ÖZGÜN ARAŞTIRMA ORIGINAL RESEARCH

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THE EFFECT OF VOLUME STATUS ON QUALITY OF LIFE, ANXIETY, DEPRESSION AND SLEEP QUALITY IN HEMODIALYSIS PATIENTS

HEMODİYALİZ HASTALARINDA VOLÜM DURUMUNUN YAŞAM KALİTESİ, ANKSİYETE, DEPRESYON VE UYKU KALİTESİ ÜZERİNE ETKİSİ

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Öz

Amaç

Çalışmada hemodiyalize girmekte olan hastaların bioimpedans yöntemi ile volüm durumlarının belirlenmesi ve volüm durumunun hastaların yaşam kalitesi, anksiyete, depresyon ve uyku kalitesi ile ilişkisinin araştırılması amaçlandı.

Gereç ve Yöntem

Kesitsel olarak planlanan çalışmaya 2016 Yılı Mart Ayı'nda Hemodiyaliz Ünitesinde hemodiyalize girmekte olan toplam 100 hasta alındı. Hastaların volüm durumunu belirlemek için, hafta ortası hemodiyaliz seansları öncesinde vücut kompozisyon monitörü ile biyoelektriksel impedans analizi (BİA) yapıldı. Hastaların yaşam kaliteleri SF-36 yaşam kalitesi ölçeği ile, uyku kalitesi Pittsburg Uyku Kalitesi İndeksi (PUKİ) kullanılarak, depresyon taramaları Beck Depresyon Ölçeği (BDÖ), anksiyete taramaları Beck Anksiyete Ölçeği ile değerlendirildi. Hastalar BİA parametrelerinden hücre dışı sıvı/ total vücut sıvısı (HDS/TVS) oranlarına göre üç gruba ayrıldı. Grup1; <25 persentil (HDS/TVS<0,426 Lt, n=24), grup 2; 25-50 persentil (HDS/TVS: 0,426-0,438 Lt, n=37), grup 3; 50-75 persentil (HDS/TVS: 0,438-0,481 Lt, n=39). İstatiksel analizler üç grup üzerinden yapıldı.

Bulgular

Kadın cinsiyette, yalnız yaşayan ve eğitim seviyesi düşük olan hastalarda HDS/TVS oranları yüksek bulundu. HDS/TVS oranı arttıkça, yaşam kalitesi komponentlerinden; fiziksel komponent (p=0,01) ve mental komponentte (p=0,02) bozulma olduğu; fiziksel komponent bileşenlerinden; fiziksel fonksiyon (p<0,001), fiziksel rol güçlüğü (p=0,03), genel sağlık algısında (p=0,03) azalma, mental komponent bileşenlerinden; mental sağlık (p=0,01), sosyal fonksiyon (p<0,001) ve vitalite (p=0,01) alanlarında bozulma olduğu görüldü. Tüm hastalarda depresyon oranı %40, gruplar kendi içinde değerlendirildiğinde depresyon oranı grup 1'de %25, grup 2'de %43 ve grup 3'de %45 olarak tespit edildi. HDS/TVS oranı arttıkça, depresyon skorlarında istatiksel anlamlı olmayan bir artış izlendi. Çalışmaya alınan hastaların tamamında PUKİ total skoru 5'in üstünde saptandı.

Sonuç

Çalışma sonucunda, HD hastalarında HDS/TVS oranı arttıkça, yaşam kalitesinin azaldığı, depresyon ve ank-

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siyete bulgularının arttığı, uyku kalitesinin bozulduğu, uyku veriminin azaldığı ve uyku süresinin kısaldığını saptadık. Tüm bu faktörlerin, hastaların morbidite ve sağkalımına etkisi göz önüne alındığında, HD hastalarında volüm kontrolü ve kuru ağırlık tespiti önemlidir.

Anahtar Kelimeler: Biyoimpedans, Depresyon, Hemodiyaliz, Uyku Kalitesi, Yaşam Kalitesi

Abstract

Objectives
To determine the volume status of patients undergoing hemodialysis using the bioimpedance method and to investigate the relationship of volume status with the patients' quality of life, anxiety, depression, and sleep quality.

