

Quality of Life in Patients with Chronic Hepatitis C Submitted to Treatment with Interferon and Ribavirin

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Abstract: Introduction: Chronic hepatitis C is a serious public health problem worldwide. Approximately eighty percent of the patients with acute infection will fall back to chronicity with long term complications such as cirrhosis, liver failure, hepatocellular cancer and death. The HCV infection per se has been found to be related with a variety of neuropsychiatric symptoms. Treatment of hepatitis C with interferon plus ribavirin is related with many side effects and affects the quality of patients' life. Purpose: The purpose of this study is to assess the quality of life in patients with chronic hepatitis C undergoing treatment with interferon and Ribavirin. Data and Methodology: The research sample was 173 patients with hepatitis C who were treated in the Outpatient Liver Unit, 2nd Department of Internal Medicine, Medical School of Athens, Hippokratio General Hospital". The data were hand- collected after the Short Form 36 scale completion by the patients. For the data analysis the statistical package SPSS 13 was used and more specifically statistical t-test and anova analysis. Results: Out of all the patients participated in the study the 28.9% were women and 71.1% were men with an average age of 54.4 years with a standard deviation of 8.14 years. The 87.3% had concomitant diseases; 88.4% diabetes, 56.6% hypertension and 59.5% high cholesterol. 38.15% of the sample had re-admitted to the hospital, 18.40% had previous heart attack and 63.16% were former smokers. The statistical analysis indicated those who had a higher education degree reported higher quality of life scores in the dimensions of mental health ($p=0.001$), physical function ($p=0.01$) and vitality ($p=0.000$). Similar, married patients reported higher quality of life scores in several dimension as well as patients without readmissions, patients without comorbidities and non-smokers. Conclusions: treatment with interferon and Ribavirin affects the quality of life of patients with chronic hepatitis C. Factors such as age, lifestyle, educational level, the reintroduction in the hospital and marital status can affect the life and mental health of the patient. The factors that adversely affect the quality of life must be identified and treated promptly by health professionals

Keywords: Quality of Life, Hepatitis C, Treatment, Interferon, Ribavirin

1. Introduction

Hepatitis C virus (HCV) was discovered in 1989. Since then, HCV has been recognized internationally as one of the major causes of chronic liver disease, and is a major public health problem today [1]. According to the World Health Organization (WHO), prevalence of this infection is estimated at about 2%, that is, 150 million patients worldwide. The countries with a higher prevalence are in Africa and Asia, while the countries with the lowest prevalence are in North America, NW. Europe and Australia [1].

In Greece the prevalence of HCV infection is not fully known. According to studies conducted in the general population, the prevalence rate was found to be around 0.5-1.3%. In blood donor populations, the prevalence rate is even lower: 0.38% in Crete and 0.61% in Northwest Greece [2-6].

HCV can be transmitted parenteral during blood transfusion or its derivatives. Sources of HCV infection include blood transfusion, the use of intravenous substances, exposure of healthcare professionals to sharp objects, mother-to-child transmission at birth, and sexual transmission [7]. High risk group includes patients who need to be blood transfused, haemodialysis patients, transplanted patients, people in close contact with the chronically ill (e.g., children of mothers with chronic disease and their sexual partners), MSM, heterosexuals with multiple relationships, drug addicts, police officers, prison staff and prisoners, and health workers [7].

Today, despite the use of IFN free direct acting antiviral drugs (DAAs) the last few years the combination of interferon and ribavirin is still in use due to high cost of DAAs either in patients with early stage of liver diseases or in countries where the new drugs are not available. Combination antiviral treatment with pegylated interferon and ribavirin has a response rate of 50-70% that depends on various host (race) and virus (genotype) factors [8-11].

