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Original Article

Differences in anxiety among patients with liver cirrhosis with different compensation abilities

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Abstract: Objective: To explore the difference in anxiety and mental health of patients with liver cirrhosis with different compensatory abilities, so as to provide comprehensive treatment measures such as individualized psychological support for patients. Methods: In this retrospective study, a total of 175 patients with liver cirrhosis admitted to the Department of Infectious Diseases, Fifth Hospital of Sun Yat-sen University from January to December 2019 were included and divided into a compensated group (n=77) and a decompensated group (n=98). The anxiety of patients was evaluated on the day of admission, one week after hospitalization, and the day of discharge using the Self-Rating Anxiety Scale (SAS). Psychological investigations were conducted on the two groups of patients with cirrhosis. Results: The SAS score of patients in the decompensated group was higher than that of the compensated group on the day of admission (48.62±6.35 vs. 37.68±8.94, F=20.313), one week after hospitalization (56.95±7.47 vs. 42.79±10.77, F=29.879), and on the day of discharge (42.95±7.85 vs. 36.43±9.29, F=7.110) (P<0.05). The SAS score of male patients in the decompensated group was higher than that of the compensated group on the day of admission (47.50±6.25 vs. 36.70±9.92, t=-4.112), one week after hospitalization (57.25±5.80 vs. 42.10±13.24, t=-4.538) and on the day of discharge (42.33±7.34 vs. 36.19±9.65, t=-2.162) (all P<0.05). The SAS score of 40-59 year-old patients of the decompensated group was higher than that of patients in the compensated group of the same age on the day of admission (51.80±6.26 vs. 36.84±8.57, t=-4.372), one week after hospitalization (60.6±7.06 vs. 42.94±10.33, t=-4.382), and on the day of discharge (48.60±4.16 vs. 37.32±10.23, t=-3.768) (P<0.05). The SAS score of female patients in the decompensated group was higher than that in the compensated group at one week after hospitalization (56.56±9.65 vs. 35.45±18.66, t=-4.617) (P<0.05). There was no difference in the SAS score between patients of different groups on the day of admission and the day of discharge (P>0.05). Conclusion: The anxiety of patients with different compensatory abilities of the liver is adversely affected by the severity of their illness and the length of hospitalization. The anxiety of male patients in the decompensated group is more significant than that of patients in the compensated group, while no significant difference was observed in anxiety between female patients in the decompensated group and those in the compensated group on the day of admission and discharge. It is necessary to strengthen psychological intervention, optimize the treatment methods, and reduce the average hospital stay in decompensated patients.

Keywords: Liver, liver cirrhosis, different compensatory ability, compensation stage, decompensation stage, anxiety

Introduction

Liver cirrhosis (LC) is a common pathologic feature of late liver damage caused by various etiologies [1]. According to liver tissue pathology and clinical manifestations, it can be divided into compensated and decompensated stages [2]. Its natural development is the transition from asymptomatic compensation stage to a decompensation stage, marked by the appearance of obvious clinical symptoms, with the most common clinical presentations being ascites, hemorrhage, encephalopathy, and jaundice [3]. Patients often develop irreversible chronic, diffuse, and progressive liver disease due to various complications. LC is a worldwide chronic disease, with increasing morbidity and mortality [4]. It is reported that LC accounts for 16% of liver disease patients in China, and the male to female ratio is 4:1 [5]. Decompensated

Table 1. Comparison of general data between the compensated group and the decompensated group at different stages

Stage	Compensated group (n=77)	Decompensated group (n=98)	$\chi^2/F/t$	P
Gender			1.243	0.265
Male	54	76		
Female	23	22		
Age	50.76±10.81	50.57±10.92	0.115	0.909
Marital status			2.767	0.598
Unmarried	14	15		
Married	39	44		
Divorced	14	23		
Separated	6	13		
Widowed	4	3		
Simultaneous phenomenon			0.607	0.895
Fever	23	29		
Cough	12	16		
Headache	26	31		
Inappetence	19	18		
History of depression			0.424	0.515
Yes	5	9		
No	72	89		
Households have no debt			0.625	0.429
Yes	15	24		
No	62	74		

LC is associated with a long treatment cycle and easy recurrence, leading to patients' loss of confidence in treatment and life, negative emotions, and eventually giving up treatment [6]. Psychological evaluation in a timely manner and follow-up investigation of patients during hospitalization is conducive to discovery of patients' psychological dynamics, so as to take effective psychological intervention to relieve their negative emotions during treatment, reduce psychological burden and pressure, and improve their quality of life [7]. In this study, the Self-Rating Anxiety Scale (SAS) was used for psychological assessment of patients with LC on the day of admission, one week after hospitalization, and on the day of discharge, in order to understand the mental state of patients with LC in time to provide rapid and effective psychological intervention.

