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## Orthorexia Nervosa Tendencies of Liver Transplant Patients Receiving Immunosuppressant Treatment: A Cross-Sectional Study

### İmmünsüpresan Tedavi Alan Karaciğer Nakli Hastalarının Ortoreksiya Nervoza Eğilimlerinin Belirlenmesi: Kesitsel Bir Çalışma

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#### Abstract

**Objective:** One of the most important factors after organ transplantation is immunotherapy, which is effective in reducing immune response to prevent post-transplant graft rejection, whileanother factor is a balanced nutrition. With these considerations in mind, this study aimed to determine the orthorexia nervosa tendencies of liver transplant patients receiving immunosuppressant treatment.

**Method:** This descriptive and cross-sectional study was carried out with patients who underwent liver transplantation at the liver transplantation institute of a university hospital in eastern Turkey. A sociodemographic information form and ORTO-R were used to collect data. The data were collected from patients who attended their follow-ups between May and August 2022.

**Results:** The mean age of the 176 patients who were receiving immunosuppressive treatment was  $58.55\pm7.56$ , while 86.4% had not received any education on nutrition. The mean ORTO-R score of the patients was  $17.09\pm2.70$ , which indicated moderate orthorexia. In our study, it was concluded that the majority of the patients who were using immunosuppressive medication had not received any education on nutrition, and they were moderately orthorexic.

**Conclusion:** It should be kept in mind that this obsessive form of eating will affect balanced nutrition among patients who have gone through a major transplant process. To make the drug-diet interaction in patients using immunosuppressive drugs after organ transplantation beneficial, ensure that they have a sufficient and balanced diet, and make this diet sustainable, it is important to monitor these patients. Additionally, it is thought that evaluating the pre-transplant orthorexia nervosa tendencies of advanced-stage liver transplant patients will increase post-transplant success.

**Keywords:** Immunosuppressive Therapy, Liver Transplantation, Nutrition, Orthorexia Nervosa, Nutrition education.

#### Özet

Amaç: Nakil sonrası greft rejeksiyonunun önlenebilmesi ve organ fonksiyonunun korunması için immün yanıtın azaltılmasında etkili immünoterapi nakil sonrası bakımın en önemli faktörlerden biri iken, bir diğer faktör ise dengeli beslenmedir. Bu düşüncelerden yola çıkarak, bu çalışma immünsüpresan tedavialan karaciğer nakli hastalarının ortoreksiya nervoza eğilimlerini belirlemeyi amaçladı.

**Yöntem:** Bu tanımlayıcı ve kesitsel çalışma, Türkiye'nin doğusunda bir üniversite hastanesinin karaciğer nakli enstitüsünde karaciğer nakli yapılan hastalarla yapıldı. Verilerin toplanmasında sosyodemografik bilgi formu ve ORTO-R kullanıldı. Veriler, Mayıs-Ağustos 2022 tarihleri arasında poliklinik takiplerine gelen hastalardan toplandı.

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**Bulgular:** İmmünsüpresif tedavi alan 176 hastanın yaş ortalaması 58,55±7,56 iken, %86,4'ü beslenme konusunda herhangi bir eğitim almamıştı. Hastaların ortalama ORTO-R skoru 17,09±2,70 olup orta derecede ortoreksiyaya işaret etmektedir. Çalışmamızda immünsüpresif ilaç kullanan hastaların büyük çoğunluğunun beslenme konusunda herhangi bir eğitim almadıkları ve orta derecede ortoreksik oldukları sonucuna varıldı.

**Sonuç:** Bu takıntılı yeme şeklinin, büyük bir nakil sürecinden geçmiş hastalarda dengeli beslenmeyi etkileyeceği akılda tutulmalıdır. Organ nakli sonrası immünsüpresif ilaç kullanan hastalarda ilaç-diyet etkileşiminin faydalı olabilmesi, yeterli ve dengeli beslenmelerinin sağlanması ve bu diyetin sürdürülebilir olabilmesi için bu hastaların izlenmesi önemlidir. Ayrıca ileri evre karaciğer nakli hastalarının nakil öncesi ortoreksiya nervoza eğilimlerinin değerlendirilmesinin nakil sonrası başarıyı artıracağı düşünülmektedir.

AnahtarKelimeler: İmmünsüpresif Tedavi, Karaciğer Nakli, Beslenme, Ortoreksiya Nervoza, Beslenme eğitimi.

