

## Original Article

# The Effect of Roy Adaptation-Based Nursing Intervention on Stress, Psychosocial Adjustment and Self-Care Power in Hemodialysis Patients: A Randomized Controlled Experimental Study

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### Abstract

**Objective:** The research was conducted to determine the effect of the nursing intervention, which was given to patients according to the Roy Adaptation Model, on patients' stress, psychosocial adjustment, and self-care power.

**Methods:** The population of the study, which was conducted as a randomized controlled experimental study, consisted of 80 patients receiving outpatient dialysis treatment in the hemodialysis unit of a university hospital. The patients from the population were included in the sample of the study in a randomized manner. The data were collected using the Descriptive Characteristics Form, the Hemodialysis Stressor Scale, the Self-Care Scale, and the Psychosocial Adjustment to Illness Scale. The patients in the Roy and clinical groups were pre-tested. After the pre-test, a Roy Adaptation-based training and nursing interventions were applied to the patients in the Roy group at home and in the clinic, twice a month, 6 times in 3 months. At the end of the third month, the post-test data of both groups were collected. The data were evaluated with the SPSS 23 package program.

**Findings:** When the pre-tests between the groups were compared, hygienic self-care power, healthcare orientation, vocational environment, domestic environment, sexual relationships, extended family relations, social environment and total psychosocial adjustment levels changed significantly ( $p < 0.05$ ). When the post-tests were compared between the groups, no significant difference was found only in the mean of the mental state sub-dimension ( $p > 0.05$ ).

**Conclusion:** Interventions made according to the Roy Adaptation Model reduced the stress level of the patients, and increased their self-care power and psychosocial adjustment.

**Keywords:** Hemodialysis, Roy Adaptation Model, Stress, Self-Care Power, Psychosocial Adjustment

### Introduction

Chronic Renal Failure (CKD) is a chronic and progressive deterioration in the functions of the kidney (Ammirati, 2020). Dialysis and renal transplantation applications play an important role in the treatment of CKD (Zhang and et al. 2020). However, dialysis is the most preferred treatment method because renal transplantation is not suitable for every patient and the risk of rejection is high (Imtiaz and Alam, 2021; Bleyer, 2022). Hemodialysis

treatment is used in 70% of the patients in the world (Bello and et al. 2022) and in 76.9% of the patients in Turkey (Suleymanlar, 2020).

While hemodialysis treatment saves patients from death and enables them to continue living, it also brings with it some physical, psychological, social and economic problems (Aksoy and Ogur, 2015). Loss of physical strength and endurance, body image disorder, fear of death, financial difficulties, diet, fluid intake, restricted activities, being dependent

on machinery and hospital at certain days and hours of the week, invasive procedures applied in each session, loss of social relations, and dependence on medical treatment cause this disease to be perceived as an extreme source of stress, and changes caused by the disease in family and marital life increase the severity of the stress (Topbas & Bingol, 2017).

The stress experienced negatively affects the psycho-social adaptation and self-care power of patients (Varol & Sivrikaya, 2018). While patients' non-compliance with treatment increases morbidity, mortality and economic problems (Sultan et al., 2022), inadequacy in self-care power causes problems in controlling the disease process and symptoms and meeting patients' own needs (Avanji et al., 2021; Gamze and Entertainment, 2013). Therefore, holistic nursing care has an important place in increasing the psychosocial adjustment and self-care power of hemodialysis patients.

The use of models will guide nurses in providing standardization in holistic nursing care (Jasemi et al., 2017). The Roy Adaptation Model (RAM), one of the models widely used in nursing, creates a framework for determining the adaptation needs of individuals, families and groups, and focuses on the changes that occur in the adaptive system of the human and the environment. In this model, which includes four areas of adaptation: physiological, self-concept, role function and interdependence, the human being is defined as a biopsychosocial entity who is in constant interaction with his/her environment and is affected by stimuli (Roy et al., 2009). Associating the Roy Adaptation Model with patients undergoing hemodialysis treatment and providing training in line with this model may yield correct results in terms of nursing practice (Vicdan & Karabacak, 2014). In the literature, in the care of epilepsy (Erdogan, 2021), cancer (Pehlivan et al., 2022), Covid-19 (Çaylar and Terzi, 2021), bariatric surgery (Güven et al., 2021) and many other diseases (Dagcan et al., 2021; Basayar et al., 2020; Yoldas et al., 2019; Ilkaz et al., 2018), the Roy adaptation model was used. As a result of these studies, it was determined that patients' compliance with treatment increased and that nursing interventions gave positive results.

