Quality of Life in Patients with Chronic Kidney Disease: A Cross-sectional Study Comparing Patients on Hemodialysis, Peritoneal Dialysis and with Kidney Transplantation

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Authors' contributions

This work was carried out in collaboration between all authors. Authors CT and EJ designed the study, wrote the protocol and wrote the first draft of the manuscript. Author CT collected all data and performed the statistical analysis. All authors contributed to the interpretation process, read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

Aims: The methods of renal replacement therapy influence highly the quality of life (QOL) of patients with chronic kidney disease. The present study aimed to evaluate and compare the QOL in patients undergoing hemodialysis (HD), peritoneal dialysis (PD) and kidney transplantation (KT).
Methodology: The sample consisted of 186 patients attending Nicosia General Hospital in 2012, 118 HD patients, 23 PD patients and 45 KT patients. QOL was assessed by the Greek Kidney Disease Quality of Life-Short Form (KDQOL-SF 36).
Results: Patients on HD had worse scores in all components. All three patient groups showed

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highest scores in mental health (HD: 57.7; PD: 70.3; KT: 75.6), whereas the lowest scores were observed in the component role physical (HD 33.1; PD 54.4 and KT 56.7) and general health (HD 32.5; PD 44.1 and KT 60.4). KT patients achieved highest scores in the physical component summary and mental component summary, as well as in the component summary of renal disease, followed by peritoneal dialysis patients. Male gender was significantly associated with higher score.

Conclusion: The study demonstrate that among the three groups the patients on hemodialysis had the worst scores, whereas the best scores are seen in KT patients. Lower scores are reported in the physical health component and here especially in the general health. Physicians as well as nursing personnel should be aware of the effects of dialysis and could improve both physical and mental health implementing empowerment programs in departments of HD and PD, to support patients in managing their health-related conditions.

1. INTRODUCTION

The number of patients with chronic kidney disease (CKD) is growing rapidly around the world. The methods currently applied globally and in our country as replacement therapy of renal function is the hemodialysis (HD) through an artificial kidney, the peritoneal dialysis (PD) and kidney transplantation (KT) from living or cadaveric donor. Consequently, there is increasing scientific interest from health professionals about the impact of support methods of renal function in quality of life (QOL) of patients with CKD.

The term QOL refers to the physical, psychological and social domains of health seen as distinct areas that are influencing patients experiences, beliefs, expectations and perceptions. The WHO defines QOL as "an individual's 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" [1].

The purpose of this study was to investigate the specific determinants that affect the assessment of health-related QOL of patients undergoing alternative renal replacement. Specifically, the investigation focuses on the comparison between patients undergoing hemodialysis, peritoneal dialysis and patients who underwent successful kidney transplantation according to the patient's subjective perception.

2. MATERIALS AND METHODS

2.1 Study Design and Study Population

The present study was carried out in the department of nephrology of the General Hospital of Nicosia in Cyprus. A cross-sectional study was employed, to enable comparisons between different patient groups with chronic kidney disease.

Between May 2012 and October 2012 all patients with end stage of renal disease (ESRD) undergoing renal replacement therapy with HD, PD or KT were consecutively included.

Inclusion criteria for patients to be eligible for the study were: age 18 years and older, both sex, diagnosis of ESRD, renal replacement therapy with HD, PD or KT for at least 6 months prior to the study, Greek as native language, adequate level of cooperation, perception and comprehension, voluntarily participation after signing the consent form.

A total of 186 patients agreed to participate who met the criteria. Of them 118 (63.4%) were undergoing chronic maintenance HD for four hours three times per week in the hemodialysis unit in the General Hospital in Nicosia, 23 (12.4%) were undergoing PD and 45 (24.2%) had undergone KT.

An ethical approval for the study was obtained from the Ethics Committee of the Health Ministry of Cyprus.

2.2 Data Collection and Instruments

Data were collected by a self-administered questionnaire which was distributed to all patients. HD patients completed it with the help of the researcher-nurse during the HD session. The PD and KT patients received the questionnaire at one of their scheduled appointment and were requested to complete it

during the consultation waiting time. The researcher-nurse was available to provide explanations and to assist patients who were not able to read and write.

The first section of the questionnaire included demographic and clinical information, i.e. sex, age, marital status, cause of renal disease and duration of renal replacement therapy. The second section obtained a health-related quality of life (HRQOL) instrument, namely the Kidney Disease Quality of Life Short-Form (KDQOL-SF 1.3) [2], which has been used in several settings with ESRD patients [3-5].

