Quality of life in chronic renal patients on hemodialysis or peritoneal dialysis: a comparative study in a referral service of Curitiba - PR

Authors
Fernanda Aguiar Gonçalves [1]
Ingrid Fernandes Dalosso [1]
Jéssica Maria Camargo Borba [1]
Juliana Bucaneve [1]
Nayra Maria Prado Valerio [1]
Cristina Terumy Okamoto [1]
Sergio Gardano Elias Bucharles [2]

[1] Universidade Positivo.
[2] Fundação Pró-Renal, Curitiba-PR.

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Correspondence to:
Juliana Bucaneve.
Fundação Pró-Renal e Universidade Positivo.
Rua Francisco Leal, nº 30, Centro, Piraquara, PR, Brasil.
CEP: 83301-700
E-mail: jubucaneve@yahoo.com.br

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Abstract

Introduction: Chronic kidney disease (CKD) compromises the health and routine of the patient. On the fifth stage of CKD, the patient becomes eligible to start renal replacement therapy: hemodialysis (HD), peritoneal dialysis (PD) or kidney transplantation. The type of CKD treatment is essential to improving quality of life of the patient. **Objective:** To compare the quality of life of CKD stage 5 patients who perform HD and home PD. **Methods:** Cross-sectional study with data collection, by convenience, through the application of socioeconomic and KDQOL SF-36 questionnaires in HD and PD patients of the Pro-Renal Foundation and satellite clinics in Curitiba-PR. **Results:** The sample was 338 patients, 222 HD and 116 PD. Average age: 54.4 years for HD group (± 15.28) and 58.00 for the DP group (± 13.99). The variables: work status ($p < 0.05$), encouragement by dialysis staff ($p < 0.01$) and patient satisfaction ($p < 0.001$) were in favor of DP; while physical functioning ($p < 0.05$) and emotional function ($p < 0.01$) were to HD. **Conclusion:** Objectively, PD was more favorable regarding quality of life, for the large number of items with significant results when compared to HD. However, the two variables of greatest significance found in HD (physical functioning and emotional functioning) ended up having a much greater impact on well-being and daily-life of the patient in the environment external to the clinic than those who were higher in DP, making HD the most favorable for patient quality of life.

Keywords: peritoneal dialysis; quality of life; renal dialysis.

Introduction

The high incidence and prevalence of chronic kidney disease (CKD) have elevated it to the status of global health problem. In addition to the poor prognosis associated with the disease, CKD adds significantly to the costs of public health care,[1] which amount to approximately BRL 1.4 billion in Brazil.[2] In 2013, 100,397 patients were on dialysis in Brazil, 90.8% on hemodialysis (HD) and 9.2% on peritoneal dialysis (PD).[3] Severe or untreated CKD may impair one's ability to perform activities of daily living. CKD may be caused by primary kidney diseases or systemic conditions such as systemic hypertension and *diabetes mellitus* (DM).[4] Other etiologies such as chronic glomerulonephritis (with lupus erythematosus and systemic vasculitis as secondary causes), urinary tract obstruction, inherited renal injury (polycystic kidney disease), drugs, toxic and occupational agents, infection, nephrectomy, and vascular disorders might be implicated.[5]

CKD presents in the form of injuries to the renal parenchyma associated or not to decreases in the glomerular filtration rate (GFR) sustained for three months or longer, or a GFR < 60 mL/min/1.73m^2 for three months or longer.[1,2] Renal replacement therapy (RRT), the recommended treatment for patients with advanced (stage 5)

CKD, is divided into three types: hemodialysis (HD), peritoneal dialysis (DP), and kidney transplantation.[6,7] CKD therapy is discussed between patients and physicians. RRT is usually presented to patients with stage 4 disease[8] and introduced as a therapy when they move to stage 5 CKD.[7,9] Jassal *et al.* interviewed 132 directors of renal care units in Great Britain and reported that the choice of treatment was affected by the patient's will, and the quality of life and morbidity and mortality associated with the recommended mode of RRT.[10,11]

HD consists of the removal of solutes and fluids with the aid of an arteriovenous fistula and an artificial filter (capillary or dialysis membranes). Patients usually undergo HD three times a week in sessions lasting three to four hours, in a rigid routine that limits the patients' independence.[9,11] PD uses the peritoneum as an exchange membrane and offers the possibility of patients being treated at home. The main complication of kidney transplantation is rejection of the donated organ.[12]

