

Original Paper

Comparison of Quality of Life in Patients Undergoing Hemodialysis and Peritoneal Dialysis: a Systematic Review and Meta-Analysis

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Key Words

Chronic renal failure • Hemodialysis • Peritoneal dialysis • Quality of life

Abstract

Background/Aims: The increase in the survival rate of patients with chronic renal failure due to substitution treatment prompts an investigation of their quality of life (QoL), a key measure to evaluate the outcomes of chronic disease treatment. To determine whether hemodialysis or peritoneal dialysis provide a better QoL, a systematic meta-analysis was performed. **Methods:** We searched through the database Cinahl, Medline, PubMed, Scopus and Proquest, including articles published from 2011 until June 2016. We selected articles that compared, through KDQOL-SF 1.3 or 36 questionnaires, QoL among patients undergoing hemodialysis and peritoneal dialysis. The data was collected using Excel Office, and t-test has been performed on independent samples to identify significant differences. **Results:** Only some of the seven articles found significant differences between the two treatments. One of the studies showed a better QoL for peritoneal dialysis patients, while, on the contrary, two other studies support that the best QoL is in patients receiving hemodialysis. Another article displayed significant difference only for satisfaction in relation to care, better in patients on peritoneal dialysis, and for physical health, better in hemodialysis. **Conclusions:** The analysis has not led to a unanimous conclusion. Quantitative analysis showed that the only statistically significant difference between the QoL of patients on hemodialysis and peritoneal dialysis regards the effect of kidney disease, which happens to be better in patients undergoing peritoneal dialysis.

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Introduction

The increasing global epidemic of Chronic Kidney Disease (CKD) and resultant End-Stage Renal Disease (ESRD) continues to be a serious challenge for many developing countries [1].

ESRD negatively impacts the quality of life (QoL) of patients by acting negatively on their social, financial and psychological wellness. The disease can also damage the body image and general QoL of patients in addition to physical, functional, metabolic, social and mental conditions [2, 3].

Hemodialysis (HD) and peritoneal dialysis (PD) are the two common forms of dialysis therapy for ESRD. The question of the optimal choice of dialysis modality, PD or HD, remains a matter of debate.

It is believed that the health-related quality of life (HRQOL) of dialysis patients is usually worse than that of the age-matched subjects from the general population, because of the typically high burden of comorbidity and complications of ESRD [4]. This was also confirmed by a study conducted by Drennan and Cleary, which showed that the patients with ESRD have a worse quality of life than the general healthy population [5, 6], due to the intrusiveness of the treatment that is required [7]; on the other hand, patients with depression and social-related poor quality of life present a 1.7-fold risk for having a decreased glomerular filtration rate [8].

Patients with ESRD who receive maintenance dialysis therapy have a significantly higher mortality rate compared to the healthy population (about 20% per year in the United States and 10 - 15% in Europe), primarily due to cardiovascular disease [9].

The mortality of ESRD patients who are treated with the two modalities has been investigated in numerous observational studies, but which dialysis modality performs better in prolonging life of ESRD patients is not clear. Some studies showed the superior outcomes of HD, whereas others demonstrated that PD was equivalent to HD or even better for certain subgroups [10, 11].

The scenario is made even more complex by the presence of complications specifically related to HD and PD [12-14].

Because of an increase in survival rates for patients with ESRD, HRQOL has become increasingly important as an outcome measure in the evaluation of dialysis treatments [15]. QoL has become a key outcome measure in the treatment of chronic illness, such as chronic kidney disease (CKD), where the goal is not the elimination of disease, but rather the adjustment of patients to physical limitations, changes in lifestyle, and medical treatments [16]. Improved QoL and self-efficacy have been associated with positive effects in patients receiving dialysis, such as improvements in key laboratory values, cognitive and emotional functioning, mortality and hospitalization rates, and improved adherence to therapy [16]. Previous studies concerning HRQOL and ESRD, have identified that modality of treatment is a factor influencing quality of life in ESRD [17].

