

World Journal of *Gastroenterology*

World J Gastroenterol 2021 October 28; 27(40): 6737-7004



FRONTIER

- 6737 Hepatocellular carcinoma risk after viral response in hepatitis C virus-advanced fibrosis: Who to screen and for how long?

Ahumada A, Rayón L, Usón C, Bañares R, Alonso Lopez S

OPINION REVIEW

- 6750 Higher doses of ascorbic acid may have the potential to promote nutrient delivery *via* intestinal paracellular absorption

Sequeira IR

EVIDENCE REVIEW

- 6757 Venous and arterial thromboembolism in patients with inflammatory bowel diseases

Stadnicki A, Stadnicka I

REVIEW

- 6775 Understanding the immune response and the current landscape of immunotherapy in pancreatic cancer

Ostios-Garcia L, Villamayor J, Garcia-Lorenzo E, Vinal D, Feliu J

- 6794 Artificial intelligence in gastroenterology: A state-of-the-art review

Kröner PT, Engels MM, Glicksberg BS, Johnson KW, Mzaik O, van Hooft JE, Wallace MB, El-Serag HB, Krittanawong C

MINIREVIEWS

- 6825 Emerging artificial intelligence applications in liver magnetic resonance imaging

Hill CE, Biasioli L, Robson MD, Grau V, Pavlides M

- 6844 Role of human nucleoside transporters in pancreatic cancer and chemoresistance

Carter CJ, Mekkawy AH, Morris DL

- 6861 Management of hepatitis B and C in special population

Kulkarni AV, Duvvuru NR

- 6874 Endoscopic ultrasound-guided vascular interventions: Current insights and emerging techniques

Mann R, Goyal H, Perisetti A, Chandan S, Inamdar S, Tharian B

ORIGINAL ARTICLE**Basic Study**

- 6888** Metabolomics of *Fuzi-Gancao* in CCl₄ induced acute liver injury and its regulatory effect on bile acid profile in rats

Wang MF, Zhao SS, Thapa DM, Song YL, Xiang Z

- 6908** Transforming growth factor beta-1 upregulates glucose transporter 1 and glycolysis through canonical and noncanonical pathways in hepatic stellate cells

Zhou MY, Cheng ML, Huang T, Hu RH, Zou GL, Li H, Zhang BF, Zhu JJ, Liu YM, Liu Y, Zhao XK

Retrospective Cohort Study

- 6927** Serum hepatitis B core-related antigen as a surrogate marker of hepatitis B e antigen seroconversion in chronic hepatitis B

Chi XM, Wang XM, Wang ZF, Wu RH, Gao XZ, Xu HQ, Ding YH, Niu JQ

- 6939** Long-term follow-up of liver alveolar echinococcosis using echinococcosis multilocularis ultrasound classification

Schuhbaur J, Schweizer M, Philipp J, Schmidberger J, Schlingeloff P, Kratzer W

Observational Study

- 6951** Hepatic and gastrointestinal disturbances in Egyptian patients infected with coronavirus disease 2019: A multicentre cohort study

Shousha HI, Afify S, Maher R, Asem N, Fouad E, Mostafa EF, Medhat MA, Abdalazeem A, Elmorsy H, Aziz MM, Mohammed RS, Ibrahim M, Elgarem H, Omran D, Hassany M, Elsayed B, Abdelaziz AY, El Kassas M

- 6967** Factors affecting anxiety, depression, and self-care ability in patients who have undergone liver transplantation

Akbulut S, Ozer A, Saritas H, Yilmaz S

META-ANALYSIS

- 6985** Prophylactic transcatheter arterial embolization reduces rebleeding in non-variceal upper gastrointestinal bleeding: A meta-analysis

Boros E, Sipos Z, Hegyi P, Teutsch B, Frim L, Váncsa S, Kiss S, Dembrowszky F, Oštarijaš E, Shawyer A, Erőss B

LETTER TO THE EDITOR

- 7000** Gastrointestinal and hepatic involvement during COVID-19 pandemic: A focus on pediatric population and possible future implications

Sica R, Pennoni S, Penta L, Riccioni S, Di Cara G, Verrotti A

ABOUT COVER

Editorial Board Member of *World Journal of Gastroenterology*, Pietro Fusaroli, MD, Associate Professor, Chief, Gastrointestinal Unit, University of Bologna at the Hospital of Imola, Via Montericco 4, Imola 40026, Italy. pietro.fusaroli@unibo.it

AIMS AND SCOPE

The primary aim of *World Journal of Gastroenterology* (WJG, *World J Gastroenterol*) is to provide scholars and readers from various fields of gastroenterology and hepatology with a platform to publish high-quality basic and clinical research articles and communicate their research findings online. WJG mainly publishes articles reporting research results and findings obtained in the field of gastroenterology and hepatology and covering a wide range of topics including gastroenterology, hepatology, gastrointestinal endoscopy, gastrointestinal surgery, gastrointestinal oncology, and pediatric gastroenterology.

INDEXING/ABSTRACTING

The WJG is now indexed in Current Contents®/Clinical Medicine, Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports®, Index Medicus, MEDLINE, PubMed, PubMed Central, and Scopus. The 2021 edition of Journal Citation Report® cites the 2020 impact factor (IF) for WJG as 5.742; Journal Citation Indicator: 0.79; IF without journal self cites: 5.590; 5-year IF: 5.044; Ranking: 28 among 92 journals in gastroenterology and hepatology; and Quartile category: Q2. The WJG's CiteScore for 2020 is 6.9 and Scopus CiteScore rank 2020: Gastroenterology is 19/136.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Jia-Hui Li*; Production Department Director: *Yu-Jie Ma*; Editorial Office Director: *Ze-Mao Gong*.

NAME OF JOURNAL

World Journal of Gastroenterology

ISSN

ISSN 1007-9327 (print) ISSN 2219-2840 (online)

LAUNCH DATE

October 1, 1995

FREQUENCY

Weekly

EDITORS-IN-CHIEF

Andrzej S Tarnawski, Subrata Ghosh

EDITORIAL BOARD MEMBERS

<http://www.wjgnet.com/1007-9327/editorialboard.htm>

PUBLICATION DATE

October 28, 2021

COPYRIGHT

© 2021 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

Observational Study

Factors affecting anxiety, depression, and self-care ability in patients who have undergone liver transplantation

Sami Akbulut, Ali Ozer, Hasan Saritas, Sezai Yilmaz

ORCID number: Sami Akbulut 0000-0002-6864-7711; Ali Ozer 0000-0002-7144-4915; Hasan Saritas 0000-0001-7558-8812; Sezai Yilmaz 0000-0002-8044-0297.

Author contributions: Akbulut S and Saritas H collected the data; Akbulut S and Ozer A performed the statistical analysis; Akbulut S and Ozer A wrote the manuscript; Akbulut S, Ozer A and Yilmaz S reviewed the final version of the manuscript.

Institutional review board

statement: This study was reviewed and approved by the Inonu University institutional review board for non-interventional studies (2019/3-27).

Informed consent statement:

Verbal and written consents were obtained from all living liver donor candidates.

Conflict-of-interest statement: The authors declare no conflicts of interest regarding this manuscript.

Data sharing statement: There are no additional data available for this study.

STROBE statement: The authors have read the STROBE Statement-checklist of items, and the manuscript was prepared and

Sami Akbulut, Sezai Yilmaz, Liver Transplant Institute, Inonu University Faculty of Medicine, Malatya 44280, Turkey

Sami Akbulut, Ali Ozer, Department of Public Health, Inonu University Faculty of Medicine, Malatya 44280, Turkey

Hasan Saritas, Department of Surgical Nursing, Siirt University Faculty of Nursing, Siirt 56100, Turkey

Corresponding author: Sami Akbulut, MD, PhD, Professor, Liver Transplant Institute, Inonu University Faculty of Medicine, Elazig Yolu 10.Km, Malatya 44280, Turkey.
akbulutsami@gmail.com

Abstract**BACKGROUND**

Depression, anxiety, and altered self-care ability are among the most important factors affecting the quality of life of liver transplant recipients. Depending on the severity of the underlying liver disease, signs and symptoms of anxiety and depression may become more pronounced.

AIM

To evaluate the factors affecting depression, anxiety and self-care abilities of liver transplant recipients.

METHODS

Recipients who are ≥ 18 years and who underwent liver transplantation at Inonu University Liver Transplantation Institute were included in this descriptive and cross-sectional study. Sample size analysis showed that the minimum number of recipients should be 301 (confidence level = 95%, confidence interval = 2.5, population = 1382). Three hundred and twenty recipients were interviewed and 316 recipients that have answered the questionnaires accurately were analyzed. The dependent variables were the Beck Depression Scale, State-Trait Anxiety Scale (Form I and II), and Self-Care Agency Scale. The independent variables of the study were sociodemographic characteristics, biliary complications, hepatocellular carcinoma, recommending liver transplantation to other patients, and the interval of out-patient clinic visits.