Patients who are suffering from chronic hepatitis C [12] and their families experience many complex problems. The disease, despite the exhaustive physical symptoms, is characterized by role changes, frequent hospital admissions, early retirement, financial burden and changes in social life. Interferon-alpha and ribavirin therapy is affecting the lives of patients and their families, with negative impact on their personal and social lives [13, 14]. All these changes can lead to depression and have a negative impact on the quality of life of both the patients and their families [15]. In particular, the changes in patient's lifestyle and the treatment can lead to an increase in mortality and morbidity rate [17-21].

The goal nowadays is to treat all patients with the new DAAs who have no major side effects and are given for short period of time (12 weeks). Mean while in cases that this treatment is not available scientists are trying to ensure a better quality of life both during the crisis (diagnosis - acceptance) and during treatment [22].

The Purpose of this study was to assess the quality of life (QoL) of patients with chronic hepatitis C who undergo

combined antiviral treatment with interferon and ribavirin.

2. Material and Methods

This study utilized a cross-sectional research design using the standardized questionnaire: 36-Item Short Form Health Survey (SF-36) created by Ware and Shelbourne in Boston in 1992. The questionnaire was completed by the patients themselves or through an interview with the researcher. The criteria for selecting the sample were as follows:

- (a) patients suffering by hepatitis C, treated with the interferon and ribavirin and they were in the third as the sixth month of the mentioned treatment.
- (b) within the age range of 18-60 years old
- (c) patients sufficient knowledge of the Greek language
- (d) patients are aware of the purpose of the study and have given their consent orally or in writing
- (e) fully communicate with the environment and had no hearing problems

All patients in the sample met the above criteria and were included in the study population.

Exclusion criteria from study were:

- (a) Patients with liver cancer or other type of cancer
- (b) HIV patients
- (c) Patients with severe cardiopulmonary insufficiency or
- (d) Another condition that significantly affects the quality of life.

Ethics

Ethical standards derived from the Helsinki Declaration were followed. Moreover, participants signed a consent form to participate in the study after they had been fully informed about the purpose of the study and their right to refuse or to discontinue their participation in the study. In addition, permission for the study was obtained from the ethical and scientific committees of the participating unit.

Measures

A two part questionnaire was used in this study consisted by

1. A sheet containing demographic, social and clinical data such as gender; age; area of residence; marital status; education; co morbidities; smoking habits.
2. Medical Outcomes Study- Short Form 36, This is a generic questionnaire that assess health-related quality of life of individuals of different ages and in various medical conditions. Indicators that have a positive or negative correlation and their measurement lead to reliable conclusions about the quality of life. The questionnaire consists of 36 questions divided into 8 subscales, which include from 2 to 10 questions each scale. These eight scales are: Physical Functioning, Social Functioning, Bodily Pain, Mental Health, Vitality, Emotional role, Physical Role. All eight dimensions are classified into two components: Physical Component and Mental Component [23, 24]. The Greek version of SF-36 was used for this study [25].

Data Analysis

Means and standard deviations (SD) were used to describe the quantitative variables. For comparison of the quantitative variables between two groups, Student's t-test was used, while an anova parametric test was used to compare quantitative variables between three or more groups. To control the Type I error caused due to the multiple comparisons, the Bonferroni correction was used, according to which, the significance level is $0.05 / \kappa$ (κ = number of comparisons). Pearson correlation coefficient (r) was used to assess the relationship of two quantitative variables. Stepwise linear regression analysis was used to find independent factors associated with the quantitative variables from which regression coefficients (b) and their standard errors (standard errors = SE) were derived. Significance levels were two-tailed and the statistical significance was set to 0.05. The statistical program SPSS 20.0 was used for the analysis.

3. Results

Descriptive statistics

The sample consisted of 173 individuals who consented to complete the questionnaire. 71.1% of the participants were male and 28.9% were female. Their mean age was 54.4 ± 8.14 . The majority of respondents were married (86.13%), and 85.29% were living with their spouse. Regarding their educational level, most respondents were high school graduates (38.7%). Further, 63.16% of the respondents were past smokers, while 15.79% were currently smoking, and the remaining 21.05% were non-smokers. Finally, 87.3% of the respondents suffered from co morbid disease, 56.6% of them were suffering from hypertension, while 59.5% had hypercholesterolemia. From the analysis of variables with clinical characteristics, it was found that 38.15% of respondents were readmitted to the hospital, and 18.40% reported a previous cardiac event (Table 1).