Patients undergoing hemodialysis usually go to dialysis centers two or three times a week for three/four hours per session, which may influence both their professional and personal lives. On the contrary, peritoneal dialysis may be performed independently or with the help of a caregiver, at home, at work or in any other clean places. This treatment can be performed several times per day every 4-5 hours and with a greater pause period at night (using the CAPD manual method), or continuously during the night, by means of a machine that makes exchanges for 8-10 consecutive hours (with the APD automated method).

The central hypothesis posits that receiving a home dialysis modality, such as peritoneal dialysis, leads to better QoL and self-efficacy than does a traditional in-center therapy [16].

An important tool for the evaluation of QoL of patients under dialysis is the KDQOL (Kidney Disease Quality of Life) questionnaire. There are multiple versions of KDQOL; the first version was the KDQOL Long-Form, which consisted of 134 questions over 11 specific scales for kidney disease. However, this method often leads to lower levels of response [18].

The KDQOL-Short Form Version 1.3 consists of 36 questions about the general physical and mental state of health, and 43 specific questions related to renal failure. The specific questions of KDQOL-SF 1.3 related to kidney failure focus on some issues that patients under dialysis have: symptoms/problems, effects of kidney disease on daily life, renal failure weight, employment status, cognitive function, quality of social interactions, sexual function, and sleep [19].

The KDQOL-SF version 1.3 has also been drafted in a shorter version, known as KDQOL-Short Form 36, which is made up of the Short Form-12 scale (which measures the physical and mental functioning by means of 12 questions), and 24 specific questions related to the disease [18].

The aim of the current study therefore was to perform a systematic review and meta-analysis of published studies using KDQOL-SF 1.3 and KDQOL-SF 36 in patients with chronic renal failure, in order to determine which hemodialysis or peritoneal dialysis treatments result in a higher QoL.

Materials and Methods

Search strategy

Two Authors screened published articles in Cinahl, Medline, PubMed, Scopus and Proquest, using the following PICO system:

P (Problem/Patient/Population): Patients suffering from chronic renal failure;

I (Intervention): Use of peritoneal dialysis;

C (Comparison): Use of hemodialysis;

O (Outcome): Best QoL in patients with chronic renal failure.

Paper research was conducted in electronic databases, with the following descriptor in English according to the MeSH (Medical Subject Headings): "Chronic renal failure", "Hemodialysis", "Peritoneal dialysis", "Quality of life".

Inclusion and exclusion criteria

The inclusion criteria for the selection of articles was: 1) Comparison between peritoneal dialysis and hemodialysis therapy for the treatment of patients with chronic renal failure in relation to the QoL; 2) English language; 3) Key words: Chronic, Renal failure, Hemodialysis, Peritoneal dialysis, Quality of life; 4) pattern of publication in a journal or magazine with full text online; 5) search time of publication from 2011/01 to 2016/06; 6) adult population sample (18 years and over); 7) articles using KDQOL-SF 1.3 or KDQOL-SF 36 tools for the evaluation of quality of life.

We excluded articles that did not meet the inclusion criteria. The flow chart of the selection process is reported in Figure 1.

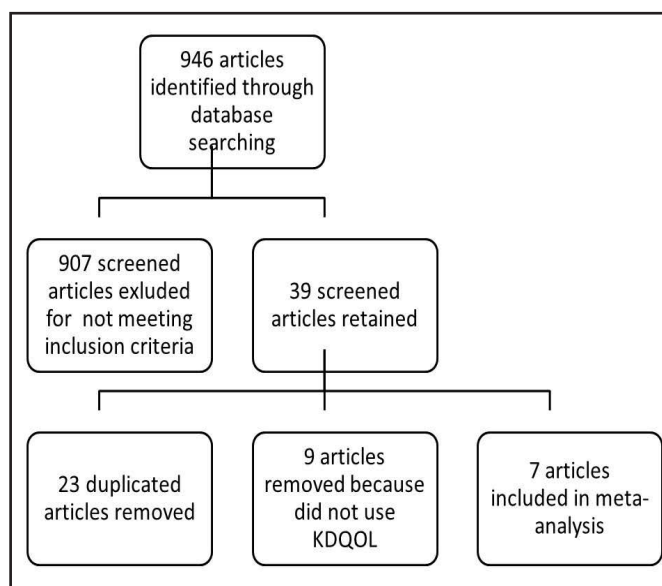


Fig. 1. Study selection process' flow diagram.

