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ORIGINAL PAPER

Resilience, pain self-efficacy and health-related quality of life of people on hemodialysis: a cross-sectional study

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Abstract

Aim: The study aimed to assess the connection of psychological resilience, pain self-efficacy and quality of life in people with chronic kidney disease (CKD) on hemodialysis. *Design:* A cross-sectional study design was chosen. *Methods:* Data were collected from 361 adults receiving hemodialysis in hospital and private settings in a Southern European country over six months. This was done in a semi-structured interview using the Connor-Davidson Resilience Scale (CD-RISC), the Pain Self-Efficacy Questionnaire (PSEQ), and the Kidney Disease Quality of Life (KDQOL-36) questionnaire. *Results:* The results indicated that the higher the resilience, the higher the pain self-efficacy. In addition, pain self-efficacy was found to have a positive effect on minimising both the symptoms and burden of the disease, leading to better quality of life. *Conclusion:* The present study showed that the level of resilience was proportional to pain self-efficacy with limited effect of demographic parameters. In addition, both resilience and pain self-efficacy affected health-related quality of life in people on hemodialysis. Using up-to-date assessment tools and implementing appropriate pharmacological and non-pharmacological interventions in everyday clinical practice can improve the quality of life of people on hemodialysis.

Keywords: health-related quality of life, hemodialysis, pain self-efficacy, resilience.

Introduction

Chronic kidney disease (CKD) is defined as a condition with abnormalities in kidney structure or function present for at least three months with implications for an individual's health (Kidney Disease: Improving Global Outcomes [KDIGO] CKD Work Group, 2024), making necessary the initiation of renal replacement therapy (RRT) with peritoneal dialysis (PD), hemodialysis (HD) and / or transplantation (Tx). Worldwide CKD is present in 700 million to one billion people (Bikbov et al., 2020; Hill et al., 2016), with HD being the most common type of treatment, accounting for 69% to 89% of those on dialysis (Bello et al., 2019; Pecoits-Filho et al., 2020). It has been established that it negatively affects the economic, psychological, social and family life of people undergoing RRT (Rikos et al., 2023).

Pain self-efficacy, resilience, and quality of life are deeply associated with CKD. The everyday life of people on HD has been found to be affected by pain due to procedures such as an arteriovenous fistula puncture or the insertion of a central venous catheter, or physical symptoms, such as musculoskeletal pain, ischemic / vascular disease and polycystic kidney disease (Casteleijn et al., 2016; Hsu et al., 2019). In addition, it is well established that CKD and HD are a major source of psychological problems, such as anxiety and depression (Kukihara et al., 2020). Resilience, the ability of a person to rebound from disease / trauma and to adapt to new situations allowing him / her to continue with everyday life and overcome stress-related impairments has been studied since the early 1980s (Flach, 1980; Liu et al., 2018; Werner & Smith, 1982). Resilient people are believed to have a better acceptance of the disease, lower level of psychological problems and higher compliance with therapy (Pradila et al., 2021).

It has been established that people with CKD have lower quality of life than the general population (Peipert et al., 2018; Pretto et al., 2020). A new and demanding way of life is imposed on people on HD including fluid and dietary restrictions,

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medication, and, a four-hour (at least) therapy session three times a week in order to improve health status and avoid complications (González-Flores et al., 2021; Stømer et al., 2020). Physical, psychological and social changes negatively affect their quality of life. It is quite common for people on hemodialysis to experience physical deterioration, sleep disorders, intimacy and sexual problems, lower appetite and malnutrition (Alikari et al., 2017; Cox et al., 2017; Aljawadi et al., 2024). Fatigue as a result of HD affects not only physical status but also social interaction and, consequently, psychological state. After HD patients are quite commonly too tired to participate in any activities and are confined to home. This can cause complications, for example with an employer. Fear of losing their job and source of income due to the HD session schedule takes an even greater toll on their psychological health (Hanspal et al., 2021).

Aim

The present cross-sectional study aimed to explore the effect of psychological resilience in pain self-efficacy and quality of life in people undergoing hemodialysis in public in-hospital and private dialysis units in northern Greece.

Methods

Design

A cross-sectional quantitative study with one-to-one semi-structured interview with the primary researcher was conducted in accordance with STROBE checklist.

Sample

The study population consisted of 361 people on hemodialysis. Data were collected from October 2022 till November 2023 during HD sessions. In order to be included in the study, participants had to be on HD for more than six months and be over 18 years old. Those with cognitive problems or severe mental disorders were excluded due to communication difficulties.