The Greek version of KDQOL-SF 1.3 which is used in the present study was validated by Malindretos [6]. This instrument for quality of life assessment combines a disease-specific instrument (KDQOL) with a generic instrument, the 36-item Short Form health survey (SF-36). The latter is designed to measure eight different areas of health, including physical functioning, bodily pain, role limitations due to physical health problems as well as due to personal or emotional problems, emotional well-being, social functioning, vitality and general health perceptions. It also provides two summary measures, which refer to the physical health component (PHC) and the mental health component (MHC) scores.

KDQOL-SF 1.3 includes additionally to the SF-36 scales further specific dimensions of chronic kidney disease. In the Greek version are included 49 items that can be summarized in 12 subscales: Symptoms/problems, effects of kidney disease, burden of kidney disease, work status, cognitive function, quality of social interaction, sexual function, sleep, social support, dialysis staff encouragement, overall health and patient satisfaction.

Items from each concept in both instruments are summed and rescaled with a standard range of 0 to 100, where 100 represent the best health related quality of life.

2.3 Statistical Analysis

All analyses were performed using the program Statistical Package of Social Sciences (SPSS 20). The quantitative variables were described as means and standard deviations (SD) for continuous variables and as frequencies and proportions for categorical variables.

Pearson's r was applied to test for correlations among study variables. Kolmogorov-Smirnov test was applied to test if the quantitative variables of the sample followed normal distribution. If the sample does not follow normal distribution, non-parametric tests were applied. The Mann-Whitney test was used for comparisons of ranked scores among two groups and the table ANOVA or Kruskal-Wallis for the three groups, as appropriate.

3. RESULTS

3.1 Characteristics of the Study Population

Table 1 shows the main demographic and clinical characteristics of the studied population. Compared to the participants in the hemodialysis and peritoneal dialysis, the kidney transplant recipients were younger (66.6 and 67.1 vs 54.1 years, respectively, P<.001), there was a predominance of men in all three groups (HD 66.9%, PD 60.9%, KT 77.8%) and the majority were married (HD 73.7%, PD 78.3%, KT 71.1%).

With regard to clinical characteristics, diabetic nephropathy was the most common cause of ESRD in HD patients (20.3%), arterial hypertension in PD patients (26.1%) and hereditary disease like polycystic kidney disease in KT patients (35.6%). The mean time on dialysis was 44.2 months in HD and 25.1 months in PD, whereas the mean time after KT was with 118.2 months significantly higher compared to the other both groups (P<.001). For more details refer to Table 1. The majority of hemodialysis patients were treated with online hemofiltration and 17 (74%) PD patients were in continuous ambulatory peritoneal dialysis (CAPD). Thirty four (75.6%) of KT patients obtained their grafts from living donor and the rest from cadaveric donor.

3.2 Descriptive Analysis of the SF-36 Scale

Table 2 shows the mean scores and SD on the SF-36 dimensions in each patient group. In all three groups the highest mean scores were achieved in mental health (HD 57.7; PD 70.3 and KT 75.6), whereas the lowest scores were observed in the component role physical (HD 33.1; PD 54.4 and KT 56.7) and general health (HD 32.5; PD 44.1 and KT 60.4).

Table 1. Characteristics of the study population (n=186)

