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Original article

Factors influencing quality of life in cancer patients receiving haemodialysis

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Summary. *Background:* Life expectancy in cancer patients is shorter than in the general population. Therefore quality of life is important. The quality of life and the affecting factors in cancer patients receiving haemodialysis (HD) treatment are not clearly known. *Objective:* This study evaluated factors affecting quality of life in cancer patients undergoing HD compared to patients without cancer undergoing HD. *Methods:* The study was conducted between May 2019 and September 2019. The dialysis unit of the authors' hospital and ten private HD centres participated in the present case control study. The study included 37 cancer patients undergoing HD (Group CA) and age, sex matched 37 patients undergoing HD without cancer (Group C). Quality of life was assessed with the health-related quality of life short form-36. Muscle mass and malnutrition were evaluated with the hand grip strength (HGS) test and malnutrition-inflammation score (MIS). Sleep disorder was assessed using the Pittsburgh sleep quality index (PSQI). *Results:* In Group CA, HGS was significantly related to both mental composite scores and mental health ($p = 0.023$, $r = 0.374$; $p < 0.001$, $r = 0.519$, respectively). In Group C, a significant relationship was detected between HGS and both physical composite scores and general health ($p = 0.03$, $r = 0.356$; $p = 0.017$, $r = 0.397$, respectively), between the PSQI and physical role functioning ($p = 0.03$, $r = -0.336$) and between the MIS and HGS ($p = 0.012$, $r = -0.408$). *Conclusion:* Only HGS affected quality of life in cancer patients undergoing receiving HD treatment.

Key words: Cancer; hand grip strength, haemodialysis, inflammation, malnutrition, physical activity, quality of life

Introduction

There are positive developments in cancer treatment each year. However, kidney disease frequently complicates malignancy and its treatment (1). Chronic kidney disease is common in patients with cancer, with reported prevalence ranging from 12% to 53% at cancer diagnosis (2). Renal replacement therapy is required in the majority of cancer patients with chronic renal failure. As transplantation and peritoneal dialysis are usually not possible for cancer patients with end-stage renal failure, the only viable renal replacement therapy is haemodialysis (HD).

The quality of life (QoL) in HD patients is poor for many reasons such as sleep disorders, depression and restless leg syndrome (RLS), which malnutrition and inflammation are among the main causes of these reasons. The malnutrition-inflammation score (MIS) and hand grip strength (HGS) test are used to evaluate malnutrition and inflammation in HD patients (3). HGS is also used to evaluate muscle mass and muscle function. HGS is associated with QoL in cancer patients without concomitant HD treatment (4). As far as we know, there is an only one study evaluating the QoL in cancer patients receiving HD treatment in the literature (5). This study reported that there was a

strong relationship between QoL and malnutrition or inflammation in HD patients without cancer but this association was weak in HD patients with cancer. Unlike this work, we hypothesized that HGS may have a role in terms of QoL in HD patients with cancer. To address this point, we aimed in this study to evaluate RLS, sleep quality, MIS and HGS as factors affecting QoL factors in HD patients with and without cancer and to assess whether there was a difference between the two groups in terms of outcomes.

Patients and Methods

The study was conducted between May 2019 and September 2019. The dialysis unit of the authors' hospital and ten private HD centres participated in the present cross-sectional study. Patients with mental problems, antipsychotic and antidepressant drug usage, disability and/or extremity loss were excluded. From 623 patients in the HD centres, 61 HD patients with cancer were identified. Of these, 24 patients were excluded due to death, disability or refusal to participate in the questionnaire and measurement procedures. The remaining 37 HD patients with cancer were included in Group CA of the study. In Group CA, only two patients' chemotherapy was still continued. The control group (Group C) was selected from HD patients without cancer in the HD unit of the hospital; these patients were matched with the cancer group for age, sex and time on HD. The laboratory results of the patients, which are creatinine, potassium, calcium, phosphorus, haemoglobin, C-reactive protein, intact parathormone, albumin and total iron binding capacity were obtained from the latest monthly routine blood samples.