Materials and methods

Study subjects

Inclusion criteria: (1) Patients with a definite diagnosis of LC [8], who were hospitalized and were discharged from our hospital; (2) Patients with complete clinical files. Exclusion criteria: (1) Patients combined with other hepatitis virus, cytomegalovirus or other pathogen infection; (2) Patients with serious cardiovascular and cerebrovascular diseases, blood and respiratory diseases; (3) Patients with alcoholic liver disease, autoimmune liver disease, fatty liver or other liver diseases; (4) Patients with incomplete clinical files. A total of 175 cases were enrolled for retrospective analysis, including 130 males (74.29%) and 45 females (25.71%), aged from 29 to 89 years, with an average age of (49.23±7.30). They were divided into a compensated group (n=77) and a decompensated group (n=98). The investigation was conducted from January to December 2019. The psychological states of patients in both groups were investigated using the SAS on the day of admission, one week after hospitalization, and on the day of discharge, and psychological results were compared between the two groups. In this study, all subjects understood the relevant diagnostic criteria, treatment, and prognosis of LC. There was no significant difference in general data between the two groups (P<0.05), indicating comparability (**Table 1**). This study was approved by the Ethics Committee of the Fifth Hospital of Sun Yat-sen University.

Methods

Application index: The SAS, compiled by Zung [9] in 1971, is widely used to assess the subjective symptoms of anxiety patients [10]. The SAS has a total of 20 items, with the score of each item ranging from 1 to 4 points; 5 items are scored in reverse. The rough score is the sum of the scores of all the 20 items, and the standard score is obtained by multiplying the rough score by 1.25 and then rounding to an integer. SAS evaluation criteria [11]: no anxiety:

Table 2. Comparison of SAS scores between the compensated group and the decompensated group at different stages

Stage	On the day of admission	One week after hospitalization	On the day of discharge	*F*	P
compensation	37.68±8.94	42.79±10.77	36.43±9.29	14.871	<0.001
decompensation	48.62±6.35	56.95±7.47	42.95±7.85	32.847	<0.001
t	20.313	29.879	5.029		
P	<0.001	<0.001	<0.001		

<50 points; mild anxiety: 50-59 points; moderate anxiety: 60-69 points; severe anxiety: ≥70 points. The higher the score, the more severe the anxiety. In this study, 175 patients with confirmed LC admitted to the Fifth Affiliated Hospital of Sun Yat-sen University from January to December 2019 were included and divided into a compensated group (n=77) and a decompensated group (n=98) based on liver histopathology and clinical manifestations. The anxiety of patients in both groups was assessed using the SAS on the day of admission, one week after hospitalization, and on the day of discharge, and the psychological investigation results were compared between the two groups.

Statistical analysis

SPSS25.0 software was used for statistical analysis. Qualitative data were expressed as percentage (%), and the inter-group comparison was performed using the chi-square test or the Fisher's exact probability method. The quantitative data all conformed to a normal distribution, and were expressed as mean ± standard deviation (x±s). Repeated measurement data were analyzed using repeated measurement analysis of variance, and an inter-group comparison was conducted using the t test. Differences with P<0.05 were consideredsignificant. The possible influencing factors of anxiety were analyzed by the multiple linear regression model with a test level α=0.05.

Results

Comparison of SAS scores between the compensated group and the decompensated group at different stages

The SAS score of LC patients in the decompensated group was significantly higher than that of patients in the compensated group on the day of admission, one week after hospitalization, and on the day of discharge. The SAS score of patients with decompensated LC on the day of admission was significantly higher than that of patients with compensated LC (48.62±6.35 vs. 37.68±8.94; t=20.313); the SAS score of patients in the decompensated group was significantly higher than that of patients in the compensated group (56.95±7.47 vs. 42.79±10.77; t=29.879) one-week after hospitalization. The SAS score of patients in the decompensated group was significantly higher than that of the patients in the compensated group on the day of discharge (42.95±7.85 vs. 36.43±9.29; t=5.029). All the differences were significant (P<0.05; **Table 2**).