Material and Method
This cross-sectional study included a total of 100 patients undergoing hemodialysis at the Hemodialysis Unit in March 2016. The volume status of the patients was determined using bioelectrical impedance analysis (BIA) performed with a body composition monitor before their mid-week hemodialysis sessions. The quality of life was evaluated using the 36-item Short Form Survey, sleep quality was assessed using the Pittsburg Sleep Quality Index (PSQI), depression screening was performed with the Beck Depression Inventory, and anxiety screening was undertaken with the Beck Anxiety Inventory. The patients were divided into three groups according to the extracellular fluid/total body fluid (ECF/TBF) ratio, which is one of the BIA parameters: Group 1, <25th percentile (ECF/TBF<0.426 L, n=24); Group 2, 25-50th percentile (ECF/TBF: 0.426-0.438 L, n=37); and Group 3, 50-75th percentile (ECF/TBF: 0.438-0.481 L, n=39). Statistical analyses were performed for the three groups.

Results
The ECF/TBF ratio was found to be higher in female patients, individuals who lived alone, and those with a low educational level. As the ECF/TBF ratio increased, there was a deterioration in the physical and mental components of quality of life, including physical functioning (p<0.001), physical role difficulties (p=0.03), general health perceptions (p=0.03), mental component (p=0.02), mental health (p=0.01), social functioning (p<0.001), and vitality (p=0.01). The rate of depression was 40% in all patients, 25% in Group 1, 43% in Group 2, and 45% in Group 3. As the ECF/TBF ratio increased, a statistically non-significant increase was observed in depression scores. The PSQI total score was found to be above 5 in all patients included in the study.

Conclusion
It was determined that as the ECF/TBF ratio increased in hemodialysis patients, the quality of life decreased, depression and anxiety symptoms increased, sleep quality deteriorated, sleep efficiency decreased, and sleep duration was shortened. Considering the impact of all these factors on patients' morbidity and survival, it is important to determine volume status and dry weight in patients undergoing hemodialysis.

Keywords: Bioimpedance, Depression, Hemodialysis, Sleep Quality, Quality Of Life.

Introductıon

Chronic kidney disease (CKD) is a prevalent public health issue that affects a substantial population of over than 750 million individuals across the world (1,2). In 2020, end-stage renal disease (ESRD) that requires renal replacement therapy was found to have a point prevalence of 996.8 per million population in Turkey (3). ESRD has a significant share in healthcare expenditures due to the high cost of treatment. In this context, there has been an increased pace of research focused on factors affecting the prognosis of patients with ESRD receiving renal replacement therapy. It is crucial to prioritize treatment approaches targeting the elimination of elements that adversely affect the quality of life (QoL) of patients. ESRD treatment primarily aims at extending the lifespan of patients as well as keeping their standard of living at an optimal level.

Hemodialysis is one of the renal replacement therapy methods applied in the management of ESRD. However, the process of hemodialysis seriously affects the patient's life in terms of both physical and psychological aspects. To ensure the appropriate and systemic treatment of CKD, it is very important to determine health-related QoL (HRQoL), anxiety, and depression among these patients (4). Within this particular context, many studies have been conducted to investigate QoL, anxiety, depression and sleep quality in hemodialysis patients and explore the associated factors. In the conducted studies, the SF36

quality of life scale, Beck Anxiety and Depression Scales and Pittsburgh Sleep Quality Index were used to determine these psychiatric conditions.

The SF36 form, used for assessing QoL, developed by the 'medical outcomes study' and its Turkısh validity and reliability have been demonstrated by Koçyiğit et al. (5). The scala consists of 8 dimensions: physical functioning, physical role limitations, vitality, general health, pain, emotional role limitations, social functioning and mental health. The arithmetic average of the first five dimensions yields the Physical Component Score (PCS), while the average of the last dimensions produces the Mental Component Score (MCS). Each scale is scored between 0 and 100, with higher scores indicating better QoL during the assessment (6).

The Pittsburg Sleep Quality Index enables the quantitative measurement of sleep quality, facilitating the identification of good and poor sleep. Developed by Buysse et al. in 1989, the reliability and validity of PSQI in Turkey were studied by Agargün et al.in 1996 (7,8). PSQI comprises 7 components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction. A higher total scale score indicates poorer sleep quality and a total PSQI score of 5 or above is considered indicative of poor sleep quality (9).

