

A Correlative Study on Social Support and Quality of Life in Patients After Adult Liver Transplantation

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Research

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Abstract

Background: The purpose of this study was to investigate the quality of life among adult liver transplantation patients and to explore the relationship between social support and quality of life in patients.

Methods: This descriptive study contain 105 patients who underwent liver transplantation. The general information questionnaire, social support rating scale (SSRS), and post-liver transplant quality of life questionnaire (pLTQ) were used. The data analysis was conducted using SPSS 18.0 software, and independent t test, ANOVA, Pearson and correlation analysis were implemented.

Results: The total score of social support in adult liver transplant patients was 45.35 ± 7.31 , including subjective support dimension (26.84 ± 4.13), objective support (11.42 ± 3.40), and utilization of social support (7.09 ± 2.12). The total score of quality of life in adult liver transplant patients was 138.08 ± 26.31 , including anxious (37.23 ± 9.86), physical function (26.60 ± 5.51), emotional function (21.23 ± 4.35), financial (12.59 ± 4.80), healthcare (24.89 ± 5.27), and complications (15.55 ± 3.38). The total score of social support was positively correlated with the total score of quality of life ($r = 0.313$), anxious ($r = 0.299$), physical function ($r = 0.255$), emotional function ($r = 0.215$), healthcare ($r = 0.214$), and complications ($r = 0.217$). Objective support was positively correlated with total score of quality of life ($r = 0.246$), anxious ($r = 0.209$), emotional function ($r = 0.210$) and complications ($r = 0.293$). Subjective support was positively correlated with total score of quality of life ($r = 0.361$), anxious ($r = 0.404$), physical function ($r = 0.305$), economy ($r = 0.281$), healthcare ($r = 0.199$), and complications ($r = 0.238$).

Conclusions: There is a positive correlation between social support and quality of life after adult liver transplantation.

Introduction

Since the first application of liver transplantation (LT) in clinical practice by Starzl in 1963, liver transplantation has become the only effective method to treat various end-stage liver diseases [1]. In the United States, 5,000 to 6,000 patients receive orthotopic liver transplantation each year [2]. Similarly, China ranked second among 58 countries in the world in terms of the number of liver transplantations in 2010, only second to the United States (6291 cases). Notably, with the maturing liver transplantation technology, the perioperative mortality of major heart and liver transplantation in China has decreased and the survival rate of recipients has been prolonging obviously.

Although the postoperative survival rate of liver transplantation patients has greatly improved, their postoperative life requires long-term use of immunosuppressive agents, antiviral drugs, and regular reviews, and the incidence of postoperative complications is high. According to statistics, the incidence of early postoperative complications (< 30 days) is 49.13%, and the incidence of late postoperative complications (> 30 days) is 32.76%. Rongies W and colleagues [3] suggested that chronic fatigue,

anxiety, loneliness and other serious effects impact the postoperative survival quality of liver transplant patients with prolonged liver transplantation.

Social support, thought to be various aspects of an individual's mental and physical help, reflect the extent to which a person is closely associated with society and quality. Sun N and colleagues [4] found that social support affects the quality of life; social support is regarded as a kind of buffer pressure, affects an individual's stress perception, helps individuals to cope with stress, and reduces the negative effects of stress on mental and physical health to improve overall health. Importantly, social support is related to the quality of life in liver transplant patients.

In this study, we investigated the status quo of quality of life and social support after adult liver transplantation and explored the correlation between social support and quality of life after adult liver transplantation.

Methods And Materials

Research type

This research is a descriptive correlation study (Belongs to cross-sectional study). The study was conducted following the Declaration of Helsinki, and all protocols were approved by the Ethical Committee of the First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China.

Research subjects

The choice of research subjects

The research subjects were adult post-liver transplantation patients, and the subjects were selected as follow-up patients after liver transplantation in the out-patient follow-up office of the Department of Hepatobiliary Surgery of First Affiliated Hospital of Xi'an Jiaotong University from October 2015 to October 2017.

The inclusion criteria of the research subjects

a. Age ≥ 18 ; b. at least one month after liver transplantation; c. Full reading comprehension ability; c. Normal conscious mental state; and d. Voluntarily participated in the survey.

The exclusion criteria of the research subjects

a. Multiple organ transplantation; b. Secondary liver transplantation; c. Patients with severe heart, lung and kidney diseases; d. Patients with severe mental disorders.