The term Quality of Life comprehends a wide range of indicators covering overall satisfaction with life in areas such as health, housing conditions, employment, safety, education, and leisure. In terms of health, the physical, social, and emotional impacts introduced by a disease and its treatment are considered.[13] The quality of life of patients with CKD on dialysis was assessed through the *Kidney Disease Quality of Life* (KDQOL™) scale developed by the Kidney Disease Quality of Life Working Group. The shorter version of the KDQOL™, the KDQOL-36™,[1] was validated and adapted for use in Brazil in a study with 94 patients.[14] This scale contemplates variables such as physical health, resting, vitality, cognitive function, sexual satisfaction, eating habits, social life, and communication, presence/absence of pain, family relations, work, leisure, and emotional status.[5,15] These parameters have been associated, among other variables, with the type of treatment offered. The everyday lives of patients on HD and PD were found to be differently affected.[16] Although different dialysis modes are equivalent in terms of patient rehabilitation and mortality, the quality of life provided by each mode still requires further investigation.

This study aimed to compare the quality of life of stable patients on HD or PD. This is one of the few studies on quality of life carried out in southern Brazil.

Methods

This study protocol was submitted to and approved by the Positivo University Ethics Committee and given permit no. 290.964. Enrolled individuals were informed of the goals of the study and voluntarily signed an informed consent term.

This cross-sectional study was carried out in three satellite hemodialysis clinics and in the peritoneal dialysis division of *Fundação Pró-Renal*, Curitiba, Brazil - a reference center for patients in need of RRT. The various clinics held by this institution and the large number of patients seen by them *versus* other centers in the region enabled the study to enroll a significant number of patients. The sample size calculated using a 95% confidence interval yielded a total of 222 patients on HD and 122 on PD of both genders.

Two validated scales were used in data collection, one covering socioeconomic variables and the other quality of life. The socioeconomic scale included the following variables: age, gender, job, marital status, religious inclination, origin, comorbidades, and prescribed drugs. The Kidney Disease Quality of Life (KDQOL™) scale, developed by the Kidney Disease Quality of Life Working Group and validated for the Portuguese language,[15] looks into the quality of life of dialysis patients with CKD. The authors of the study applied the questionnaire to a convenience sample made up of patients aged 18 years and older with stage 5 CKD on HD

or home PD for at least 90 days voluntarily willing to answer the questions. The individuals on HD had arteriovenous fistulas. They went to the clinic three times a week and spent three hours in each session. Individuals not meeting the enrollment criteria, subjects with mental illnesses (consequent to stroke or related to dementia) that prevented them from answering the questions, and patients with cancer were excluded.

The data on quality of life was treated on Microsoft Excel and converted using the KDQOL-SF™ Version 1.3 Scoring Program (v 3.0). The data on patient identification and socioeconomic status were entered into a Microsoft Excel spreadsheet. Statistical treatment was performed using software package SPSS v.20.0. Mean, median, minimum, and maximum values, and standard deviations were used to describe quantitative variables. Qualitative variables were described in terms of frequencies and percent values. Comparisons between the two groups were performed using Student's *t*-test for independent variables or the Mann-Whitney U test depending on the data distribution pattern. The three age groups were compared using the Kruskal-Wallis test. The chi-square test was used to assess distribution homogeneity. The Jarque-Bera test was used to assess distribution normality. Statistical significance was attributed to differences with a *p*-value under 5% - ($p < 0.05$).

Results

The study enrolled 338 participants - 222 on HD and 116 on PD. Statistical corrections were made in order to avoid impacts on the final comparison between the groups. Patients on HD had a mean age of 54.4 ± 15.2 years *versus* 58.0 ± 13.9 years for patients on PD. The patients were divided into three groups based on their ages: 18-40 years, 41-60 years, and 60 years and older (Table 1).

The groups were not statistically different when compared for gender ($p > 0.05$). The number of married individuals was statistically greater among patients on PD (62.9%; n = 72.9) when compared to subjects on HD (51.4%; n = 114.1), with singles ranking second. Sixty-eight individuals on PD and 119 on HD were Catholics; Evangelicals ranked second, with 33 PD and 75 HD patients.

Table 1 Patient age ranges

Age range	Group			
	HD		PD	
	N	%	n	%
18 to 40	45	20.3%	16	13.8%
41 to 60	96	43.2%	44	37.9%
> 60	81	36.5%	56	48.3%
Total	222	100.0%	116	100.0%

Kruskal-Wallis test. Significance: $p < 0.086$.HD = Hemodialysis; PD = Peritoneal dialysis.