The Beck Depression Inventory, developed by Beck et al. in 1961, underwent validity and reliability studies in Turkey by Tegin and Hisli. It is a self-assessment scale consisting of 21 items, each socored between 0 and 3. The highest total score attainable on the scale is 63. In Turkish populations a score of 15 or higher is considered indicative depression (10).

The Beck Anksiety Inventory developed by beck et al. in 1988, underwent reliability and validity studies in Turkey by Ulusoy et al. it is a acale that queries subjective anxiety and physical symptoms. The scale consisting of 21 items is scored ranging from 0 to 3. The score range is 0 to 63. The higher total score obtained from the scale the more severe the individuals experienced anxiety (11).

Another important problem for patients undergoing hemodialysis is overhydration (12). It is common in hemodialysis patients and stands out as a significant contributor to mortality rates. In hemodialysis patients, ideal dry weight refers to the body weight closest to the optimal hydration state, where hypovolemia and hypervolemia symptoms are not observed after hemodialysis. Dry weight is one of the basic concepts in hemodialysis and is essential for achieving adequate dialysis outcomes. However, the determination of the ultrafiltration volume, i.e., quantity of excess fluid, which must be eliminated during every hemodialysis session remains a clinical problem. Currently, the dry weight of hemodialysis patients is determined using traditional methods that are not always able to provide an accurate measurement. Various methods have been devised to accurate assess dry weight among patients undergoing hemodialysis, including echocardiographic measurements, determination of the diameter of the inferior vena cava and the level of natriuretic peptide, and bioelectrical impedance analysis (BIA) (13,14).

Numerous studies have shown that many hemodialysis patients who are clinically considered euvolemic are actually hypervolemic when evaluated by BIA (14-16). The body composition monitör is a device that easily and objectively determines patients body composition and volüme status using the bioimpedance method. Measurements are taken at 50 different frequencies within the range of 5 to 1000 kHz with the body composition monitör to calculate the electrical resistance of body fluids. Using BIA, extracellular fluid (ECF) can be estimated from the total body fluid (TBF) content. It is known that ECF also reflects hypervolemia (17). In addition, it has been shown that ECF/TBF, ECF/total body weight, and ECF percentage indicate volume load in a similar manner (17,18). It has also been reported that comorbidities have a significant association with the ECF/TBF ratio among hemodialysis patients.

The aim of this study was to investigate the volume status of patients undergoing hemodialysis using the BIA method and to investigate the relationship of volume status with the patients' QoL, anxiety, depression, and sleep quality.

Material and Method

This cross-sectionally designed study included 100 patients undergoing hemodialysis at the Hemodialysis Unit in March 2016. The study assessed the eligibility of patients aged 18 to 75 years who had been undergoing hemodialysis for four hours a day for three days a week for at least three months. Other eligibility criteria included a Kt/V value of more than 1.4, where K represents the dialyzer clearance of urea, t represents the treatment duration, and V represents the volume of urea distribution. Excluded from the study were patients who did not agree to participate; those with a heart valve prosthesis or pacemaker; those who

had limb amputation, active infection, or malignancy; those who had undergone cardiac revascularization within the last six months; and those who had signs of acute decompensated heart failure.

The patients' age and gender, hemodialysis duration, place of residence, marital and educational status, occupation, the presence of comorbidities, and a history of psychiatric illnesses were obtained and recorded by the researcher. The weight and height of the patients were measured before the mid-week dialysis session. The body mass index (BMI), expressed in kilograms per square meter (kg/m2), was calculated by dividing the body weight in kg by the square of their height in m. The volume status of the patients was determined with a body composition monitor. Bioelectrical ımpedance analysis indices were measured using a bioimpedance device (Bodystat Quadscan 4000) that utilizes a constant 50 kHz frequency current. Each patient underwent BIA before the mid-week hemodialysis session. Measurements were performed while the patients were in a supine position. The electrodes were placed on the extremities where the patients did not have a fistula or catheter. The electrodes were placed on the dorsal aspect of the wrist in the upper extremity and the anterior aspect of the ankle in the lower extremity. Using BIA, total body weight, total body water, ECF, intracellular fluid, total body fat, and lean body mass were measured at the time of entering dialysis.

The 36-item Short Form Survey (SF-36) was used to assess the patients' QoL, and the Pittsburgh Sleep Quality Index (PSQI) was employed to measure their sleep quality. The Beck inventories were administered to perform anxiety and depression screenings, respectively The researcher administered these scales to the patients. The scoring and assessment of the scales were undertaken according to their respective evaluation instructions (5,8,10,11).

