Original Article

Replacement Therapy and its Impact on Quality of Life in Patients With End-Stage Kidney Disease

Terapia sustitutiva y su impacto en la calidad de vida de pacientes con enfermedad renal crónica terminal

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Summary

Objective: to assess the quality of life (QoL) score according to the type of renal replacement therapy (RRT) in patients with end-stage renal disease (ESRD). **Methods:** cross-sectional, analytical study. Patients with ESRD, on peritoneal dialysis (PD) or hemodialysis (HD), older than 18 years, without disease exacerbation, assigned to the Regional General Hospital No. 1 of Mexico City, were included. The study was carried out from December 2018 to March 2019. QoL was measured with the EQ-5D index and the visual analogue scale to obtain a health self-assessment index; clinical and sociodemographic variables were obtained from the medical record and through interrogation. Results: a total of 406 participants, 203 patients on hemodialysis and 203 on PD, were included. A mean EQ-5D index score of 0.46 ± 0.18 was found for PD versus 0.29 ± 0.22 for HD ($p < 0.001$). The self-assessment index showed no difference between both groups. The quality of life indicators that were most affected in patients treated with HD were pain and anxiety or depression. **Conclusion:** in patients with end-stage renal disease, HD is associated with lower quality of life.

Keywords: quality of life, hemodialysis, peritoneal dialysis

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Resumen

Objetivo: evaluar el puntaje de calidad de vida (CV) de acuerdo con el tipo de tratamiento sustitutivo de función renal (TSFR) en pacientes con enfermedad renal crónica terminal. **Métodos:** estudio transversal analítico. Se incluyeron pacientes con TSFR, en diálisis peritoneal (DP) o hemodiálisis (HD), mayores de 18 años, sin agudización de enfermedad, adscritos al Hospital General Regional No. 1 de la Ciudad de México. Se llevó a cabo de diciembre de 2018 a marzo de 2019. La CV se midió con el índice EQ-5D y la escala de evaluación análoga para obtener índice de autoevaluación de salud, las variables clínicas y sociodemográficas se tomaron de expediente clínico y mediante el interrogatorio. **Resultados:** se incluyó un total de 406 participantes, 203 pacientes en hemodiálisis y 203 pacientes en DP. Se encontró una media del índice EQ-5D de 0.46±0.18 para DP versus 0.29±0.22 para HD (p<0.001). El índice de autoevaluación no mostró diferencia entre los grupos. Los indicadores de calidad de vida con mayor afección en los pacientes con HD fueron dolor y ansiedad o depresión. **Conclusión:** en pacientes con enfermedad renal crónica terminal la HD se asocia a menor calidad de vida.

Palabras clave: calidad de vida, hemodiálisis, diálisis peritoneal

Introduction

Chronic kidney disease (CKD) is the eleventh cause of mortality in Mexico and it is estimated that it affects 10% of the population. It is a process with multiple causes that results from a loss in the number and function of nephrons, and it is characterized by a decrease in the glomerular filtration rate (GFR) to less than 60 mL/min/1.73 m^2, which is an indicator of renal damage, for at least three months. CKD often culminates in end-stage renal disease (ESRD), with the risk of death increasing as renal function worsens. ESRD is a state where irreversible loss of endogenous renal function has occurred, the magnitude of which is sufficient for the subject to permanently depend on renal replacement therapy (peritoneal dialysis, hemodialysis or transplantation) in order to avoid life-threatening uremia. This occurs when GFR is between 5 and 10 mL/min/1.73 m^2.[1-5]

ESRD negatively impacts the quality of life of patients, due to its effect on social and economic functioning, body image and psychological well-being. Hemodialysis (HD) and peritoneal dialysis (PD) are two forms of renal replacement therapy (RRT), with the questioning on which the best dialysis modality is being a matter of debate. During RRT, different symptoms occur, such as pain, depression, sleep disorders, weakness and blood pressure fluctuations, which vary according to the type of treatment. Patients who receive hemodialysis attend the hospital two or three times a week, with a duration of three or four hours per session, which will impact on quality of life, while peritoneal dialysis can be carried out independently at patients' domicile.[6-8]

Previous studies have identified that the modality of replacement therapy can influence on quality of life in patients with ESRD, with results that are inconsistent.[9] In Mexico, the population has different characteristics to those reported in other populations, such as the type of comorbidities, different disease severity and delay in treatment initiation; hence, the purpose of this study was to assess the quality of life (QoL) score according to the type of renal replacement therapy in patients with end-stage renal disease. The secondary endpoint was the determination of quality of life predictors.