### **INTRODUCTION**

Liver transplantation refers to the transplantation of a graft liver from a live/cadaveric donor with blood-tissue compatibility with an end-stage liver failure patient to increase their life expectancy and quality in cases where there is no chance of success with medical treatment (1, 2). However, the detection of the graft by the immune system as a foreign body and the immune response to destroy the transplanted organ may lead to severe dysfunction in the transplanted liver and the rejection of the liver (3, 4). For this reason, to prevent posttransplant graft rejection and preserve organ function in liver transplant cases, immunosuppressive drugs that suppress the immune system are used. In this sense, one of the most important factors in post-transplant care is immunotherapy, which is effective in reducing immune response (4, 5). Another factor that speeds up graft survival and the adjustment process after transplantation is balanced nutrition. To speed up the adjustment process, increase the quality of life of advanced-stage liver disease patients and prevent dietrelated complications, the nutritional statuses of these patients should be assessed as soon as possible in the pre-transplant phase, and the appropriate dietary interventions should be made (6). According to previous studies, dietary intake in liver transplant patients increases significantly after their transplant operation. This issue is more noticeable especially among individuals who had undergone severe dietary restrictions before their transplant and suffered from pre-transplant gastrointestinal symptoms and anorexia (7, 8). There are many factors that affect sufficient and balanced nutrition after transplant operations. These factors include perioperativemalnutrition, surgicalstress, immunosuppressivetreatment, energy metabolism, sociocultural status, and postoperative complications (9-11).

The term "orthorexia" emerged in 1997, and it was derived from the Greek words "ortho" meaning "right, proper" and "orexis" meaning "appetite" (12, 13). Orthorexianervosa (ON) is defined as an obsession with proper eating, and orthorexic individuals are more interested in the quality of their food than in its quantity (13-17). They keep busy with planning their foods, avoiding foods that are considered impure or unhealthy, checking their food sources, and following up on all food-related concerns such as packaging, processing, and the inclusion of artificial sweeteners. Moreover, they consider it necessary to constantly comply with rules about preparing food, consuming food, and healthy eating, and they aim to never break a rule. In these patients, nutritional deficiencies, severe weight loss, and similar medical complications associated with the avoidance of some food groups may develop. Furthermore,

as a consequence of withdrawal from social contexts, they may also experience educational and occupational issues, as well as social isolation (13-17).

Data on the prevalence of ON have been collected in studies conducted with various populations including medical students, high school students, artists, and dieticians (18). No study examining orthorexia nervosa in patients using post-transplant immunosuppressives could be found.

The purpose of this study is to determine the orthorexia nervosa tendencies of liver transplant patients receiving immunosuppressanttreatment.

### METHOD

### **Design and Participants**

This descriptive and cross-sectional study was carried out with patients who underwent liver transplantation at the liver transplantation institute of a university hospital in eastern Turkey. The population of the study included patients who had undergone liver transplantation in the last 2 years. For 321 patients, using the formula for a known population[n= N.t<sup>2</sup> p.q / (d<sup>2</sup>.(N-1) + t<sup>2</sup> p.q], with the parameters  $\alpha$ = .05, p= .5, and q= .5, with d= .05 error, and in a 95% confidence interval, the minimum required sample size was calculated as 176(19). The inclusion criteria were being at or over the age of 18, having undergone liver transplantation in the last 2 years with at least 6 months since transplantation, and voluntarily agreeing to participate in the study. The exclusion criteria were being under the age of 18, having undergone liver transplantation more than 2 years ago, and not agreeing to participate in the study.

#### **Data Collection Instruments**

A "sociodemographicinformation form" and "ORTO-R" were used for data collection.

#### **Sociodemographic Information Form**

The form included questions on the patients' age, sex, education level, marital status, income level, occupation, family structure, type of transplant, nutritional education status, time of transplant, and access to nutrition-related information sources.

#### **ORTO-R** scale

The ORTO-R is a revised version (14) of the ORTO-15 scale, showing an unstable factorial structure, and is a scale used to assess individuals' pathological obsessions for healthy food (14,20). The validity and reliability study of the ORTO-15 scale in Turkey was conducted by Arusoğlu(21), and the ORTO-R questions consisting of 6 items (3, 4, 7, 10, 11, 12) of the ORTO-15 scale (20) range from "always" to "never". It is a 4-point Likert-type scale with varying degrees of variation (14, 20) According to the most recent studies, the ORTO-R scale is a more reliable scale than ORTO-15 to evaluate and compare orthorexic trends in different populations (22). A minimum of 6 points from the ORTO-R scale and a maximum score of 24. In the ORTO-R, low scores represent low levels of orthorexic eating behavior and high

scores represent high levels of orthorexic eating behavior (14). In this study, the Cronbach alpha internal consistency coefficient of the ORTO-R scale was found to be 0.81.