Table 1. Descriptive statistics.

	N	%
Gender		
Men	123	71.1%
Women	50	28.9%
Marital status		
Single	9	5.20%
Married	149	86.13%
Divorced	14	8.09%
Widowed	1	0.58%
Habitat Status		
With Children	3	1.760%
Spouse	145	85.29%
Alone	22	12.94%
Educational Status		
Elementary	25	14.45%
Junior high school	30	17.34%
Hghschool	67	38.73%
Higher Education	51	29.48%
Smoking Status		
Non-smoker	36	21.05%
Currently smoking	27	15.79%
Past smoker	108	63.16%
Comorbidities		
None	22	12.72%
Diabetes	2	1.156%
Hypertension	24	13.87%
Hypercholesterolemia	36	20.81%
Osteoarthritis	2	1.156%
Hypertension&hypercholesterolemia	62	35.84%
Hypertension& Bronchitis	6	3.468%
Diabetes&Hypertension	13	7.514%
Diabetes&Hypertension&hypercholesterolemia	4	2.312%
Hypertension & hypercholesterolemia &A. A. E.	1	0.578%
Diabetes&Hypertension& Cancer	1	0.578%
Readmissions		
Yes	66	38.15%
No	107	61.85%
Other cardiac condition		
Yes	30	18.40%
No	133	81.60%
Angina		
Yes	52	30.95%
No	116	69.05%

Table 2. Descriptive of SF-36 subscales.

Variable	Min	Max	Mean	SD
Physical functioning	25	100	71.76	18.87
Physical role	0	100	63.05	41.20
Emotional role functioning	0	100	72.64	39.29
Vitality	30	100	59.27	15.75
Mentalhealth	28	100	60.27	14.56
Socialfunctioning	12.50	100	60.48	17.35
Bodilypain	22.50	100	73.51	17.82
Generalhealth	20	81.25	50.97	8.49

Table 3. Association of SF-36 Subscales and patients' Demographic Characteristics.

Association of SF-36 Subscales and patients' Demographic Characteristics									
		Mental Health		vitality		General Health		Bodybily Pain	
Demographic Charateristics	n	x±SD	p	x±SD	p	x±SD	p		
Gender ^a									
Men	123	59.70±14.86	NS	58.53±15.62	NS	51.28±8.81	NS	73.13±17.98	NS
Women	50	61.68±13.83		61.06±16.08		50.20±7.69		75.45±17.55	
Marital Status ^a									
Married	149	60.67±13.68	NS	60.32±16.03	0.028	51.63±7.87	NS	75.12±17.04	0.003
Sing/Div/Wid	24	57.83±19.30		52.70±12.24		46.87±11.02		63.54±19.60	
Habitat Status ^a									
Spouse/Children	148	60.70±13.83	NS	60.49±16.07	0.019	51.53±8.09	NS	75.59±17.01	0.000
Alone	22	57.27±19.64		52.04±12.21		47.27±10.77		60.91±18.91	
Educational Status ^b									
Primary	25	59.68±18.29	0.001	57.60±15.95	0.000	52.20±10.21	NS	72.50±14.73	NS
Junior High school	30	54.00±15.88		53.00±15.89		48.83±7.51		72.83±15.73	
High school	67	58.50±12.37		56.39±14.58		50.52±5.37		70.29±16.69	
Higher Education	51	66.27±14.56		67.54±14.08		52.20±11.04		78.62±20.87	
Smoking Statu ^b									
Currently Smoking	27	58.51±13.90	0.000	62.12±15.41	0.000	45.93±9.51	0.000	64.44±20.98	0.000
Past Smoker	108	57.51±15.13		55.78±15.05		50.64±7.10		72.52±16.47	
Non Smoker	36	68.78±8.70		67.63±14.21		54.37±8.26		83.05±15.58	

a= t-test

b=Anona

NS= Non statistical Significant

Table 3. Continue, Association of SF-36 Subscales and patients' Demographic Characteristics.

