



Investigation of Anxiety and Health Locus of Control in Patients Undergoing Hemodialysis

Sofia Kalini, Afroditi Zartaloudi, Anna Kavga, Angeliki Stamou, Victoria Alikari, Evangelos C. Fradelos, and Georgia Gerogianni

Abstract

Introduction: Hemodialysis is the most frequent treatment modality for End-Stage Renal Disease (ESRD). However, a number of limitations and modifications accompany this treatment, affecting people's physical and psychological well-being and increasing anxiety symptoms. The aim of this study was to investigate the level of anxiety and health locus of control among dialysis patients. **Methodology:** One hundred and five patients on hemodialysis treatment completed a questionnaire with demographic characteristics, the State-Trait Anxiety Inventory and the Multidisciplinary Health Locus of Control Scale. **Results:** Women had significantly higher levels of state anxiety than men ($p = 0.019$). Similarly, patients with primary school education had significantly higher trait and total anxiety levels than those with technological education ($p = 0.002$ and $p = 0.033$, respectively). Widowed patients exhibited significantly higher state, trait, and total anxiety levels

than married ($p = 0.032$, $p = 0.012$, and $p = 0.012$, respectively). Participants who did not do any kind of exercise had significantly higher level of state, trait, and total anxiety than those who did ($p = 0.011$, $p = 0.015$, and $p = 0.006$, respectively). Respondents who did not have any self-care skills had significantly higher level of state, trait, and total anxiety than those who had ($p = 0.011$, $p = 0.015$, and $p = 0.006$, respectively). State, trait, and total anxiety levels were significantly ($p \leq 0.05$) correlated negatively with internal locus of control and positively with "chance" locus of control scale. **Conclusions:** Hemodialysis patients had increased anxiety symptoms and believed that others had control over their health to a greater extent. Renal professionals need to apply effective interventions to dialysis patients in order to help them gain a better sense of control over their health and reduce anxiety symptoms.

Keywords

Renal disease · Hemodialysis · Anxiety · Health locus of control

S. Kalini · A. Zartaloudi (✉) · A. Kavga · A. Stamou · V. Alikari · G. Gerogianni
Department of Nursing, University of West Attica,
Athens, Greece
e-mail: azarta@uniwa.gr

E. C. Fradelos
Department of Nursing, University of Thessaly,
Larissa, Greece

5.1 Introduction

Hemodialysis is the most frequent treatment modality for End-Stage Renal Disease (ESRD) [1]. However, a number of limitations and modi-

fications accompany this treatment, affecting people's physical and psychological well-being and increasing anxiety symptoms [2]. Most often concerns experienced by these patients are food and fluid limitations; changes in marital roles; financial problems; frequent hospital admissions; restrictions in vacations; restrictions in physical activities; increased dependency on dialysis machine, dialysis staff, and family caregivers; uncertainty about the future; sleep disorders; fatigue; sexual dysfunction; difficulty in maintaining a job; changes in body appearance; pain; muscle cramps; and pruritus [3]. Additionally, these people usually have a poor appetite, infertility, problems with bones, anemia, and cardiovascular and gastrointestinal disorders [2].

Health locus of control beliefs point out whether people believe that their health condition is under their own control or under the control of forces external to themselves, such as other people, destiny, or luck [4]. Patients' beliefs about their health are significant to understand responses to chronic illness. It has been found that hemodialysis patients' beliefs that one's health is under control is related to less depressive symptoms. Moreover, internal health locus can help dialysis patients effectively face their difficulties derived from ESRD and have a better psychological condition, less somatic symptoms, and better quality of life. On the contrary, when patients are focused on important others' control over their condition, they have a depressive mood [5].

It has been found that an increased number of hemodialysis population have an external locus of control, while the longer the duration of hemodialysis the more external their locus of control. This may happen because dialysis patients are frequently dependent on family caregivers, dialysis staff, and dialysis machines, as well as their religious and spiritual beliefs about coping with problems and disease [6].

Moreover, chronic and long-term hemodialysis leads to a loss of meaning in patients' life and increases their anxiety symptoms. Additionally, patients have a sense of lack of control and feelings of hopelessness due to complications and limitations of hemodialysis. Moreover, hemodi-

alysis patients are usually of an increased age, with a variety of physical, cognitive, and emotional problems, which make them unable to live independently [1]. The aim of this study was to investigate the level of anxiety and health locus of control among dialysis patients.