RESULTS

revised according to the STROBE Statement-checklist of items.

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Manuscript source: Invited manuscript

Specialty type: Gastroenterology and hepatology

Country/Territory of origin: Turkey

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B, B, B
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

Received: July 6, 2021

Peer-review started: July 6, 2021

First decision: August 7, 2021

Revised: August 15, 2021

Accepted: October 11, 2021

Article in press: September 30, 2021

Published online: October 28, 2021

P-Reviewer: Goktepe HM, Kowalewski G, Li HL

S-Editor: Gao CC

L-Editor: Filipodia

P-Editor: Gao CC



Self-care ability scores were lower ($P = 0.002$) and anxiety scores were higher ($P = 0.004$) in recipients with biliary complications. On the other hand, in recipients with hepatocellular carcinoma, self-care scores were lower ($P = 0.006$) while depression ($P = 0.003$) and anxiety scores ($P = 0.009$) were higher. Liver transplantation recipients with a monthly income < 3000 Turkish liras had higher depression ($P < 0.001$) and anxiety ($P = 0.003$) scores. The recipients who stated that they would not recommend liver transplantation to others had lower self-care scores ($P = 0.002$), higher depression ($P < 0.001$), higher state anxiety ($P = 0.02$), and trait anxiety ($P < 0.001$) scores.

CONCLUSION

Presence of biliary complications and hepatocellular carcinoma, low income level, and an obligation for monthly visits to the outpatient clinic are factors that are found to affect self-care capability, depression, and anxiety.

Key Words: Liver transplantation; Biliary complications; Hepatocellular carcinoma; Socioeconomic status; Depression; Anxiety; Self-care capabilities

©The Author(s) 2021. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Depression, anxiety, and deficiency in self-care ability are among the most important factors affecting the quality of life of liver transplant recipients. This descriptive, cross-sectional questionnaire-based study shows that presence of biliary complications and hepatocellular carcinoma, low monthly income level, and monthly visits to the outpatient clinic are factors that affect self-care capability, depression, and anxiety.

Citation: Akbulut S, Ozer A, Saritas H, Yilmaz S. Factors affecting anxiety, depression, and self-care ability in patients who have undergone liver transplantation. *World J Gastroenterol* 2021; 27(40): 6967-6984

URL: <https://www.wjnet.com/1007-9327/full/v27/i40/6967.htm>

DOI: <https://dx.doi.org/10.3748/wjg.v27.i40.6967>

INTRODUCTION

Since the first successful liver transplantation (LT) performed by Starzl *et al*[1] in 1967, LT has become the gold standard treatment modality for end stage liver failure and acute liver failure. In recent years, advancements in immunosuppressive medication, management of postoperative complications, and surgical technique have resulted in extended survival periods for transplant recipients[2,3]. The expectations in quality of life (QOL) of the LT recipients became more prominent with the increased survival rates of the recipients.

The parameters, signs, and symptoms related to QOL, such as the preoperative depression, anxiety, or need for support of a relative, can be exacerbated or can initially be seen in the postoperative period depending on the severity of preoperative psychosocial problems, operative trauma of a major operation, such as LT, long duration of hospitalization in either intensive care unit or in patient-wards, adverse effects of immunosuppressive agents (diabetes mellitus, osteoporosis, infection risk, hypertension, renal failure *etc.*), development of postoperative biliary complications that require interventions, the fear of recurrence of the underlying disease, such as hepatocellular carcinoma (HCC), the fear of the risk of acute or chronic organ rejection, loss of occupation that result in economic losses, and the need for regular postoperative follow-up[4-13]. The major factors affecting the QOL related with health are presence of preoperative co-morbidities (diabetes, hypertension, pulmonary disease), advanced age, female gender, occupation, low socioeconomic status, and financial burden[14-16]. Therefore, all these data suggest that strict surveillance of the transplant recipients in the preoperative and postoperative period in terms of psychosocial status and treatment of any psychosocial problems with psychotherapy and medication may increase the physical and mental QOL and may have a positive

impact on the life expectancy of the individuals[7,8].

Depression, anxiety, and the ability of self-care seem to be the most important parameters in the recipients in the postoperative period. Furthermore, some recipients may develop anxiety and depression depending on the risk factors mentioned above that may have an impact on the postoperative mental and physical QOL of the individual. In the present study on patients who received a LT, the anxiety was evaluated by State-Trait Anxiety Scale (STAI; Form I and II), depression was evaluated using the Beck Depression Scale (BDS), and the self-care was evaluated using the Self-Care Agency Scale (SCAS). All these scoring systems and scales were individually used in previous studies involving solid organ transplantation[17-19]. However, we have not encountered any study involving all three scales used together to evaluate a population of recipients. The aim of the present study is to analyze the relationship between sociodemographic characteristics, presence of biliary complications, presence of HCC, preference of recommendation of LT to others, and frequency of out-patient clinic control and some post-transplant QOL indicators (depression, anxiety, self-care ability).

MATERIALS AND METHODS

Type, duration, and location of the study

The preset study is descriptive, cross-sectional questionnaire-based study on patients transplanted between March 2002 and December 2018 at Inonu University Liver Transplant Institute. The recipients that are compliant with regular out-patient follow-up were selected for evaluation in the study, and face-to-face interview technique was applied to all these recipients. This study was reviewed and approved by the Inonu University institutional review board for non-interventional studies (3/27/2019).

Study population and sample size

The study population included 1382 recipients who met the above-mentioned criteria. The sample size was calculated (from the website <https://www.surveysystem.com/sscalc.htm>) using the confidence level of 95% and patient population ($n = 1382$) and the calculation showed that minimum of 301 individuals were required for evaluation in the present study. We interviewed 320 recipients in the present study considering the proportion of the recipients with missing data. Of those, the 316 recipients who answered the questionnaire forms accurately were included in the present study.

Inclusion and exclusion criteria

LT recipients who were discharged that were equal to or greater than 18 years old, who can communicate verbally, and understand and answer the questions were included in the present study. At the time of this study, LT was not performed for patients with intellectual disability in our liver transplant institute. Foreigners who lacked sufficient Turkish to answer the questions and recipients younger than 18 years were excluded from the study.

Parameters and scales used in the study

Demographic and clinical characteristics form: Age, gender, marital status, blood type, residency (city center, town, or village), monthly income [≤ 1000 Turkish liras (TL), 1000-3000 TL, ≥ 3000 TL], underlying liver disease (hepatitis B, hepatitis C, HCC *etc.*), type of LT (living donor LT, deceased donor LT), smoking status, alcohol consumption, type of immunosuppressive agent that is being used (tacrolimus, everolimus, cyclosporin, mycophenolate mofetil, corticosteroids, *etc.*), presence of postoperative biliary complications, co-morbidities (cardiac, pulmonary, metabolic *etc.*), and the frequency of the out-patient visits [monthly or once in every 3 mo (quarterly)] were all evaluated for the present study.

BDS: BDS is designed to evaluate how the individual feels about one-self that was defined by Beck *et al*[20] for the first time in 1961. Hisli[21] evaluated the validity and reliability of the Turkish version in 1989 (Cronbach's alpha = 0.80). BDS includes 21 articles that are scored between 0 and 3 points. The scores obtained from BDS range between 0 and 63 points and it evaluates the presence and the severity of depression in individuals. The severity of depression according to the scores of the individuals are minimal depression (0-9 points), mild depression (10-16 points), moderate depression (17-29 points), and severe depression (30-63 points)[22].

STAI: STAI was first defined by Spielberger *et al*[23] in 1970 to define the reaction of individuals with newly-developed or pre-existent anxiety. The validity and reliability of the scale was performed by Oner and LeCompte in 1983[24]. The Cronbach's alpha reliability coefficient for instantaneous and continuous anxiety scores calculated were 0.96 and 0.83, respectively[24]. The scale includes STAI Form-I (State) and STAI Form-II (Trait) parts. The first part of the form evaluates the recent anxiety status of the individual and the later part of the form evaluates the general anxiety status of the patient. The answers to the first part of the form are as follows: not at all (= 1), somewhat (= 2), moderately so (= 3), and very much so (= 4). The answers to the second part of the form are as follows: almost never (= 1), sometime (= 2), often (= 3), and almost always (= 4). In the STAI-I scale questions 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20 are graded inversely (1 = 4 points, 2 = 3 points, 3 = 2 points, and 4 = 1 points). The other questions are graded directly (1 = 1 points, 2 = 2 points, 3 = 3 points, 4 = 4 points). In a similar fashion, in the STAI-II scale, 21, 26, 27, 30, 36, and 39th questions are graded inversely as explained before. At the end of evaluation, the anxiety is classified as high if the points are high; and is considered as low if the points are low. The total points from the instantaneous and the continuous parts is also helpful for the diagnosis of anxiety. If the total points are ≥ 35 points, this indicates the presence of anxiety and if the total points are < 35 , this suggests that there is no anxiety in the patients[24,25].