The predominant comorbidity for patients on HD was systemic hypertension (41.9%; n = 93). Patients on PD were predominantly affected by a combination of systemic hypertension and *diabetes mellitus* (33.0%; n = 38.28) (Table 2 contains only the percent values pertaining to comorbidities). Five patients did not answer this question and were thus excluded from the analysis. The patients were assessed for whether they knew the causes of CKD. More than three quarters (78.4%; n = 90.9) of the patients on PD answered yes to this question, *versus* 62.2% (n = 138) of the individuals on HD ($p < 0.01$). In terms of level of education, 43.1% (n = 49.9) of the individuals on PD and 40.5% (n = 89.9) of the patients on HD had not completed basic education ($p = 0.355$) (Table 3).

Most of the interviewees stated monthly household incomes of one minimum wage or less (50% of the patients on PD [n = 58]; 52.3% of the subjects on HD [n = 116.1]). Most of the patients claimed they were homeowners (81.9% of the individuals on PD [n = 95]; 74.2% of the subjects on HD [n = 164.7]); most of the owned homes were built with bricks (79.3% of the patients on PD [n = 91.9]; 65.8% of the subjects on HD [n = 146]) and were served by public

Table 2 Most prevalent comorbidities of patients on peritoneal dialysis and hemodialysis

Comorbidities	Group			
	HD		PD	
	N	%	N	%
SH	91	41.9%	37	32.2%
DM	10	4.6%	2	1.7%
Other	11	5.1%	4	3.5%
None	21	9.7%	9	7.8%
SH and DM	48	22.1%	38	33.0%
SH and other	23	10.6%	17	14.8%
SH, DM and others	12	5.5%	8	7.0%
DM + other	1	0.5%	0	0.0%
Total	217	100.0%	115	100.0%

HD = Hemodialysis; PD = Peritoneal Dialysis, SH = Systemic Hypertension; DM = *Diabetes Mellitus*; Other = Systemic Lupus Erythematosus, Polycystic Kidneys, Urethral Stricture, Obstructive Uropathy/Glomerulonephritis and Nephrectomy.

Table 3 Patient level of education

Level of education	Group			
	HD		PD	
	N	%	N	%
Complete BE	26	11.7%	15	12.9%
Incomplete BE	90	40.5%	50	43.1%
Incomplete HS	12	5.4%	1	0.9%
Complete HS	48	21.6%	27	23.3%
Incomplete HE	9	4.1%	0	0.0%
Complete HE	22	9.9%	15	12.9%
Illiterate	15	6.8%	8	6.9%
Total	222	100.0%	116	100.0%

Teste Qui-Quadrado $p < 0,035$ DP = Diálise Peritoenal; HD = Hemodiálise; EF = ensino fundamental; EM = ensino médio; ES = ensino superior.

sewer systems (96.6% of the patients on PD [n = 112]; 95.9% of the individuals on HD [n = 212.8]).

The following variables of the KDQOL-SF 36 scale were statistically different between PD and HD patients: occupational status (mean score = 14.64 for patients on HD and 25.0 for individuals on PD, $p < 0.05$); dialysis staff encouragement (mean score = 83.11 for patients on HD and 96.12 for individuals on PD, $p < 0.01$); patient satisfaction (mean score = 71.47 for patients on HD and 81.61 for individuals on PD, $p < 0.001$); physical functioning (mean score = 52.75 for patients on HD and 45.78 for individuals on PD, $p < 0.05$); emotional functioning (mean score = 56.61 for patients on HD and 44.25 for individuals on PD, $p < 0.01$) (Table 4).

Discussion

Quality of life, as defined by the World Health Organization in 1994, is the "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns."[4] The term quality of life gains relevance for individuals with chronic diseases for the negative effects they have on their lives.[5]

Despite the many studies published on the topic, few authors have looked into this matter in the Brazilian Southeast.[5,17] The present study is one of the few carried out in this region comparing dialysis methods.