Data collection

Data were collected during HD session from one-to-one semi-structured interviews involving various research tools. The first tool (the Connor-Davidson Resilience Scale, CD-RISC) measured resilience with 25 items grouped in five factors: 1 – high standards, tenacity, and competence (eight items), 2 – way of handling negative emotions, trusting one's instincts, and perceived benefits of stress (seven items), 3 – having a positive attitude to change and secure relationships (five items), 4 – perceived control (three items), and 5 – spirituality (two items) (Connor & Davison, 2003). The second research tool (Pain Self-Efficacy Questionnaire, PSEQ), a ten-item questionnaire that assessed the ability of people in pain to perform daily activities (e.g. household chores, socializing and work), and to cope with pain without medication. The higher the score the greater the level of confidence in dealing with pain (Nicholas, 2007). The final tool (the Kidney Disease Quality of Life Instrument – Short Form, KDQOL-SF) had five scales: two scales (physical and mental health) measuring Health-Related Quality of Life (HRQoL) and three kidney disease specific scales (24 items) with main subscales of symptoms and problems, effects and burden of kidney disease. The Kidney Disease Component Summary (KDCS) was an average score of the eleven kidney disease-specific subscales (Peipert et al., 2019). All three research tools were used in their Greek translations after obtaining the appropriate permissions (Kontodimopoulos & Niakas, 2005; Theofilou et al. 2013; Tsigkaropoulou et al., 2018).

Data analysis

Statistical analysis was performed with IBM SPSS Statistics for Windows, version 25 (IBMCorp, 2017) and p-value of ≤ 0.05 was defined as statistically significant. The mean (standard deviation, SD) were used for continuous variables, whereas frequencies and percentages were used for dichotomous and categorical data. In addition, the Kolmogorov-Smirvov or Shapirto-Wilk criteria were applied as appropriate. To assess the differences between parameters the Mann–Whitney U test or the Kruskal–Wallis test were used. To identify independent predictors Spearman's rho correlation coefficient was used for correlation analysis and linear logistic regression analysis was performed. All research tools were tested for their reliability using Cronbach's α. The CD-RISC had a 0.873 score, the PSEQ 0.942, and the total KDQOL score was also calculated at 0.849.

Results

According the descriptive statistics, the sample consisted predominately of males (68.7%, n = 248). A majority of participants were married (56%, n = 202), had children (75.1%, n = 271), and lived with at least one member of their family (69.3%, n = 250). Nearly half were secondary education graduates (46.8%, n = 169). Participants were predominantly born and resided in urban areas (46.3% and 63.4%, respectively). The majority were

pensioners (78.7%, n = 284) and half reported low family income (51.5%, n = 186). The mean age of the sample was 61.1 (± 15.5) years old, with males being older than females (61.98 vs 59.31 years old). When calculating mean values, it was found that participants had high levels of self-efficacy (PSEQ 44.56 ± 16.2), fairly high resilience (CD-RISC 62.25 ± 12.7) and the subscale of KDQOL-SF were as follows: SF-12 Physical health 44.1 (± 10.9), Mental health 50.3 (± 9), Symptom-problem list 79.8 (± 14), Effects of kidney disease 56 (± 14), Burden of kidney disease 52.1 (± 22.8).

In the comparison between genders in all relevant scales, no statistical significance was found even though males had higher scores than females. Statistical significance was found only in SF-12 Mental health (p = 0.029) and in the Symptom-problem list (p < 0.001) (Table 1). No statistical significance was found in a comparison of age groups in all scales, except in the CD-RISC (p = 0.004), the SF-12 Physical health (p < 0.001), and the SF-12 Mental health (p = 0.039). In particular, participants younger than 40 years old had statistically higher mean scores compared to those older than 70 years old (Table 2).