Data and statistical analysis

The scoring procedure for the KDQOL-SF consists of two steps. Firstly, a scoring procedure translates the raw pre-coded numeric values of items into a 0-100 possible range, with higher translated scores reflecting better QoL. Each item is put on a 0 to 100 range so that the lowest and highest possible scores are respectively set at 0 and 100. Secondly, items in the same scale are averaged together to create the scale scores [19].

Data were collected through Excel Office. Statistical analyses were performed through the t-test on independent variables. Determination of mean differences (MD), and a 95% confidence interval (CI) were calculated. Correlations were determined through the Pearson correlation coefficient.

Results

Based on the inclusion and exclusion criteria, 7 articles have been included [1, 2, 4, 15, 16, 20, 21]. The total sample of patients examined by the two questionnaires (KDQOL-SF 1.3 and KDQOL-SF 36), consist of 1857 individuals, of whom 1165 (62.7%) undergoing hemodialysis and 692 (37.3%) undergoing peritoneal dialysis. Excluding the study by Gonçalves [20] - for which there was no gender specification between the 338 patients - the remaining 1519 individuals were 805 males and 714 females, with an average age of 54.4.

Qualitative results

The article by Wakeel et al [2]. compared, through the KDQOL-SF 1.3, the quality of life between two groups of patients undergoing hemodialysis and peritoneal dialysis in Saudi Arabia, involving a total of 200 patients and excluding those who had suffered cognitive impairment, neurological deficit and who were suffering from psychiatric disorders which prevented them from replying satisfactorily to questionnaires. The scores of quality of life were higher and statistically significant ($P < .001$) in almost all domains analyzed by the KDQOL-SF 1.3 in peritoneal dialysis patients. The only exception was found in physical functioning which, although with no statistically significant difference ($P < .27$), was better in hemodialysis patients. This study therefore concludes that, in Saudi Arabia, the peritoneal dialysis patients have a better quality of life than those on hemodialysis.

The article by Gonçalves et al [20]. compared, by the KDQOL-SF 36, the quality of life of 222 hemodialysis patients with 116 peritoneal dialysis patients. Also in this study, patients suffering from mental disorders were not included as well as cancer patients. Domains, which yielded the best results, and with statistical significance in peritoneal dialysis patients were: work status (PD M = 25.00 against HD M = 14.64, $p = .012$), encouragement from dialysis staff (PD M = 96.12 against HD M = 83.11; $p = 0.008$) and satisfaction of the patient (PD M = 81.61 against HD M = 71.47; $p < 0.005$). On the contrary, hemodialysis showed better results in physical (PD M = 45.78 against HD M = 52.75; $p = 0.043$) and emotional functioning (PD M = 44.25 against HD M = 56.61; $P = .009$). Gonçalves concludes by affirming that, although peritoneal dialysis has obtained higher scores in three domains of the KDQOL-SF 36 against two in hemodialysis, the latter is the favorable mode for a better quality of life because the domains in which hemodialysis is found to be better have a significant influence on the well-being.

The article by De Abreu et al [15]. involves 350 participants undergoing at least one year to the same dialysis mode (HD or PD), and evaluates the quality of life through the KDQOL-SF 36. Peritoneal dialysis patients show the best results regarding constant encouragement and support from dialysis staff, and with regards to patient satisfaction in relation to treatment. A greater percentage of hemodialysis patients had clinically significant improvements in the quality of life, from the beginning of the study until the 12-month checkup, compared to those on peritoneal dialysis ($P = .004$), but initially they had lower scores. Furthermore, concerning the quality of social interactions, hemodialysis patients improved significantly of 4.86 points ($P = .0285$) against peritoneal dialysis patients; on the contrary, those on peritoneal dialysis

improved by 4.85 points ($P = .0275$) compared with hemodialysis concerning patient satisfaction in relation to treatment. The article concludes that the differences found by comparing the quality of life between the two groups were not statistically significant.