SCAS: SCAS was first developed in 1979 by Kearney and Fleischer[26] to evaluate the self-care ability of individuals. The validation of the Turkish version in healthy subjects was performed by Nahcivan[27] in 1993 (Cronbach's alpha = 0.89). All 35 questions in the questionnaire are designed in a five-point Likert scale: It does not define me at all (= 0), it does not define me entirely (= 1), I have no idea (= 2), it defines me a little (= 3), and it defines me completely (= 4). In the questionnaire, the question 6, 9, 13, 19, 22, 26, and 31 are graded inversely (0 = 4 points, 1 = 3 points, 2 = 2 points, 3 = 1 points, 4 = 1 points). The other questions are graded directly (0 = 1 points, 1 = 1 points, 2 = 2 points, 3 = 3 points, 4 = 4 points). Maximum points obtained from the scale can be 140, and higher scores indicate higher self-care ability.

Statistical analysis

All statistical analyses are performed by Statistical Software Package for Social Sciences (SPSS v. 25). The Kolmogorov-Smirnov test was used to evaluate the normality of distribution of the variables. Some of the variables did not distribute normally and, therefore, all the continuous variables were expressed as median and interquartile range (IQR = Q3-Q1). Qualitative variables were expressed as the number of affected individuals (*n*) and percentage (%). Two-independent groups were compared using the Mann-Whitney *U* test, Pearson Chi-Square test, and Chi-Square test with Yates correction. For three-independent group comparisons, the Chi-Square test was used for qualitative variables and the Kruskal-Wallis test was used for continuous variables. For parameters that showed significant differences in the Kruskal-Wallis test, these parameters were further evaluated with Kruskal-Wallis One-way ANOVA (*k* sample) to determine the source of difference among the multiple groups. The correlation between the discrete variables was evaluated using Spearman's Rho correlation analysis. The correlation between the qualitative and quantitative variables were evaluated using the Point Double-Series Correlation Coefficient. Partial correlation analysis was performed to evaluate the individual contribution of variables to the correlation. The Correlation coefficient (*r*) was classified according to the power of the correlation; as defined before: very weak (*r* = 0.00-0.25), weak (*r* = 0.00-0.25), moderate (*r* = 0.50-0.69), high (*r* = 0.70-0.89), and very high (*r* = 0.90-1.00). Any *P* value less than 0.05 was considered as being statistically significant.

RESULTS

A total 316 patient with an age ranging from 18 to 76 years (median = 50, IQR = 58-36) were included in the present study. There were 189 (59.8%) male and 127 (40.2%) female patients included in the study. The demographic and sociocultural characteristics, clinical characteristics related with LT, and data regarding self-care ability, depression and anxiety status of the recipients are summarized in Tables 1-3.

Table 1 Sociodemographic characteristics of the study group

| Parameters | n | % |
|--|-------|------|
| Gender | | |
| Female | 127 | 40.2 |
| Male | 189 | 59.8 |
| Age (yr) | | |
| Median | 50 | |
| IQR | 58-36 | |
| BMI (kg/m ²) | | |
| Median | 25 | |
| IQR | 28-22 | |
| Marital status | | |
| Married | 245 | 77.5 |
| Unmarried | 58 | 18.4 |
| Divorced | 13 | 4.1 |
| Residency | | |
| City Center | 175 | 55.4 |
| Town | 106 | 33.5 |
| Village | 35 | 11.1 |
| Levels of education | | |
| Unschool ed | 48 | 15.2 |
| Primary school | 156 | 49.4 |
| Secondary school | 23 | 7.3 |
| High school | 61 | 19.3 |
| Bachelor's degree or more | 28 | 8.9 |
| Career | | |
| Housewife | 90 | 28.5 |
| Employed | 27 | 8.6 |
| Retired | 78 | 24.7 |
| Tradesman | 40 | 12.7 |
| Unemployed | 81 | 25.6 |
| Monthly income (Turkish liras) | | |
| ≤ 1000 | 18 | 5.7 |
| 1000-3000 | 260 | 82.3 |
| ≥ 3000 | 38 | 12.0 |
| Chronic disease (except liver disease) | | |
| Yes | 113 | 35.8 |
| No | 203 | 64.2 |
| Smoking (pre-LT) | | |
| Yes | 127 | 40.2 |
| No | 189 | 59.8 |
| Smoking (post-LT) | | |
| Yes | 12 | 3.8 |

| | | |
|-----------------------|-----|------|
| No | 304 | 96.2 |
| Alcohol use (pre-LT) | | |
| Yes | 37 | 11.7 |
| No | 279 | 88.3 |
| Alcohol use (post-LT) | | |
| Yes | 7 | 2.2 |
| No | 309 | 97.8 |

BMI: Body mass index; IQR (Q3-Q1): Inter-quartile range.

Evaluation of the patients according to the presence of biliary complications

The recipients were classified into two groups according to presence ($n = 200$) and absence ($n = 116$) of biliary complications. Body mass index ($P = 0.038$), type of liver graft ($P < 0.001$), SCAS ($P = 0.002$), and STAI-I ($P = 0.004$) were significantly different among the groups. In recipients with biliary complications SCAS scores were found to be low and STAI-I scores were high. The median BDS scores did not significantly change. However, when the BDS scores were classified, there was a significant difference among the recipients with and without biliary complications ($P = 0.04$). The moderate to severe depression rate was higher in recipients with biliary complications. Total STAI scores were classified according to the anxiety of the recipients and the severity of anxiety was higher in recipients with biliary complications (57.5%, $P = 0.009$). There was no statistically significant difference in other variables according to the presence of biliary complications (Table 4).

Evaluation of the patients according to the presence of HCC

The recipients were classified according to presence ($n = 32$) or absence ($n = 284$) of HCC (Table 5). SCAS ($P = 0.006$), BDS ($P = 0.003$), and STAI-II scores ($P = 0.009$) were significantly different among recipients with and without HCC. While mild and moderate depressive symptoms were more pronounced in recipients with HCC, minimal depressive symptoms were higher in recipients without HCC. Other variables showed no difference according to presence or absence of HCC (Table 5).

Evaluation of the patients according to monthly income

The recipients were grouped in to three groups according to their monthly income (TL): ≤ 1000 ($n = 18$), 1000-3000 ($n = 260$), and ≥ 3000 ($n = 38$) (Table 6). There were significant differences in gender ($P < 0.001$), place or residence ($P = 0.002$), BDS scores ($P < 0.001$), and STAI-II scores ($P = 0.003$) among groups. In recipients with monthly income ≥ 3000 TL, the depressive symptoms were minimal; while, in recipients with low income, higher rates of mild and moderate depressive symptoms were observed. Other parameters did not show difference according to income of the recipients (Table 6).

Evaluation of the patients according to their inclination towards recommendation of LT to others

The recipients were grouped according to their preference of recommending ($n = 285$) or not recommending ($n = 31$) LT to others. The groups showed statistically significant difference in terms of SCAS ($P = 0.002$), BDS scores ($P < 0.001$), STAI-I ($P = 0.02$), and STAI-II scores ($P < 0.001$). In the group of recipients that do not recommend LT to others, about half of the individuals had moderate to severe depressive symptoms which was significantly higher than the recipients in the group that do recommend LT (48.5% vs 11.6%; $P < 0.001$). All STAI scores were stratified according to the anxiety of the recipients and the rate of anxiety was significantly higher in recipients in the group that do not recommend LT (100% vs 85.6%; $P = 0.021$). There was no significant difference in other variables according to inclination towards recommending or not recommending LT to others (Table 7).