Table 1 Comparisons according to gender in the PSEQ, CD-RISC and KDQOL-SF subscales questionnaires

Research tool	Gender (mean ± SD*)		p-value**
	Male	Female	
PSEQ	45.6 ± 15.5	42.3 ± 17.4	0.089
CD-RISC	62.3 ± 12.9	62.2 ± 12.5	0.785
SF-12 Physical health	44.7 ± 10.7	42.7 ± 11.2	0.124
SF-12 Mental health	50.8 ± 9.2	49.1 ± 8.5	0.029
Symptom-problem list	81.6 ± 14.1	76.0 ± 13.1	< 0.001
Effects of kidney disease	56.4 ± 15.9	55.1 ± 15.7	0.361
Burden of kidney disease	51.8 ± 22.9	52.6 ± 22.6	0.99

*PSEQ – Pain Self-Efficacy Questionnaire; CD-RISC – Connor-Davidson Resilience Scale; *SD – Standard Deviation; ** p < 0.05*

Table 2 Comparison of PSEQ, CD-RISC and KDQOL-SF subscales with age groups

Research tool	Age groups (mean ± SD*)			p-value**
	< 40 years old	41–69 years old	> 70 years old	
PSEQ	45.1 ± 14.9	46.2 ± 15.1	41.7 ± 17.9	0.270
CD-RISC	68.8 ± 15.1	62.2 ± 12.3	60.1 ± 12.0	0.004
SF-12 Physical health	48.5 ± 9.4	45.5 ± 10.4	40.3 ± 11.2	< 0.001
SF-12 Mental health	47.1 ± 10.1	50.1 ± 9.1	51.7 ± 8.2	0.039
Symptom-problem list	79.6 ± 16.3	80.4 ± 13.7	78.9 ± 13.8	0.597
Effects of kidney disease	59.5 ± 18.2	56.5 ± 16.7	54.1 ± 13.0	0.135
Burden of kidney disease	53.4 ± 27.2	52.8 ± 22.7	50.4 ± 21.4	0.502

*PSEQ – Pain Self-Efficacy Questionnaire; CD-RISC – Connor-Davidson Resilience Scale; *SD – Standard Deviation; ** p < 0.05*

Spearman's rho was used in order to find relationships between chronic pain (PSEQ), resilience (CD-RISC) and dialysis patients' quality of life (KDQOL-SF). Low negative statistically significant correlation with age was found in PSEQ (rho = -0.118). PSEQ also had positive statistically significant correlation with CD-RISC (rho = 0.164), the SF-12 Physical health subscale (rho = 0.506), the Symptom-problem list (rho = 0.468), the SF-12 Mental health (rho = 0.221), the Effects of kidney disease (rho = 0.264) and the Burden of kidney disease subscale (rho = 0.259) (Table 3).

Regression analysis was used to establish whether chronic pain (PSEQ) predicted resilience (CD-RISC) and dialysis patients' quality of life (KDQOL-SF). It was found that chronic pain significantly predicted resilience and dialysis patients' quality of life. Resilience increased as PSEQ increased (p < 0.001) and was inversely proportional to age (p < 0.001). Patients with no academic education was found to have higher resilience (p = 0.04). Multivariate regression analysis revealed similar trends. In addition, it was found that the group of pensioners-unemployed participants had lower resilience than the other occupational groups (p = 0.002) (Table 4).

Upon completing the statistical analysis, the impact of chronic pain, age, and the presence of children on patients' physical and mental health was examined.

Table 3 Correlations between PSEQ and age, CD-RISC and KDQOL-SF subscales

	Age	PSEQ	CD-RISC	SF-12 PH	SF-12 MH	SPL	EKS	BKS
Age	–	-0.118*	-0.180**	-0.283**	0.165**	-0.023	-0.082	-0.015
PSEQ	-0.118*	–	0.164**	0.506**	0.221**	0.468**	0.264**	0.259**
CD-RISC	-0.180**	0.164**	–	0.245**	0.253**	0.135**	0.402**	0.318**
SF-12 Physical health	-0.283**	0.506**	0.245**	–	0.131*	0.552**	0.448**	0.398**
SF-12 Mental health	0.165**	0.221**	0.253**	0.131*	–	0.385**	0.278**	0.419**
Symptom-problem list	-0.023	0.468**	0.135**	0.552**	0.385**	–	0.406**	0.410**
Effects of kidney disease	-0.082	0.264**	0.402**	0.448**	0.278**	0.406**	–	0.567**
Burden of kidney disease	-0.015	0.259**	0.318**	0.398**	0.419**	0.410**	0.567**	–

*PSEQ – Pain Self-Efficacy Questionnaire; CD-RISC – Connor-Davidson Resilience Scale; SF-12 PH – SF-12 Physical health; SF-12 MH – SF-12 Mental health; SPL – Symptom-problem list; EKS – Effects of kidney disease; BKS – Burden of kidney disease; *p < 0.05; **p < 0.01 Spearman's rho correlation*

Table 4 Regression analysis of resilience and pain self-efficacy with demographic characteristics