	HD [a] (n=118)	PD (n=23)	KT (n=45)	P value
Age in years, mean (SD)	66.6 (13.4)	67.1 (13.8)	63.6 (14.4)	<.001
Gender (%)				.278
Male	79 (66.9%)	14 (60.9%)	35 (77.8%)	
Female	39 (33.1%)	9 (39.1%)	10 (22.2%)	
Causes of ESRD (%)				.002
Diabetic nephropathy	24 (20.3%)	1 (4.3%)	1 (2.2%)	
Art. Hypertension	21 (17.8%)	6 (26.1%)	2 (4.4%)	
Hereditary disease	18 (15.3%)	4 (17.4%)	16 (35.6%)	
Renal arteries stenosis	4 (3.4%)	0 (0%)	1 (2.2%)	
Toxins/ Drugs	16 (13.6%)	1 (4.3%)	3 (6.7%)	
Other	16 (13.6%)	6 (26.1%)	14 (31.1%)	
Unknown	19 (16.1%)	5 (21.7%)	8 (17.8%)	
Marital status (%)				.338
Single	13 (11%)	1 (4.3%)	8 (17.8%)	
Married	87 (73.7%)	18 (78.3%)	32 (71.1%)	
Divorced	6 (5.1%)	0 (0%)	3 (6.7%)	
Widowed	12 (10.2%)	4 (17.4%)	2 (4.4%)	
Work status (%)				<.001
Full-time employment	6 (5.1%)	2 (8.7%)	17 (37.8%)	
Part-time employment	9 (7.6%)	1 (4.3%)	1 (2.2%)	
Unemployed	0 (0%)	1 (4.3%)	3 (6.7%)	
Retired	79 (66.9%)	14 (60.9%)	16 (35.6%)	
Unable to work	17 (14.4%)	4 (17.4%)	6 (13.3%)	
Student	1 (0.8%)	0 (0%)	0 (0%)	
Housewife	2 (1.7%)	1 (4.3%)	2 (4.4%)	
Other	4 (3.4%)	0 (0%)	0 (0%)	
Time of therapy in months, mean ± SD	44.2±43.96	25.1±20.6	118.2±102.9	<.001

[a]*HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation*

Table 2. Total scores of SF-36 by dimensions and patient group

SF-36[a]	HD (SD)	PD (SD)	KT (SD)	P value
Physical functioning	37.5(28.5)	47.2(26.6)	73.4(23)	<.001
Role physical	33.1(40.1)	54.4(45)	56.7(39.7)	<.001
Bodily pain	57.5(36.4)	71.6(30.2)	82.5(24.9)	<.001
General health	32.5(22.2)	44.1(24.5)	60.4(28.9)	<.001
PHC	**40.1(23.9)**	**54.3(24.9)**	**68.3(22.2)**	**<.001**
Vitality	40(29.2)	59.6(21.7)	66.9(28.3)	<.001
Social functioning	49.5(35.7)	67.9(25.8)	78.3(27.4)	<.001
Role emotional	41.5(44.9)	58(39.2)	66.2(38.9)	.01
Mental health	57.7(26.2)	70.3(18.4)	75.6(19.2)	<.001
MHC	**47.2(27.6)**	**63.9(21.9)**	**71.5(22.7)**	**<.001**

[a]*Lower scores indicate worse health; HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation, SD: standard deviation; PHC: physical Health component summary, MHC: mental health component summary*

There were statistical differences in all subscales. Kidney transplantation recipients scored in all dimensions higher compared to HD and PD. In both, the physical health component summary (PHC) (KT 68.3 vs HD 40.1, PD 54.3) and in the mental health component summary (MHC) (KT 71.5 vs HD 47.2; PD 63.9) they achieved the highest scores.

The second item of the SF-36 questionnaire that compares health in general relatively to the previous year, was evaluated separately taking into consideration that it is not included in the

final score. This item is punctuated from 0 to 100 according to the patient's answer: 1) much better (100%), 2) a little better (75%), 3) almost the same (50%), 4) a little worse (25%) and 5) much worse (0%). The PD and KT patients indicated an improvement in their health relatively to the previous year (HD: 44.9±28; PD: 59.8±22.3 and KT: 59.4±27.8).

3.3 Descriptive Analysis of the KDQOL Scale

Table 3 presents the comparison between the three groups regarding the disease-targeted health-related concerns of the kidney disease patients. The mean scores for each subscale of the KDQOL-SF 1.3 ranged from 17.4 to 94.6. The KT patients showed significantly higher scores comparing to PD and HD patients in the scales symptoms/problems, effects of kidney disease, burden of kidney disease, as well as in work status, sexual function and sleep. The highest scores in HD and PD are observed in the dialysis staff encouragement, followed by quality of interactions in HD and by cognitive functions in PD. At the other extreme, work status had the lowest score (HD 17.8, PD 17.4). For more details refer to Table 3.

Furthermore we examined whether age and sex were associated with HRQOL. Since age did not follow a normal distribution non-parametric tests were applied after recoding the variable into three age groups (<50 years, 50-65 years, >65 years). Kruskal-Wallis test was applied to evaluate the associations among the three age-groups (Table 4).