The article by Kim et al [4]. uses KDQOL-SF 36 for evaluating the quality of life between two groups of patients undergoing hemodialysis and peritoneal dialysis, revealing the association with self-efficacy and satisfaction with treatment. Concerning the list of symptoms and problems, patients undergoing peritoneal dialysis had significantly lower scores than hemodialysis (PD versus HD $M = 62.1$ $M = 69.6$; $P < .01$). Self-efficacy in reaching treatment goals and in the management of treatment were significantly related to the mental component score ($P = .013$), to the symptoms/problems list ($P < .011$), to the effects of kidney disease ($P = .037$) and to weight of renal failure ($P < .001$). The treatment satisfaction showed significant correlations with the score of physical component ($P = .005$), the score of the mental component ($P = .023$) and the effects of kidney disease ($P = .001$). The article concludes that both self-efficacy and satisfaction with the treatment can affect the quality of life of patients.

The article by Griva et al [21]. compares the QoL and emotional adjustment in 433 patients undergoing hemodialysis and peritoneal dialysis (at least for 3 and 6 months, respectively). The levels of quality of life investigated through the KDQOL-SF 36 were significantly lower than standard average for both hemodialysis patients than for those on peritoneal dialysis ($P < .001$). The comparison between the QoL scores of the two dialysis modalities reports that patients on peritoneal dialysis have better satisfaction in relation to treatment ($P = .02$), but a smaller physical health than recipients of hemodialysis. The levels of quality of life between the two different dialysis modalities are equivalent in all the other domains. About the Hospital Anxiety and Depression Scale (HADS), patients under peritoneal dialysis have significantly higher levels of depression symptoms than those on hemodialysis ($P = .024$). No differences were found in relation to anxiety symptoms. Furthermore, there are no age-related differences.

The article by Okpechi et al [1]. evaluates the QoL of 56 patients on hemodialysis and 26 on peritoneal dialysis by means of KDQOL-SF 1.3. Comparing the quality of life, peritoneal dialysis patients presented better scores than those on hemodialysis, but without a statistically significant difference. An analysis of univariate regression was performed. The use of erythropoiesis-stimulating agents (ESA) in peritoneal dialysis patients is associated to emotional well-being ($P = .01$), while in hemodialysis patients with pain ($P = .049$), emotional well-being ($P < .0001$) and energy/fatigue ($P = .001$). The area of the emotional role in patients on peritoneal dialysis is related to ferritin in serum ($P = .002$) and to hemoglobin concentration ($P = .006$) on hemodialysis. Parathyroid hormone (PTH) significantly affects physical function ($P < .0001$) and energy/fatigue ($P < .0001$) in hemodialysis patients, calcium affects the level of general health ($P = .019$) in patients treated with hemodialysis. In hemodialysis patients hemoglobin concentration is associated to the areas regarding the symptom ($P = .001$) and cognitive function ($P = .003$), as well as the ESA use, respectively ($P < .0001$) and ($P = .001$). In patients treated with peritoneal dialysis, the area of cognitive functioning was found connected to the blood pressure values both systolic ($P = .015$) and diastolic ($P = .002$), while the serum level of inorganic phosphate was associated with the quality of social interaction ($P = .019$).

The article by Wright et al [16]. compares, through KDQOL-SF 1.3, the QoL of 29 patients undergoing hemodialysis in structure with 22 patients on home hemodialysis and 26 on peritoneal dialysis, for at least 6 months. Patients on home hemodialysis had the highest scores relative to sleep, sexual function, quality of social interactions and work status, whereas they showed the lowest scores with regard to symptoms/problems list, the burden of kidney disease, social support and physical component. On the other hand, patients on in-center hemodialysis presented the lowest scores in relation to renal failure effects, work status, cognitive function, quality of social interactions, encouragement from the dialysis