Comparison of SAS scores of patients of different ages and genders in three different stages

On the day of admission, the SAS score of male patients in the decompensation stage was significantly higher than that of male patients in the compensation stage (47.50±6.25 vs. 36.70±9.92, t=-4.112); Also, the SAS score of 40 to 59-year-old patients in the decompensation stage was higher than that of age-match LC patients in the compensation stage (51.80± 6.26 vs. 36.84±8.57, t=-4.372), and the SAS score of patients aged 59 years and above in the decompensation stage was higher than that of patients of the same age group in the compensation stage (49.08±4.40 vs. 36.75± 7.96, t=-3.995), with statistical significance (all P<0.05; **Table 3**).

After one week of hospitalization, both the male and female LC patients in the decompensation stage had significantly higher SAS scores than those in the compensation stage [Male: (57.25±5.80 vs. 42.10±13.24, t=-4.538); Female: (56.56±9.65 vs. 35.45±18.66, t= -4.617)]. The SAS score of decompensated LC patients aged from 40 to 59 years old was higher than that of compensated LC patients of the same age group (60.6±7.06 vs. 42.94±10.33, t=-4.382). In LC patients aged 59 and above,

Table 3. Comparison of SAS scores of patients of different ages and genders in the compensated group and decompensated group on the day of admission

	Gender		Age		
	Male	Female	<40	40~59	≥59
Compensated group (n=77)	36.70±9.92	35.24±11.54	37.81±9.54	36.84±8.57	36.75±7.96
Decompensated group (n=98)	47.50±6.25	44.56±17.95	43.25±9.46	51.80±6.26	49.08±4.40
t	-4.112	-1.894	-1.083	-4.372	-3.995
P	<0.001	0.065	0.286	0.002	0.003

Table 4. Comparison of SAS scores of patients of different ages and genders in the compensated group and decompensated group during one week of hospitalization

	Gender		Age		
	Male	Female	<40	40~59	≥59
Compensated group (n=77)	42.10±13.24	35.45±18.66	41.35±10.77	42.94±10.33	47.25±11.99
Decompensated group (n=98)	57.25±5.80	56.56±9.65	51.25±12.28	60.60±7.06	57.33±4.92
t	-4.538	-4.617	-1.685	-4.382	7.557
P	<0.001	<0.001	0.103	0.001	<0.001

Table 5. Comparison of SAS scores of patients of different ages and genders in the compensated group and decompensated group on the day of discharge

	Gender		Age		
	Male	Female	<40	40~59	≥59
Compensated group (n=77)	36.19±9.65	31.67±18.03	34.84±8.25	37.32±10.23	44.00±13.04
Decompensated group (n=98)	42.33±7.34	38.22±16.69	40.25±4.27	48.60±4.16	41.50±9.01
t	-2.162	-1.195	-1.277	-3.768	0.509
P	0.039	0.239	0.210	0.002	0.617

the SAS score was significantly higher in patients with decompensated LC than in those with compensated LC (57.33±4.92 vs. 47.25± 11.99, t=7.557), and the difference was significant (all P<0.05; **Table 4**).

On the day of discharge, the SAS score of male patients in the decompensation stage was higher than that of patients in the compensation stage (42.33±7.34 vs. 36.19±9.6, t= -2.162), and the SAS score of 40-59 year old patients in the decompensation stage was significantly higher than that of patients in the compensation stage (48.60±4.16 vs. 37.32± 10.23, t=-3.768), with significant differences (P<0.05; **Table 5**).

There were no significant differences in SAS scores between female patients in the decompensation stage and patients in compensation stage on the day of admission and on the day of discharge. The SAS score of decompensated patients under 40 years old and patients in compensation stage were not significantly different in the three different periods (all P>0.05).

Comparison of the incidence of anxiety between the compensated group and the decompensated group

We calculated the occurrence of anxiety in patients in the two groups, and compared the incidence of anxiety at different stages. The results showed that the incidence of anxiety in decompensated patients on the day of admission was significantly higher than that of compensated patients. The incidence of anxiety in decompensated patients who were hospitalized for one week was significantly higher than that of compensated patients, and differences were significant (all P<0.05; **Table 6**). There was no significant difference in the incidence of anxiety between the two groups on the day of discharge (P>0.05).