With regard to age, younger patients (<50 years) on hemodialysis show higher scores in the scales role physical and mental health, as well as in burden of kidney disease and sexual function, whereas in the dimension effects of kidney disease patients aged >65 years show significant higher scores. In patients on peritoneal dialysis only the parameter dialysis staff encouragement appears to be associated with younger (<50 years) and older (>65 years) age. Younger patients with kidney replacement show significantly higher scores in cognitive function and sexual function. For more details refer to Table 4 and Table 5.

For the comparison between males and females, Mann-Whitney U test was applied for all three patient-groups (Tables 6 and 7). Significant differences were found mainly in HD patients, revealing higher scores in males in almost all dimensions, i.e. in physical functioning, bodily pain, general health, vitality and mental health. Males rated significant higher scores in both the physical and the mental health component summary (44.7 vs 30.8, P=.003 and 52.2 vs 37, P=.01, respectively). With regard to the kidney-specific components, males had significant higher scores on symptoms and problems (75.1 vs 65.2, P=.004), effects of kidney disease (51.7 vs 40.2, P=.003) and work status (21.5 vs 10.3, P=.02). Higher scores in males are observed also in the PD group nearly in all components. However, significant differences are recorded only in the components bodily pain (85.5 vs 50, P=.01), mental health (77.4 vs 59.1, P=.03) and symptoms and problems (87.4 vs 69.9, P=.001). No statistical significant differences were observed between male and female kidney transplant recipients. For more details refer to Table 6 and Table 7.

Table 3. Total scores of KDQOL by dimensions and patient group

KDQOL[a]	HD (SD)	PD (SD)	KT (SD)	P value
Symptoms/ problems	71.8 (17.1)	80.5 (13.3)	86.8 (13.7)	<.001
Effects of kidney disease	47.9(21.4)	62.9 (21.4)	83.6 (16.9)	<.001
Burden of kidney disease	22.4 (21.3)	36.1 (29.3)	64.7 (29.2)	<.001
Work status	17.8 (29.6)	17.4 (28.6)	56.7 (43.4)	<.001
Cognitive function	74.3 (27.1)	81.4 (21)	82.5 (24.4)	.14
Quality of social interaction	74.9 (22)	80.9 (19.6)	86.5 (16.5)	.01
Sexual function	24.7 (32.2)	48.6 (34.5)	70 (38)	<.001
Sleep	40.5 (22.9)	41.6 (26.8)	57.5 (30)	<.001
Social support	60.4 (24.3)	69.6 (16.4)	71.9 (20.3)	.011
Dialysis staff encouragement	86.9 (24.4)	94.6 (14.5)	92.8 (13.7)	.130
Patient satisfaction	69.8 (17.6)	83.3 (12.3)	74.1 (15.7)	.002

[a]Lower scores indicate worse health; HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation, SD: standard deviation

Table 4. Mean scores of SF 36 in relation to age

SF-36[a]	HD (SD)				PD (SD)				KT (SD)			
	<50years	50-65 years	>65 years	P value	<50 years	50-65 years	>65 years	P value	<50 years	50-65 ears	>65 years	P value
PF	46 (31.5)	38.5 (23.4)	35.4 (29.7)	.37	52.5 (27.8)	47.5 (20.6)	45.7 (29)	.90	85.4 (13.5)	65.2 (27.8)	74 (14.7)	.06
RP	50 (40.1)	17.2 (30)	35.8 (42)	.02	56.3 (42.7)	12.5 (14.4)	65 (46.1)	.15	67.9 (38.5)	46.4 (39)	62.5 (41.2)	.28
BP	59.7 (34.2)	46.8 (37.3)	61.2 (36.2)	.20	70 (22.6)	45 (41.4)	79.2 (26.3)	.22	89.1 (22.8)	73.3 (27.5)	92.5 (14.8)	.08
GH	28.7 (21)	27.1 (20)	35.4 (23.1)	.19	43.8 (26.3)	28.8 (13.8)	48.3 (25.8)	.34	64.6 (21.7)	56.9 (33.9)	62 (28)	.87
PHC	46.1 (25.1)	32.4 (18.9)	42 (24.9)	.14	55.6 (21.4)	33.4 (18.9)	59.5 (25.4)	.22	76.7 (19)	60.5 (23.7)	72.8 (19.1)	.09
Vitality	50 (25.7)	32.8 (25)	40.9 (31)	.15	68.8 (19.7)	51.2 (27.2)	59.3 (21.6)	.61	76.8 (18)	59.8 (33.2)	68 (26.9)	.40
SF	57.5 (32.3)	40.5 (28.1)	51.4 (38.7)	.32	81.3 (16.1)	43.8 (31.5)	70.8 (23.5)	.15	81.3 (26.3)	70.2 (30.2)	91.3 (16.7)	.17
RE	57.8 (40.8)	30 (39.2)	42.8 (47)	.18	58.3 (31.9)	25 (16.7)	66.7 (41.8)	.17	69.1 (38)	55.6 (39.9)	80 (35.8)	.19
MH	63.7 (23.1)	45.7 (24.8)	61.2 (26.1)	.02	72 (18.8)	57 (13.2)	73.3 (19)	.33	80.6 (14.7)	71.6 (22.1)	76.8 (18.5)	.49
MHC	57.3 (26.2)	37.2 (22.2)	49.1 (28.9)	.06	70.1 (14.2)	44.3 (17.3)	67.5 (22.7)	.18	76.9 (18.8)	64.3 (25.2)	79 (19.2)	.19