The KDQOL-SF 36 scale is an objective means to measure aspects of quality of life such as physical, psychological, social, and cultural conditions from the perspective of patients with CKD. The scale helps build a profile of the health care and intervention needs of these individuals.[15]

When choosing between modes of treatment, patients with CKD are faced with numerous options (hemodialysis, peritoneal dialysis, transplant, and conservative management).[7] However, not always are they given all the information on the modes of dialysis and the possibilities offered by renal transplantation. The choice usually depends on the physician, on treatment availability, and patient preferences.[10]

Socioeconomic factors

The mean ages of 54.4 years for patients on HD and 58.0 years for individuals on PD enrolled in this study were in agreement with the ages reported by *Zhang et al.*[18] in a study carried out in Beijing, China, and by *Arenas et al.*[17] in a study conducted in São Paulo, Brazil, in 2009. Patients on PD were predominantly of

Table 4 Comparison between groups of relevant aspects in quality of life assessment based on the KDQOL - SF 36 scale

Variable	Hemodialysis Group n (mean)	Peritoneal Dialysis Group N (mean)	*p*-value*
List of symptoms/problems	222 (77.88)	116 (75.77)	0.331
Effect of kidney disease	222 (68.03)	116 (69.81)	0.586
Burden of kidney disease	222 (42.23)	116 (42.89)	0.879
Occupational status	222 (14.64)	116 (25.00)	0.012
Cognitive function	222 (79.64)	116 (81.09)	0.446
Quality of social interaction	222 (79.85)	116 (79.14)	0.988
Sexual function	77 (87.99)	30 (83.50)	0.074
Sleep	222 (68.63)	116 (67.56)	0.791
Social support	222 (83.11)	116 (86.21)	0.771
Emotional functioning	222 (56.61)	116 (44.25)	0.009
Physical functioning	222 (52.75)	116 (45.78)	0.043
Patient satisfaction	222 (71.47)	116 (81.61)	< 0.005
Dialysis staff encouragement	222 (83.11)	116 (96.12)	0.008

Mann-Whitney U test. $p < 0.05$.

the female gender and individuals on HD were predominantly males, as also described in the literature.[18]

Rufino et al. reported DM prevalence rates of 62.4% and 44% in patients on PD and HD, respectively; other comorbidities were not described.[19] In our study, the prevalence of DM as an isolated comorbidity was lower (1.7% [n = 1.97] and 4.6% [n = 10.2] for patients on PD and HD); however, when combined with systemic hypertension prevalence increased to 33.0% (n = 38.2) among patients on PD and 22.1% (n = 49) for patients on HD. The most prevalent comorbidity was isolated systemic hypertension in patients on HD (41.9% [n = 93]) and systemic hypertension combined with DM in individuals on PD (33.0% [n = 38.2]).

Most of the patients in this study had household income levels of up to one minimum wage, whereas *Arenas et al.* reported household income levels of 1-4 minimum wages for patients on HD and of more than four minimum wages for individuals on PD.[17] The level of education of the individuals enrolled in this study was similar to the levels reported by other authors, with most individuals not having completed basic education.[15]

Effects of kidney disease

According to *Ginieri-Coccossis et al.*, patients on PD in Athens, Greece, had better levels of quality of life in areas such as ability to travel, financial issues, problems having access to dialysis, and food and water intake restrictions.[20] Food and water intake restrictions were also described on a meta-analysis published by *Oreopoulos et al.* in 2008; the authors reported that patients on DP were allowed to have more liberal diets and water intake levels due to the preservation of residual renal function.[21] However, our study failed to reveal significant differences in this area between the two modes of dialysis ($p = 0.586$).

Burden of kidney disease

Theofilou et al.,[22] *Fructuoso et al.*,[23] *and Ginieri-Coccossis et al.*[20] found that patients on PD had higher quality of life ratings in the burden of kidney disease domain. The mean score attained by PD patients in our study was higher, but not statistically different ($p = 0.879$).

Satisfaction with medical care

Patients on PD were found to be significantly more satisfied in this domain than individuals on HD. A possible explanation is that patients on PD have to be seen at the clinic only twice a month,

whereas subjects on HD go to the clinic three times a week for a mean of four hours each time - and are potentially exposed more often to stressing situations with physicians and employees.

Occupational status

Patients on PD were found to be more occupationally active (p = 0.012), as also reported by García-*Llana et al.* in a study carried out in Madrid, Spain, in 2013.[7] Most patients on PD opt to be treated in the evening, which makes them more available to work during the day.

Cognitive function and quality of social interaction

The results found in this study in regards to cognitive function and quality of social interaction were in agreement with the findings reported by *Fructuoso et al.* from a study carried out in Vila Real, Portugal, in 2011.[23] The groups were not statistically different, although the mean cognitive function scores of patients on PD were higher and individuals on HD had higher mean quality of social interaction scores.