Table 6. Comparison of the incidence of anxiety in the compensated group and the decompensated group

Stage	Anxiety index	Anxiety levels	Admission day		In the hospital for a week		Discharge day	
			Cases	Anxiety rate (%)	Cases	Anxiety rate (%)	Cases	Anxiety rate (%)
Compensated group (n=77)	<50	No	71	92.2	77	100	75	97.4
	50~59	Mild	6	7.8	0	0	2	2.6
	60~69	Moderate	0	0	0	0	0	0
	≥70	Severe	0	0	0	0	0	0
Decompensated group (n=98)	<50	No	70	71.4	75	76.5	93	94.9
	50~59	Mild	23	23.5	9	9.2	5	5.1
	60~69	Moderate	5	5.1	14	14.3	0	0
	≥70	Severe	0	0	0	0	0	0
t			6.364		12.453	-		
P			0.026		0.001	1		

Table 7. Multivariate linear regression analysis of influencing factors of anxiety occurring in different groups

	Influencing factor	β	Standard error	Standard regression coefficient	t	P	95% CI
Compensated	Constant	22.040	4.376	-	5.039	0.000	13.321-30.758
	Age (years)	0.132	0.059	0.236	2.245	0.028	0.015-0.249
	Gender (Female =0, Male =1)	2.279	1.518	0.166	1.501	0.138	-0.748-5.305
	Marital status (unmarried =1, married =2, divorced =3, separated =4, widowed =5)	0.017	0.673	0.003	0.025	0.980	-1.325-1.359
	Debts (Yes =1, No =0)	7.592	1.576	0.477	4.818	0.000	4.451-10.733
Decompensated	Constant	44.326	3.855	-	11.500	0.000	36.672-51.981
	Age (years)	0.013	0.067	0.017	0.194	0.846	-0.120--0.146
	Gender (Female =0, Male =1)	-0.748	1.630	-0.040	-0.459	0.647	-3.985-2.489
	Marital status (unmarried =1, married =2, divorced =3, separated =4, widowed =5)	-0.991	0.685	-0.128	-1.447	0.151	-2.352-0.369
	Debts (Yes =1, No =0)	9.860	1.564	0.546	6.303	0.000	6.753-12.966

Analysis of factors affecting the occurrence of anxiety

Multiple linear regression analysis was conducted with age, gender, marital status, and debts as independent variables and the anxiety score on the day of discharge as the dependent variable. As shown in **Table 7**, age and debts were the major influencing factors of anxiety in compensated patients while debt was the major influencing factor of anxiety in decompensated patients (**Table 7**).

Discussion

Liver Cirrhosis (LC) is a long-term and chronic disease, and the mental and psychological health problems caused by the disease have attracted wide attention in recent years [12]. The disease has a long course, complex symptoms, recurrent episodes and serious illness, with no specific treatment at present. It has a high incidence in China. When the disease is difficult to control, it will progress to liver cancer. The disease is irreversible and will seriously affect the quality of life of patients [13]. Based on the above, patients are prone to psychological problems, such as anxiety, depression, nervousness, negative attitudes towards treatment and nursing, and even suicide. From a physiological point of view, one of the main hormones that regulate mood changes is catecholamines. Once liver function declines, the liver's inactivation of catecholamines will be weakened, resulting in behavioral or personality abnormalities in patients [14]. As the disease progresses, some patients will become increasingly worried about the possibility of cancer.

Due to the current lack of specific treatment methods, patients with decompensated LC do not understand the disease-related mechanisms and treatment options, resulting in their susceptibility to anxiety and other negative emotions. These patients have particularly strong emotional fluctuations [15]. Having a long-term illness, expensive medical expenses, heavy psychological pressure and family burden, triggers the body's stress response and affects the treatment effectiveness [13]. This is also one of the direct causes of patient anxiety. There are many domestic and foreign studies on the impact of psychological care interventions on the mental health of patients with LC [16], with confirmed positive effects. During the treatment of LC, patients show special and abnormal mental disorders at different stages during hospitalization. Physical diseases often cause different emotional disorders, which can seriously affect the treatment effect and prognosis of the disease [17]. Studies have shown that the difference in psychological factors between patients with ordinary infectious diseases and patients with other diseases is significant. Long-term adverse emotional stimulation affects the human immune system, which leads to the decline of the body's immune function and rapid disease aggravation [18].