Table 1. T-test between KDQOL-SF 1.3 and KDQOL-SF 36. * P ≤ .05; ** P ≤ .01

		N	M	SD	T	P
Symptom/ Problems list	KDQOL SF - 36	4	72,75	4,992	-,439	,669
	KDQOL SF - 1.3	10	73,90	4,228		
Effect of Kidney Disease	KDQOL SF - 36	4	67,25	2,500	,602	,558
	KDQOL SF - 1.3	10	65,60	5,147		
Burden of Kidney Disease	KDQOL SF - 36	4	37,25	6,076	-2,071	,061
	KDQOL SF - 1.3	10	46,20	7,671		
Work Status	KDQOL SF - 36	2	20,00	7,071	-,941	,369
	KDQOL SF - 1.3	10	28,50	12,058		
Cognitive function	KDQOL SF - 36	2	80,50	,707	,570	,581
	KDQOL SF - 1.3	10	78,10	5,724		
Quality social interaction	KDQOL SF - 36	2	79,50	,707	,556	,591
	KDQOL SF - 1.3	10	77,60	4,648		
Sexual function	KDQOL SF - 36	2	86,00	2,828	1,580	,145
	KDQOL SF - 1.3	10	64,70	18,318		
Sleep	KDQOL SF - 36	2	68,50	,707	1,842	,095
	KDQOL SF - 1.3	10	61,30	5,314		
Social Support	KDQOL SF - 36	4	77,50	8,185	,715	,488
	KDQOL SF - 1.3	10	75,00	4,922		
Dialysis Staff Encouragement	KDQOL SF - 36	4	81,50	10,661	-,631	,542
	KDQOL SF - 1.3	8	84,25	4,862		
Patient Satisfaction	KDQOL SF - 36	4	69,25	10,046	-2,543	,029*
	KDQOL SF - 1.3	8	79,88	4,824		
Physical functioning	KDQOL SF - 36	2	49,50	4,950	-,443	,667
	KDQOL SF - 1.3	10	54,00	13,711		
SF-12 Physical Component Scale	KDQOL SF - 36	2	36,50	,707	-13,000	,006**
	KDQOL SF - 1.3	2	43,00	0,000		
SF-12 Mental Component Scale	KDQOL SF - 36	2	43,50	,707	-9,899	,010*
	KDQOL SF - 1.3	2	50,50	,707		

staff and patient satisfaction, while conversely showing the highest scores in physical role limitations, emotional role limitations and pain. In addition, the in-center hemodialysis group has the lowest mental health composite score. Patients with home dialysis had higher scores regarding the symptoms/problems list, the effects of renal failure, the burden of kidney disease, the cognitive function, the encouragement from the dialysis staff and the patient satisfaction. However, they had lower scores in relation to sleep and sexual function. The peritoneal dialysis patients had the highest scores with regard to physical functioning, emotional well-being, energy/fatigue and general health. None of these differences, however, were statistically significant. The peritoneal dialysis group also presented the highest scores in all three dimensions of SUPPH (positive attitude, stress reduction and decision process), but also these differences were not significant. The author concludes that, although the results of the study suggest possible benefits for patients on peritoneal dialysis as to the quality of life and self-efficacy, the lack of statistical significance makes it impossible for a final recommendation.

Quantitative results

The determination of Cronbach's Alpha proved a high overall internal sample reliability both in KDQOL-SF1.3 ($\alpha = .956$) and in KDQOL-SF 36 ($\alpha = .946$). The same value is also confirmed in the sum of the items of the two instruments ($\alpha = .954$).