Association of SF-36 Subscales and patients; Demographic Characteristics Cont...									
		Physical functioning		emotional role		Physical Role		Social Functioning	
Demographic Characteristics	n	x±SD	p	x±SD	p	x±SD	p	x±SD	p
Gender ^a									
Men	123	70.40±20.14	NS	69.10±41.14	0.043	60.70±42.34	0.221	58.73±17.08	0.039
Women	50	75.10±14.93		81.33±33.10		68.83±38.05		64.75±17.43	
Marital Status ^a									
Married	149	73.19±18.46	0.013	77.85±35.59	0.001	67.00±39.44	0.002	61.32±15.87	NS
Sing/Div/Wid	24	62.92±19.33		40.27±46.08		38.54±44.21		55.20±24.42	
Habitat Status ^a									
Spouse/Children	148	72.90±18.43	0.024	77.70±35.66	0.001	67.73±39.41	0.001	61.74±16.11	0.017
Alone	22	63.18±20.15		39.39±45.58		36.36±44.13		52.27±23.34	
Educational Status ^b									
Primary	25	62.60±23.98	0.01	65.33±44.59	0.072	65.66±44.96	0.552	62.00±20.56	0.015
Junior High school	30	67.33±18.18		72.22±37.22		62.50±41.91		55.83±13.43	
High school	67	71.11±17.27		72.63±37.00		57.96±40.08		57.46±11.93	
Higher Education	51	79.70±15.63		76.47±41.25		68.79±40.71		66.42±21.86	
Smoking Statu ^b									
Currently Smoking	27	67.77±19.96	0.003	56.79±47.87	0.009	49.07±46.24	0.000	50.92±21.06	0.000
Past Smoker	108	69.25±18.41		71.29±38.45		58.41±39.57		59.25±15.12	
Non Smoker	36	80.69±16.04		87.03±30.10		85.41±34.00		70.48±16.13	

a= t-test

b=Anona

NS= Non statistical Significant

Table 4. Association of SF-36 Subscales and patients' Clinical Characteristics.

Clinical Characteristics	N	Mental Health		Vitality		General Health		Bodily Pain	
		x±SD	p	x±SD	P	x±SD	p	x±SD	p
Comorbidities ^a									
Yes	151	60.26±13.86	NS	58.92±15.18	NS	50.31±7.85	0.049	72.79±17.94	NS
No	22	60.36±19.04		61.59±19.48		55.45±11.22		78.41±16.48	
Diabetes ^a									
Yes	20	62.00±18.33	NS	54.25±14.53	NS	50.50±10.87	NS	75.25±24.54	NS
No	153	60.05±14.05		59.92±15.83		51.03±8.17		73.28±16.84	
Hypertension ^a									
Yes	98	61.30±12.56	NS	62.07±14.45	0.008	50.68±7.41	NS	73.93±18.05	NS
No	75	58.93±16.80		55.60±16.70		51.33±9.77		72.96±17.61	
Hypercholesterolemia ^a									
Yes	103	58.99±12.22	NS	58.23±14.61	NS	50.19±5.28	NS	71.91±14.08	NS
No	70	62.17±17.35		60.78±17.29		52.10±11.68		75.85±22.11	
Readmission ^a									
Yes	66	52.84±15.18	0.000	50.83±14.18	0.000	48.26±9.09	0.001	66.78±16.31	0.000
No	107	64.85±12.13		64.47±14.41		52.64±7.68		77.66±17.50	
Other Cardiac condition ^a									
Yes	30	47.46±13.88	0.000	43.66±9.82	0.000	50.33±7.53	NS	68.00±13.49	0.041
No	133	63.18±12.43		62.80±14.59		51.03±8.89		74.07±17.72	
Angina ^a									
Yes	52	48.69±15.67	0.000	50.00±14.62	0.000	49.33±6.11	NS	70.19±14.32	NS
No	116	65.52±10.90		63.39±14.80		51.40±9.33		74.07±18.82	

a= T-test

NS= Non statistical Significant

Table 4. Continue, Association of SF-36 Subscales and patients' Clinical Characteristics.