5.2 Materials and Methods

The study sample included 105 patients from one hemodialysis unit in Athens, the capital of Greece, after receiving written informed consent from each respondent. Inclusion criteria were age over 18 years, undergoing hemodialysis, and being able to speak, read, and write in Greek. Exclusion criteria were insufficient language skills, cognitive disorders, and drug or alcohol abuse. All the participants were undergoing regular hemodialysis three to four times per week and they were asked to complete the questionnaires at that time. Participation was voluntary and anonymity was assured. Before collecting data, approval was obtained by the Scientific Council of the hemodialysis unit. The research complied with the General Regulation for the Protection of Personal Data (GDPR) and the ethical standards of the Declaration of Helsinki (1989) of the World Medical Association. Data collection was carried out by interviews using the State-Trait Anxiety Inventory (STAI) for the evaluation of anxiety, the Multidisciplinary Health Locus of Control (MHLC), FORM A, for the evaluation of health beliefs, and a questionnaire that was created by the researchers and included demographic and clinical characteristics.

5.2.1 Instruments

5.2.1.1 State-Trait Anxiety Inventory (STAI)

The state-trait anxiety inventory (STAI) was created by Spielberger [7] and is a reliable and valid scale widely used in research and clinical setting. The State Anxiety questionnaire includes 20 statements that assess how the participant feels "right now, at this moment." The Trait Anxiety

questionnaire contains 20 statements evaluating how the participant feels “generally.” The assessment is carried out on the basis of a 4-point Likert scale (1–2–3–4) with a range from 1 (“not at all” for State- or “almost never” for Trait-Anxiety) to 4 (“very much so” for State- and “almost always” for Trait-Anxiety). Reverse scoring is used for anxiety-absent items (e.g., “I feel calm” or “I am happy”), and therefore a higher score indicates greater anxiety. Scores for State Anxiety and Trait Anxiety questionnaires can vary from 20 to 80. The state–trait anxiety inventory had high reliability and validity in Greek population [8].

5.2.1.2 Multidisciplinary Health Locus of Control, MHLC (FORM A)

The MHLC is an 18-item form developed by Wallston et al. [9]. It consists of three subscales, each of which includes six questions: The first subscale assesses the extent to which people believe that their health condition is due to their own actions. The second subscale assesses the belief that one’s health condition is due to the actions of other persons (health care providers, family members, friends). The third subscale assesses the belief that nobody or nothing controls individuals’ health condition, and that their health status is due to fate, luck, or chance. Higher scores for each subscale indicate the prevalence of each type of health belief (score for each subscale ranges from 6 to 36) [4]. The MHLC had high reliability and validity in the Greek population [10].

5.2.2 Data Analysis

Descriptive and inductive statistics were used in the present research study. Through descriptive statistics, the characteristics of the sample and their responses to the main part of the survey were captured. Also, through inductive statistics the research hypotheses and the effect of sample characteristics on anxiety and focus of control were examined. More specifically, Pearson’s correlation index, *t*-test, and analysis of variance (ANOVA) test were used. The analysis was performed using the statistical program SPSS 17.0.

Statistical significance was set up at 0.05. A *p*-value ≤ 0.05 was considered to be statistically significant. Internal consistency for the questionnaire was evaluated with Cronbach’s alpha indexes. Values ≥ 0.7 were indicative of good internal consistency of the items.

5.3 Results

5.3.1 Sample Characteristics

A total of 105 (response rate 65.62%) out of 160 patients participated in the study. The mean age of the respondents was 62.51 years (standard deviation [SD]: 17.55). Additionally, 58.1% of them were male and 41.9% were female. Most of the participants were married (59.6%) and 45.7% had more than 2 children. Almost 40.9% of the participants had secondary education and 60.2% were pensioners. The majority of the participants were Greek (93.3%) and lived in Athens (78.1%). The most dominant co-morbid diseases among the respondents were diabetes (39%), hypertension (31.4%), and heart disease (30.5%). The duration of hemodialysis was 58.15 months (SD: 58.37; Table 5.1).