In the literature, there are descriptive (Vicdan and Karabacak, 2014) and experimental studies (Vicdan and Karabacak, 2016) and case reports (Ozdemir, 2022) studies showing the benefits of using the Roy adaptation model in hemodialysis patient education in terms of adaptation to illness. However, there is no experimental study evaluating stress, self-care power and psychosocial adaptation in hemodialysis patients by performing interventions according to the Roy adaptation model. For this reason, this study is important in terms of enabling patients to cope with stress and increasing their self-care power by increasing the adaptation to illness with the nursing interventions applied to the patients according to the Roy adaptation model.

### Objective

The research was carried out to determine the effect of the nursing intervention given to patients according to the Roy Adaptation Model on patients' stress, psychosocial adjustment and self-care power and to contribute to patients and nursing interventions.

The hypotheses in the post-test of the Roy group, which was applied according to the Roy adaptation model, are as follows:

H<sup>1</sup>: Stress level is lower than the clinical group.

H<sup>2</sup>: Self-care power level is higher than the clinical group.

H<sup>3</sup>: Psychosocial adjustment level is higher than the clinical group.

### Materials and Methods

**Location of the Research:** The study was conducted in the hemodialysis unit of a university hospital and at patients' homes.

**Type of the Research:** The research was performed as a randomized controlled experimental study.

**Population and Sample of the Research:** The population of the research consisted of 80 patients receiving outpatient dialysis treatment in the hemodialysis unit of a university hospital. In the sample of the study, those patients who came to the dialysis session on Monday-Wednesday-Friday were randomly assigned to the Roy group (experimental) (40 patients), and those who came to the dialysis session on Tuesday-

Thursday-Saturday were included in the Clinical group (control) (40 patients). The criteria for inclusion in the study were as follows: the absence of hearing and visual impairments that would prevent communication; no diagnosed psychiatric disorder; literacy; and Turkish proficiency.

#### **Data Collection Tools**

**Descriptive Characteristics Form:** This form, prepared by the researchers, was created under the headings of socio-demographic characteristics (7 questions) and characteristics related to the disease (13 questions).

**Hemodialysis Stressor Scale:** The scale developed by Baldree et al. (1982) was adapted to Turkish society by Kara (2006). The perceived physiological (6 items) and psychosocial stressors (23 items) associated with the treatment of hemodialysis patients are listed in the scale. The 5-point Likert scale is coded as “Always” (5 points), “Often” (4 points), “Sometimes” (3 points), “Rarely” (2 points), “Never” (1 point). The Physiological Hemodialysis Stressor sub-dimension score is between 6-30 points, the Psychosocial Hemodialysis Stressor sub-dimension score is between 23-115 points, and the total scale score is between 29-145. An increase in the score obtained from the scale indicates an increase in the perceived stress level. The total Cronbach alpha value of the scale is 0.77 (Kara,2006). The Cronbach's alpha value of our study was 0.85 in the pre-test group and 0.80 in the post-test group.

**Self-Care Power Scale:** It is a scale developed by Oren (2010) for hemodialysis and peritoneal dialysis patients. The scale is a 3-point Likert-type scale consisting of 22 items and is scored between 0-2. The items 12, 22, 23, and 25 on the scale are reversed. Each item is answered as ‘I always apply’ (2 points), ‘I sometimes apply’ (1 point) and ‘I do not apply at all’ (0 points). The total score obtained from the scale is between 0-44. The scale has 5 sub-dimensions: Drug Use: 1,2,3,4,5,20, Diet: 8,9,10,11,12, Self-Monitoring: 6,7,13,14, Hygienic Care: 16,17,18,21, and Mental State 22,23,25. Scoring for the sub-dimensions is obtained by summing the item scores under each sub-dimension. At this point, drug use scores change between 0-12, diet scores change between 0-10, self-monitoring scores change between 0-8,

hygienic care scores change between 0-4, and mental state scores change between 0-6. Low scores obtained as a result of the analysis indicate that self-care power is not good, whereas high scores indicate good self-care power. The Cronbach's alpha value of the whole scale was 0.75 in the hemodialysis group (Oren, 2014). The Cronbach's alpha value of our study was 0.70 in the pre-test group and 0.73 in the post-test group.