### **Data Collection**

The data of the study were collected from liver transplant patients who met the inclusion criteria and presented to the organ transplantation outpatient clinics of the liver transplantation institute where the study was conducted between May and August 2022.

### **Statistical Analysis**

The data that were collected in the study were analyzed using the Statistical Package for the Social Sciences for Windows (SPSS, Version 25, Armonk, NY: IBM Corp. Released 2017).Skewness andkurtosis values wereexamined, and it was determined that the data were normally distributed. The descriptive statistics of the data included frequency, percentage, mean, standard deviation, minimum, and maximum values. Independent-samples t-test was used to compare sociodemographic data between 2 groups, while comparisons among 3 or more groups were made using one-way analysis of variance (ANOVA). Pearson's correlation tests were used to compare scale scores based on continuous data. Cronbach's alpha analysis was utilized to calculate the reliability of the scale. The level of statistical significance was accepted as p<0.05.

### **Ethical Consideration**

All steps of this study complied with publication ethics principles and the principles of the Declaration of Helsinki. Permission was obtained from the directorate of the liver transplantation institute where the study would be conducted with the decision dated 10.05.2022 and numbered E-176197. Approval for the study was obtained from the Non-Interventional Clinical Studies Ethics Committee of Malatya Turgut ÖzalUniversity with the decision dated 26.05.2022 and numbered 2022/9-133. It was ensured that the participants participated in the study by filling out the data collection forms after they read the informed consent form on the first page and agreed to it. The sample included liver transplant patients who voluntarily agreed to participate in the study and filled out the data collection forms.

### RESULTS

It was found that 52.3% of the patients who participated in this study were male, 84.7% were married, 31.8% were primary-secondary school graduates, 74.4% were living with their spouses and children, 83.3% received transplants from live donors, 88.6% were following diets, 86.4% had not received education about nutrition, and their mean age was  $58.55\pm7.56$  (Table 1).

In the comparisons of the mean ORTO-R scores of the patients based on their sociodemographic characteristics, it was determined that the male patients, the patients who were married, those who had undergraduate or higher degrees, those who were homemakers, those who received their transplants from live donors, those who were not following a diet, and those who had received nutritional education were more orthorexic (p<0.05) (Table 1).

**Table 1.** Distribution of the Mean ORTO-R Scores of the Participants Based on Their Sociodemographic and Nutrition-Related Characteristics

Sociodemographic	Ν	%	ORTO-R Mean Scores
Characteristics			$(\bar{x} \pm SD)$
Sex			
Female	84	47.7	18.25±2.16
Male	92	52.3	16.03±2.72
	·		t: 5.940, <b>p: 0.000</b> *
Marital Status			
Married	149	84.7	16.59±2.45
Single	27	15.3	19.81±2.41
			t: -6.280, <b>p: 0.000*</b>
Education Level			
Literate, no formal degree	23	13.1	15.52±1.62
Primary-secondary school	56	31.8	17.10±2.57
High school	48	27.3	19.35±1.99
Associate degree	25	14.2	16.88±1.39
Undergraduate or higher	24	13.6	14.25±2.36
			F: 27.146, <b>p: 0.000</b> *
Income Level			
Income < expenses	78	44.3	17.97±2.58
Income ~ expenses	82	46.6	16.67±2.50
Income > expenses	16	9.1	14.09±2.69
			F: 11.438, <b>p: 0.000*</b>
Occupation			
Civil servant	56	31.8	16.41±2.85
Laborer	23	13.1	17.39±2.62
Freelance	15	8.5	16.93±2.65
Retired	22	12.5	17.90±2.89
Homemaker	25	14.2	15.40±1.25
Not working	35	19.9	18.74±2.14
8			F: 6.672 <b>p: 0.000</b> *
Family Structure			L L
Living alone	34	19.3	18.79±2.88
Living with parent(s)	11	6.3	17.54±2.58
Living with spouse-children	131	74.4	16.61±2.49
			F: 9.867, <b>p: 0.000</b> *
Transplant Type			, <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> , <b>_</b> _, <b>_</b> , <b>_</b> _, <b>_</b> , <b>_</b> _, <b>_</b> , <b>_</b> _, <b>_</b> _, <b>_</b> , <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> _, <b>_</b> , <b>_</b>
Cadaveric donor	31	16.7	17.34±2.75
Live donor	155	83.3	15.50±1.61
			t: 4.622, <b>p: 0.000</b> *
Follows a Diet	1		
Yes	156	88.6	17.23±2.84
No	20	11.4	15.95±0.22
- 10			t: 5.529, <b>p: 0.000</b> *
Has Received Education on Nut	rition		
Yes	24	13.6	13.54±1.61
No	152	86.4	17.65±2.40
110	132	00.4	t: -10.735, <b>p: 0.000</b> *
	$(\overline{\mathbf{x}}\pm\mathbf{SD})$	Min-Max	
Δ ge	$(x \pm SD)$ 58.55 $\pm$ 7.56	(38-75)	r:011, p: 0.883
Age	JU.JJ±1.JU	(30-73)	1011, p. 0.000

\*p<0.05; t: Independent-Samples t-Test; F: One-way ANOVA; r: Pearson's Correlation Test.