The comparison between KDQOL-SF 1.3 and KDQOL-SF 36 (Table 1) showed few significant differences. As regards to Patient satisfaction, the KDQOL-SF 1.3 presented an M = 79.88 (SD = 4.824), whereas the M = 69.25 (SD = 10, 046) of the KDQOL-SF 36

Table 2. T-test between patients subjected to hemodialysis (HD) and peritoneal dialysis (PD)

	N	M	DS	T	P
Symptom/ Problems list	HD 7	73,00	4,546	-,483	,638
	PD 7	74,14	4,298		
Effect of Kidney Disease	HD 7	63,57	4,541	-2,433	,032
	PD 7	68,57	2,992		
Burden of Kidney Disease	HD 7	41,43	7,525	-1,014	,330
	PD 7	45,86	8,764		
Work Status	HD 6	22,83	9,663	-1,310	,219
	PD 6	31,33	12,612		
Cognitive function	HD 6	77,83	6,145	-,422	,682
	PD 6	79,17	4,708		
Quality social interaction	HD 6	78,17	3,920	,194	,850
	PD 6	77,67	4,967		
Sexual function	HD 6	68,33	20,559	,015	,988
	PD 6	68,17	18,280		
Sleep	HD 6	62,33	6,121	-,099	,923
	PD 6	62,67	5,538		
Social Support	HD 7	75,29	5,376	-,267	,794
	PD 7	76,14	6,594		
Dialysis Staff Encouragement	HD 6	79,83	4,792	-1,968	,077
	PD 6	86,83	7,278		
Patient Satisfaction	HD 6	73,50	8,573	-1,199	,258
	PD 6	79,17	7,782		
Physical functioning	HD 6	54,67	10,013	,374	,717
	PD 6	51,83	15,651		
Role limitation due to physical function	HD 4	37,50	15,801	-,516	,624
	PD 4	42,75	12,816		
Pain	HD 4	63,50	13,916	-,453	,666
	PD 4	67,50	10,847		
General Health	HD 5	47,60	5,550	-1,005	,344
	PD 5	53,00	10,654		
Emotional Well-being	HD 4	67,75	11,899	-,453	,667
	PD 4	71,00	8,042		
Role limitation due to emotional function	HD 4	56,50	20,889	-,645	,543
	PD 4	64,25	11,899		
Social Functioning	HD 4	66,75	7,228		
	PD 4	66,75	4,924		
Energy/ Fatigue	HD 3	51,67	7,095	-,277	,796
	PD 3	54,00	12,767		
Overall Health	HD 2	63,00	4,243		
	PD 2	63,00	5,657		
SF-12 Physical Component Scale	HD 2	40,00	4,243	,108	,924
	PD 2	39,50	4,950		
SF-12 Mental Component Scale	HD 2	46,50	4,950	-,202	,859
	PD 2	47,50	4,950		

($t = -2.543$, $p = .029$). Even in the SF-12 Physical Component Scale and Mental Component Scale there were differences between the two instruments: the KDQOL-SF 1.3 showed $M = 43$ ($SD = 0.707$), whereas the KDQOL-SF 36 was $M = 36.50$ ($SD = 0.707$) ($t = -13.000$, $P = .006$). Regarding Mental Component Scale the KDQOL-SF 1.3 was $M = 50.50$ ($SD = 0.707$), against $M = 43.50$ ($SD = 0.707$) of the KDQOL-SF 36 ($t = -9.899$, $P = .010$).

Neither of the parametric calculation by the sum of the items of the two questionnaires, KDQOL-SF 1.3 and KDQOL-SF 36, showed many significant differences between patients treated with hemodialysis and peritoneal dialysis (Table 2). The only difference was found in item Effect of Kidney Disease, in which peritoneal dialysis patients presented an M = 68.57 (SD = 2.992) against the M = 63.57 (SD = 4.541) of those receiving hemodialysis (t = -2433, P = .032).

The evaluation through Pearson correlation coefficient (Figure 2) with $\rho \leq .01$, highlights many direct correlations between the domains of the two questionnaires.

Patients with minor limitations due to physical functioning also display a lower burden of kidney disease ($\rho = .845$), an improved physical function ($\rho = .873$), a better pain relief ($\rho = .931$), a better general health ($\rho = .888$), a higher social functioning ($\rho = .965$) and a higher score of energy/fatigue ($\rho = .946$).

Patients with minor limitations due to emotional functionality also have a minor effect of renal disease ($\rho = .848$) and greater pain relief ($\rho = .894$). Those with better working conditions also have a higher pain relief ($\rho = .874$).