Methods

Cross-sectional, analytical study, carried out from December 2018 to March 2019 at the Regional General Hospital No. 1 from Mexico City. A non-probabilistic sampling of consecutive cases was performed. The sample size was calculated using a mean difference formula, with a statistical power of 80%, 95% CI, with a total of 406 participants being obtained: 203 patients on hemodialysis and 203 on peritoneal dialysis. This project was approved by the ethics and research committee of the Mexican Institute of Social Security (IMSS), and all patients included in the study signed an informed consent form. The risk level of this investigation was minimal.

Patients older than 18 years, with ESRD on renal replacement therapy, treated with any of both replacement therapy modalities: HD or PD in the ambulatory (APD) or continuous ambulatory (CAPD) modality, with more than one month of having started renal replacement therapy, were included. Patients with disease exacerbation, transplanted patients and pregnant women were excluded. The quality of life index was assessed using the EuroQol 5-D test (EQ-5D) and the health self-evaluation scale as a health self-assessment index.[10] A clinical interrogation was conducted to collect data such as age, previous therapy, therapy-associated complications, attendance to the nutrition department, support networks, as well as for obtaining the EQ-5D test five dimensions (mobility, self-care, activities of daily life, pain, discomfort, anxiety,

depression). For the interpretation of the EQ-5D test, the index was calculated using the formula established with constants according to the answers provided for each dimension, with 1.0 being the best possible QoL obtained. The health self-assessment scale is interpreted from 0 to 1.0, the higher the represented index, the better the patient's perception of health at the time of the study. Biochemical values such as hemoglobin (Hb), creatinine (Cr), potassium (K), GFR and albumin were obtained from the medical record.

Statistical analysis was carried out using the SPSS program; the Kolmogorov-Smirnov test was used to determine quantitative variables (age, Hb, Cr, K, and GFR levels) type of distribution. For freely-distributed quantitative variables, the median and interquartile range (IQR) were calculated; for variables with normal distribution, the mean and standard deviation were used as a measure of dispersion. Qualitative variables were represented in frequencies and percentages. To find out the differences between both study groups according to the type of RRT, the chi-square test, Mann-Whitney's U-test and Student's t-test were resorted to. A p-value < 0.05 was considered significant.

Table 1. General characteristics according to the type of RRT

General Variables	Peritoneal dialysis total=203 n(%)	Hemodialysis total=203 n(%)	p
Gender[1]			
Females	110 (54.2)	97 (47.8)	0.197
Males	93 (45.8)	106 (52.2)	
Age (years)[2]	65 (59-70)	65 (60-69)	0.727
Associated comorbidities[1]			
Diabetes mellitus	127 (62.6)	122 (60.1)	0.506
High blood pressure	60 (29.6)	57 (28.1)	
Other	16 (7.8)	24 (11.8)	
Albumin[1]			
Hypoalbuminemia	69 (34)	61 (30)	0.395
Normal albumin	134 (66)	142 (70)	
RRT-associated complications[1]	71 (35.0)	86 (42.4)	0.126
Previous therapy[1]	17 (8.4)	46 (22.7)	<0.001
Hemoglobin (Hb)(g/dL)[2]	9.90 (9.30-10.50)	9.90 (9.70-10.70)	0.515
Creatinine (Cr)(mg/dL)[2]	5.80 (4.90-6.90)	5.60 (4.70-6.80)	0.427
Potassium (K)(mEq/L)[2]	5.70 (5.20-6.33)	5.50 (5.0-6.0)	0.049
GFR (ml/min/1.73 m^2)[2]	8.40 (6.33-10.54)	8.57 (6.67-11.14)	0.178
Support networks[1]	184 (90.6)	180 (88.7)	0.514
Depressive episode[1]	82 (20.1)	118 (29.06)	<0.001
EQ5D index[3]	0.46 ± 0.18	0.29 ± 0.22	<0.001
Self-assessment index[3]	0.66 ± 0.15	0.65 ± 0.14	0.315

[1]Variables are presented as frequencies and percentages, chi-square test
[2]Values are presented as the median and interquartile range, Mann-Whitney's U-test
[3]Values are presented as the mean, standard deviation, Student's t-test

Results

A total of 406 participants were included, out of which 51% corresponded to women (n = 209); median age was 65 years (IQR 59, 69.25), and 38.7% of patients had RRT-associated complications (n = 157); mean Hb was 9.92 mg/dL ± 0.93, Cr was 5.89 mg/dL ± 1.46, K, 5.66 mEq/L ± 0.86, GFR, 8.69 mL/min/1.73m^2 ± 2.60; 61.3% of patients had diabetes (n = 249), followed by 57.7% with high blood pressure (n = 117); 49.3% of participants experienced a depressive episode (n = 200).

Table 1 shows the population characteristics according to the type of RRT. Differences are observed in the quality of life score (EQ-5D index), which are lower in patients treated with HD, corresponding to higher deterioration in the quality of life (p <0.001). The self-assessment index did not show differences between groups. Other variables that showed significant differences were previous therapy and depressive episodes, which were more commonly observed in the group of patients on HD.