Sexual function

Fructuoso et al. did not describe significant differences of sexual function between individuals on PD and HD.[23] *Thodis et al.* published a meta-analysis in 2011 and reported a significant advantage for patients on HD.[11] In our study, the mean scores of patients on HD were higher than the scores of individuals on PD, but not at a statistically significant level (p = 0.074). However, the patients on PD had catheters implanted in their abdomens, which may have increased the level of discomfort of the patients and their partners and discouraged them from having sex.

Sleep

Turkmen et al.,[24] in a study in Turkey in 2012, and *Theofilou et al.*[22] reported that 41%-83% of the patients on HD had trouble sleeping. Trouble sleeping has been more frequently associated with female gender and advanced age, diagnosis of depression and cardiovascular disease, poor quality dialysis, and compromised health. *Ginieri-Coccossis et al.*[20] compared two dialysis modes and found that patients on HD had less trouble sleeping than patients on PD. In our study, patients on HD slept better than individuals on PD, although the difference was not statistically significant. This is possibly due to the fact that the PD machine is turned on during the night, potentially making it harder for patients to sleep and move in bed.

Social support

Social support ratings did not differ significantly between individuals on PD and subjects on HD, as also reported by *Fructuoso et al.,* although patients on PD had higher scores in this domain.[23] Dialysis staff encouragement yielded an incoherent finding, as patients on PD scored higher than individuals on HD (p = 0.008).

Physical functioning and pain

There is no consensus in the literature about physical functioning. Some studies,[17] ours included, reported patients on HD had higher physical functioning scores than patients on PD, whereas others[6] showed quite the opposite. *García-Llana et al.*[7] and *Zhang et al.*[20] reported pain was more frequently observed in patients on HD, while our results indicated pain was more commonly seen in subjects on PD, although the difference between the groups was not statistically significant. This apparent counterintuitive finding might explained by the fact that patients on PD had a higher mean age than individuals on HD. Older patients tend to be physically more degraded than young patients, and may have other comorbidities in which pain is a factor (such as degenerative bone diseases).

General health

No statistically significant differences were seen between groups for general health, as also reported in another study carried out n Brazil.[17] However, patients on PD had higher ratings in this area than individuals on HD.

Emotional functioning

Emotional functional ratings were significantly higher in patients on HD, contrary to what *Zhang et al.*[18] reported. Emotional well-being ratings, although not statistically different between groups and not correlated with the literature, were higher among patients on HD.

Social functioning

Our study and *García-Llana et al.*[7] failed to describe statistically significant differences between the groups for this variable, although patients on PD had higher ratings. *Zhang et al.*[18] reported groups were statistically different, with higher ratings seen among patients on PD. The observed data suggested that patients on PD were less limited in performing everyday life activities and were more able to socialize.

Vitality

No significant differences were seen between groups in this domain, although the ratings of patients on PD were higher. *Zhang et al.* also found higher scores for patients on PD and a statistically significant difference between patient groups.[18] This might be explained by the more extenuating nature of HD. Patients reported that after treatment sessions they needed some time to recover from intense fatigue, a common complication of HD.[25]

Physical functioning and mental well-being

No statistically significant differences were seen between patient groups in SF-12 variables physical functioning and mental well-being. However, higher ratings were observed among patients on HD, similarly to what *García-Llana et al.* and Arenas *et al.*[7,17] reported.

Conclusion

Individuals with chronic conditions such as CKD present complex physical and emotional involvement, not always measurable through assessment scales. Although the KDQOL-SF 36 scale contemplates various relevant points pertaining to the everyday lives of patients with CKD, it cannot accurately describe subjective items such as looking tired and depressed, or complaints concerning symptoms not covered in the questions. Individual factors may play a determining role in the choice of therapy. Therefore, physicians must find from their patients what they value the most.

In objective terms, PD was significantly better than HD in three areas, *versus* two areas in which HD was superior to PD. Nonetheless, the two areas in which HD was significantly better - emotional and physical functioning - are more relevant to the everyday lives of patients outside the clinic. Only one of the three variables in which PD was superior - occupational status - affects the lives of patients in a relevant way. The other two - patient satisfaction and dialysis staff encouragement - were rated more highly by individuals on PD probably because these patients were in contact with the medical staff less frequently and were less susceptible to the stresses characteristic of dialysis centers.

The limitations of the study included the lack of data on lab workup, ultrafiltrate, and kt/v, which might interfere with patient quality of life.

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