Evaluation of the patients according to frequency of out-patient clinic visits

The data of the 264 LT recipients that come to out-patient clinic monthly were compared to 52 recipients who come to out-patient visits quarterly. Age ($P = 0.047$) and BDS scores ($P = 0.028$) showed significant difference among the groups. The

Table 2 Clinical characteristics of the study group associated with liver transplantation

| Parameters | <i>n</i> | % |
|--|----------|------|
| Underlying liver disease | | |
| HBV | 157 | 49.7 |
| Cryptogenic | 25 | 7.9 |
| HCC | 32 | 10.1 |
| Wilson | 15 | 4.7 |
| HCV | 19 | 6.0 |
| Autoimmune | 22 | 6.9 |
| Others | 46 | 14.5 |
| Type of LT | | |
| LDLT | 291 | 92.1 |
| DDLT | 25 | 7.9 |
| Biliary complications | | |
| Presence | 200 | 63.3 |
| Absence | 116 | 36.7 |
| Antiviral agents use (HBV/HCV) | | |
| Yes | 196 | 62.0 |
| No | 120 | 38.0 |
| Ursodeoxycholic use | | |
| Yes | 229 | 72.5 |
| No | 87 | 27.5 |
| Tacrolimus use | | |
| Yes | 286 | 90.5 |
| No | 30 | 9.5 |
| Everolimus use | | |
| Yes | 108 | 34.2 |
| No | 208 | 65.8 |
| Corticosteroid use | | |
| Yes | 96 | 30.4 |
| No | 220 | 69.6 |
| Mycophenolate mofetil use | | |
| Yes | 212 | 67.1 |
| No | 104 | 32.9 |
| PPI Inhibitors use | | |
| Yes | 314 | 99.4 |
| No | 2 | 0.6 |
| Inclination towards recommendation of LT to others | | |
| I recommend | 285 | 90.2 |
| I do not recommend | 31 | 9.8 |
| Frequency of out-patient visits | | |
| Monthly | 264 | 83.5 |
| Quarterly | 52 | 16.5 |

DDL: Deceased donor liver transplantation; HBV: Hepatitis B virus; HCC: Hepatocellular carcinoma; HCV: Hepatitis C virus; LDLT: Living donor liver transplantation; LT: Liver transplantation.

Table 3 Evaluation of the Study group according to the scores obtained Self-Care Agency Scale, Beck Depression Scale and State-Trait Anxiety Scale

| Parameters | Results |
|-------------------------------------|------------|
| SCAS scores | |
| Median | 95 |
| IQR | 108-86 |
| BDS scores | |
| Median | 9 |
| IQR | 14-5 |
| STAI-I (state) scores | |
| Median | 35 |
| IQR | 41-28 |
| STAI-II (trait) scores | |
| Median | 42 |
| IQR | 50-36 |
| STAI-I (state) (categorized form) | |
| Presence anxiety (≥ 35 point) | 164 (51.9) |
| Absence anxiety (< 35 point) | 152 (48.1) |
| STAI-II (trait) (categorized form) | |
| Presence anxiety (≥ 35 point) | 275 (87.0) |
| Absence anxiety (< 35 point) | 41 (13.0) |
| BDS (categorized form) | |
| Minimal depression (0-9 point) | 183 (57.9) |
| Mild depression (10-16 point) | 85 (26.9) |
| Moderate depression (17-29 point) | 45 (14.2) |
| Severe depression (30-63 point) | 3 (0.9) |

BDS: Beck Depression Scale; IQR (Q3-Q1): Inter-quartile range; SCAS: Self-Care Agency Scale; STAI: State-Trait Anxiety Scale.

moderate depression rate of the recipients that come to monthly controls were significantly higher (16.7% *vs* 1.9%; $P = 0.004$). Other variables did not show significant difference according to the frequency of out-patient clinical visits (Table 8).

The results of correlation statistics between the scales

SCAS and BDS showed a significant but weak and negative correlation ($P < 0.001$; $r = -0.340$). There was also a significant but weak and negative correlation between SCAS and STAI-I scales ($P < 0.001$; $r = -0.473$) and SCAS and STAI-II scales ($P < 0.001$; $r = -0.391$). There was a significant but weak positive correlation between BDS and STAI-I scores ($P < 0.001$; $r = +0.498$) and between BDS and STAI-II scores ($P < 0.001$; $r = +0.455$). There was a significant, moderate, and positive correlation between STAI-I and STAI-II scores ($P < 0.001$; $r = +0.539$). The impact of presence of biliary complications, HCC, and the frequency of out-patient clinic visits on correlations observed between STAI-I, STAI-II, BDS, and SCAS scores were further analyzed using partial correlation analyses techniques which showed that the correlation between different scales were independent from the factors that were investigated.

Table 4 Comparison of various characteristics of the study group according to presence of postoperative biliary complications

| Parameters | Biliary complications (+) (n = 200) | Biliary complications (-) (n = 116) | P value |
|--------------------------|-------------------------------------|-------------------------------------|---------|
| Age (yr) | | | 0.126 |
| Median | 48 | 53 | |
| IQR | 56-36 | 60-40 | |
| Gender (%) | | | 0.533 |
| Female | 83 (41.5) | 44 (37.9) | |
| Male | 117 (58.5) | 72 (62.1) | |
| BMI (kg/m ²) | | | 0.038 |
| Median | 26 | 25 | |
| IQR | 28-22 | 27-22 | |
| Type of LT | | | < 0.001 |
| LDLT | 194 (97) | 97 (83.6) | |
| DDLT | 6 (3) | 19 (16.4) | |
| SCAS scores | | | 0.002 |
| Median | 94 | 98 | |
| IQR | 108-82 | 107-89 | |
| BDS scores | | | 0.375 |
| Median | 9 | 9 | |
| IQR | 15-5 | 12-7 | |
| STAI-I (state) scores | | | 0.004 |
| Median | 37 | 32 | |
| IQR | 43-29 | 41-27 | |
| STAI-II (trait) scores | | | 0.454 |
| Median | 42 | 42 | |
| IQR | 50-36 | 54-37 | |
| BDS (categorized form) | | | 0.040 |
| Minimal depression | 114 (57) | 69 (59.5) | |
| Mild depression | 52 (26) | 33 (28.4) | |
| Moderate depression | 34 (17) | 11 (9.5) | |
| Severe depression | 0(0) | 3 (2.6) | |
| STAI-I (state) | | | 0.009 |
| Presence anxiety | 115(57.5) | 49(42.2) | |
| Absence anxiety | 85(42.5) | 67(57.8) | |
| STAI-II (trait) | | | 1.000 |
| Presence anxiety | 174 (87.0) | 101 (87.1) | |
| Absence anxiety | 26 (13.0) | 15 (12.9) | |

BDS: Beck Depression Scale; BMI: Body mass index; IQR (Q3-Q1): Inter-quartile range; SCAS: Self-Care Agency Scale; STAI: State-Trait Anxiety Scale.

DISCUSSION

With the advances in surgical techniques, perioperative patient management, the treatment of postoperative complications with minimally invasive methods, and the development of targeted immunosuppressive treatment protocols with fewer side effects, significant reductions in mortality and morbidity rates have been achieved in

Table 5 Comparison of various characteristics of the study group according to presence of hepatocellular carcinoma

| Parameters | HCC (+) (n = 32) | HCC (-) (n = 284) | P value |
|------------------------------------|------------------|-------------------|--------------|
| Age (yr) | | | 0.195 |
| Median | 52 | 50 | |
| IQR | 59-44 | 58-36 | |
| BMI (kg/m ²) | | | 0.063 |
| Median | 26 | 25 | |
| IQR | 29-23 | 28-22 | |
| Gender (%) | | | 1.000 |
| Female | 13 (40.6) | 114 (40.1) | |
| Male | 19 (59.4) | 170 (59.9) | |
| Biliary complications | | | 0.147 |
| Presence | 16 (50) | 184 (64.8) | |
| Absence | 16 (50) | 100 (35.2) | |
| SCAS scores | | | 0.006 |
| Median | 92 | 96 | |
| IQR | 95-68 | 108-86 | |
| BDS scores | | | 0.003 |
| Median | 13 | 9 | |
| IQR | 17-8 | 13-5 | |
| STAI-I (state) scores | | | 0.856 |
| Median | 34 | 35 | |
| IQR | 50-26 | 41-28 | |
| STAI-II (trait) scores | | | 0.009 |
| Median | 45 | 42 | |
| IQR | 56-39 | 50-36 | |
| BDS (categorized form) | | | 0.004 |
| Minimal depression | 10 (31.3) | 173 (60.9) | |
| Mild depression | 12 (37.5) | 73 (25.7) | |
| Moderate depression | 10 (31.3) | 35 (12.3) | |
| Severe depression | 0 (0) | 3 (0.9) | |
| STAI-I (state) (categorized form) | | | 0.968 |
| Presence anxiety | 16 (50) | 148 (52.1) | |
| Absence anxiety | 16 (50) | 136 (47.9) | |
| STAI-II (trait) (categorized form) | | | 0.402 |
| Presence anxiety | 30 (93.8) | 245 (86.3) | |
| Absence anxiety | 2 (6.2) | 39 (13.7) | |

BDS: Beck Depression Scale; BMI: Body mass index; IQR (Q3-Q1): Inter-quartile range; SCAS: Self-Care Agency Scale; STAI: State-Trait Anxiety Scale.

patients who received LT during the last quarter century[8]. The 1- and 5-years survival rates of the patients following LT were 85%-86% and 68%-74%, respectively [28]. On the other hand, together with the long-term survival rates obtained, the QOL of the recipients started to become one of the major concerns for both the physicians and the relatives of the recipients[8].