Sample size calculation

This study belongs to the present situation investigation. There are approximately 50 cases of liver transplantation in the Department of Liver Transplant Center of First Affiliated Hospital of Xi'an Jiaotong University every year. Data have shown that the 1-year cumulative survival rate after liver transplantation in adults was 78.13%, 65.81% in 3 years, and 59.25% in 5 years. Thus, according to actual conditions, this study collected the greatest amount of data possible from 105 cases of liver transplantation data.

Research tools

General information questionnaire

The researchers and included age, gender, education level, occupation, marital status, per capita income, medical expense burden, operation time, complication status, and number of postoperative hospitalizations designed the general information questionnaire.

Social support rating scale (SSRS)

The SSRS was used to measure the social support degree of individuals. The SSRS includes 10 items, consisting of three dimensions, including objective support (3 items), subjective support (4 items) and utilization degree of social support (3 items). Objective support was 0.825, subjective support was 0.849, support utilization was 0.833 and the total was 0.69. The correlation coefficient of the subscale and the total scale was 0.724 ~ 0.835, indicating that the scale content validity was higher. The correlation coefficient between the subscales was 0.462 ~ 0.664, lower than that between the total tables, indicating that the scale had higher structure validity. The retest reliability in this study was 0.666.

Quality of life questionnaire for liver transplantation recipients in Chinese (pLTQ)

Saab and colleague [5] created a profession questionnaire in 2010 called pLTQ, which included 32 items in eight fields, and the overall Cronbach's rating was 0.93. Each option was divided into 7 grades: always, most of the time, more time, sometimes, occasionally, almost none, and never, ranging from 1 to 7 points, respectively; the higher the score, the better the quality of life. Researchers sinicized the questionnaire and studied its reliability and validity in 2015. The Chinese version of the pLTQ included six dimensions, such as concern (8 items), physical function (5 items), emotional function (4 items), economy (3 items), health services (5 items) and complications (3 items), for a total of 28 items and 28 ~ 196 points. The result of the content validity index ($s-cvi / Ave$) of the scale was 0.93, and the six dimensions were worry (0.895), physical function (0.763), emotional function (0.810), economy (0.879), health services (0.725), complications (0.708), and overall (0.939). The retest reliability was 0.713. The Chinese version of the

pLTQ had good applicability and evaluation performance in Chinese liver transplantation recipients and can be used in Chinese liver transplantation recipients' quality of life surveys. The retest reliability in this study was 0.917.

Data collection methods

The team of researchers completed the data collection. Importantly, researchers obtained consent from the Department of Liver Transplant Center of First Affiliated Hospital of Xi'an Jiaotong University before beginning the investigation. First, researchers clarified the purpose of the study, the content, the nature of commitment to research, the confidentiality, and the exclusion of private interests, and they obtained permission from the respondents. Then, researchers handed out questionnaires and explained the matters requiring attention to patients. Next, the patients filled out the questionnaire themselves. When filling in the form, the researchers assisted the patients with explanations. It took 15 to 30 minutes to complete the survey, and the questionnaire was collected on the spot. After the questionnaire was returned, the patient's medical records were found according to the patient's hospitalization number, and part of the questionnaire was additionally filled. Authors had no access to information that could identify individual participants during or after data collection. Then the follow-up analysis and manuscript writing were carried out immediately (from October 2017 to March 2018).

Statistics

EpiData3.1 was used to establish the database. SPSS 18.0 was used for the analysis. Statistical methods included descriptive statistical analysis, chi-square test, t test, variance analysis and correlation analysis. $P < 0.05$ was considered statistically significant.

Results

General information for adults undergoing liver transplantation.

In this study, 109 questionnaires were issued, 108 were retrieved, and the recovery rate was 99.08%. Three unqualified questionnaires were excluded, 105 effective questionnaires were issued, and the effective rate was 97.22%. The unqualified questionnaires were due to patients' withdrawal from the study (2 questionnaires) and patients' secondary liver transplantation (1 questionnaire). The average age of the 105 subjects was 46.71 ± 10.34 years (Table 1).

Table 1
General demographic characteristics of adult liver transplant patients (n = 105).