The mean value of the state anxiety of respondents was 44.6 and anxiety as a characteristic of the personality (trait anxiety) was 46.09. The mean value for the overall anxiety scale in the present study was 90.27. The mean value in the subscale of internal control focus was 24.61, in the subscale of health control focus by others 27.18, and in the subscale of health control focus by chance 21.0 (Table 5.2).

In this study there was a statistically significant negative correlation between state anxiety and internal control focus ($r = -0.310$), trait anxiety and internal control focus ($r = -0.249$), and total anxiety and internal control focus ($r = -0.304$). Furthermore, there is a statistically significant positive correlation between state anxiety and control focus by chance ($r = 0.196$), trait anxiety and control focus by chance ($r = 0.341$), and total anxiety and control focus by chance ($r = 0.261$; Table 5.3).

Table 5.1 Sociodemographic characteristics of the sample ($N = 105$)

		<i>N</i>	%
Gender	Male	61	58.1
	Female	44	41.9
Marital status	Single	15	14.5
	Married	62	59.6
	Divorced	12	11.5
	Widowed	15	14.4
Children	Yes	82	78.1
	No	23	21.9
Occupation	Freelancer	21	25.0
	Civil servant	11	13.1
	Private sector employee	31	36.9
	Student	1	1.2
	Another	20	23.8
Education	Illiterate	9	8.6
	Primary school	26	24.8
	Secondary education	14	13.3
	High school	29	27.6
	Technological education	6	5.7
	University education	18	17.1
	McS	2	1.9
Do you work at present?	Full time	10	9.7
	Part time	10	9.7
	Unemployed	10	9.7
	Pensioner	62	60.2
	Household	10	9.7
	Another	1	1.0
Residence	Athens	82	78.1
	Urban areas	22	20.9
	Rural areas	1	1.0
Nationality	Greece	98	93.3
	Other country	7	6.7
Age, in years: mean (range)			62.51 (20–93)
Hemodialysis duration, in months: mean (range)			58.15 (1–270)
Do you take an anxiolytic/antidepressant treatment?	Ναί	28	27.5
	Όχι	74	72.5
Do you do some kind of exercise?	Ναί	29	28.4
	No	73	71.6
Do you have self-care skills?	Yes	27	72.4
	No	71	27.6

5.3.2 Association of Anxiety Scale with Patient Characteristics

Women had higher levels of state anxiety than men ($p = 0.019$). Participants who used to take an anxiolytic/antidepressant treatment had higher levels of anxiety (total, state, and trait) than those

who did not take ($p = 0.005$, $p = 0.050$, $p = 0.001$, respectively). Participants who did not do any kind of exercise had higher level of anxiety (total, state, and trait) than those who did ($p = 0.006$, $p = 0.011$, $p = 0.015$, respectively). Respondents who did not have self-care skills exhibited higher level of anxiety (total, state, and trait) than those

Table 5.2 Anxiety and health control focus

	Min	Max	Mean	Standard deviation
Anxiety (total)	41.00	133.00	90.27	21.82
Anxiety (state)	23.00	70.00	44.60	11.82
Anxiety (trait)	22.00	73.00	46.09	11.54
Internal control focus	8.00	35.00	24.61	5.27
Focus of control in relation to others	9.00	36.00	27.18	5.95
Control focus on chance	6.00	36.00	21.00	6.03

Table 5.3 Correlation between anxiety and locus of control

	Anxiety (total)	Anxiety (state)	Anxiety (trait)	Internal control focus	Focus of control in relation to others	Control focus on chance
Anxiety (total)	1	0.900**	0.910**	-0.304**	-0.140	0.261**
Anxiety (state)	0.900**	1	0.666**	-0.310**	-0.174	0.196*
Anxiety (trait)	0.910**	0.666**	1	-0.249*	-0.030	0.341**
Internal control focus	-0.304**	-0.310**	-0.249*	1	0.449**	0.223*
Focus of control in relation to others	-0.140	-0.174	-0.030	0.449**	1	0.260**
Control focus on chance	0.261**	0.196*	0.341**	0.223*	0.260**	1

* $p < 0.05$; ** $p < 0.01$

who had (SD: 22.06 vs. 16.67; Table 5.4). Similarly, patients with primary school education had higher levels of (total and trait) anxiety than those with technological education ($p = 0.033$, $p = 0.002$, respectively; Table 5.5). Widowed had higher levels of anxiety (total, state, and trait) than married ($p = 0.012$, $p = 0.032$, $p = 0.012$, respectively; Table 5.6).