**Psychosocial Adjustment to Illness-Self-Report Scale:** This scale, which was developed by Derogatis (1986) and evaluates psychosocial adjustment to illness, measures the interaction of individuals with other individuals and institutions that make up the socio-cultural environment. This scale, which was validated in Turkey by Adaylar (1995), consists of 46 items and 7 sub-dimensions. These sub-dimensions are Healthcare orientation, Vocational environment, Domestic environment, Sexual relationships, Extended Family Relations, Social Environment and Psychological distress. Each item is scored between 0-3. Major negative changes since illness are scored with 3 points, whereas no change or positive changes are scored with 0 points. The total score obtained from the scale is between 0-138. A low score on this scale indicates “good psychosocial adjustment” to illness, and a high score indicates “poor psychosocial adjustment” to illness. The Cronbach's alpha value of the whole scale was determined as 0.94 (Adaylar, 1995). The Cronbach's alpha value of our study was 0.91 in the pre-test group and 0.94 in the post-test group.

**Data Collection Method:** Pre-test was applied to the patients in Roy and clinical groups using data collection tools. After the pre-test, the patients in the Roy group were trained 6 times in 3 months, twice a month, at home and in the clinic. Nursing interventions were performed using the Roy Adaptation Model in the trainings. At the end of the third month, the post-test data of both groups were collected. During the study, no training or intervention was given to the patients in the clinical group. The nursing education and interventions of this group were carried out by nurses working in the dialysis clinic within the scope of routine practices.

**Evaluation of Data:** The data were evaluated with the SPSS 23 package program. Percentage, mean and standard deviation values were given for numerical variables, and frequency distributions were given for categorical variables. Chi-square was used to determine the relationship between categorical variables, the independent sample t-test was used to examine the difference between two groups, and the paired-sample t-test was used to examine the changes in the scale averages measured at two different times over time.

**Ethical Principles:** Permission was obtained from the ethics committee of the University to

conduct the study. Consent was obtained from the patients who participated in our study, which was conducted in accordance with the principles of the Declaration of Helsinki. Interventions were applied to the patients in the clinical group at the end of the study, and a training booklet was given.

### Findings

When the descriptive characteristics of the hemodialysis patients in the ROY and clinical groups were compared, it was found that there was no statistically significant difference between the groups and that these two groups were similar to each other ( $p < 0.005$ ) (Table 1).

**Table 1: Findings Related to Descriptive Characteristics of Hemodialysis Patients in ROY and Clinical Groups**

Descriptive Characteristics n (%)		ROY	Clinic	X <sup>2</sup> /t	p
Gender	Female	21(52.5)	22 (57.9)	0.229	0.632
	Male	19(47.5)	16(42.1)		
Age	20-39 years	13(32.5)	7(18.4)	2.032	0.362
	40-49 years	5(12.5)	6(15.8)		
	50 and above	22(55.0)	25(65.8)		
Educational status	Elementary and below	30(75.0)	31(81.6)	0.495	0.482
	High school and above	10(25.0)	7(18.4)		
Marital status	Married	32(80.0)	31(81.6)	0.031	0.860
	Single/living apart	8(20.0)	7(18.4)		
Difficulty in meeting health expenses	Yes	5(12.5)	6(15.8)	0.174	0.677
	No	35(87.5)	32(84.2)		
Residence	City Center	37(92.5)	34(89.5)	0.640	0.708
	town/village	3(7.5)	4(10.5)		
Habits	Smoking	10(25.0)	10(26.3)	1.172	0.760
	Alcohol and smoking	4(10.0)	4(10.5)		
	None	26(65.0)	24(63.2)		
Hemodialysis access route	Catheter	5(12.5)	5(13.2)	0.008	0.931
	Fistula	35(87.5)	33(86.8)		
How many days a week do you have dialysis?	Two days	8(20.0)	8(21.1)	0.013	0.908
	Three days	32(80.0)	30(78.9)		
The presence of continuous treatment other than kidney failure	Yes	13(32.5)	19(50.0)	2.467	0.116
	No	27(67.5)	19(50.0)		
Have a helping person	Yes	36(90.0)	33(86.8)	0.663	0.734