Characteristic		Frequency	Percentage
Age	< 40	34	32.38%
	40 ~ 55	45	42.86%
	≥ 55	26	24.76%
Gender	Male	84	80.00%
	Female	21	20.00%
Profession	Worker	26	24.76%
	Farmer	24	22.86%
	Civil servants	32	30.48%
	Else	23	21.90%
Education background	Primary schools	4	3.81%
	Junior high school	12	11.43%
	High school	38	36.19%
	University	49	46.67%
	Else	2	1.90%
Marriage	Yes	8	7.62%
	No	97	92.38%
Family income (10000/month)	< 1	72	68.57%
	1 ~ 2	15	14.29%
	≥ 2	14	13.33%
	Else	4	3.81%
Payment	New cooperative medical insurance	28	26.67%
	Self-paying	4	3.81%
	Social medical insurance	71	67.62%
	Else	2	1.90%
Postoperative time	< 3 month	29	27.62%
	3 month ~ 1 year	28	26.67%
	1 ~ 3 year	38	36.19%

Characteristic		Frequency	Percentage
	3 ~ 5 year	6	5.71%
	> 5 year	4	3.81%
Complication	Yes	51	48.57%
	No	54	51.43%

Social support status after adult liver transplantation.

The social compliance scores of the 105 adults undergoing liver transplantation ranged from 25 to 60, with a total score of 45.35 ± 7.31 . Scores for objective support (11.42 ± 3.40), support utilization (7.09 ± 2.12), and subjective support (26.84 ± 4.13) were recorded. The specific scores are shown in Table 2.

Table 2
Social support scores after adult liver transplantation (n = 105).

Dimension Score	Highest	Lowest	Mean \pm SD	National norm	t
Objective support	18	5	11.42 ± 3.40	12.68 ± 3.47	-3.756*
Subjective support	32	15	26.84 ± 4.13	23.81 ± 4.75	7.559*
Support utilization	12	3	7.09 ± 2.12	9.38 ± 2.40	-11.090*
Total social support	60	25	45.35 ± 7.31	44.34 ± 8.38	1.456
*P < 0.05					

Quality of life after adult liver transplantation.

The total score of survival quality after adult liver transplantation was 28 ~ 196, with a higher score indicating better quality of life. Overall, 105 liver transplantation recipients scored 61 ~ 193 points, with an average score of 138.08 ± 26.31 . Of the 105 adult liver transplant patients, the survival quality score ranged between 61 ~ 193, and the total score was 138.08 ± 26.31 , including the anxious dimension (37.23 ± 9.86), body function dimension score (26.60 ± 5.51), emotional function dimension score (21.23 ± 4.35), economic condition dimension score (12.59 ± 4.80), health services dimension score (24.89 ± 5.27), and complication dimension score (15.55 ± 3.38) (Table 3).

Table 3
Quality of life after adult liver transplantation (n = 105).

Dimension Score	Highest	Lowest	Mean ± SD
Anxious	56	13	37.23 ± 9.86
Body function	35	8	26.60 ± 5.51
Emotional function	28	9	21.23 ± 4.35
Economic condition	21	3	12.59 ± 4.80
Health services	35	13	24.89 ± 5.27
Complication	21	6	15.55 ± 3.38
Total	193	61	138.08 ± 26.31

The correlation between survival quality score and ecumenical demonology character in patients after liver transplantation.

Correlations between demographic characteristics and survival quality differences were investigated between adult liver transplant recipients by assessing age, sex, occupation, cultural degree, marital status, family income, medical treatment charge of payment, time of transplantation, and complications as independent variables and the overall quality of life in liver transplant recipients as the dependent variable and by using t test, single factor analysis of variance and SNK-q inspection analyses. The results showed that different age, gender, occupation, educational level, family income, payment method of medical expenses, time after transplantation and whether complications had occurred had an impact on the overall quality of life of adult liver transplant recipients ($P < 0.05$), as shown in Table 4.

Table 4
Single factor analysis of quality of life after adult liver transplantation (n = 105).

Characteristic		Frequency	Survival quality score	F/t	P value	SNK-q	
Age	A < 40	34	124.98 ± 23.30	F = 7.395	0.001	A vs B or C, P < 0.05	
	B 40 ~ 55	45	142.97 ± 27.95				
	C ≥ 55	26	147.25 ± 20.43				B vs C, P > 0.05
Gender	A Male	84	133.97 ± 25.84	t=-3.473	0.001	-	
	B Female	21	155.14 ± 21.05				
Profession	A Worker	26	148.72 ± 21.41	F = 5.594	0.001	B vs A or C or D, P < 0.05	
	B Farmer	24	121.18 ± 29.90				
	C Civil servants	32	141.58 ± 27.49				A vs C or D, P > 0.05
	D Else	23	139.39 ± 16.69				C vs D, P > 0.05
Education background	A Primary schools	4	105.10 ± 50.92	F = 3.727	0.014	B vs A or C or D, P > 0.05	
	B Junior high school	12	127.37 ± 30.91				
	C High school	38	142.68 ± 21.40				A vs C or D, P < 0.05
	D University	49	141.50 ± 23.76				C vs D, P > 0.05
Marriage	A Yes	8	123.50 ± 25.27	t=-1.661	0.100	-	
	B No	97	139.42 ± 26.11				
Family income (10000/month)	A < 1	72	122.67 ± 14.89	F = 7.500	0.001	A vs B, P < 0.05	
	B 1 ~ 2	15	137.02 ± 27.77				