Subjects who receive better social support show a better quality of sleep ($\rho = .708$), more encouragement from the dialysis staff ($\rho = .750$), greater pain relief ($\rho = .913$), minor limitations due to emotional functionality ($\rho = .852$) and a higher score regarding the SF-12 Physical Component Scale ($\rho = .993$).

Those who report a better social functioning also show a higher physical function ($\rho = .908$), a decreased limitation due to physical function ($\rho = .965$) and greater pain relief ($\rho = .896$).

Patients with a better symptoms/problems list also display a minor burden of kidney disease ($\rho = .745$) and a better SF-12 Mental Component Scale ($\rho = .996$).

Patients showing better cognitive function also report greater emotional wellness ($\rho = .930$) and minor limitations due to emotional functionality ($\rho = .934$).

Population with high scores in relation to energy/fatigue also display a greater pain relief ($\rho = .940$) and a better general health ($\rho = .990$).

Those who result most satisfied are patients who have also received an increased level of dialysis staff encouragement ($\rho = .730$).

	Symptom/Problems list	Effect of Kidney Disease	Burden of Kidney Disease	Work Status	Cognitive Function	Sexual Function	Sleep	Social Support	Dialysis Staff Encouragement	Patient Satisfaction	Physical functioning	Role limitation due to Physical function	Pain	General Health	Emotional Well-being	Role limitation due to emotional function	Social Functioning	Energy/Fatigue	Overall Health	SF-12 Physical Component Scale	SF-12 Mental Component Scale		
Symptom/Problems list		.745 ⁻																				.996 ⁻	
Effect of Kidney Disease																							
Burden of Kidney Disease	.745 ⁻										.845 ⁻					.848 ⁻							
Work Status													.874 ⁻										
Cognitive function							.708 ⁻								.930 ⁻	.934 ⁻							
Social Support								.750 ⁻					.913 ⁻			.852 ⁻						.993 ⁻	
Dialysis Staff Encouragement									.730 ⁻														
Patient Satisfaction										.730 ⁻													
Physical functioning											.873 ⁻					.908 ⁻							
Role limitation due to physical function			.845 ⁻									.873 ⁻											
Pain				.874 ⁻								.931 ⁻	.888 ⁻			.894 ⁻							
General Health							.913 ⁻					.931 ⁻	.888 ⁻			.894 ⁻							
Emotional Well-being					.930 ⁻																		
Role limitation due to emotional function								.852 ⁻															
Social Functioning											.908 ⁻	.965 ⁻	.896 ⁻										
Energy/Fatigue												.946 ⁻	.940 ⁻	.990 ⁻									
SF-12 Physical Component Scale								.993 ⁻															
SF-12 Mental Component Scale	.996 ⁻																						

Fig. 2. Pearson Correlation coefficient.

Discussion

The analysis of the articles included in this systematic review and meta-analysis [1, 2, 4, 15, 16, 20, 21] has not led to a unanimous conclusion.

Quantitative analysis performed to compare the differences among patients undergoing hemodialysis and peritoneal dialysis, through the sum of the items of the two instruments, revealed that the only statistically significant difference was the effect of kidney disease ($p = .032$), which was better in patients on peritoneal dialysis than those undergoing hemodialysis ($M = 68.57 \pm 2.992$ vs $M = 63.57 \pm 4.541$).

The internal consistency of the KDQOL-SF 1.3 and KDQOL SF-36, identified by the Cronbach's α , was excellent, and also the sum of the items of the two instruments detected an excellent internal consistency.

Through the Pearson correlation coefficient we found 24 direct correlations between the domains of the two questionnaires, until now there were no studies which had surfaced so many correlations.

Previously few correlations were found; an inverse relationship between the comorbidity and QoL [22]; patients with depression present worse scores in the domains of the SF-36 questionnaire than those without depression, suggesting that depression can significantly impair the QoL [23]; self-management of patients on peritoneal dialysis develops a sense of personal control which correlates positively and significantly with many aspects of QoL [24].