	No	4(10.0)	5(13.2)		
Seeking alternative methods due to illness	Yes	16(40.0)	10(26.3)	1.642	0.200
	No	24(60.0)	28(73.7)		
Surgery due to illness	Yes	40(100.0)	36(94.7)	0.142	0.234
	No	0(0)	2(5.3)		
Taking care to protect the dialysis access route	Yes	39(97.5)	36(94.7)	0.526	0.610
	No	1(2.5)	2(5.3)		
Early termination of dialysis	Yes	1(2.5)	3(7.9)	0.280	0.352
	No	39(97.5)	35(92.1)		
Organ transplant status	Yes	4(10.0)	1(2.6)	0.184	0.359
	No	36(90.0)	37(97.4)		
When was the definitive diagnosis of CKD made? X±SD		9.9±8.04	10.8±7.5	-0.470	0.640
How many months have you been on dialysis X±SD		68.3±50.1	81.4±9.4	-0.928	0.357
How much is your dry weight X±SD		92.4±18.6	98.3±11.3	0.201	0.841
How much is your weight on admission to dialysis X±SD		8.0±1.4	8.5±1.0	0.144	0.886

When the pre- and post-tests within the groups were compared, only the psychosocial stressors and self-monitoring sub-dimension of the hemodialysis patients in the Roy group did not show a significant change ( $p > 0.05$ ). In the clinical group, the mental state, healthcare orientation, vocational environment, domestic environment, sexual relationship, extended family relationships, and social environment sub-dimensions and the total psychosocial adjustment score averages changed significantly ( $p < 0.05$ ) (Table 2).

When the pre-tests between the groups were compared, the levels of hygienic self-care power, healthcare orientation, vocational environment, domestic environment, sexual relationship, extended family relationships, and social environment and the total psychosocial adjustment changed significantly ( $p < 0.05$ ) (Table 2).

When the post-tests were compared between the groups, no significant difference was found only in the mean of the mental state sub-dimension ( $p > 0.05$ ) (Table 2).

**Table 2: Findings related to Mean Scores and General Total Scores of Pre- and Post-Test Hemodialysis Stressor Scale, Self-Care Power Scale, and Psychosocial Adjustment to Illness-Self-Report Scale Sub-Dimensions of Hemodialysis Patients in ROY and Clinical Groups**

			Pre-Test	Post-Test	Analysis within groups t/p
<b>HEMODIALYSIS STRESSOR SCALE SUB-DIMENSIONS AND GENERAL TOTAL</b>	Physiological	ROY	24.6±3.2	20.5±2.0	7.245/0.000
		Clinic	24.4±3.2	24.5±3.4	-0.183/0.856
	<b>Analysis within groups t/p</b>		0.278/0.782	-6.175/0.000	
	Psychosocial	ROY	67.8±16.6	63.3±3.8	1.782/0.083
		Clinic	72.4±13.5	72.2±10.4	0.198/0.844