In table 2, it is possible to observe the quality of life indicators according to the renal replacement therapy, with a larger effect on the pain, anxiety and depression variables in patients treated with HD being observed.

Discussion

The purpose of this study was to assess the difference in the quality of life score according to the type of renal replacement therapy in patients with end-stage renal disease. In patients on hemodialysis, a lower quality of life score was found in comparison with subjects on PD. Our results are not consistent with

Table 2. EQ-5D quality of life indicators according to the type of RRT

Indicator	Peritoneal dialysis Total=203 n(%)	Hemodialysis Total=203 n(%)	p
Mobility			
No problems	121 (54.2)	86 (47.8)	0.001
Some problems	82 (45.8)	117 (52.2)	
Self-care			
No problems	126 (62.06)	96 (47.29)	0.004
Some problems	71 (34.97)	104 (51.23)	
Unable to get dressed	6 (2.95)	3 (1.4)	
Daily life activities			
No problems	106 (52.21)	89 (43.84)	0.069
Some problems	90 (44.33)	98 (48.27)	
Unable to perform activities	7 (3.4)	16 (7.88)	
Pain/ Discomfort			
No pain	90 (44.33)	63 (31.03)	0.003
Moderate pain	92 (45.32)	98 (48.27)	
Severe pain	21 (10.34)	42 (20.68)	
Anxiety/ Depression			
No anxiety/depression	85 (41.87)	61 (30.04)	<0.001
Moderate anxiety/depression	94 (46.30)	94 (46.30)	
Highly anxious/depressive	24 (11.82)	66 (32.51)	

Data presented in frequencies and percentages, chi-square test

those reported by Günalay *et al*., which show a mean EQ-5D index of 0.60 ± 0.29 for HD and 0.68 ± 0.33 for PD; however, no significant differences were found between both therapies, and their scores show a better quality of life than that of our population. This discrepancy in results between the different studies may be due to different general conditions of the patients, disease severity and the time to require replacement therapy.[11]

It is important to consider that HD is offered as an alternative when peritoneal dialysis catheter dysfunction has occurred. In our population, 22.7% of patients on HD had previously received PD; therefore, it is possible that patients on HD have higher deterioration of health status, which might explain the lower score and higher quality of life deterioration in this population. However, in the study we did not have an indicator such as the Karnofsky scale that would allow us assessing the functional capacity of patients on replacement therapy and measure the impact on their quality of life.[12]

In a study carried out by Hernández *et al*. in 2014, patients treated with HD were also found to show higher quality of life deterioration in comparison with patients receiving CAPD, which are results that are consistent with those of this study. When an analysis by categories was performed, quality of life in patients on HD was found to be determined by a higher involvement of the general health, mental health and emotional role areas, in comparison with patients on CAPD, in whom there is greater involvement found in the general health and feeling of vitality areas. In our study, the most affected EQ-5D test indicators in patients treated with HD were anxiety, depression and pain.[13]

In a study where only patients treated with HD were analyzed, there was greater deterioration in activities of daily living and self-care.[11] Another study reported greater deterioration in patients with malnourishment. However, no between-group differences were observed in this study when hypoalbuminemia was assessed as a nutritional status indicator.[14]

Alvares J *et al*.[15] indicate that patient clinical condition and age were variables associated with QoL. Another factor that has been associated with decreased QoL is anemia; however, in this study, no differences were found between both groups.[16] Previous studies have shown better survival in patients treated with PD versus HD, with a mortality risk of 48% at two years of follow-up, which is possibly related to better general conditions in these patients.[17]

The present study has as strengths its sample size calculation, with a sufficient size to show the differences in quality of life between both types of treatment, in addition to quality of life assessment through an instrument that is valid and reliable in the Mexican population. The possible limitations of the study are due to its cross-sectional design, which entails temporal ambiguity; although the gender and type of RRT variables are statistically significant, they only allow us predicting 15.8% of the quality of life score. The analysis of results grouped both PD modalities, and no QoL stratification was performed for each modality (APD or CAPD).

Patients on RRT are treated at secondary or tertiary level of care, with irregular care by the family doctor, and it is therefore required for patients receiving RRT to be treated by a multidisciplinary health team that includes the nutrition, social work, psychiatry and

psychology departments, in addition to monitoring by the family doctor in order to implement strategies that improve the quality of life of these patients.[18] Intervention by the psychology department in patients and primary caregivers has been effective in improving quality of life and adherence in patients with ESRD.[19-20]

Conclusion

In patients with ESRD and renal replacement therapy based on hemodialysis, there is a lower quality of life in comparison with patients on treatment with peritoneal dialysis. It is necessary for future research to assess other variables that can explain a higher percentage of the phenomenon, such as patient general conditions, associated symptoms and economic impact of the disease.

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