Table 6 Comparison of various characteristics of the study group according to monthly income

| Parameters | ≤ 1000 TL (n = 18) | 1000-3000 TL (n = 260) | ≥ 3000 TL (n = 38) | P value |
|------------------------|--------------------|------------------------|--------------------|---------|
| Age (yr) | | | | 0.921 |
| Median | 44 | 51 | 50 | |
| IQR | 60-30 | 58-36 | 57-43 | |
| Gender (%) | | | | < 0.001 |
| Female | 13 (72.2) | 107 (41.2) | 7 (18.4) | |
| Male | 5 (27.8) | 153 (58.8) | 31 (81.6) | |
| Residency (%) | | | | 0.002 |
| City center | 12 (66.7) | 131 (50.4) | 32(84.2) | |
| Town | 4 (22.2) | 96 (36.9) | 6 (15.8) | |
| Village | 2 (11.1) | 33 (12.7) | 0 (0) | |
| SCAS scores | | | | 0.119 |
| Median | 94 | 94 | 97 | |
| IQR | 109-86 | 105-86 | 112-87 | |
| BDS scores | | | | < 0.001 |
| Median | 9 | 9 | 6 | |
| IQR | 16-5 | 15-6 | 9-3 | |
| STAI-I (state) scores | | | | 0.106 |
| Median | 35 | 35 | 33 | |
| IQR | 46-26 | 42-28 | 41-25 | |
| STAI-II (trait) scores | | | | 0.003 |
| Median | 48 | 42 | 39 | |
| IQR | 52-43 | 50-36 | 45-36 | |
| BDS (categorized form) | | | | 0.004 |
| Minimal depression | 10 (55.6) | 139 (53.5) | 34 (89.5) | |
| Mild depression | 4 (22.2) | 78 (30) | 3 (7.9) | |
| Moderate depression | 4 (22.2) | 40 (15.4) | 1 (2.6) | |
| Severe depression | 0 (0) | 3 (1.2) | 0 (0) | |

BDS: Beck Depression Scale; IQR (Q3-Q1): Inter-quartile range; SCAS: Self-Care Agency Scale; STAI: State-Trait Anxiety Scale; TL: Turkish liras.

According to the World Health Organization (WHO), healthy individual is not only free of disease or disability but also defined as a state of psychological and physical well-being[8-10]. From this WHO's perspective, technical and medical success following LT does not necessarily indicate health of the individual; the recipients should also be in the acceptable range of well-being in psychosocial terms as well. For this reason, physicians should also aim to mediate the factors that affect the psychosocial QOL of the individuals following the LT procedures. In the last two decades the studies regarding the QOL of the living donors and recipients after LT have increased tremendously[8,29-33].

Biliary complications are frequently encountered following LT and especially after living donor LT[34,35]. The treatment involves a combination of surgical therapy and endoscopic or interventional radiology assisted percutaneous stenting or catheter placement[36-39]. These complications result in prolonged hospitalization, repeated interventions, and frequent outpatient clinic visits. Therefore, the QOL of the recipients with biliary complications are expected to be lower than recipients without biliary complications[6,40-42]. We have seen that there are no studies analyzing the relationship between biliary complications and the QOL of the recipients. The majority of the published studies state that the biliary complications that develop can adversely

Table 7 Evaluation of the study group according to their inclination towards recommendation of liver transplantation to other patients

| Parameters | I recommend (n = 285) | I do not recommend (n = 31) | P value |
|------------------------------------|-----------------------|-----------------------------|---------|
| Age (yr) | | | 0.519 |
| Median | 51 | 50 | |
| IQR | 58-36 | 62-40 | |
| Gender (%) | | | 1.000 |
| Female | 115 (40.4) | 12 (38.7) | |
| Male | 170 (59.6) | 19 (61.3) | |
| Residency (%) | | | 0.551 |
| City center | 155 (54.4) | 20 (64.5) | |
| Town | 98 (34.4) | 8 (25.8) | |
| Village | 32 (11.2) | 3 (9.7) | |
| Biliary complications | | | 0.660 |
| Presence | 182 (63.9) | 18 (58.1) | |
| Absence | 103 (36.1) | 13 (41.9) | |
| SCAS scores | | | 0.002 |
| Median | 95 | 74 | |
| IQR | 108-87 | 101-69 | |
| BDS scores | | | < 0.001 |
| Median | 9 | 15 | |
| IQR | 13-5 | 29-9 | |
| STAI-I (state) scores | | | 0.020 |
| Median | 35 | 42 | |
| IQR | 41-28 | 51-27 | |
| STAI-II (trait) scores | | | < 0.001 |
| Median | 42 | 49 | |
| IQR | 50-36 | 53-43 | |
| BDS (categorized form) | | | < 0.001 |
| Minimal depression | 173 (60.7) | 10 (32.3) | |
| Mild depression | 79 (27.7) | 6 (19.4) | |
| Moderate depression | 33 (11.6) | 12 (38.7) | |
| Severe depression | 0 (0) | 3 (9.8) | |
| STAI-I (state) (categorized form) | | | 0.095 |
| Presence anxiety | 143 (50.2) | 21 (67.7) | |
| Absence anxiety | 142 (49.8) | 10 (32.3) | |
| STAI-II (trait) (categorized form) | | | 0.021 |
| Presence anxiety | 244 (85.6) | 31 (100) | |
| Absence anxiety | 41 (14.4) | 0 (0.0) | |

BDS: Beck Depression Scale; IQR (Q3-Q1): Inter-quartile range; SCAS: Self-Care Agency Scale; STAI: State-Trait Anxiety Scale.

affect the QOL of the recipients[6,8,40]. In the present study, the self-care ability of the recipients with biliary complications was found to be low ($P = 0.002$) and the instantaneous anxiety index was found to be increased ($P = 0.004$). Furthermore, in recipients with biliary complications, 17% showed moderate depression and 57.5% showed signs

Table 8 Comparison of various characteristics of the study group according to frequency of out-patient clinic visits

| Parameters | Monthly control (n = 264) | Quarterly control (n = 52) | P value |
|------------------------------------|---------------------------|----------------------------|--------------|
| Age (yr) | | | 0.047 |
| Median | 52 | 44 | |
| IQR | 58-38 | 56-29 | |
| Gender (%) | | | 1.000 |
| Female | 106 (40.2) | 21 (40.4) | |
| Male | 158 (59.8) | 31 (56.9) | |
| Residency (%) | | | 0.077 |
| City center | 150 (56.8) | 25 (48.1) | |
| Town | 82 (31.1) | 24 (46.2) | |
| Village | 32 (12.1) | 3 (5.8) | |
| SCAS scores | | | 0.664 |
| Median | 95 | 94 | |
| IQR | 108-86 | 108-87 | |
| BDS scores | | | 0.028 |
| Median | 9 | 9 | |
| IQR | 15-6 | 10-3 | |
| STAI-I (state) scores | | | 0.728 |
| Median | 35 | 38 | |
| IQR | 41-28 | 44-29 | |
| STAI-II (trait) scores | | | 0.519 |
| Median | 42 | 40 | |
| IQR | 50-36 | 50-36 | |
| BDS (categorized form) | | | 0.004 |
| Minimal depression | 147 (55.7) | 36 (69.2) | |
| Mild depression | 72 (27.3) | 13 (25) | |
| Moderate depression | 44 (16.7) | 1 (1.9) | |
| Severe depression | 1 (0.4) | 2 (3.8) | |
| STAI-I (state) (categorized form) | | | 0.360 |
| Presence anxiety | 134 (50.8) | 30 (57.7) | |
| Absence anxiety | 130 (49.2) | 22 (42.3) | |
| STAI-II (trait) (categorized form) | | | 0.506 |
| Presence anxiety | 228 (86.4) | 47 (90.4) | |
| Absence anxiety | 36 (13.6) | 5 (9.6) | |

BDS: Beck Depression Scale; IQR (Q3-Q1): Inter-quartile range; SCAS: Self-Care Agency Scale; STAI: State-Trait Anxiety Scale.

of instantaneous anxiety. In our opinion, this observation can be explained by prolonged hospitalization, pain and discomfort that is caused by percutaneous catheter placement, the fear of losing the transplanted organ, and the necessity of frequent outpatient clinic visits.