According to the ECF/TBF percentiles determined by BIA, the following three groups were formed: Group 1, <25th percentile (ECF/TBF < 0.426 L, n=24); Group 2, 25-50th percentile (ECF/TBF: 0.426-0.438 L, n=37); and Group 3, 50-75th percentile (ECF/TBF: 0.438-0.481 L, n=39). Statistical analyses and comparisons were performed for the three groups.

The Ethics Committee of Selcuk University Faculty of Medicine granted approval for this clinical research on March 31, 2015, with the decision number 2015/7.

Statistical Analysis

The Statistical Package for the Social Sciences version 22.0 was used to perform the statistical analysis of the data obtained. Data were expressed as mean (± standard deviation) or median (min-max) values. The comparison of categorical data between groups was undertaken using the chi-square statistic. Parameters conforming to a normal distribution were compared with the analysis of variance test, and their subgroup analyses were undertaken with the post-hoc Tukey test. Parameters that did not comply with a normal distribution were analyzed with the Kruskal-Wallis test, and their subgroups were analyzed using the Mann-Whitney-U test. The statistically significant levels was accepted as $p < 0.05$. In the examination of correlations, the Pearson test was used for variables with a normal distribution and the Spearman test for those that did not comply with a normal distribution. Multivariate regression analysis (independent variables: age, gender, BDI score, PSQI score, marital status, educational level, and renal replacement therapy duration) was undertaken to determine the factors independently associated with the SF-36 component scores.

Results

The study included 100 individuals diagnosed with ESRD aged 18 to 75 years who had been undergoing hemodialysis treatment for a minimum duration of three months. Sixty of these patients were male (60%), and 40 were female (40%). The patients' average age was calculated as 60 ± 10.7 years, and their average BMI as 27 ± 5.4 kg/m². Seventy-three patients were married, 24 patients were widowed, and three patients were single. Fifteen patients were illiterate. Fifty-three patients had no comorbidities, while 23 patients had hypertension and 24 had diabetes. A history of psychiatric illness was present in 14 patients, of whom 13 had also received antidepressant treatment due to depression.

Gender distribution significantly differed between the three groups (Group 1 vs. Group 2 and Group 2 vs. Group 3; $p < 0.0001$ for both). Thirty-five of the 40 female patients were in Group 3. The ECF/TBF ratio of women was higher than that of men.

The marital status of the patients significantly differed between the groups ($p = 0.036$). The difference between Group 1 and Group 3 in relation to marital status was statistically significant ($p = 0.04$). The number of widowed patients was statistically significantly greater in Group 3 when compared to the remaining groups ($p = 0.036$). The ECF/TBF ratio was higher among patients living alone than among those who did not live alone.

Significant differences were also observed in the educational level of the groups ($p < 0.001$). Thirteen of the 15 illiterate patients were in Group 3. The ECF/TBF ratio exhibited a greater value in patients with a lower educational level, and this was at a statistically significant level.

The comparison of the patient groups according to QoL revealed statistically significant differences concerning the physical ($p = 0.01$) and mental ($p = 0.02$) component scores, as well as the domains constituting these components. The scores of Group 1 were significantly higher than when compared to Group 2 and Group 3. It was also observed that as the ECF/TBF ratio increased, these scores decreased, and the QoL deteriorated (Table-1).

In the correlation analysis of the ECF/TBF ratio and SF-36 scores, ECF/TBF was negatively correlated with the physical functioning score ($r=-0.201$, $p=0.045$) and negatively correlated with the physical role difficulties score ($r=-0.225$, $p=0.025$). As the ECF/TBF increased, there was a decrease in physical functioning and an increase in physical role difficulties.