Relevant studies have shown that the patient's education level, work pressure, life status, and average monthly income are related factors that directly affect the degree of anxiety [19]. The results of this study showed that the SAS score of patients in the decompensation stage was higher than that of patients in the compensation stage on the day of admission, one week after hospitalization, and on the day of discharge, which may be attributed to the following reasons: 1) Patients in the decompensation stage have insufficient knowledge about decompensated LC, resulting in fear and worry about the prognosis of the disease [20]; 2) The anxiety of patients with decompensated LC is aggravated due to severe illness and severe physical discomfort [21], resulting in their lack of confidence in recovery; 3) Patients in the decompensation stage are worried about their children and family members, fearing that they will be infected; 4) As LC easily recurs with a long course of disease and high treatment costs, patients are worried about the progression of the disease and fear that they cannot afford treatment expenses [22]; 5) Patients in the decompensation stage often have a large amount of ascites in the later stage of the disease, which leads to obvious abdominal distension and impairs the patient's self-image. In addition, the disease is contagious, which leads to more sensitive interpersonal relationships, low self-esteem, and even the need to request medical staff to keep their condition secret from family or friends, resulting in serious negative emotion [7], causing more serious anxiety than patients in the compensation stage.

This study found that the SAS score of men in the decompensation stage was higher on the day of admission, one week after hospitalization, and on the day of discharge than the males in the compensation stage. Male patients with decompensated LC also showed more serious anxiety than those with compensated LC, while no significant difference was observed in anxiety between female patients in the decompensated group and those in the compensated group on the day of admission or day of discharge. The reasons may be: 1) The majority of men are the main source of income for their families, and there may be a financial crisis once they fall ill. According to the survey, 95% of patients said that economic pressure, mainly brought by medical expenses, is the biggest burden [23]; 2) Men are the spiritual support and backbone of the family, and the focus of life is basically on men, so they must support the whole family alone; 3) Under the influence of traditional ideas, men generally have more psychological pressure from work and family than women, as women pay more attention to psychological catharsis while men are more restrained and not good at revealing and expressing their emotions [24]; 4) Male patients have to suspend work during hospitalization, resulting in the temporary loss of their main source of income while having to pay the medical expenses. Under multiple pressures, they are prone to anxiety.

The SAS score of 40-59-year-old patients in the decompensation stage was higher on the day of admission, one week after hospitalization, and on the day of discharge, compared to compensated patients of the same age group. The anxiety of 40-59-year-old patients in the decompensation stage was more serious than that of age-matched patients in the compensation stage. The reason may be: 1) Patients at

this age have basically achieved success in family and career and are the most important spiritual and economic pillar of the family; 2) The disease can be transmitted sexually, and they are worried that it will be transmitted directly or occasionally, affecting the quality of marriage; 3) Some middle-aged people are in the rising stage of careers, with a great difference between the social role and the role of a patient, which is likely to cause greater psychological pressure; 4) Middle-aged patients bear important family and social responsibilities, as well as economic pressure and the suffering from long-term illness; 5) It may also be related to a patient's low level of education, limited understanding of the disease and little understanding of the disease outcome. If the treatment effect is not satisfactory, mood disorders are prone to occur.

Patients with compensated and decompensated cirrhosis developed anxiety on the day of admission and one week after hospitalization, and with more serious complications in the decompensation stage than in the compensated stage [3]. Studies have shown that [25], patients suffering from LC continue to have liver disease stress after illness. This is a psychological stress peculiar to liver disease, which is usually negative, extreme, or even absolute. The misunderstanding of LC is related to subjective psychological factors of patients.

This study has some limitations. First, the sample size of the study was too small to be representative. Second, the retrospective, single-center design is a limitation and may be biased by institutional expertise. Third, the sample size is insufficient, leading to the inevitable probability of false-positive errors seen in small-sample clinical studies. Other mental states such as depression should also be included for analysis in follow up studies. Therefore, a well-designed, large sample size and multicenter cohort study is needed to further confirm the conclusions of this study. To sum up, work pressure, current life status, severity of illness, length of hospitalization, disease progression speed and poor prognosis of patients with LC [26] directly affect the psychological status of patients. Attention should be paid to the assessment of anxiety and even suicidal tendencies of LC patients. In addition, professionals are required to strengthen psychological counseling and intervention for patients with decompensated LC [27], so as to reduce their psychological burden and pressure and build their confidence in life. It is also of great significance to improve treatment methods to facilitate patients' recovery, and take effective measures to reduce the average hospital stays of patients.

Disclosure of conflict of interest

None.

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