The Cronbach's alpha of the total anxiety questionnaire was found to be 0.947. In particular, the Cronbach's alpha was 0.909 for "state anxiety" subscale and 0.921 for "trait anxiety" subscale, indicating very high reliability for the total scale and for each subscale as well. Additionally, the Cronbach's alpha was 0.693 for internal locus of control, 0.773 for external locus of control, and 0.735 for chance locus of control.

5.4 Discussion

The results of this study showed that women had a higher rate of anxiety than men. This finding is consistent with previous studies [11, 12]. This can be caused due to hormonal factors, low self-

confidence, social and cultural restrictions, as well as multiple roles and responsibilities of women [13].

The present study also found that widowed patients had higher levels of anxiety than singles. This finding is consistent with previous studies indicating that people who live alone are more likely to experience higher levels of anxiety [14, 15]. The loss of a close person is experienced as a stressful event leading to anxiety symptoms [14].

The mean values of the scales and subscales of the present study demonstrate that the sample shows slightly higher anxiety than the general population [16]. These results are congruent with those of Ng et al. [17], where 55.3% of participants showed little or no symptoms of anxiety. However, Petrakis et al. [14] found in their research study that 25.2% of men undergoing hemodialysis had high levels of anxiety. Similarly, Gerogianni et al. [11] found that 17.1% of hemodialysis patients had high levels of anxiety. It is important to take into consideration that anxiety of people on hemodialysis is related to health problems they experience and the propor-

Table 5.4 Association of anxiety with demographic characteristics of participants

	Gender				<i>t</i>	<i>df</i>	<i>p</i>
	Male		Female				
	Mean	SD	Mean	SD			
Anxiety (total)	86.92	20.66	95.02	22.77	-1.888	102	0.062
Anxiety (state)	42.33	11.73	47.84	11.32	-2.393	102	0.019
Anxiety (trait)	44.59	10.86	48.29	12.28	-1.608	101	0.111
	Do you take an anxiolytic/antidepressant treatment?				<i>t</i>	<i>df</i>	<i>p</i>
	Yes		No				
	Mean	SD	Mean	SD			
Anxiety (total)	100.70	19.67	87.23	21.23	2.877	99	0.005
Anxiety (state)	48.56	11.58	43.31	11.88	1.976	99	0.050
Anxiety (trait)	52.15	10.74	43.92	11.26	3.289	99	0.001
	Do you do some kind of exercise?				<i>t</i>	<i>df</i>	<i>p</i>
	Yes		No				
	Mean	SD	Mean	SD			
Anxiety (total)	81.52	19.88	94.24	21.08	-2.788	99	0.006
Anxiety (state)	39.86	11.81	46.40	11.37	-2.587	99	0.011
Anxiety (trait)	41.66	11.02	47.83	11.50	-2.472	99	0.015
	Do you have self-care skills?				<i>t</i>	<i>df</i>	<i>p</i>
	Yes		No				
	Mean	SD	Mean	SD			
Anxiety (total)	86.97	22.06	102.58	16.67	-3.726	58.731	0.000
Anxiety (state)	43.06	11.61	50.58	10.65	-2.887	95	0.005
Anxiety (trait)	44.53	11.96	52.00	8.28	-3.453	64.632	0.001

tion of those experiencing anxiety disorders ranges between 25.2% and 87% [18–23].

The differences in the intensity of the anxiety symptoms experienced by the patients are usually attributed to the stage of their disease that affects their adaptation, as well as the different psychometric tools used by the researcher in order to assess anxiety symptoms [18].

Additionally, it is worth noting that several of the participants in the present study (27.5%) were under medication for the treatment of anxiety or depressive symptoms, a condition that probably affects the result of the assessment of the level of anxiety during the conduct of this survey. According to Timmers et al. [24], the chronic nature of the disease and the treatment of hemodialysis cause severe anxiety to patients. As a result, it is likely that a proportion of these patients are taking medication in order to control their anxiety symptoms [17].

Participants in this study showed a lower score on the internal locus of control subscale (mea-

sures the degree to which participants feel they have control of their own health), a higher score on the others' focus of health control subscale (measures the degree to which participants believe that others—doctors—have control over their health), and a higher score on the health control focus on luck subscale (measures the extent to which participants believe that their health is a matter of luck) compared to the general population [10].