Table 1 Quality of life (36-item Short Form) scale scores of the patient groups

	Group 1 (<25th percentile)	Group 2 (25-50th percentile)	Group 3 (>50th percentile)	p
Physical component score	44.9 ± 11.2	36.2 ± 12.7	37.5 ± 11.4	0.01
Bodily pain	54.9 ± 10.9	49.1 ± 12.5	52.4 ± 10.8	0.15
Physical functioning	46.7 ± 12.4	34.9 ± 14.5	38.5 ± 13.7	0.01
Physical role difficulties	42.9 ± 13.8	35.4 ± 11.5	36.1 ± 11.8	0.05
General health perceptions	41.6 ± 10.5	36.2 ± 11.7	36.1 ± 10.7	0.11
Mental component score	45.1 ± 10.8	40.3 ± 9.4	44.0 ± 10.3	0.14
Mental health	46.4 ± 11.0	40.8 ± 11.1	44.2 ± 11.7	0.14
Emotional role functioning	43.8 ± 16.4	38.7 ± 14.3	42.6 ± 13.4	0.22
Social functioning	43.5 ± 10.9	34.1 ± 12.3	39.3 ± 11.4	<0.001
Vitality	46.1 ± 9.2	40.0 ± 9.9	40.9 ± 10.5	0.05

Physical component: Group 1 vs. Group 2, p = 0,01; Group 1 vs. Group 3; p = 0.01, physical functioning: Group 1 vs. Group 2, p < 0,001; Group 1 vs. Group 3; p = 0.02, physical role difficulties: Group 1 vs. Group 2, p = 0.03; Group 1 vs. Group 3; p = 0.03, general health perceptions: Group 1 vs. Group 2, p = 0.03; Group 1 vs. Group 3, p = 0.02, mental component: Group 1 vs. Group 2, p = 0.02, mental health: Group 1 vs. Group 2, p = 0.01, social functioning: Group 1 vs. Group 2, p < 0.001, vitality: Group 1 vs. Group 2, p = 0.01; Group 1 vs. Group 3; p = 0.02

Table 2 Multıple Variable Linear Regression Analysis Results for Factors Associated with Physical Component and Mental Component Scores

Dependent Variable	Independent Variable	B	Beta	%95 CI	P
PCS	**Age**	-0,458	-0,401	-0,639 - (-0,276)	0,000
	Marital status	-3,697	-0,258	-5,887 - (-1,507)	0,001
	BDI Score	-0,451	-0,310	-0,680 - (-0,221)	0,000
MCS	**Marital status**	1,818	0,153	0,053-3,583	0,044
	BDI Score	-0,827	-0,684	-1,006 - (-0,648)	0,000

CI: confidence interval, PCS: physical component score, BDI: Beck Depression İndex, MCS: mental component score

Table 3 PSQI scores of the patient groups

	Group 1 (<25th percentile)	Group 2 (25-50th percentile)	Group 3 (>50th percentile)	p
PSQI total*	7.7 ± 4.8	8.8 ± 3.8	10.1 ± 3.5	0.07
Subjective sleep quality	1.1 ± 0.8	1.4 ± 0.9	1.4 ± 0.8	0.19
Sleep latency	1.1 ± 1.0	1.4 ± 1.1	1.6 ± 1.1	0.18
Sleep duration**	1.7 ± 1.3	1.7 ± 1.2	2.5 ± 0.9	0.08
Sleep efficiency***	1.9 ± 1.3	2.1 ± 1.1	2.5 ± 0.8	0.06
Sleep disturbances	1.1 ± 0.4	1.3 ± 0.5	1.2 ± 0.4	0.26
Use of sleeping medication	0.1 ± 0.6	0.1 ± 0.7	0.5 ± 0.3	0.17
Daytime dysfunction	0.5 ± 0.8	0.6 ± 0.8	0.6 ± 0.8	0.90

*Group 1 vs. Group 2, p = 0.02 **Group 1 vs. Group 3, p = 0.02; Group 2 vs. Group 3, p = 0.00
***Group 1 vs. Group 3; p = 0.03, Group 2 vs. Group 3, p = 0.04 PSQI: Pittsburgh Sleep Quality Index

Table 4 Beck Depression Inventory and Beck Anxiety Inventory scores of the patient groups

	Group 1 (<25th percentile)	Group 2 (25-50th percentile)	Group 3 (>50th percentile)	p
Beck Anxiety Inventory score*	5.0 ± 4.5	6.6 ± 4.4	6.2 ± 6.3	0.17
Beck Depression Inventory score**	11 ± 7.4	15.4 ± 9.1	14.2 ± 8.1	0.13

*Group 1 vs. Group 2, p = 0.04 **Group 1 vs. Group 2, p = 0.03

According to multivariate analysis undertaken to ascertain the variables that were independently related to with the physical and mental component scores, the former had an association with QoL, independent of age, marital status, and the BDI score, while the latter had an association with QoL, independent of marital status, the BDI score, and volume status (Table-2).

