.57)	49.70 (20.19)	0.193

Discussion

The increasing global trend of ESRD indicates an increase in problems faced by both the patients and their families, which ultimately reduces their QoL; patients on dialysis should increase their QoL and receive suitable treatment, and such studies can broaden the view about QoL in these patients. Three therapeutic strategies are available worldwide for patients with chronic renal problems, including HD, PD, and kidney transplantation, with different impacts on patients' HRQoL (15). In the present cross-sectional study, we evaluated the HRQoL of patients on HD and compared it with that of patients on PD.

In general, the findings indicated that all dimensions of QoL in patients undergoing HD and PD are less than that of the general population; in other words, performing dialysis in any type (HD or PD) will have severely negative effects on QoL (11). This finding was consistent with the results of Chen et al.'s study (35).

Overall, the patients undergoing PD had a better QoL in most measures. This finding was consistent with the results of Chen et al.'s study (35).We found statistically significant differences in physical functioning, role physical, role emotional, and the physical component summary between HD and PD patients. Also, role physical in HD patients and bodily pain in PD group were the worst and best dimensions of quality of life, respectively.

Although previous studies compared HD and PD and found that patients undergoing both treatments experienced QoL deficits, there are certain controversies among researchers. Similar to our results,

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Liu et al. in two studies in Malaysia with an eight-year interval reported that HD had a significant effect on decreasing the HRQoL score (36, 37). In addition, the results of Chuasuwan et al. showed that patients with PD had higher HRQoL than HD in terms of physical functioning and role limitations due to emotional problems; this result was consistent with ours (22).

Although some studies reported that PD patients enjoy better HRQoL compared to HD patients (38), other studies could not detect any difference between the two methods. For instance, de Wit et al. used four instruments and identified no differences between HD and PD patients (39). Similarly, it has been reported that dialysis modality has no impact on health utility for HD and PD patients (40). This similarity in HRQoL between HD and PD patients also was shown by other researchers using different instruments (41-43).

A systematic review in Iran showed that HRQOL does not differ significantly in patients on HD compared to PD (27). However, the results of a study in Taiwan indicated that patients treated with PD had a better QoL compared to patients treated with HD (44). The findings of Hiramatsu's study demonstrated that the QoL of PD patients is higher compared to HD patients (26). The results of another longitudinal study also showed that at the beginning of dialysis (in the first two years), patients treated with PD had better HRQoL, but after two years, they had similar conditions; in other words, the magnitude of changes in HRQoL did not differ between the two dialysis methods over time (45). According to Jamal Al Wakeel's study in Saudi Arabia, PD patients had better QoL compared to HD patients, which is consistent with the findings of other research reports (15).

There are several reasons for such differences between our results and those of some previous reports including differences in age, gender, sample size, and the instruments used to measure the HRQoL. In addition, the nature of two therapeutic strategies can influence some differences in HRQoL. PD is often performed at home but HD patients have to go to the dialysis centers. Although it seems that daily activity in HD should to be higher than PD, the HD patients would usually remain in the center for several hours and this restricts their daily activities. Again, there are controversies among researchers so that some of them reported that HD patients had better physical activity (15, 41).

As our results showed, HD patients had a lower level in most of the evaluated parameters compared to PD patients. In this regard, a similar finding has been previously confirmed that HD compared to PD patients suffered from more problems including availability/quality of health services, transportation, finances, recreation and opportunities for acquiring new skills and knowledge (1) which seems to be partly justified by differences in local and regional characteristics, cultural differences and different perceptions of quality of life, based on personal characteristics.

The results of the current study suggest that patients on hemodialysis have a lower quality of life than patients on peritoneal dialysis in all aspects of quality of life, which can be due to problems, such as repeated visits to hemodialysis centers, delay in dialysis units, stressful environment in the process of hemodialysis and observation of death, depression and mental decline in hemodialysis patients, and underlying problems associated with the absence of metabolic activities, such as malnutrition, uremia and other associated illnesses (46). Another cause can be evaluated from the perspective that in spite of the small number of patients who chose peritoneal dialysis compared to hemodialysis patients, these patients are more involved in different aspects of treatment, and patient's participation in care and treatment process is higher, due to the increased awareness of these

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patients before commencement of dialysis.

In this study, other factors that are responsible for the higher quality of life in peritoneal dialysis patients include the role of family as the most important and the primary source of support. The provision of family support influences the treatment compliance; normally the lack of support causes many patients to hesitate at the start of dialysis to choose peritoneal dialysis. Conversely, the incidence of chronic renal failure can make the patient to be dependent on others, decrease their self-esteem and induce the feeling of loneliness, which eventually will affect the mental and social aspect of the person's quality of life (47).

These results can be explained by the fundamental differences in dialysis methods between HD and PD. Unlike patients on PD, patients undergoing HD have to go to dialysis centers two to three times a week for four hours per session. This requirement might negatively affect both personal lives and occupational achievement. Furthermore, patients receiving PD maintained social interaction and social support more actively, had greater satisfaction with dialysis staff encouragement, and ultimately experienced better general physical health and emotional well-being compared with those undergoing HD (48).

Strengths and limitations

Our study had several strengths. The main strength: This study in Iran compared the quality of life both groups of HD and PD patients with the general population using standard tool (SF36) to collected data. Using a completion of the questionnaires through structured interview rather than self-reported by trained questioners was another strength.

The study, however, had some limitations. One limitation of this study was that our study was cross-sectional. We were incapable of establishing a causal inference. Secondly, the number of patients undergoing peritoneal dialysis was low due to the low acceptance of ESRD patients for this treatment method and it was difficult to reach them due to not going to medical centers. Thirdly, because the samples did not represent the whole country, it cannot be generalized to the entire population of Iran, Therefore, we suggest the cohort studies, based on large national representative samples to better understand the HRQOL in patients on hemodialysis compared to peritoneal dialysis to strengthen current study evidence. Finally, since urea clearance and anemia management affect QoL in dialysis patients, it is suggested that in future studies laboratory data should be considered including serum urea nitrogen, serum creatinine and blood hemoglobin.

Conclusion

The current study ameliorates our understanding of the QoL of patients undergoing various dialysis modalities in Iran. Although the findings suggest that the quality of life in both HD and PD patients was lower than that of the general population, PD patients had higher quality of life in most aspects than HD patients. However, only few patients chose to start PD. Therefore, according to the advantages of the QOL in patients under PD and the lack of HD centers, it seems that we need that these differences must be taken into account by physicians, nurses, and patients when selecting each modality. Physicians and Health care workers be able to give individual patients the ability to select and continue to make the best decisions for their care, also educate and encourage patients to choose PD treatment in order to enjoy a better quality of life.

Footnotes

List of abbreviations

WHO: World Health Organization; ESRD: End stage renal disease; QOL: Quality of life HRQOL: health related Quality of life SF-36: Short Form Health Survey; HD:

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Hemodialysis; PD: Peritoneal dialysis; PF: Physical functioning; RP: Role limitations due to physical health problems; BP: Bodily pain; GH: General health; VT: Vitality; SF: Social functioning; RE: Role limitations due to emotional problems; MH: Mental health; PCS: Physical Component Summary; MCS: Mental Health Component Summary.

Declarations

Ethics Committee approval and consent to participate

The ethics committee of Jahrom University of Medical Sciences (IR.JUMS. REC.2011.036) approved this study. All patients gave consent to take part in the study.

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Conflict of interest

The authors declare that they have no conflict of interest.

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