Clinical Characteristics	N	Physical functioning		emotional role		Physical role		Social functioning	
		x±SD	p	x±SD	P	x±SD	p	x±SD	p
Comorbidities ^a									
Yes	151	71.32±18.88	NS	72.18±40.21	NS	62.41±41.66	NS	59.60±16.29	NS
No	22	74.77±18.93		75.75±32.82		67.42±38.48		66.47±22.94	
Diabetes ^a									
Yes	20	67.75±23.36	NS	65.00±45.20	NS	61.25±46.92	NS	58.75±22.97	NS
No	153	72.28±18.23		73.63±38.50		63.28±40.56		60.70±16.56	
Hypertension ^a									
Yes	98	71.78±19.12	NS	73.46±41.71	NS	66.07±43.33	NS	60.07±16.31	NS
No	75	71.73±18.77		71.55±36.11		59.11±38.16		61.00±18.71	
Hypercholesterolemia ^a									
Yes	103	70.63±18.67	NS	74.43±37.90	NS	63.83±39.32	NS	58.01±12.48	0.040
No	70	73.43±19.16		70.00±41.37		61.90±44.08		64.12±22.31	
Readmission ^a									
Yes	66	60.15±15.59	0.00	56.56±41.22	0.000	45.07±39.87	0.000	55.30±15.20	0.001
No	107	78.93±17.11		82.55±34.67		74.14±38.13		63.67±17.89	
Other Cardiac condition ^a									
Yes	30	58.50±12.39	0.00	61.11±31.66	0.046	40.27±32.46	0.000	55.83±11.24	0.035
No	133	74.62±18.80		74.93±40.85		69.36±40.71		61.37±17.90	
Angina ^a									
Yes	52	61.63±17.03	0.00	64.74±40.91	NS	50.00±37.19	0.005	55.05±15.70	0.008
No	116	75.38±17.99		75.28±38.79		69.25±41.41		62.39±17.71	

a= T-test; NS= Non statistical Significant

Regarding the scales of SF 36, Table 2 gives a description for each subscale, in addition detailed information about the association between the scales of SF 36 and patients' clinical and demographic characteristics are given in tables 3 and 4.

Upon the examination of mental health component of SF 36, it was found that the results of high school and lyceum graduates differ from higher education graduates who reported a better "mental health" from the rest ($p < 0.05$,

Bonferroni). Moreover, married respondents reported statistically significant higher scores in the "vitality" subscale than those who were single / divorced / widowed ($p = 0.028$). Similarly, higher scores were reported in the "vitality" subscale by those respondents who lived with their spouse or children as compared to those who were living alone ($p = 0.019$). In addition, higher education graduates reported greater scores in "vitality" subscale than other respondents

($p < 0.05$, Bonferroni).

According to our results, non-smokers reported greater scores in the "general health" domain than smokers and past smokers ($p < 0.05$). Furthermore, those who were smokers reported significantly higher scores in "general health" than past smokers ($p < 0.05$). In the analysis of the "general health" subscale in relation to the clinical characteristics, it was observed that patients who were readmitted to the hospital reported lower values in the corresponding subscales than those who weren't ($p = 0.01$).