Characteristic		Frequency	Survival quality score	F/t	P value	B vs C, P < 0.05 SNK-q
	C ≥ 2	14	158.53 ± 17.87			A vs C, P < 0.05
Payment	A New cooperative Medical insurance	28	125.22 ± 28.42	F = 5.418	0.006	A vs B, P < 0.05
	B Self-paying	4	157.16 ± 4.44			B vs C, P < 0.05
	C Social medical insurance	71	141.25 ± 24.07			A vs C, P < 0.05
Postoperative time	A < 3 month	29	144.57 ± 30.75	F = 2.647	0.038	A or B or C vs D or E, P < 0.05
	B 3 month ~ 1 year	28	141.90 ± 20.03			
	C 1 ~ 3 year	38	136.42 ± 26.78			A vs B or C, P > 0.05
	D 3 ~ 5year	6	111.33 ± 13.66			B vs C, P > 0.05
	E > 5 year	4	123.50 ± 7.51			D vs E, P > 0.05
Complication	A Yes	51	129.58 ± 26.42	t=-3.435	0.001	-
	B No	54	146.35 ± 23.60			

The correlation between survival quality score and the status of social support in patients after liver transplantation.

Pearson correlation analysis ($\alpha = 0.05$) was performed to analyze the correlation between total social support scores and each dimension score after adult liver transplantation and between the total quality of life score and each dimension score. The results showed that social support and quality of life scores, including anxiety, physical function, emotional function, and complications, were positively correlated. Objective support and quality of life scores, including anxiety, emotional function and complications, were positively correlated. Finally, subjective support and quality of life scores, including anxiety, physical function, economy, health services, and complications, were positively correlated (Table 5).

Table 5

The correlation between survival quality score and the status of social support in patients after liver transplantation (n = 105).

	Anxious	Physical function	Emotional function	Economy	Health service	Complication	Quality of life score
Objective support	0.209*	0.183	0.210*	0.138	0.163	0.293**	0.246*
Subjective support	0.404**	0.305**	0.148	0.281**	0.199*	0.238*	0.361**
Support utilization	-0.093	-0.008	0.116	0.021	0.089	-0.186	-0.019
Total social support	0.299**	0.255**	0.215*	0.229*	0.214*	0.217*	0.313**
**P < 0.01							
* P < 0.05							

Discussion

In this study, the total score of social support was slightly higher than the national norm, suggesting that better social support after adult liver transplantation may be due to more support and care after adult liver transplantation. The objective support score was lower than the national norm, indicating that the patients had poor access to direct material assistance and social network participation. The score of subjective social support was higher than the national norm, suggesting that liver transplant patients experienced higher emotional support. The support utilization score (such as respected, supported, and understood) was lower than the national norm, suggesting that patients have a low degree of utilization of support.

Yang LS and colleagues' systematic evaluation showed that, the postoperative quality of life of patients after liver transplantation was no different from that of normal people [6]. Aguiar et al.[7] found that male patients with high education level and good economic conditions had a high quality of life. Heits et al.[8] showed that poor quality of life of liver transplantation patients was related to long hospitalization,