	<b>Analysis within groups t/p</b>		-1.344/0.183	<b>-4.952/0.000</b>	
	Hemodialysis Stressor Scale total	ROY	92.4±18.6	83.8±4.5	<b>3.096/0.004</b>
		Clinic	96.8±14.6	96.7±11.7	0.122/0.904
	<b>Analysis within groups t/p</b>		-1.159/0.250	<b>-6.329/0.000</b>	
<b>SELF-CARE POWER SCALE SUB-DIMENSIONS AND GENERAL TOTAL</b>	Drug use	ROY	8.0±1.4	9.2±0.8	<b>-6.627/0.000</b>
		Clinic	7.4±1.9	7.5±1.7	-0.561/0.578
	<b>Analysis within groups t/p</b>		1.472/0.146	<b>5.574/0.000</b>	
	Diet	ROY	7.4±2.0	8.8±0.8	<b>-5.014/0.000</b>
		Clinic	7.4±1.6	7.5±1.7	-0.598/0.554
	<b>Analysis within groups t/p</b>		0.128/0.899	<b>4.384/0.000</b>	
	Self-monitoring	ROY	1.1±0.7	1.3±0.6	-1.433/0.160
		Clinic	1.1±0.7	1±0.6	1.071/0.291
	<b>Analysis within groups t/p</b>		0.108/0.915	<b>2.134/0.036</b>	
	Hygienic care	ROY	4.9±0.9	5.3±0.4	<b>-2.576/0.014</b>
		Clinic	4±1.2	4.1±1.1	-0.850/0.401
	<b>Analysis within groups t/p</b>		3.658/0.000	<b>6.037/0.000</b>	
	Metal State	ROY	6.6±1.7	7.2±0.9	<b>-2.452/0.019</b>
		Clinic	6.5±1.8	6.8±1.7	<b>-2.182/0.036</b>
	<b>Analysis within groups t/p</b>		0.245/0.807	1.204/0.233	
Self-Care Power Scale total	ROY	28.1±4.9	32.0±2.2	<b>-6.185/0.000</b>	
	Clinic	26.4±5	27±4.7	-1.334/0.190	
<b>Analysis within groups t/p</b>		1.500/0.138	<b>5.943/0.000</b>		
Healthcare orientation	ROY	5.5±3.9	1.9±1.6	<b>7.027/0.000</b>	
	Clinic	7.7±4.4	6.1±3.8	<b>3.788/0.001</b>	
<b>Analysis within groups t/p</b>		-2.359/0.021	<b>-6.210/0.000</b>		
Vocational environment	ROY	7.6±2.4	5.9±2.1	<b>5.880/0.000</b>	
	Clinic	10.7±3.2	8.5±3.3	<b>5.338/0.000</b>	
<b>Analysis within groups t/p</b>		-4.806/0.000	<b>-4.118/0.000</b>		
Domestic environment	ROY	6.1±3.5	4.0±2.1	<b>6.171/0.000</b>	
	Clinic	9.7±5.2	8.7±5	<b>2.626/0.012</b>	
<b>Analysis within groups t/p</b>		-3.543/0.001	<b>-5.286/0.000</b>		
Sexual relationships	ROY	8.7±4.0	6.0±3.7	<b>6.271/0.000</b>	
	Clinic	10.7±4	9.3±4.5	<b>3.224/0.003</b>	
<b>Analysis within groups t/p</b>		-2.208/0.030	<b>-3.454/0.001</b>		
Extended Family Relations	ROY	2.8±2.1	0.8±1.0	<b>6.736/0.000</b>	
	Clinic	4.9±3.4	3.9±3.3	<b>2.538/0.015</b>	
<b>Analysis within groups t/p</b>		-3.145/0.003	<b>-5.613/0.000</b>		
Social Environment	ROY	5.4±2.7	2.6±2.2	<b>8.143/0.000</b>	
	Clinic	7.7±4.6	7.3±4.5	<b>2.490/0.017</b>	
<b>Analysis within groups t/p</b>		-2.701/0.009	<b>-5.745/0.000</b>		
	ROY	7.5±5.3	4.9±2.8	<b>3.485/0.001</b>	

	Psychological distress	Clinic	8.9±4.9	8.4±4.6	1.398/0.171
	<b>Analysis within groups t/p</b>		-1.196/0.236	<b>-3.958/0.000</b>	
	Psychosocial Adjustment to Illness-Self-Report Scale total	ROY	43.8±13.3	26.3±8.8	11.938/ <b>0.000</b>
		Clinic	60.6±21	52.4±20.5	4.617/ <b>0.000</b>
	<b>Analysis within groups t/p</b>		<b>-4.184/0.000</b>	<b>-7.235/0.000</b>	

## Discussion

Hemodialysis is the most common method used to treat end-stage renal disease (Boz and Topbas, 2021; Suleymanlar et al., 2020). Success in this treatment method largely depends on the stress levels and self-care powers of patients (Alemdar & Pakyuz, 2015) and their psychosocial adaptation to the treatment (Ozen et al., 2019). Studies found that hemodialysis patients had high stress levels (Kang and Chae, 2021), and their self-care abilities (Hussein and etc., 2022; Demir and Ozer, 2022) and psychosocial adjustment (Eryilmaz et al., 2022) were low. Similar to the literature, the stress levels and psychosocial adjustment of the patients participating in this study were low in the pre-tests, and their self-care power was close to the average level. The interventions made according to the Roy adaptation model reduced the stress levels of the hemodialysis patients and increased their psychosocial adjustment and self-care power significantly above the average level.