Nutrition-related information was accessed via television by 55.7% of the patients, via the internet by 73.3%, via social media by 69.9%, via scientific publications and articles by 5.7%, via clinic doctors by 63.1%, via clinic nurses by 79.5%, via dieticians by 12.5%, and via family and friends by 75.6% (Table 2). It was found that those who reached information about nutrition through television, internet and social media were moderately orthorexic (p<0.05) (Table 2).

Information Sourc	es	Ν	%	ORTO-RMean Scores
				$(\overline{x}\pm SD)$
Television	Yes	98	55.7	16.00±2.72
	No	78	44.3	18.46±2.58
				t: -6.661, <b>p: 0.000</b> *
Internet	Yes	129	73.3	16.04±2.26
	No	47	26.7	19.95±1.44
				t: -13.0478, <b>p: 0.000</b> *
Social Media	Yes	123	69.9	16.63±2.65
	No	53	30.1	18.15±2.52
				t: -3.522, <b>p: 0.001</b> *
Scientific Publication,	Yes	10	5.7	18.60±2.79
	No	166	94.3	17.00±2.68
Article				t: 1.829, p: 0.069
Clinic Doctor	Yes	111	63.1	17.44±2.75
	No	65	36.9	16.49±2.52
				t: 2.273 <b>p: 0.024</b> *
Clinic Nurse	Yes	140	79.5	16.85±2.59
	No	36	20.5	18.02±2.96
				t: -2.360, <b>p: 0.019</b> *
Dietician	Yes	22	12.5	16.95±3.34
	No	154	87.5	17.11±2.61
[				t: -0.210, p: 0.836
Family, Friends	Yes	133	75.6	17.24±2.74
	No	43	24.4	16.60±2.55
				t: 1.359, p: 0.176

**Table 2.** Distribution of the Mean ORTO-R Scores of the Participants Based on TheirSources of Nutrition-Related Information

\*p<0.05, t: Independent-Samples t-Test.

Among the mean ORTO-R item scores of the patients who participated in this study, the highest mean score was  $3.46\pm0.72$  in the item "In the last 3 months, did the thought of food worry you?", and the lowest mean score was  $1.88\pm0.93$  in the item "Does the thought about food worry you more than three hours a day?" The mean total ORTO-R score of the patient was  $17.09\pm2.70$ , and their tendency to have orthorexia nervosa was moderate (Table 3).

ORTO-R Scale Items	Orthorexia	
	Mean	SD
1 - In the last 3 months, did the thought of food worry you?	3.46	0.72
2 - Are your eating choices conditioned by your worry about your health status?	2.48	1.10
<b>3</b> - Does the thought about food worry you for more than three hours a day?	1.88	0.93
4 - Do you think that the conviction to eat only healthy food increases self- esteem?	2.88	0.80
5 - Do you think that eating healthy food changes your lifestyle? (frequency of eating out, friends)	3.09	0.93
6 - Do you think that consuming healthy food may improve your appearance?	3.27	0.96
Total Orthorexia Mean Score (6-24)	17.09	2.70

#### DISCUSSION

ON is a form of an eating disorder that has recently gained attention, and its prevalence is constantly increasing. Today, factors such as the increase in the prevalence of diseases with high mortality and morbidity rates and the lack of sufficient food safety and security in the world have led individuals to pay increased attention to their health (23). This concern results in the association of health-seeking with relevant obsessions, shaping of one's eating habits around strict rules, and development of eating disorders (15). A tendency to display obsessive and hygienic eating behaviors may lead to orthorexia in liver transplant patients. Our study is the first study that investigated the ON tendencies of liver transplant patients receivingimmunosuppressivedrug treatment.