	Univariate model		Multivariate model	
CD-RISC	**Unstandardized Coefficient B**	**95% CI(p)**	**Unstandardized Coefficient B**	**95% CI(p)**
PSEQ	0.222	0.144 / 0.301 (p < 0.001)	0.223	0.147 / 0.3 (p < 0.001)
Age	-0.165	-0.249 / -0.082 (p < 0.001)	-0.085	-0.173 / 0.003 (p = 0.059)
Family status	0.573	-0.586 / 1.731 (p = 0.331)	–	–
Educational level	6.674	0.299 / 13.050 (p = 0.040)	7.809	1.79 / 13.829 (p = 0.001)
Income	-0.905	-3.323 / 1.513 (p = 0.462)	–	–

PSEQ – Pain Self-Efficacy Questionnaire; CD-RISC – Connor-Davidson Resilience Scale; CI – Confidence Interval

Results showed that physical health increased by 0.379 units for each unit increase in PSEQ and in the absence of children, whereas it decreased as age increased. Mental health also increased by 0.151 units for each unit increase in PSEQ, while decreasing in females compared to males and in those without children compared to those with children (Table 5).

The Symptom-problem list subscale was significantly influenced by chronic pain, age, and gender. The subscale was found to increase for each unit increase in PSEQ, and to decrease in older participants and in females. Multivariate regression revealed that the Symptom-problem list subscale increased by 0.414 units for each unit increase in PSEQ, and decreased by 4.162 units in females compared to males. The Effects of kidney disease subscale increased by 0.315 units for each unit increase in PSEQ, and decreased by 0.093 as age increase. Finally, the Burden of kidney disease subscale was found to increase by 0.424 with PSEQ increase.

Table 5 Test of the relations of physical health with chronic pain and demographic characteristics

	Univariate model		Multivariate model	
SF-12 Physical	**Unstandardized Coefficient B**	**95% CI (p)**	**Unstandardized Coefficient B**	**95% CI (p)**
PSEQ	0.379	0.322 / 0.437 (p < 0.001)	0.364	0.307 / 0.420 (p < 0.001)
Age	-0.190	-0.26 / -0.12 (p < 0.001)	-0.127	-0.201 / -0.052 (p = 0.001)
Presence of children	3.890	1.31 / 6.47 (p = 0.003)	0.912	-1.752 / 3.548 (p = 0.497)
SF-12 Mental	**Unstandardized Coefficient B**	**95% CI (p)**	**Unstandardized Coefficient B**	**95% CI (p)**
PSEQ	0.151	0.096 / 0.207 (p < 0.001)	0.163	0.108 / 0.219 (p < 0.001)
Age	0.106	0.047 / 0.165 (p = 0.001)	0.119	0.047 / 0.191 (p = 0.001)
Gender	-1.718	-3.723 / 0.287 (p = 0.093)	-0.854	-2.776 / 1.059 (p = 0.381)
Presence of children	-2.841	-4.979 / -0.704 (p = 0.009)	-0.371	-2.925 / 2.184 (p = 0.775)

PSEQ – Pain Self-Efficacy Questionnaire; CI – Confidence Interval

Discussion

Hemodialysis is necessary for people with stage five CKD in order to achieve water-electrolyte and acid-base balance and for removal of metabolic waste products. It is necessary in order to maintain life. It is improves health status and, in the long-term, improves health-related quality of life (Budhram et al., 2020; Fidan & Ağırbaş, 2023; Tsirigotis et al., 2022). The present study aimed to explore

the relationship between resilience, pain self-efficacy and health-related quality of life of people on HD. The sample's mean age was 61.1 (± 15.5) years old, more than a decade lower than the global CaReMe study (Sundström et al., 2022) and almost six years lower than previous European studies (García-Martínez et al., 2020; Moura et al., 2015). Our mean age was closer to other Greek studies (Kontodimopoulos & Niakas, 2005; Malindretos et al., 2010) and nearly the same as the USA mean age (Cohen et al., 2019; Peipert et al., 2018). This variety in mean age could be attributed to different global distributions of CKD (European Renal Association, 2022).