The most common stressors in dialysis patients are food and fluid restrictions, itching, nausea, vomiting, pain, frequent hospitalizations, restrictions in leisure activities, increased dependency, unemployment, sexual problems, and uncertainty about the future (Georgia and Babatsikou, 2013). In a study, it was determined that fatigue (97%) was the most common physiological stressor, whereas among the psycho-social stressors, the most recurrent ones were found to be transportation to the hospital (99.5%), treatment cost (99.5%), and vacation place and time limitations (99%) (Tchape, 2018). Other studies (Senmar et al., 2020; Gunarathne et al., 2022) found that the majority of patients

undergoing hemodialysis experienced high stress. In our study, on the basis of the Roy adaptation model, trainings on hemodialysis treatment, nutrition, fluid intake and hemodialysis vascular access were applied to the patients in the Roy group, and nursing interventions were applied to inform the families and ensure their participation in the process, to monitor the weight and blood values of the patients, and to make dressings. On the basis of ROY adaptation model, when the post-tests of the experimental group that underwent nursing intervention and the control group that underwent routine clinical practice were compared, it was determined that stressors decreased significantly in the experimental group. This result showed that nursing interventions based on the Roy Adaptation Model reduced the physiological, psychosocial and general stressors of the patients. This finding confirms the hypothesis of our study that the post-test stress level of the Roy group is lower than that of the clinical group.

It is important that patients undergoing hemodialysis treatment perform self-care behaviors adequately in order to control the disease process and symptoms (Gamze & Eglence, 2013). It includes many processes such as following the self-care treatment regimen in dialysis patients, appropriate diet intake, regular drug use, compliance with fluid restriction, communication, information, and coping with stress and life satisfaction (Alemdar & Pakyuz, 2015). If the patient's self-care power is insufficient, morbidity, mortality and economic problems increase (Lee and Noh, 2021). According to literature studies, failure to comply with the treatment regimen, fluid restriction and diet was observed in dialysis patients (Halle et al., 2020). Another study showed that

hemodialysis patients had low self-care levels (Kim and Cho, 2021). In our study, while the self-care power levels of the Roy and clinical groups were the same in the pre-test comparison, a significant improvement was observed in drug use, diet, self-monitoring, hygienic care and general self-care power in the post-test comparisons. This finding confirms the hypothesis of our study that the self-care power level of the Roy group in the post-test was higher than that of the clinical group.

In our study, there was no significant difference in mental state self-care power. We think that the severe effects of death and constant machine dependency on the patient's mental state cannot improve in a short time and that patients should therefore receive professional support in addition to nursing interventions.

According to Roy, human is defined as an open system that responds to both internal and external stimuli and tries to adapt to its environment physiologically, psychologically and socially. The aim of nursing interventions is to develop positive and effective adaptation and to help the individual reach to the level of perfect adaptation (Vicdan & Karabacak, 2014).

In the pre-test comparison of the Roy and clinical groups in our study, while the psychosocial adjustment levels of the Roy group were good, the psychosocial adjustment levels of both groups increased in the post-test. However, the level of improvement was higher in the Roy group. This finding confirms the hypothesis of our study that the psychosocial adjustment level of the Roy group in the post-test was higher than that of the clinical group. Interventions made empower individuals to participate in their treatment and to adapt. For this reason, we think that individuals, who do not receive the necessary intervention and adequate training, may not feel this power and cannot adapt to their treatment and become more dependent.

**Conclusion and Recommendations:** As a result, the interventions applied to the hemodialysis patients according to the Roy Adaptation Model reduced the patients' stress level and increased their self-care power and psychosocial adjustment. In line with these

results, it was determined that nurses who care for dialysis patients should be trained on the subjects of stress, self-care insufficiency and psychosocial adjustment disorder according to the Roy adaptation model, that trainings should be repeated systematically and at regular intervals according to the needs of patients, and that nurses should receive professional support to improve the mental status of patients. It is recommended that scientific studies should be conducted to help patients on hemodialysis, to reduce the stress level, and to increase their self-care power and psychosocial adjustment.

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