The study protocol was approved by the ethics committee of the Ankara Diskapi Training and Research Hospital (approval date: 29.04.2019 and number: 62/22). The study was performed in accordance with the ethical principles of the Helsinki Declaration, and informed consent was obtained from all participants.

Measurements

Hand grip strength test: HGS was measured using a hand dynamometer (TAKEİ TKK-5401 digital grip dynamometer, Takei Scientific Instruments Co., Tokyo, Japan) following 15 minutes of rest after the HD treatment. Three measurements were taken from the arm without arterio-venous fistula in extension and adduction while the patient was standing, and the highest value obtained was recorded in kilograms.

Quality of life: The study used the Turkish version of the health-related QoL short form-36 (SF-36) questionnaire, whose reliability and validity were confirmed by Demiral et al study, to measure QoL (6). This questionnaire includes 36 questions, with eight components. Each component is scored between 0 and 100. From the combination of five components (physical functioning, role physical, bodily pain, vitality and general health) as overall physical component summary score (PCS) and other five components (mental health, social function, role emotional, vitality and general health) as overall mental component summary score (MCS) are obtained. Vitality and general health components are included in both the PCS and MCS (7).

Pittsburgh sleep quality index: The PSQI, whose validity and reliability have been evaluated (8), was used to investigate sleep disorder. This index includes seven different components. A score over 5 indicates bad sleep quality (9).

Restless leg syndrome: The criteria of the International RLS study group were used to determine RLS (10).

Malnutrition-inflammation score: The MIS evaluates malnutrition and inflammation in ten components, seven of which are included in the subjective global assessment questionnaire. The remaining three components are as follows: body mass index (BMI), serum albumin and total iron binding capacity. Each component is scored between 0 and 3, and the overall score is between 0 and 30. A high overall score indicates severe malnutrition. The MIS has been shown to be superior to the subjective global assessment for evaluating mortality (11).

Statistical Analysis

The Statistical Package for Social Sciences for Windows (version 25.0, SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Descriptive statistics results were expressed as mean ± standard deviation. To determine whether all variables were dis-

tributed normally, the Kolmogorov-Smirnov test was used. For normally distributed variables, the t test was used, while the Mann-Whitney U test was used for variables that were not distributed normally. To determine correlation, Pearson and Spearman tests were used. The statistical analysis of categorical variables was performed using chi-square tests, and the results were evaluated using Pearson or Fisher's exact tests. A p-value < 0.05 was considered statistically significant.

Results

Demographic, clinical and laboratory data of the patients are shown in Table 1. The serum haemoglobin level (p < 0.001), serum phosphorus level (p < 0.001) and incidence of coronary artery disease (p = 0.035) were found to be significantly different between the two groups.

The QoL, PSQI, MIS, HGS and RLS evaluations of both groups are shown in Table 2. A statistically significant difference was found between Group CA and Group C, which were matched for age and sex, in HGS (p = 0.033), RLS (p = 0.043), MIS (p < 0.001), physical functioning (p = 0.001), role physical (p = 0.037), bodily pain (p = 0.004), general health (p = 0.002), MCS (p = 0.037) and PCS (p < 0.001). No significant difference was found between Group CA and Group C with respect to PSQI (p = 0.879), vitality (p = 0.239), mental health (p = 0.160) or social function (p = 0.629).

In the evaluation of the correlation analyses in Group CA, a significant relationship was found between the MCS and HGS (p = 0.023, r = 0.374) and between mental health and HGS (p < 0.001, r = 0.519). No significant relationship was found between HGS and the MIS (p > 0.05). PSQI was not associated with QoL (p > 0.05). RLS was associated with BMI (p = 0.04). No relationship was found between the laboratory parameters and QoL, PSQI, MIS, HGS or RLS (for all parameters, p > 0.05).