[a] *Lower scores indicate worse health; HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation, SD: standard deviation; PF: physical functioning, RP: role physical, BP: bodily pain, GH: general health, PHC: physical health component summary, SF: social functioning, RE: role emotional, MH: mental health, MHC: mental health component summary*

Table 5. Mean scores of KDQOL in relation to age

KDQOL[a]	HD (SD)				PD (SD)				KT (SD)			
	<50 years	50-65 years	>65 years	P value	<50 years	50-65 years	>65 years	P value	<50 years	50-65 ears	>65 years	P value
S/P	72.8 (16.1)	70.8 (18.4)	72(17)	.95	74 (20.6)	75.5 (6)	83.6 (12.2)	.29	92.2(6.3)	84.6 (16.3)	83.9 (14.2)	.38
EKD	41.2 (19.3)	41.4 (17.8)	51.8(22.3)	.03	59 (26.5)	59.8 (23.8)	64.8 (20.9)	.90	86.7(11.4)	81.5 (16)	83.6 (24.9)	.51
BKD	31.3 (20.5)	23.3 (15.4)	20.2(23.1)	.03	34.4 (29.5)	14.1 (10.7)	42.5 (30.9)	.19	72.3(22.4)	61.6 (28.6)	60.6 (38.8)	.62
WS	36.7 (39.9)	17.2 (30.7)	14.2(25.5)	.06	37.5 (47.9)	12.5 (25)	13.3 (22.9)	.51	75(38)	52.4 (43.2)	40 (46)	.13
CF	84 (16.5)	74.5 (24)	72.3(29.7)	.52	73.3 (31.3)	91.7 (12.6)	80.9 (20)	.64	92.3(17.5)	73 (28.2)	88.7 (17.2)	.03
QSI	77.3 (17.2)	72.4 (20.9)	75.4(23.4)	.60	83.3 (22.1)	80 (13.3)	80.4 (21.5)	.91	88.6(20.6)	84.1 (14.8)	88.7 (15.4)	.35
SF	50 (25.9)	33.9 (32.1)	13.9(23.8)	0.002	32.5 (24.7)	50 (35.4)	42.5 (29.1)	.79	95(10.5)	67.5 (40.5)	25 (25)	0.004
Sleep	50 (25.9)	39.8 (20.4)	38.8(22.9)	.18	32.5 (24.7)	32.5 (18.6)	46.5 (29.1)	.46	69.8(29.8)	53.9 (30.6)	47.8 (28.7)	.11
SS	65 (25.5)	56.5 (26.9)	61 (23)	.70	75 (17.7)	71.9 (21.3)	67.5 (15.5)	.78	75.9(94.6)	69 (22.2)	72.5 (14.2)	.59
DSE	83.3 (22)	88.8 (25.5)	86.9(24.6)	.45	93.8 (12.5)	74 (27)	100 (0)	.003	94.6(10.6)	92.9 (14)	90 (17.5)	.84
PS	66.7 (18.9)	73 (15.7)	69.1 (18)	0.57	83.3 (13.6)	79.2 (8.3)	84.4 (13.3)	.75	77.4(15.5)	73.8 (16.3)	70 (15.3)	.50

[a] *Lower scores indicate worse health; HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation, SD: standard deviation; S/P: symptoms/problems, EKD: effects of kidney disease, BKD: burden of kidney disease, WS: work status, CF: cognitive function, QSI: quality of social interaction, SF: sexual function, SS: social support, DSE: dialysis staff encouragement, PS: patient satisfaction*