The total PSQI score was found to be above 5 in all patients included in the study. Group 1 had a significantly greater total score on the PSQI compared to Group 2 (p=0.02). The scores obtained from the sleep duration (p=0.02) and sleep efficiency (p=0.03) subscales were significantly lower in Group 1 than in Group 3, and these scores were also significantly lower in Group 2 compared to Group 3 (p <0.001 and p= 0.04, respectively). The ECF/TBF ratio had a negative correlation with the sleep duration (r=0.248, p=0.013) and sleep efficiency (r=0.205, p=0.041) scores among the PSQI domains. As the ECF/TBF ratio increased, the total PSQI score increased, and sleep duration and efficiency decreased (Table-3).

A low level of anxiety was detected in all patients included in the study (mean score: 6.1 ± 5.3). The rate of depression was 40% in all patients. In the evaluation of the groups, the rate of depression was found to be 25% in Group 1, 43% in Group 2, and 45% in Group 3. As the ECF/TBF ratio increased, the depression scores increased, albeit at a statistically non-significant level (Table-4).

Discussion

This study investigated the relationship between volume status and QoL, anxiety, depression, and sleep quality among patients receiving hemodialysis due to ESRD. Chronic subclinical or significant volume overload among the common complications observed in hemodialysis patients and is closely linked to arterial

stiffness, hypertension, left ventricular hypertrophy, heart failure, and consequently increased rates of death and morbidity (19,20). Many studies have investigated QoL, depression, anxiety, and sleep quality in hemodialysis patients. However, there is no research examining the relationship between these parameters and overhydration. There is a limited body of research exploring the relationship between HRQoL and BIA parameters.

In this study, it was found that overhydration was more common in female patients, individuals with a lower educational level, and those living alone. Given the psychological effects of living alone on patients, it is considered that such circumstances may exacerbate volume status by impeding patients' adherence to treatment regimens and dietary recommendations.

Hemodialysis negatively affects the patient's life, both physically and psychologically. QoL is adversely affected by various factors, including the profound impact of family roles, job proficiency, fear of death, and dependence on treatment. Since hemodialysis results in significant limitations in the patient's life caused by being dependent on a machine, a decrease in QoL can be observed frequently with this treatment (4).

Hypervolemia and the associated acute and chronic complications are closely related to HRQoL, especially its physical domain (16). In the current study, it was observed that as overhydration increased, QoL decreased in the domains of physical role difficulties, physical functioning, vitality, and general health perceptions.

In this study, the comparison of the patient groups according to QoL revealed significant differences in the physical component, physical role difficulties, physical functioning, mental component, mental health, social functioning, general health perceptions, and vitality scores. These scores decreased as the ECF/TBF ratio increased. Additionally, volume status was negatively correlated with the physical functioning and physical role difficulties scores. As the ECF/TBF ratio increased, physical functioning decreased, while physical role difficulties increased. HRQoL has a significant predictive value for survival and hospitalization frequency in patients with CKD (21). It is a consistent and strong indicator of the prognosis of patients with ESRD undergoing hemodialysis. Although it has been reported that QoL increases with some treatments in ESRD, patients often experience physical function limitations and dialysis-related symptoms. QoL has been found to be associated with clinical indicators, morbidity, and survival in hemodialysis patients (22,23).

The multivariate analysis undertaken to ascertain the variables that were independently related to the QoL components showed that patient age, marital status, and BDI scores were associated with QoL, independent of volume status. As patient age increased, deterioration in the physical component score and the mental component score decreased, which was an expected result. It was also an anticipated result that, given the psychological state of individuals living alone, the negative effects of living alone on patients' adherence to treatment and dietary regimens, as well as the contribution of this situation to depression, were accompanied by a decline in volume status and a deterioration in overall QoL.

In order to treat patients with CKD appropriately and systematically, it is very important to determine their HRQoL, anxiety, and depression status. A detailed examination of the psychoemotional state should be considered an integral part of the treatment process to improve the QoL of this patient population.