divorce, low education level, lack of employment, distance from the transplant center, and young age. Pei-Xian and colleagues [9] investigated the postoperative quality of life of 256 recipients of liver transplantation. They found that the total score of psychological factors of patients who have postoperative complications was lower than that of patients who have no complications. Patients with complications had a 4.26 times higher risk of having a lower overall score for quality of life than those without complications. Specifically, firstly, Gender is an important factor affecting the quality of life of liver transplantation patients, and our study showed that the quality of life of female liver transplantation recipients was higher than that of males. Nevertheless, a survey of 150 liver transplant recipients carried out by Aguiar et al.[7] using Liver Disease Quality of Life Questionnaire(LDQOL)found that men had higher scores on the quality of life loneliness dimension than women, and there were no differences in other dimensions. Werkgartner and colleague [10] showed that the quality of life of elderly women was lower than that of men in a study of elderly liver transplant recipients. Rugari et al.[11] reported that men had a higher quality of life than women. Women only accounted for 20% of the survey, which may be related to the small number of women surveyed. Secondly, Heitset al.[8] suggested that education background was the main factor affecting the quality of survival in liver transplant recipients. Consist with these findings, in this study, we found that the quality of survival in liver transplant recipients who only have primary school education background was lower than other groups, suggesting that low education background may influence the quality of life after liver transplantation. The possible reasons for the above phenomenon maybe that patients with low educational level were obstacles to understanding of disease and doctor's advice [12]. However, when education background reaches a certain level, it is no longer a significant influence on the quality of survival. Thirdly, age is an important factor influencing the quality of life of liver transplantation patients. Studies have shown that young age is also a risk factor for low quality of life [8]. In this study, we found that younger patients (< 40 years old) have lower quality of life score (124.98 ± 23.30) than that of those 40 ~ 55 years old patients and ≥ 55 years old patients. However, studies of liver transplant recipients over 60 years old found that older recipients had lower overall scores of quality of life and physiological function, physiological function only, physical pain, general health, energy, social function, and emotional function[10, 13]. Fourthly, our study showed that farmers' quality of life was significantly lower than people of other professionals were and farmer was a risk factors affect the quality of adult survival after liver transplantation. The possible reasons may because that famers often had heavy manual labor in their daily life even after liver transplantation which may affect their quality of life; Or may be due to the farmers' lower income, education background and social status in China, leading to less health care, that may affect the quality of life, as a study suggested that low-income and education background liver transplant patients have low survival quality[14].

A study of social support in solid organ transplant patients carried out by Cetingok M and colleagues [15] found that the social support network had an average of 13.68 members, with the support lasting an average of 7.9 ± 4.9 years. Emotional support is the most common type of support. Gender, race, and social class have no major relationship to the structure and type of support. Langenbach M et al.[16] showed a positive correlation between perceived social support and perceived quality of life in liver and

heart transplant patients. Researches showed that there is a certain degree of anxiety among liver transplantation patients/donors, and good social support significantly reduces their anxiety level [17]. Besides, researches showing that patients with liver transplantation are prone to fatigue, insomnia and other conditions after surgery and recipients with higher social support have a lower risk of insomnia [18, 19]. Gangeri L and colleagues[20] explored the correlation of the quality of survival in liver transplant recipients and social support, the results showed that subjective support, objective support and survival were significantly and positively related to quality of life; Besides, Support utilization was positively correlated with psychological, social relationships, suggesting that medical personnel should pay attention to the impact of social support systems on the quality of survival to improve the quality of survival. Consistent with this, researches also suggested that social support is positively correlated with quality of life [16, 21–23].

The strengths of this study are that the scale with good reliability was used to identify the relationship between social support and quality of life, which increases the credibility of the research results.

The limitations of this study should be addressed: 1) due to the particularity of the research objective, the sample number was small, and the extension and application scope of some of the results are limited; 2) postoperative compliance of the patients was measured, but the questionnaire was issued in the ambulatory clinic follow-up office with a certain degree of selectivity, resulting in high compliance of the liver transplantation patients and selectivity bias. Hence, a larger sample size should be studied.

Conclusion

The success of liver transplantation does not mean the end of treatment but provides new life for the recipient. It is not sufficient to focus on the survival rate for liver transplantation and emphasis should be placed on the quality of life of liver transplantation patients, which should be transformed from purely a biological index evaluation to a biosocial-social-psychological index evaluation of post-liver transplantation status.

Abbreviations

pLTD:Quality of life questionnaire for liver transplantation recipients in Chinese;SSRS:Social support rating scale;LT:liver transplantation;LDQOL:Liver Disease Quality of Life Questionnaire

Declarations

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Authors' contributions

Conceived, drafted and directed the study: QX, BZ, QM and HS. designed the study: QX, BZ, HL and LL. Collected and analyzed the data: QX, BZ, JZ and QY. Wrote the article: QX, BZ, HL, LL, JZ, QY, QM and HS. Critical revision of the manuscript: QX, BZ, HL, LL, JZ, QY, QM and HS. All authors read and approved the final manuscript.

Data availability statement

Data are available from the corresponding author upon request.

Consent for publication

This study has obtained consent to publish from the participants to report individual data.