Another factor that has a major impact on the QOL is the presence of HCC diagnosis before the LT. Mabrouk *et al*[43] have stated that the QOL parameters in recipients transplanted for HCC were significantly worse than that of the recipients transplanted for other etiologies; the reason for this was correlated with anxiety related with the probability of a recurrence of the HCC in the post-LT period. On the

other hand, Castaldo *et al*[44] suggested that the diagnosis of HCC had a positive impact on the physical and mental components of QOL for the recipients. On the other hand, Heits *et al*[45] have found no relation between HCC and QOL parameters. In Europe and the United States, recipients with HCC receive additional points during the waiting list and recipients are transplanted in early disease stages, which results in a favorable prognosis compared to recipients without HCC. In the present study, in patients with HCC, the self-care ability was low ($P = 0.006$) while depression ($P = 0.003$) and continuous anxiety indices ($P = 0.009$) were higher than recipients without HCC. Furthermore, 31.3% of the patients with HCC had signs and symptoms of moderate depression. We agree with the Mabrouk *et al*[43] regarding this issue; however, we believe that the negative effect on the QOL parameters should be further investigated regarding the impact of HCC diagnosis and the cumulative effect of the various other factors on this outcome. The cadaveric organ donations in Turkey are significantly lower than that of the developed western countries, and, for this reason, the recipients with HCC have almost no chance for deceased donor LT and the majority need a living liver donation from a family member or a relative[46]. Therefore, the patients have to live with HCC for a period of time before the LT, with some patients requiring bridging procedures, such as chemoembolization, radioembolization, microwave or radiofrequency ablation, and surgical resection. This prolonged and hard waiting period may be the cause of the adverse effects observed on the QOL parameters in the post-LT period.

Other important factors that have an impact on the QOL of the recipients following LT is the income and the frequency of the required out-patient clinic visits of the recipients. The studies have shown that the recipients taking long journeys to come for an out-patient control visit had detrimental economical consequences and reduction in QOL of the recipients[47]. Furthermore, the prolonged hospitalization and frequent hospital visits delay the time to return to work, which reduce the household income. This will inevitably result in psychosocial problems in the recipients. Previous studies from our institute have shown that families of pediatric recipients with a low incomes experienced severe social and economic problems following the transplant procedure [48]. In the present study, we have shown that as the monthly income increased, the parameters related with depression ($P < 0.001$) and continuous anxiety indices ($P = 0.003$) decreased significantly. The symptoms related with moderate depression was observed in 22.2% of the patients with a monthly income lower than 1000 TL; on the other hand, patients with 1000-3000 TL and ≥ 3000 TL had moderate depression rate of 15.4% and 2.6%, respectively ($P = 0.004$). Similarly, the depression level of the recipients who were required to attend frequent visits to the out-patient clinic were significantly higher than recipients who only had to attend quarterly ($P = 0.028$). In other words, 22.2% of the patients that had to come to out-patient clinic monthly showed signs and symptoms of moderate depression ($P = 0.004$).

Immunosuppressive drugs that are being used to prevent organ rejection also have a significant impact on the QOL of the recipients. Zaydfudim *et al*[49] have stated that high dose steroid use in recipients have reduced the physical and mental health of the recipients and caused majority of the anxiety related symptoms of the individuals. Lerut[50] stated that reduction or even discontinuation of steroids and other immunosuppressives would eliminate their adverse effects and would increase the QOL of the recipients. In the present study, we found no difference between the Beck's depression score, instantaneous or continuous anxiety indices, and self-care ability of the patients who did or did not use steroids. Braun *et al*[51] have suggested that recipients that are treated with cyclosporin had better QOL when compared to patients treated with tacrolimus. However, there are contradicting studies that show better QOL with tacrolimus treatment when compared to patients that are on cyclosporin treatment[52,53]. In the present study, the type of immunosuppressive (tacrolimus *vs* cyclosporin) did not have significant impact on the BDS, STAI-I, STAI-II, and SCAS scores of the recipients. Similarly, we found no difference in terms of the BDS, STAI-I, STAI-II, and SCAS among the patients who did or did not receive cyclosporin treatment. However, we found that the BDS scores of the recipients that are on tacrolimus therapy were significantly higher ($P = 0.018$) and the SCAS scores ($P = 0.001$) were significantly lower than the recipients that are not receiving tacrolimus therapy. In general, our results suggest that there is no impact of either cyclosporin or tacrolimus on the QOL parameters of the recipients. However, our results regarding the impact of tacrolimus on the self-care abilities of the recipients are original and need to be validated by prospective studies.

The decision to recommend LT to others and its relationship with the QOL parameters requires further analysis. Our review of current literature showed that there are no studies addressing this problem. In the present study, we have found that

the SCAS scores were lower ($P = 0.002$) and BDS ($P < 0.001$), STAI-I ($P = 0.020$), and STAI-II ($P < 0.001$) scores were higher in patients who stated that they would not to recommend LT to others. Furthermore, moderate depression rate and signs of prominent anxiety was present in 38.7% and 100% of the recipients who did not recommend LT to others, respectively. The recipients that did or did not recommend LT did not differ in terms of incidence of biliary complications ($P = 0.660$), presence of HCC ($P = 1.000$), and use of tacrolimus ($P = 0.056$) as immunosuppressive treatment. However, 36.1% of the recipients that did recommend LT and 16.1% of the recipients that did not recommend LT were using everolimus ($P = 0.042$). Patients that do or do not use everolimus did not significantly differ in terms of depression, anxiety, and self-care ability. Therefore, our results need validation and further analyses by studies that will be conducted in future.

CONCLUSION

Biliary complications cause depression, reduced self-care ability, and cause anxiety in patients after LT. This has a major impact on the QOL of the recipients. HCC reduces the QOL by increasing depression and anxiety and reducing self-care ability of the recipients. These recipients have HCC that exceed the acceptable limits in the preoperative period, and they receive multiple procedures to down-stage the tumors. This results in frustration and concerns of recurrence of the tumor in the postoperative period. The monthly income and frequent out-patient clinic visits have a significant impact on the QOL of the recipients. The recipients and their relatives cannot return to work until they recover fully after the LT procedure. Furthermore, frequent visits to the out-patient clinic further compromise return to work for the recipients which has a major impact on the income of the recipients. All recipients should be examined by psychiatry in the preoperative period and should receive medico-social therapy in necessary situations. Routine postoperative follow-up of the recipients with a psychologist and physiotherapists are very important for physical and mental QOL of the recipients. Transplant centers should also employ physiotherapists and psychologists that will work with specifically with recipients.

ARTICLE HIGHLIGHTS

Research background

Depression, anxiety, and status of self-care ability are among the most important factors affecting the quality of life of patients who have undergone liver transplantation. Depending on the severity of the underlying liver disease, signs and symptoms of anxiety and depression may become more pronounced.

Research motivation

Depression, anxiety, and deficiency in self-care ability are among the most important factors affecting the quality of life of liver transplant recipients. This descriptive, cross-sectional questionnaire-based study shows that presence of biliary complications and hepatocellular carcinoma, low monthly income level, and monthly visits to the outpatient clinic are factors that are found to affect self-care capability, depression, and anxiety.

Research objectives

The main objective of this study is to analyze the relationship between sociodemographic characteristics, presence of biliary complications, presence of hepatocellular carcinoma, preference of recommendation of liver transplantation to others, and frequency of out-patient clinic control, and some post-transplant quality of life indicators (depression, anxiety, self-care ability).

Research methods

This study is descriptive, cross-sectional questionnaire-based study on patients transplanted between 2002 and 2018 at our Liver Transplant Institute. The recipients who were discharged that were equal to or greater than 18-years-old and who can communicate verbally and understand and answer the questions were included in the present study. We interviewed 320 liver transplant recipients in the present study

considering the proportion of the recipients with missing data. Of those, 316 recipients who answered the questionnaire forms accurately were included in the present study. The dependent variables were Beck Depression Scale, State-Trait Anxiety Scale (Form I and II) and Self-Care Agency Scale. The independent variables of the study were sociodemographic characteristics, biliary complications, hepatocellular carcinoma, recommending liver transplantation to other patients, and the interval of out-patient clinic visits.

Research results

Self-care ability scores were lower and anxiety scores were higher in recipients with biliary complications. On the other hand, in recipients with hepatocellular carcinoma, self-care scores were lower and depression and anxiety scores were higher. In liver transplantation recipients with a monthly income < 3000 Turkish liras had higher depression and anxiety scores. The recipients who stated that they would not recommend liver transplantation to others had lower self-care scores and higher depression, state anxiety, and trait anxiety scores.

Research conclusions

Presence of biliary complications and hepatocellular carcinoma, low income level, and an obligation monthly visits to the outpatient clinic are factors that are found to affect self-care capability, depression and anxiety.

Research perspectives

To our knowledge, this study is one of the most comprehensive studies examining the relationships between post liver transplant quality of life indicators and various clinical parameters.