In the present meta-analysis the Pearson correlation coefficient identified that patients who have lower role limitations due to physical functioning also demonstrate a lower burden of kidney disease ($\rho = .845$) and improvements in physical function ($\rho = .873$), pain relief ($\rho = .931$), overall health ($\rho = .888$), social functions ($\rho = .965$) and energy/fatigue ($\rho = .946$). Patients with minor role limitations due to emotional functionality also show a smaller effect of renal disease ($\rho = .848$) and greater pain relief ($\rho = .894$). Those who have a better working condition also display higher pain relief ($\rho = .874$). Patients who receive better social support show better quality of sleep ($\rho = .708$), more encouragement from dialysis staff ($\rho = .750$), greater pain relief ($\rho = .913$), minor role limitations due to emotional functionality ($\rho = .852$) and a higher score regarding the SF-12 Physical Component Scale ($\rho = .993$). Those who report a better social functioning also show higher physical function ($\rho = .908$), minor role limitations due to physical function ($\rho = .965$) and greater pain relief ($\rho = .896$). Patients who display a better list of symptoms/problems report even a less burden of kidney disease ($\rho = .745$) and a better SF-12 Mental Component Scale ($\rho = .996$). Patients with better cognitive functions also report greater emotional well-being ($\rho = .930$) and minor role limitations due to emotional functionality ($\rho = .934$). Those who have higher scores regarding energy/fatigue also display a greater pain relief ($\rho = .940$) and better overall health ($\rho = .990$). The most satisfied patients are those who also have greater encouragement from dialysis staff ($\rho = .730$).

Study limitations

Patients taking part in the several studies analyzed undergo different lengths of dialysis treatment and have different contexts of life in relation to the areas in which studies were performed. Furthermore, the total sample of participants has a male prevalence, excluding those partaking in Gonçalves' study [20], which in a sample of 338 patients does not highlight gender. The results of the review and of the meta-analysis must be interpreted with caution because of the intrinsic flaws associated with the research designs of the included studies. Moreover, the restricted existence of studies comparing home hemodialysis with the other two modalities did not allow for its inclusion in comparison with the other studies.

Conclusion

The literature analysis has not led to a unanimous conclusion, and therefore does not allow making a final recommendation regarding the best treatment between hemodialysis and peritoneal dialysis.

Some studies suggest possible benefits for patients receiving peritoneal dialysis, because they have high scores in the domains of QoL, but without reaching a statistically significant difference [1, 15, 16]. The study by Griva et al. concludes that the two modalities are equivalent in almost all domains [21]. Wakeel et al. confirms that peritoneal dialysis patients have a statistically better quality of life than those receiving hemodialysis regarding almost all domains of QoL [2].

On the contrary, others claim that hemodialysis is the best treatment [4, 21]. The first article concludes that the only significant difference between the two methods is the symptoms/problems list which results improved in hemodialysis patients; the second article shows that, despite having obtained the best results in patients undergoing peritoneal dialysis in three domains of QoL (employment status, encouragement from dialysis staff and patient satisfaction), against the two in which hemodialysis yielded stronger results (physical and emotional function), concluding that hemodialysis is the treatment which leads to a better QoL, as these last two functions are those which have a major influence on well-being and everyday life.

The quantitative analysis shows that the only statistically significant difference between the QoL of patients on hemodialysis and those on peritoneal dialysis - compared using the sum of the items of the KDQOL-SF 1.3 and KDQOL-SF 36 - concerns the effect of kidney disease, which is better in patients undergoing peritoneal dialysis ($P = .032$). The correlations obtained using the Pearson's coefficient demonstrate that, improving social support and reducing role limitations, positive outcomes could be achieved regarding the emotional well-being, the quality of sleep and the symptom's management by the patients. Furthermore, as obtained by the Pearson correlation coefficient, the peritoneal dialysis patients who present a lower effect of kidney disease also display a minor role limitation due to emotional functionality.

Disclosure Statement

The authors of this manuscript state that they do not have any Disclosure Statements and nothing to disclose.

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