The patients who participated in our study were found to be moderatelyorthorexic (mean score:  $17.09\pm2.70$ ). The male patients were significantly moreorthorexicthan the female patients. In the literature, the rates ON in both sexes have been reported to increase (24-27). In a study that was conducted with performance artists in Turkey, it was emphasized that sex does not have an effect on theorthorexicstatuses of individuals (25). In another study that included 878 medical students, it was found that male students displayed more orthorexictendencies than female students (28). There are different results on sex-based differences in the relevant literature (26, 29, 30).The results of our study regardingorthorexictendencies were in parallel with the literature. Differences in results may have resulted from the sociocultural characteristics of groups and participants included in different studies.

In our study, the participants who were married had a significantly higher tendency to beorthorexic than those who were single. Arusoğlu et al. also found higher orthorexic tendencies among married individuals (21). In another study, marital status was not found to be effective onorthorexia (20,31). The higher orthorexic tendencies in the married participants

of our study were considered to be associated with the possibility that they could be more obsessed with their health to cope with responsibilities in their family environment.

Among the participants of our study, it was determined that sociodemographic characteristics such as education level, income level, occupation, family structure, and sources of information about nutrition were significantly effective on the ON tendencies of the participants. Highly variable results have been reported in the relevant literature. While Donini reported that ON tendencies decrease as education levels increased, Ernst stated that most individuals who showed ON symptoms were those in the earlier years of their education, those who were single, those without children, and those who were working full-time, but basic demographic characteristics did not have a significant effect on ON (20,30). In their study with 177 participants, Ramacciottiet al. reported the rate of ON as 57.6%, but they emphasized that sociodemographic characteristics were not significantly effective in this result (32). Another study, which was carried out with performance artists, revealed that sex, age, education status, and work experience were not effective on ON (25). In their study in 2014, Varga identified a significant but weak relationship between ON and age, but there was no significant difference between the sexes.Similarly, Bosi et al. did not find a significant effect of sex on individuals' tendencies to have ON (33,34). In the study conducted by Martinovic et al., the mean score of the ORTO-R scale was found to be 13.87±3.06, and this finding was more or less similar to our study (Table 3) (22). It is believed that all these different results have stemmed from differences in the cut-off points of ON scale used by different researchers, differences in populations, and differences in sociocultural settings. Because no study investigating ON tendencies in liver transplant patients, let alone patients with any chronic diseases, was found in the literature review, it was not possible to compare the results of our study to those in similar studies.

### Limitations and Strengths of the Study

This study had several limitations. The first was the fact that it was a single-center study, the second was the absence of similar studies in the literature, and the third was the fact that only patients who had undergone organ transplant surgery in the last two years were included. Finally, the number of studies that determined ON using the ORTO-R scale was small. The authors of the revised ORTO-R scale from ORTO-15 state that it should not be used to determine the prevalence of ON. Study data initially collected against the ORTO-15 were recalculated using the ORTO-R scale guidelines.

### CONCLUSION

Transplantation surgery is prevalently performed today. One of the important factors that speed up graft survival and the adjustment process after transplantation is balanced nutrition. In our study, it was concluded that the majority of the patients who were using immunosuppressive medication had not received any education on nutrition, and they were moderately orthorexic. It should be kept in mind that this obsessive form of eating will affect balanced nutrition among patients who have gone through a major transplant process.

To not only support advanced-stage liver disease patients in the pre-transplant period but also speed up the adjustment process of these patients to the new organ in the post-transplant period, improve their quality of life and prevent nutrition-related complications, the nutritional statuses of these patients should be assessed as soon as possible, and they should be supported with the appropriate dietary interventions. To make the drug-diet interaction in patients using immunosuppressive drugs after organ transplantation beneficial, ensure that they have a sufficient and balanced diet, and make this diet sustainable, it is important to monitor these patients. Additionally, it is thought that evaluating the pre-transplant orthorexia nervosa tendencies of advanced-stage liver transplant patients will increase post-transplant success, and further studies in this field will be guiding.

### **Declarations**

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**Competing Interest:** The authors did not experience any conflict of interest in the writing of this article.

**Informed consent:** Verbal consent was obtained from all participants and then included in the study.

**Institutional Review Board Approval:** Approval for the study was obtained from the Non-Interventional Clinical Studies Ethics Committee of Malatya Turgut Özal University with the decision dated 26.05.2022 and numbered 2022/9-133.

**Data availability:** The data sets obtained in the analysis of this study can be obtained with a request from the responsible author.

### **Author contributions**

NK: Conceptualization, Methodology, Data collection, Writing – Original draft preparation, Control, Supervision. GK: Conceptualization, Methodology, Resources, Writing-Original draft preparation, Formal analysis, Writing-Review and Editing, Control. +00MK: Conceptualization, Control, Data Collection, Data improvement, Writing – Original draft preparation, Writing-Review and Editing, Supervision. We certify that all authors named in this article have read the final version.

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