The majority of dialysis patients in other studies seem to attribute health control to significant others, such as family and doctors [25, 26]. This may be related to the participants' low self-esteem and a reduced sense of self-efficacy due to their illness [25]. However, in a similar research study, hemodialysis patients reported a higher internal locus of control, possibly due to their attempt to compensate for a sense of dependence on treatment by developing personal control over their illness [27].

Table 5.5 Association of anxiety with educational level of participants

	Education															
	Illiterate		Primary education		Secondary education		High school		Technological education		University education					
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD				
Anxiety (total)	93.00	18.19	99.19	22.82	89.29	15.06	93.28	22.81	77.50	14.92	79.33	20.62	5	95	2.541	0.033
Anxiety (state)	43.88	11.48	48.58	13.02	44.00	8.74	45.52	11.48	40.00	10.60	40.67	12.57	5	95	1.229	0.302
Anxiety (trait)	49.13	8.44	50.62	11.58	45.29	8.85	49.43	11.26	37.50	9.69	38.67	9.89	5	94	4.231	0.002

The present study also found that when patients had more control over their health, they experienced less anxiety. This finding is congruent with other research studies where there was found that patients with an internal locus of control had a better quality of life and better mental health. According to Theofilou [27], internal locus of control appeared to be negatively related to participants' anxiety, since patients with a high internal locus of control seemed to experience fewer symptoms of anxiety and fewer negative consequences in their daily lives [28].

The findings of the present study indicated that participants with a lower level of academic education had increased anxiety. This can be attributed to the fact that hemodialysis patients with a low level of academic education may be more concerned about maintaining their job due to their decreased functionality since they are usually involved in manual-type occupations. In addition, individuals with a higher level of academic education are likely to have increased abilities to apply more effective coping strategies to manage anxiety. Also, people with higher academic education may be more likely to refer to mental health professionals and seek appropriate intervention to manage difficulties and stressful situations. Seeking help allows them to reduce their anxiety while enhancing their sense of self-efficacy [29].

In this study, participants with self-care skills showed statistically significant lower level of anxiety compared to those who needed help. Similarly, Mahmoud and Abbelaziz [30] found that patients with a higher level of self-efficacy and self-care skills reported lower levels of anxiety. A person's dependence on someone else to meet their basic needs limits their autonomy and sense of freedom, reducing their self-esteem [31].

This study also showed a statistically significant correlation between the degree that participants' health condition affects their ability to respond to daily activities and the anxiety they experience. In a similar research study, it was found that health problems experienced by dialysis patients caused changes in their daily life (professional, social, personal) and increased

their anxiety [21]. The social life of patients is frequently affected since they have to adjust their lives to the strict treatment program imposed by hemodialysis treatment [30]. It can be assumed that renal disease affects the patient's daily life and increases their anxiety [32], while the difficulties of the participants to respond to daily activities can be possibly derived from the intense anxiety they experience [33].

The present study also found that 71.6% of participants did not do any kind of exercise and had increased levels of anxiety. It can be assumed that problems caused by hemodialysis affect the physical, mental, and social status of patients and limit their participation in physical exercises, which leads to increased anxiety levels [34]. In a similar research study with the participation of 72 hemodialysis patients, it was found that participants' anxiety and depressive symptoms were associated with reduced physical activity [23]. Patients with lower levels of physical exercise are characterized by a statistically significant higher level of anxiety, while physical exercise has been found to lead to a reduction in anxiety [35, 36].

5.4.1 Limitations of the Study

The sample used in this study is a convenience sample since it comes from one dialysis unit in Athens, Greece. Thus, the findings cannot be generalized. Further investigation of anxiety and health control locus in patients undergoing hemodialysis can be achieved with more qualitative approaches.

5.5 Conclusions

Hemodialysis patients have increased anxiety symptoms than the general population and believe that others have control of their health to a greater extent. This is possibly due to the fact that they are dependent on others, such as physicians, nurses, family, and machines, leading to a limitation of their sense of freedom and autonomy. Furthermore, when patients' anxiety increases, the belief that their health level depends

on themselves decreases, and their belief that their health level depends on luck increases. This finding can help renal professionals to apply effective interventions to dialysis patients in order to gain a better sense of control over their health and reduce anxiety symptoms.

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