REFERENCES

- 1 Akbulut S, Yilmaz S. Liver transplantation in Turkey: historical review and future perspectives. *Transplant Rev (Orlando)* 2015; **29**: 161-167 [PMID: 25535023 DOI: 10.1016/j.tre.2014.12.002]
- 2 Akbulut S, Sahin TT, Yilmaz S. Comment on pediatric living donor liver transplantation decade progress in Shanghai: Characteristics and risks factors of mortality. *World J Gastroenterol* 2020; **26**: 4564-4566 [PMID: 32874065 DOI: 10.3748/wjg.v26.i30.4564]
- 3 Pillai AA, Levitsky J. Overview of immunosuppression in liver transplantation. *World J Gastroenterol* 2009; **15**: 4225-4233 [PMID: 19750565 DOI: 10.3748/wjg.15.4225]
- 4 Åberg F. Quality of life after liver transplantation. *Best Pract Res Clin Gastroenterol* 2020; **46-47**: 101684 [PMID: 33158471 DOI: 10.1016/j.bpg.2020.101684]
- 5 Medved V, Medved S, Skočić Hanžek M. Transplantation Psychiatry: an Overview. *Psychiatr Danub* 2019; **31**: 18-25 [PMID: 30948685 DOI: 10.24869/psyd.2019.18]
- 6 Coelho JCU, Leite LO, Molena A, Freitas ACT, Matias JEF. Biliary complications after liver transplantation. *Arq Bras Cir Dig* 2017; **30**: 127-131 [PMID: 29257849 DOI: 10.1590/0102-6720201700020011]
- 7 Benson AA, Rowe M, Eid A, Bluth K, Merhav H, Khalailah A, Safadi R. Pre-liver transplant psychosocial evaluation predicts post-transplantation outcomes. *Psychol Health Med* 2018; **23**: 788-796 [PMID: 29278010 DOI: 10.1080/13548506.2017.1417610]
- 8 Onghena L, Develtere W, Poppe C, Geerts A, Troisi R, Vanlander A, Berrevoet F, Rogiers X, Van Vlierberghe H, Verhelst X. Quality of life after liver transplantation: State of the art. *World J Hepatol* 2016; **8**: 749-756 [PMID: 27366301 DOI: 10.4254/wjh.v8.i18.749]
- 9 Bownik H, Saab S. Health-related quality of life after liver transplantation for adult recipients. *Liver Transpl* 2009; **15** Suppl 2: S42-S49 [PMID: 19876941 DOI: 10.1002/lt.21911]
- 10 Jay CL, Butt Z, Ladner DP, Skaro AI, Abecassis MM. A review of quality of life instruments used in liver transplantation. *J Hepatol* 2009; **51**: 949-959 [PMID: 19775771 DOI: 10.1016/j.jhep.2009.07.010]
- 11 Golfieri L, Gitto S, Vukotic R, Andreone P, Marra F, Morelli MC, Cescon M, Grandi S. Impact of psychosocial status on liver transplant process. *Ann Hepatol* 2019; **18**: 804-809 [PMID: 31471202 DOI: 10.1016/j.aohep.2019.06.011]
- 12 Duffy JP, Kao K, Ko CY, Farmer DG, McDiarmid SV, Hong JC, Venick RS, Feist S, Goldstein L, Saab S, Hiatt JR, Busuttil RW. Long-term patient outcome and quality of life after liver transplantation: analysis of 20-year survivors. *Ann Surg* 2010; **252**: 652-661 [PMID: 20881772 DOI: 10.1097/SLA.0b013e3181f5f23a]
- 13 Miller LR, Paulson D, Eshelman A, Bugenski M, Brown KA, Moonka D, Abouljoud M. Mental health affects the quality of life and recovery after liver transplantation. *Liver Transpl* 2013; **19**: 1272-1278 [PMID: 23959592 DOI: 10.1002/lt.23728]
- 14 Polis S, Fernandez R. Impact of physical and psychological factors on health-related quality of life in

- adult patients with liver cirrhosis: a systematic review protocol. *JBI Database System Rev Implement Rep* 2015; **13**: 39-51 [PMID: 26447006 DOI: 10.11124/jbisrir-2015-1987]
- 15 **Šumskienė J**, Kupčinskas L, Šumskas L. Health-related quality of life measurement in chronic liver disease patients. *Medicina (Kaunas)* 2015; **51**: 201-208 [PMID: 26424183 DOI: 10.1016/j.medici.2015.06.006]
 - 16 **Sobhonslidsuk A**, Silpakit C, Kongsakon R, Satitpornkul P, Sripetch C, Khanthavit A. Factors influencing health-related quality of life in chronic liver disease. *World J Gastroenterol* 2006; **12**: 7786-7791 [PMID: 17203521 DOI: 10.3748/wjg.v12.i48.7786]
 - 17 **Mendes KD**, Lopes AR, Martins TA, Lopes GF, Ziviani LC, Rossini FM, Castro-e-Silva O, Galvão CM. Relevance of anxiety and stress levels on sleep quality after liver transplantation. *Transplant Proc* 2014; **46**: 1822-1826 [PMID: 25131046 DOI: 10.1016/j.transproceed.2014.05.051]
 - 18 **Mohamed S**, Sabki ZA, Zainal NZ. Depression and psychosocial correlates of liver transplant candidates: a systematic review. *Asia Pac Psychiatry* 2014; **6**: 447-453 [PMID: 25132651 DOI: 10.1111/appy.12145]
 - 19 **Celikturk N**, Edeer AD. Self-Care Agency and Associated Factors in Heart Transplant Patients. *Turkiye Klinikleri J Cardiovasc Sci* 2019; **31**: 148-154 [DOI: 10.5336/cardiosci.2019-70586]
 - 20 **Beck AT**, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry* 1961; **4**: 561-571 [PMID: 13688369 DOI: 10.1001/archpsyc.1961.01710120031004]
 - 21 **Hisli N**. Beck depresyon ölçeğinin üniversite öğrencileri için geçerliliği, güvenilirliği. *Psikoloji Dergisi* 1989; **7**: 3-13
 - 22 **Ardic A**. The Relationship Between Depression, Anxiety and Stress Levels of Overweight and Obese Adolescents: The Sample of Istanbul. *TJFMPC* 2020; **14**: 384-390
 - 23 **Spielberger CD**, Gorsuch RL, Lushene RE. Manual for the State-Trait Anxiety Scale (Self Evaluation Questionnaire). Palo Alto, CA: Consulting Psychologists Press, 1970
 - 24 **Oner N**, LeCompte A. Durumluk Surekli Kaygi Ölçeği El Kitabı. Istanbul: Bogazici Universitesi Yayinlari, 1983: 1-26
 - 25 **Kacmaz N**, Balas GU. The Psychosocial Status of Liver Transplant Patients and Their Relatives Regarding the Procedure's Effects on Their Quality of Life. *J Psychiat Nursg* 2014; **5**: 1-8
 - 26 **Kearney BY**, Fleischer BJ. Development of an instrument to measure exercise of self-care agency. *Res Nurs Health* 1979; **2**: 25-34 [PMID: 254279 DOI: 10.1002/nur.4770020105]
 - 27 **Naheivan NO**. A Turkish language equivalence of the Exercise of Self-Care Agency Scale. *West J Nurs Res* 2004; **26**: 813-824 [PMID: 15466617 DOI: 10.1177/0193945904267599]
 - 28 **Becchetti C**, Dirchwolf M, Banz V, Dufour JF. Medical management of metabolic and cardiovascular complications after liver transplantation. *World J Gastroenterol* 2020; **26**: 2138-2154 [PMID: 32476781 DOI: 10.3748/wjg.v26.i18.2138]
 - 29 **Tome S**, Wells JT, Said A, Lucey MR. Quality of life after liver transplantation. A systematic review. *J Hepatol* 2008; **48**: 567-577 [PMID: 18279999 DOI: 10.1016/j.jhep.2007.12.013]
 - 30 **Yang LS**, Shan LL, Saxena A, Morris DL. Liver transplantation: a systematic review of long-term quality of life. *Liver Int* 2014; **34**: 1298-1313 [PMID: 24703371 DOI: 10.1111/liv.12553]
 - 31 **Janik MK**, Księżopolska A, Kostrzewa K, Kobryń K, Moskwa M, Raszeja-Wyszomirska J, Kornasiewicz O, Patkowski W, Milkiewicz P, Krawczyk M, Zieniewicz K. Long-Term Health-Related Quality of Life in Living Liver Donors. *Ann Transplant* 2019; **24**: 45-51 [PMID: 30666044 DOI: 10.12659/AOT.911109]
 - 32 **Ladner DP**, Dew MA, Forney S, Gillespie BW, Brown RS Jr, Merion RM, Freise CE, Hayashi PH, Hong JC, Ashworth A, Berg CL, Burton JR Jr, Shaked A, Butt Z. Long-term quality of life after liver donation in the adult to adult living donor liver transplantation cohort study (A2ALL). *J Hepatol* 2015; **62**: 346-353 [PMID: 25195558 DOI: 10.1016/j.jhep.2014.08.043]
 - 33 **Chandran B**, Bharathan VK, Shaji Mathew J, Amma BSPT, Gopalakrishnan U, Balakrishnan D, Menon RN, Dhar P, Vayoth SO, Surendran S. Quality of life of liver donors following donor hepatectomy. *Indian J Gastroenterol* 2017; **36**: 92-98 [PMID: 28393329 DOI: 10.1007/s12664-017-0743-7]
 - 34 **Daniel K**, Said A. Early Biliary complications after liver transplantation. *Clin Liver Dis (Hoboken)* 2017; **10**: 63-67 [PMID: 30992762 DOI: 10.1002/cld.654]
 - 35 **Simoes P**, Kesar V, Ahmad J. Spectrum of biliary complications following live donor liver transplantation. *World J Hepatol* 2015; **7**: 1856-1865 [PMID: 26207167 DOI: 10.4254/wjh.v7.i14.1856]
 - 36 **Moy BT**, Birk JW. A Review on the Management of Biliary Complications after Orthotopic Liver Transplantation. *J Clin Transl Hepatol* 2019; **7**: 61-71 [PMID: 30944822 DOI: 10.14218/JCTH.2018.00028]
 - 37 **Crismale JF**, Ahmad J. Endoscopic Management of Biliary Issues in the Liver Transplant Patient. *Gastrointest Endosc Clin N Am* 2019; **29**: 237-256 [PMID: 30846151 DOI: 10.1016/j.giec.2018.11.003]
 - 38 **Koksal AS**, Eminler AT, Parlak E, Gurakar A. Management of biliary anastomotic strictures after liver transplantation. *Transplant Rev (Orlando)* 2017; **31**: 207-217 [PMID: 28427741 DOI: 10.1016/j.tre.2017.03.002]
 - 39 **Czubkowski P**, Markiewicz-Kijewska M, Janiszewski K, Ruraz M, Kaliciński P, Jarzębicka D, Pertkiewicz J, Kamińska D, Jankowska I, Teisseyre M, Szymczak M, Pawłowska J. Percutaneous Treatment of Biliary Strictures After Pediatric Liver Transplantation. *Ann Transplant* 2018; **23**: 845-851 [PMID: 30531688 DOI: 10.12659/AOT.910528]