In the evaluation of the correlation analyses of Group C, a positive correlation was found between the

Table 1. Demographic, clinical characteristics and biochemistry results in patients

Variables	Haemodialysis patients with cancer (Group CA)	Haemodialysis patients without cancer (Group C)	p
Sex			0.356
Male	24	26	
Female	13	11	
Age	64.89±13.09	61.54±16.62	0.090
Comorbidities			
Diabetes mellitus	11	17	0.150
Hypertension	27	22	0.219
Coronary artery disease	12	21	0.035
Smoke	24	13	0.037
Kt/V	1.49±0.12	1.42±0.18	0.550
Time on dialysis (months)	46.14±22.18	53.97±33.48	0.762
Interdialytic weight gain (gr)	2343.24±1356.72	2071.62±1058.53	0.340
Body mass index (kg/m^2)	24.91±4.07	25.10±4.37	0.850
Haemoglobin (g/dl)	9,88±0.90	11,12±1.22	<0.001
Intact parathormone (pg/ml)	431,98±404.63	497.90±397.95	0.482
Calcium (mg/dl)	8.77±0.75	8.75±0.77	0.949
Phosphorus (mg/dl)	4.55±0.93	5.52±1.28	<0.001
Potassium (mEq/l)	4.76±0.69	4.94±0.91	0.328
C-reactive protein (mg/dl)	22.21±41.24	9.97±7.09	0.239

p<0.05

PCS and HGS (p = 0.03, r = 0.356) and between general health and HGS (p = 0.017, r = 0.397), while the PSQI and role physical were inversely correlated (p = 0.03, r = -0.336), as were the MIS and HGS (p = 0.012, r = -0.408). RLS was associated with duration of HD (p = 0.014) and HGS (p = 0.005). A relationship was also found between smoking and both the PSQI (p = 0.03) and the MCS (p = 0.041). No relationship was found between the laboratory values and RLS, QoL, MIS, HGS or the PSQI (for all parameters, p > 0.05).

No significant difference was found between Group CA and Group C in terms of serum albumin, TIBC, CRP or BMI. No association was found between CRP and RLS, PSQI or QoL components in HD patients with or without cancer.

Discussion

Factors affecting quality of life in cancer patients are still controversial. Kidneys are the most common organ affected by malignancy. The incidence of renal failure due to cancer and chemotherapeutic agents is high, increasing the difficulty of treatment and the rate of mortality. When the estimated glomerular filtration rate (eGFR) is 30 to 59 ml/dk/1.73 m^2 in cancer patients with chronic renal failure, the adjusted hazard ratio (HR) for mortality is 1.12 for these patients. If the eGFR is < 30 ml/min/1.73 m^2, then the adjusted HR is 1.75 (12). Indeed, the Dialysis Outcomes and Practice Patterns Study (1996 to 2004) reported that the risk of mortality in HD patients with a history of cancer was increased (HR 1.41; 95% CI 1.07 to 1.85) (13).

Mortality rate is high in cancer patients. Therefore it is important to identify factors that determine the QoL in cancer patients and cancer patients receiving HD.

In HD patients, the leading causes of RLS, sleep disorder and low QoL are malnutrition and inflammation (7, 14). However, the presence of a similar relationship in HD patients with cancer remains unclear. This study attempted to answer whether different approaches are required to improve QoL in HD patients with cancer. In the present study, QoL and HGS were found to be associated in HD patients with and without cancer, whereas HGS and the MIS were not found to be associated in HD patients with cancer. Relationship was found QoL, MIS and HGS or sleep disorder in only HD patients without cancer. Castro et al. reported that

Table 2. Results of health-related quality of life (SF-36), Pittsburgh sleep quality index, handgrip strength and malnutrition inflamation score in patients