Table 6. Mean scores of SF 36 in relation to gender

SF-36[a]	HD (SD)			PD (SD)			KT (SD)		
	Male	Female	P value	Male	Female	P value	Male	Female	P value
PF	43.4 (28)	25.5 (26)	<.001	55 (24.2)	35 (26.8)	.08	77 (19.3)	61 (30.7)	.17
RP	35.8 (41)	27.6 (38.4)	.29	60.7 (43.5)	44.4 (48.1)	.37	53.6 (40.7)	67.5 (35.5)	.27
BP	63.8 (35.1)	44.6 (36.1)	.006	85.5 (23.6)	50 (27.2)	.01	84.1 (24.1)	77 (27.9)	.35
GH	35.9 (23.4)	25.5 (18.1)	.02	49.2 (26.4)	36.1 (20)	.20	62.1 (26.5)	54.5 (37.1)	.64
PHC	44.7 (24.3)	30.8 (20.2)	.003	62.6 (23.6)	41.4 (22.1)	.05	69.2 (20.9)	65 (27.4)	.76
Vitality	46.7 (30)	26.5 (22.8)	<.001	66.1 (19)	49.4 (22.7)	.06	69 (25.9)	59.5 (36.1)	.56
SF	55.2 (34.5)	37.8 (35.8)	.01	75.9 (23.7)	55.6 (25)	.11	81.4 (25.3)	67.5 (33)	.25
RE	46 (45.7)	32.5 (42.2)	.09	61.9 (43.1)	51.9 (33.8)	.56	62.9 (40.2)	73.3 (34.4)	.53
MH	61 (25.8)	51.2 (26)	.05	77.4 (18.5)	59.1 (12.3)	.03	76.6 (18.9)	72 (21.2)	.53
MHC	52.2 (28)	37 (24)	.01	70.3 (22.2)	54 (18.4)	.10	72.5 (22.2)	68.1 (25.3)	.82

[a] *Lower scores indicate worse health; PF: physical functioning, RP: role physical, BP: bodily pain, GH: general health, PHC: physical health component summary, SF: social functioning, RE: role emotional, MH: mental health, MHC: mental health component summary*

Table 7. Mean scores of KDQOL in relation to gender

KDQOL[a]	HD *(SD)*			PD *(SD)*			KT (SD)		
	Male	Female	P value	Male	Female	P value	Male	Female	P value
S/P	75.1 (16)	65.2 (17.7)	.004	87.4 (7.5)	69.9 (13.7)	<.001	82.2 (11.7)	88.2 (18.8)	.51
EKD	51.7 (21)	40.2 (20.1)	.003	68.6 (21.8)	53.9 (18.3)	.07	82.2 (17.1)	88.2 (16.1)	.15
BKD	24.8 (22.4)	17.5 (18.2)	.08	45.1 (33.2)	22.2 (14.7)	.12	60.7 (29.9)	78.9 (22.9)	.10
WS	21.5 (30.7)	10.3 (26.1)	.02	21.4 (32.3)	11.1 (22)	.56	57.1 (44)	55 (43.8)	.88
CF	75.6 (27.4)	71.6 (26.7)	.32	84.8 (21.2)	76.3 (20.8)	.28	85.5 (20.1)	72 (35)	.56
QSI	76.8 (22.7)	71.1 (20.1)	.09	83.8 (21.8)	76.3 (15.7)	.40	86.3 (17)	87.3 (15.9)	.76
SF	14.1 (29)	19.6 (38)	.66	18.6 (38.5)	19.4 (28.9)	.55	35.7 (37.7)	50 (42)	.84
Sleep	40.9 (23.6)	39.8 (21.6)	.72	47.7 (30)	32.2 (18.7)	.20	54.6 (31.6)	67.5 (25.1)	.34
SS	59.8 (27.7)	62.8 (21.9)	.37	67.9 (16)	72.2 (17.4)	.69	72.9 (18.8)	68.8 (25.9)	.74
DSE	85 (22.4)	88.5 (17.7)	.78	98.2 (6.7)	88.9 (21.1)	.31	93.6 (12.6)	90 (17.5)	.70
PS	70.7 (25.6)	67.9 (17.5)	.43	83.3 (11.3)	83.3 (14.4)	1	75.2 (16.4)	70 (13.1)	.25