- 40 **Silva ACDS**, Andrade AMDF, Lisboa QC, Lima CXD, Araujo JP, Gambogi TR, Borges VO, Filho IJZ. Epidemiologic Study on the Incidence of Biliary Complications after Liver Transplantation. *J Liver* 2018; **7**: 229 [DOI: [10.4172/2167-0889.1000229](https://doi.org/10.4172/2167-0889.1000229)]
- 41 **Fang C**, Yan S, Zheng S. Bile Leakage after Liver Transplantation. *Open Med (Wars)* 2017; **12**: 424-429 [PMID: [29318188](https://pubmed.ncbi.nlm.nih.gov/29318188/) DOI: [10.1515/med-2017-0062](https://doi.org/10.1515/med-2017-0062)]
- 42 **Palanisamy AP**, Taber DJ, Sutter AG, Nadig SN, Dowden JE, McGillicuddy JW, Baliga PK, Chavin KD. Clinical outcomes and costs associated with in-hospital biliary complications after liver transplantation: a cross-sectional analysis. *J Gastrointest Surg* 2015; **19**: 282-289 [PMID: [25319035](https://pubmed.ncbi.nlm.nih.gov/25319035/) DOI: [10.1007/s11605-014-2675-1](https://doi.org/10.1007/s11605-014-2675-1)]
- 43 **Mabrouk M**, Esmat G, Yosry A, El-Serafy M, Doss W, Zayed N, El-Sahhar M, Awany S, Omar A. Health-related quality of life in Egyptian patients after liver transplantation. *Ann Hepatol* 2012; **11**: 882-890 [PMID: [23109452](https://pubmed.ncbi.nlm.nih.gov/23109452/) DOI: [10.1016/S1665-2681\(19\)31414-0](https://doi.org/10.1016/S1665-2681(19)31414-0)]
- 44 **Castaldo ET**, Feurer ID, Russell RT, Pinson CW. Correlation of health-related quality of life after liver transplant with the Model for End-Stage Liver Disease score. *Arch Surg* 2009; **144**: 167-172 [PMID: [19221329](https://pubmed.ncbi.nlm.nih.gov/19221329/) DOI: [10.1001/archsurg.2008.563](https://doi.org/10.1001/archsurg.2008.563)]
- 45 **Heits N**, Meer G, Bernsmeier A, Guenther R, Malchow B, Kuechler T, Becker T, Braun F. Mode of allocation and social demographic factors correlate with impaired quality of life after liver transplantation. *Health Qual Life Outcomes* 2015; **13**: 162 [PMID: [26420554](https://pubmed.ncbi.nlm.nih.gov/26420554/) DOI: [10.1186/s12955-015-0360-z](https://doi.org/10.1186/s12955-015-0360-z)]
- 46 **Kutluturk K**, Akbulut S, Baskiran A, Gonultas F, Dirican A, Isik B, Yilmaz S. Aborted donor hepatectomy in living donor liver transplantation: lessons learned. *S Afr J Surg* 2020; **58**: 91-100 [PMID: [32644313](https://pubmed.ncbi.nlm.nih.gov/32644313/)]
- 47 **O'Connell Francischetto E**, Damery S, Ferguson J, Combes G; myVideoClinic randomised evaluation steering group. Video clinics vs standard face-to-face appointments for liver transplant patients in routine hospital outpatient care: study protocol for a pragmatic randomised evaluation of myVideoClinic. *Trials* 2018; **19**: 574 [PMID: [30340637](https://pubmed.ncbi.nlm.nih.gov/30340637/) DOI: [10.1186/s13063-018-2953-4](https://doi.org/10.1186/s13063-018-2953-4)]
- 48 **Akbulut S**, Gunes G, Saritas H, Aslan B, Karipkiz Y, Demyati K, Gungor S, Yilmaz S. Differences in parents of pediatric liver transplantation and chronic liver disease patients. *World J Clin Cases* 2020; **8**: 2162-2172 [PMID: [32548146](https://pubmed.ncbi.nlm.nih.gov/32548146/) DOI: [10.12998/wjcc.v8.i11.2162](https://doi.org/10.12998/wjcc.v8.i11.2162)]
- 49 **Zaydfudim V**, Feurer ID, Landman MP, Moore DE, Wright JK, Pinson CW. Reduction in corticosteroids is associated with better health-related quality of life after liver transplantation. *J Am Coll Surg* 2012; **214**: 164-173 [PMID: [22137824](https://pubmed.ncbi.nlm.nih.gov/22137824/) DOI: [10.1016/j.jamcollsurg.2011.10.006](https://doi.org/10.1016/j.jamcollsurg.2011.10.006)]
- 50 **Lerut J**. Minimalization of immunosuppression in liver transplantation: steps from 'how' to 'now'. Interview by Emily Reeve. *Expert Rev Clin Immunol* 2012; **8**: 605-607 [PMID: [23078057](https://pubmed.ncbi.nlm.nih.gov/23078057/) DOI: [10.1586/eci.12.53](https://doi.org/10.1586/eci.12.53)]
- 51 **Braun F**, Teren K, Wilms P, Günther R, Allmann J, Broering DC, Kuechler T. Quality of life after liver transplantation. *Transplant Proc* 2009; **41**: 2564-2566 [PMID: [19715975](https://pubmed.ncbi.nlm.nih.gov/19715975/) DOI: [10.1016/j.transproceed.2009.06.030](https://doi.org/10.1016/j.transproceed.2009.06.030)]
- 52 **Felser I**, Wagner S, Depee J, Johnson N, Staschak S, Jain A, Fung JJ, Starzl TE. Changes in quality of life following conversion from CyA to FK 506 in orthotopic liver transplant patients. *Transplant Proc* 1991; **23**: 3032-3034 [PMID: [1721350](https://pubmed.ncbi.nlm.nih.gov/1721350/)]
- 53 **Scholler G**, Rose M, Neuhaus R, Neuhaus P, Klapp BF. Comparison of cyclosporine A and FK506 with regard to complaints and psychosocial characteristics before and after liver transplantation. *Transplant Proc* 1997; **29**: 2491-2493 [PMID: [9270822](https://pubmed.ncbi.nlm.nih.gov/9270822/) DOI: [10.1016/s0041-1345\(97\)00461-2](https://doi.org/10.1016/s0041-1345(97)00461-2)]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