Variables	Haemodialysis patients with cancer (Group CA)	Haemodialysis patients without cancer (Group C)	p
HRQOL (SF-36)			
Physical functioning	20.14±11.99	33.78±18.27	0.001
Role physical	15.41±18.50	37.16±38.92	0.037
Role emotional	16.03±23.56	43.30±42.26	0.011
Vitality	35.41±12.16	39.73±16.24	0.239
Mental health	53.62±16.17	55.89±13.52	0.160
Social function	51.92±19.05	49.24±19.77	0.629
Bodily pain	38.32±18.29	51.70±21.25	0.004
General health	28.78±11.43	39.05±15.22	0.002
Physical component summary score	25.35±8.69	39.08±16.51	<0.001
Mental component summary score	40.63±8.72	46.01±11.87	0.037
Pittsburg sleep quality index	5.73±2.32	5.65±2.57	0.879
Handgrip strength	14.50±6.01	17.77±6.89	0.033
Malnutrion inflamation score	11.89±4.74	8.24±3.28	<0.001
Restless leg syndrome	7	16	0.043

HRQOL (SF-36): Health-related quality of life short form-36, p<0.05

there was no relationship between the MIS and PSQI or between the MIS and RLS in HD patients with cancer, they underlined that there was only a relationship between MIS and QoL in HD patients with or without cancer (5) HGS was included in our study because it provides information on muscle mass and functional aspect of muscle strength as well as malnutrition. Jakobsen et al showed that HGS is an indicator of physical activity, and at the same time HGS is associated with QoL and mobility (15). In Paek's study on cancer patients reported that weak HGS is significantly associated with having a poor QoL (4). A review by Morishita found that increase in physical activity causes improvement in muscle mass and QoL in HD and chronic kidney disease patients (16). One year later Morishita et al suggested that higher HGS was correlated with higher QoL in cancer patients, while higher HGS was not correlated with higher QoL in healthy persons (17). In our study, a positive correlation was found HGS, mental health and MCS in HD patients with cancer. Another recent study emphasized the relationship between HGS and cognitive function impairment (18), reporting that nerve cell growth factor neuropeptides (namely, brain-derived neurotrophic factor) were produced in the brain and muscle cells. Blood levels increase in response to muscular contraction and decrease in association with muscular weakness and chemotherapeutic agents. All these investigations supported the our study's results that physical activity and HGS are important for QoL in HD patients with cancer.

The prevalence of sleep disorders is high in HD patients, especially in elderly patients, those who have undergone dialysis for a long time and those with high serum parathormone levels (19). Previous studies have demonstrated an association between malnutrition, sleep quality and QoL in HD patients (7,14). In the present study, sleep disorder was present in both groups, but its only relationship with QoL was demonstrated in HD patients without cancer.

A previous study evaluating QoL in cancer patients undergoing HD stated that disease was controlled during the study period in only 27 of 44 patients (5). In the present study, 35 of 37 HD patients with cancer were in remission. In addition, the time of dialysis in patients with cancer in the previous study was shorter than in the present study (33.23 ± 5.65 vs. 46.14 ± 22.18). This may have influenced patient compliance to dialysis treatment.

There was no relationship between HGS and MIS or between QoL and MIS , while QoL was correlated with HGS in HD patients with cancer. As far as we know, this study is the first study in terms of its different results compared to literature.

Our study has some limitations including small sample size. The small number of patients affected the statistical power of this study. Additionally, we could not use dual X-ray absorptiometry and magnetic resonance imaging or bioelectrical impedance analysis to assess muscle mass or lean body mass. High mortality rate, indulgence, unwillingness of patients to participate in the study for various reason are difficulties in this study.

Conclusion

This study showed that QoL was associated only with HGS in cancer patients receiving HD treatment; this demonstrated the greater importance of physical capacity and HGS than malnutrition. It is possible to determine the QoL with an inexpensive, practical, reliable and easily accessible test such as HGS.

However, further research is needed to determine the effect of HGS on QoL in HD patients with cancer.

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Conflicts of interest

No potential conflict of interest relevant to this article was reported by the authors

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