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Ethical approval and consent to participate

The study was conducted following the Declaration of Helsinki, and all protocols were approved by the Ethical Committee of the First Affiliated Hospital of Xi'an Jiaotong University, Xi'an, China.

Competing interests

The authors declare that they have no competing interests.

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References

1. Starzl TE (2012) The long reach of liver transplantation. *Nat Med* 18:1489-1492

2. Rustad JK, Stern TA, Prabhakar M et al (2015) Risk factors for alcohol relapse following orthotopic liver transplantation: a systematic review. *Psychosomatics* 56:21-35
3. Rongies W, Stepniewska S, Lewandowska M et al (2011) Physical activity long-term after liver transplantation yields better quality of life. *Ann Transplant* 16:126-131
4. Sun N, Lv DM, Man J et al (2017) The correlation between quality of life and social support in female nurses. *J Clin Nurs* 26:1005-1010
5. Saab S, Ng V, Landaverde C et al (2011) Development of a disease-specific questionnaire to measure health-related quality of life in liver transplant recipients. *Liver Transpl* 17:567-579
6. Yang LS, Shan LL, Saxena A et al (2014) Liver transplantation: a systematic review of long-term quality of life. *Liver Int* 34:1298-1313
7. Aguiar MI, Braga VA, Garcia JH et al (2016) Quality of life in liver transplant recipients and the influence of sociodemographic factors. *Rev Esc Enferm USP* 50:411-418
8. Heits N, Meer G, Bernsmeier A et al (2015) Mode of allocation and social demographic factors correlate with impaired quality of life after liver transplantation. *Health Qual Life Outcomes* 13:162
9. Chen PX, Yan LN, Wang WT (2012) Health-related quality of life of 256 recipients after liver transplantation. *World J Gastroenterol* 18:5114-5121
10. Werkgartner G, Wagner D, Manhal S et al (2013) Long-term quality of life of liver transplant recipients beyond 60 years of age. *Age (Dordr)* 35:2485-2492
11. Rugari SM (2010) Longitudinal quality of life in liver transplant recipients. *Gastroenterol Nurs* 33:219-230
12. Gomes-Villas BLC, Foss MC, Freitas MC et al (2012) Relationship among social support, treatment adherence and metabolic control of diabetes mellitus patients. *Rev Lat Am Enfermagem* 20:52-58
13. Bownik H, Saab S (2009) Health-related quality of life after liver transplantation for adult recipients. *Liver Transpl* 15 Suppl 2:S42-49
14. Gruttadauria S, Grosso G, Mistretta A et al (2011) Impact of recipients' socio-economic status on patient and graft survival after liver transplantation: the IsMeTT experience. *Dig Liver Dis* 43:893-898
15. Cetingok M, Winsett RP, Russell CL et al (2008) Relationships between sex, race, and social class and social support networks in kidney, liver, and pancreas transplant recipients. *Prog Transplant* 18:80-88
16. Langenbach M, Schmeisser N, Albus C et al (2008) Comparison of social support and psychosocial stress after heart and liver transplantation. *Transplant Proc* 40:938-939
17. Hayashi A, Noma S, Uehara M et al (2007) Relevant factors to psychological status of donors before living-related liver transplantation. *Transplantation* 84:1255-1261
18. Casanovas T, Herdman M, Chandía A et al (2016) Identifying Improved and Non-improved Aspects of Health-related Quality of Life After Liver Transplantation Based on the Assessment of the Specific Questionnaire Liver Disease Quality of Life. *Transplant Proc* 48:132-137
19. Lin XH, Teng S, Wang L et al (2017) Fatigue and its associated factors in liver transplant recipients in Beijing: a cross-sectional study. *BMJ Open* 7:e011840

20. Gangeri L, Scignaro M, Bianchi E et al (2018) A Longitudinal Investigation of Posttraumatic Growth and Quality of Life in Liver Transplant Recipients. *Prog Transplant* 28:236-243
21. Delgado JF, Almenar L, González-Vilchez F et al (2015) Health-related quality of life, social support, and caregiver burden between six and 120 months after heart transplantation: a Spanish multicenter cross-sectional study. *Clin Transplant* 29:771-780
22. Langford CP, Bowsher J, Maloney JP et al (1997) Social support: a conceptual analysis. *J Adv Nurs* 25:95-100
23. Garcia CS, Lima AS, EIG L et al (2018) Social support for patients undergoing liver transplantation in a Public University Hospital. *Health Qual Life Outcomes* 16:35