[a] *Lower scores indicate worse health; HD: hemodialysis, PD: peritoneal dialysis, KT: kidney transplantation, SD: standard deviation; S/P: symptoms/problems, EKD: effects of KIDNEY disease, BKD: burden of kidney disease, WS: Work status, CF: cognitive function, QSI: quality of social interaction, SF: sexual function, SS: social support, DSE: dialysis staff encouragement, PS: patient satisfaction*

4. DISCUSSION

This cross-sectional study was undertaken to explore for the first time the health-related quality of life in patients undergoing different renal replacement therapies in Cyprus. The findings raise important considerations for the HRQOL when comparing dialysis patients with kidney transplant recipients and when comparing hemodialysis and peritoneal dialysis patients. The two summary measures of the SF-36, PHC and MHC, indicate a significant increase from patients on HD through patients on PD to KT, allowing us a fast evaluation of the HRQOL, with scarce loss of information when the eight scales are resumed in these two main components [5].

Several studies have already compared the QOL of dialysis patients with the general population, the majority disclosing the negative impact of CKD and its treatments [5,6]. The present study, even with the limitation of being an observational cross-sectional study with a small number of patients [7], was conducted to evaluate the HRQOL in three groups of patients with CKD, different characteristics (age, gender, duration of illness) and under different renal replacement treatments (HD; PD and KT).

The results demonstrate that HD patients had the worst scores, whereas the best scores are reported in KT patients. In all three groups, lower scores are reported in the physical health component and here especially in the general health. In other chronic diseases than CKD, a greater impact in mental health comparing to physical health was found. This situation can be explained by the higher average age. Similar results are found in other studies [8,5].

Comparisons of QOL between hemodialysis and peritoneal dialysis patients are not consensual. In our study, the PD group achieved better scores in scales like "Effects of kidney disease", "Burden of kidney disease" and "Patient satisfaction". According to the literature peritoneal dialysis patients select this dialysis technique to keep their active lives and possibility to study or work [9,10]. Though in the present study the most patients are retired, they are all the same more active, more autonomous and motivated than the HD patients.

On the other hand, our hemodialysis patients are integrated in a Hospital Unit that selects older, sicker and more dependent persons [11]. These facts may be a partial explanation for the better results of our PD patients. Individual characteristics of personality are obviously not evaluated in our study, but must also be considered when analyzing these results. Apart from these, hemoglobin levels, creatinine, adequacy of dialysis and comorbidity are important parameters for the HRQOL.

Female gender and older age emerged as predictors of lower HRQOL score. Our findings are in agreement with other studies, where lower scores are reported in women and in higher ages [12-15]. The reason for the lower scores in females may be psychological, since female patients show generally more depression and anxiety which is associated with lower QOL and has been well documented in various studies [16,17].

There are some limitations to this study. First, the patients were recruited from a single department, which may limit the generalizability of the findings. Second, the study was conducted among three groups of CKD patients with no even distribution according to age. Due to the limited sample size, this could suggest the existence of bias, as the younger patients tended to report a higher HRQOL. Third, we did not investigate the impact of clinical factors, such as the adequacy of hemodialysis or peritoneal dialysis, levels of hemoglobin or creatinine or comorbidities on the QOL of these patients. There are many other factors that contribute to the QOL, limiting thus the comparability at the baseline.

5. CONCLUSION

In conclusion, HD patients in our study had the lowest scores comparing to peritoneal dialysis patients or even to kidney transplant recipients, which is in accordance with other studies [18-20]. The worst scores in all three groups were found in the Physical Health Component, whilst the highest being observed in dialysis staff encouragement and quality of social interactions. Variables found to be related with QOL were age and gender, whereas males and younger patients show significant higher values [21].

The study has further demonstrated the feasibility of using a standardized quality of life instrument in different groups of CKD patients and comparing the results among them. Renal nurses should participate actively in investigating and improving the health-related quality of life, mainly for people receiving hemodialysis. Assessing QOL in these patients could give

nurses additional insight how they adapt to their chronic illness, in terms of physical, psychological and social process. The attention of all health professionals to the patient's subjective perception about their health can be determinant in achieving the best medical intervention and improving survival.

CONSENT

All authors declare that written informed consent was obtained from the patient (or other approved parties) for publication of this original research.

ETHICAL APPROVAL

All authors hereby declare that the study design and realisation of the study have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the contribution of all participating patients; without their effort and support this study would not have been possible.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=1118&id=12&aid=9165