Depression is common among individuals with ESRD (24,25). It is known that there is a relationship between a high prevalence of depression and increased morbidity and mortality in dialysis patients (26). In a study by Hedayati et al., who used the DSM-IV criteria and directly interviewed patients, clinical depression was detected in 26.5% of hemodialysis patients. The authors also reported that the hospitalization rate was twice as high in patients with clinical depression when compared to those without clinical depression (27).

In this study, the rate of depression in all patients was 40%. The analysis performed according to the groups showed that the rates of depression in Groups 1, 2, and 3 were 25%, 43%, and 45%, respectively. As the ECF/TBF ratio increased, the severity of depressive symptoms increased, albeit at a statistically non-significant level. In previous studies, an increase in depressive symptoms was found to be associated with markers of poor treatment adherence among dialysis patients (28). Furthermore, it has been observed that depression causes poor nutritional status and a decrease primarily in serum albumin levels in patients with ESRD (29).

In the current study, similar to the literature, depression was associated with a deterioration in volume status and a decrease in QoL.

Anxiety is associated with the process of dialysis, early mortality, social status, and work and financial

conditions in patients with CKD (30). In the current study, low levels of anxiety were detected in all patients. According to the evaluation of the patient groups, there was a statistically non-significant increase in anxiety scores with an increase in the ECF/TBF ratio.

In hemodialysis patients, sleep disorders have an occurrence rate between 40 and 80%, although it varies depending on the evaluation method (31,32). A few studies evaluating polysomnographic parameters in hemodialysis patients have shown that these patients have a reduced total sleep time (260-360 minutes) and experience disrupted sleep patterns characterized by irregular cycles and prolonged durations of awakening during sleep (33,34). In a study by Sabbatini et al., insomnia symptoms were found in 45% of the 694 dialysis patients, and the risk of insomnia was determined to be higher in elderly patients, individuals who had been on dialysis for a long time, and those with high parathormone levels (35). Other studies similarly indicate that insomnia is linked to a deterioration in QoL and increased morbidity and mortality (36,37).

As in the general population, there exists a correlation between poor sleep quality and poor QoL in hemodialysis patients. In a study evaluating sleep quality with the PSQI and QoL with the SF-36 in 89 hemodialysis patients, sleep quality and QoL were found to be correlated (36). In the current study, the total PSQI score was above 5 in all patients, meaning that their sleep quality was low. The comparison of the patient groups according to the PSQI components showed significantly higher total PSQI, sleep duration, and sleep efficiency scores in Group 1 than in Group 2. In addition, Group 2 had significantly higher sleep duration and sleep efficiency scores when compared to Group 3. Volume status had a negative correlation with sleep duration and sleep efficiency among the PSQI components. In other words, as the ECF/TBF ratio increased, sleep duration and sleep efficiency decreased. A previous study found a high prevalence for sleep disordered breathing among hemodialysis patients (38).

Although the causes of the frequent occurrence of this condition in hemodialysis patients are not yet fully understood, it is considered that upper respiratory tract edema due to volume overload, decreased muscle tone associated with uremic myopathy, and neuropathy may contribute to the development of obstructive sleep apnea (38).

In the current study, as expected, an increase in the ECF/TBF ratio resulted in a decrease in sleep quality, sleep duration, and sleep efficiency.

Conclusion

This study revealed that as the ECF/TBF ratio increased in hemodialysis patients, their QoL decreased, depression and anxiety symptoms increased, sleep quality deteriorated, sleep efficiency decreased, and sleep duration was shortened. Considering the impact of all these factors on patients' morbidity and survival, volume control and the determination of dry weight are important for hemodialysis patients. There is potential to enhance the QoL of these patients, particularly through the implementation of efficient psychosocial assistance for elderly individuals and those who lack sufficient social support due to living alone, as well as the early diagnosis and treatment of depression in these patients. There is a need for prospective studies that will examine the effects of psychosocial support and depression treatment on the achievement of the optimal dry weight in this patient population.

Ethical Approval
Ethics The Ethics Committee of Selcuk University Faculty of Medicine granted approval for this clinical research on March 31, 2015, with the decision number 2015/7 and was conducted in accordance with the principles of the Declaration of Helsinki.

Conflict of İnterest
The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Informed Consent
Informed consent and written permission to publish the data were obtained from all individuals participating in the study.

Availability of Data
Data can be requested from the authors.

Author Contributions
SÖD: Concept, Literature Review, Analysis and Interpretation, Article Writing

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