No gender difference was found in the scores in contrast to previous results (Kontodimopoulos & Niakas, 2005; Malindretos et al., 2010), probably due to gender bias. The only differences found were in the SF-12 Mental health composite ($p = 0.029$) and in the Symptom-problem list ($p < 0.001$) of the KDQOL. Age in groups showed differentiation in the SF-12 Physical ($p < 0.001$) and Mental ($p = 0.039$) composite of KDQOL, as well as in CD-RISC ($p = 0.004$). It should be noted that people up to 40 years old had a statistically higher mean than those over 70 years old. In a previous study in Greece, age was also found to be associated with poorer results in HRQOL (Malindretos et al., 2010). When analyzing the other demographic parameters no significance was found with exception of family status in the SF-12 Physical health subscale ($p < 0.001$) and CD-RISC ($p = 0.018$), while it was borderline in PSEQ ($p = 0.048$). In particular, widowed participants had significantly lower scores than the other family status groups in CD-RISC ($p = 0.004$) and in SF-12 Physical composite of KDQOL ($p = 0.001$).

With regards to the mean scores in all questionnaires, the CD-RISC scores (62.25 ± 12.7) were similar to the results of the Greek validation study (60.97 ± 18.59) (Tsigkaropoulou et al., 2018) and showed more than average resilience. A similar negative correlation with age ($r = 0.237$, $p = 0.01$) was found, but not with education, probably due to the fact that participants were mostly primary and secondary education graduates. The mean scores for PSEQ were in agreement with the findings of previous published studies in Greece, Switzerland, and Palestine (Mousa et al., 2018; Rikos et al., 2023; Zyga et al., 2015). In addition, the KDQOL subscale results were in line with Greek results (Stavrianou & Pallikarakis, 2007) and consistent with USA data (Peipert et al., 2019). More specifically, the Symptom-problem list in our study (79.8) was in line with results in Greek (79.4) and US (79.0). The Burden of kidney disease results in our study (52.1) were also quite similar to Greek (49.0) and US (52.8) studies.

Regression analysis showed that resilience was an independent factor that affected pain self-efficacy positively. Higher resilience is associated with higher pain self-efficacy, in agreement with other publications on resilience and chronic pain (Cohen et al., 2019; Peipert et al., 2018). Regression models of the subscales of KDQOL found that for Symptoms / problems and Burden of disease, the pain self-efficacy score was the only independent predictor (37.8% and 23.5% of the variance, respectively). Specifically pain self-efficacy had a positive effect on minimizing both the symptoms and burden of the disease.

Effects of kidney disease in pain self-efficacy and resilience were positive independent predictors with the model predicting up to 26.2% of the variance. Regarding SF-12 Physical composite, age was a negative independent predictor while pain self-efficacy score was a positive independent predictor, with the model predicting up to 40.8% of the variance.

For SF-12 Mental composite, age was a positive independent predictor together with pain self-efficacy with the model predicting up to 29.7% of the variance. These results are in line with current understanding of the effect of resilience in CKD-5 (García-Martínez et al., 2020; González-Flores et al., 2021; Keskin, 2022; Pradila et al., 2021) and pain self-efficacy (Mousa et al., 2018; Zyga et al., 2015) as indicated by studies in various parts of the globe. Our results indicate a predictive role for resilience in pain self-efficacy.

Limitation of the study

An important limitation of the present study was the sample size and the fact that it included only people on HD and not on other types of RRT. A strength of the study is that despite the use of self-reporting questionnaires, data were all collected by a single researcher in one-to-one interviews, avoiding any misunderstandings that would have a negative impact on the quality of the findings.

Conclusion

The present study showed that level of resilience is proportional to pain self-efficacy with limited effect of demographic parameters such as age and female gender. In addition, both resilience and pain self-efficacy can affect health-related

quality of life in people on hemodialysis either positively, when they are high, or negatively, when they are low. These findings could have important clinical implications as they could help renal healthcare professionals better understand their patients and their needs. Using up-to-date assessment tools to evaluate pain levels and implementing appropriate pharmacological (pain relief and antidepressant medications) and non-pharmacological interventions (physiotherapy, massage, occupational therapy etc) in everyday clinical practice can improve quality of life of people on hemodialysis.

Ethical aspects and conflict of interest

There was no financial support and sponsorship for the present research study. All participants were informed about the aim and process of the study and gave their signed consent. They were able to withdraw from the study at any time they wanted. Written permission for the research was awarded by the university's ethics committee and the ethical boards of all participating dialysis units / hospitals. No conflict of interest.

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Author contributions

Conception and design (MT, MK), data analysis and interpretation (MT, TK, DP), manuscript draft (MT, TK, DP, MK), critical revision of the manuscript (MT, TK, DP, MK), final approval of the manuscript (MT, TK, DP, MK).

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