The findings of our study indicated that married people had a significantly higher value in the "Physical pain" category than those who were single / divorced / widowed ($p = 0.003$). In addition, respondents who were living with their spouse or children had a statistically higher score in the "Physical Pain" subscale than the respondents who were living alone ($P < 0.05$). In addition, married respondents reported significantly better "physical functioning" than respondents who were single / divorced / widowed ($p = 0.013$). Likewise, those who were living with their spouse or children reported better "physical functioning" than the respondents who were staying alone ($p = 0.024$). In terms of the education level, it was observed that the score of "physical functioning" varied according to the education level, as higher education graduates (AEI/TEI) reported better scores in this subscale than others ($p < 0.05$, Bonferroni).

On the "emotional role" subscale, it was observed that men had lower scores than women ($p = 0.043$). In addition, married respondents reported statistically significant higher scores in the "Emotional role" subscale than unmarried / divorced / widowed respondents ($p = 0.001$). Moreover, respondents who were living with their spouse or children reported greater scores in this specific subscale than those who were living alone ($p = 0.001$).

Upon examination of the physical role subscale, the following differences were observed: Married respondents reported greater scores in this subscale than single/ divorced / widowed respondents ($p = 0.002$). Moreover, those who were living with their spouse or children reported greater scores in this specific subscale than those who were living alone ($p = 0.001$). Finally, non-smokers reported higher scores in this subscale than those who were smokers or past ($p < 0.05$).

According to the results of our study, men reported significantly lower scores in the "Social functioning" subscale than women ($p = 0.039$). As far as the relation of this subscale with clinical characteristics is concerned, it was observed that patients who were readmitted to the hospital reported lower values in the corresponding subscales than those who weren't ($p = 0.01$). Finally, non-smokers reported higher scores for the "Social Function" subscale than smokers ($p = 0.007$).

4. Discussion

The number of researches focusing on assessing the quality of life of patients with hepatitis C is increasing. It is a fact that QoL is a predictor of mortality and a reliable tool for

personalized care planning. In fact, QoL is so important for patients that it is often evaluated on the same scale as other most important lifetime events [26, 27].

Patients with chronic hepatitis C treated with interferon and ribavirin had a better quality of life 6 months after starting treatment. Patients have better physical and mental health, fact that can have a positive impact on their quality of life [28]. Patient compliance in therapy is an important factor in achieving Sustained Virological Response, which contributes positively to improving their health and quality of life [29].

According to previous studies, Hepatitis C patients face serious physical and mental health issues [30]. Recent studies in U.S.A, which used SF-36 as a research tool, reported that non-cirrhotic patients are exhibiting deviations as compared to healthy individuals in the subscales of physical functioning, pain, and in the physical component of SF-36. With regard to the mental health status, the patient's vitality was reduced and so are their social activities, a fact that is reflected in the mental health component of SF-36 [31].

Interferon- α plus ribavirin treatment for chronic hepatitis C patients seems to reverse these outcomes in those who achieve a sustained virological response (SVR), since non-cirrhotic patients following this treatment appear to have improved physical and mental health [8]. The results are similar to those of other chronic conditions [9, 10].

Interferon- α based treatment is related with many side effects namely flu like symptoms, fatigue, anorexia, insomnia and emotional changes. Certainly, the treatment side effects vary depending on age, health status and duration of the illness [9, 10].

Age is an important factor that can affect QoL of patients positively or negatively. Participating patients in this study who were under the age of 55 years reported a better QoL status as opposed to those who were 65 years and older. Individuals aged >60 years reported that the physical problems they face can affect their social activities. Moreover, older individuals have to deal with many difficulties when adapting to the rehabilitation programs and have many psychological and social problems as a result of their frequent hospitalization. In addition, the age factor is related to both the duration of the disease over time and the physiological disability associated with age and aging of all body functions.

Regardless of age, the physical and psychological symptoms experienced by people with hepatitis C have a serious impact on the patient's family and their social life as it forces them to readjust their habits and accept all these changes in their everyday life [32-34].

In a longitudinal study conducted by Brink *et al.*, it was found that physical and mental problems can affect patients' life, their return to work as well as their behaviour in family and social life. Furthermore, it was observed that patients aged 65 years and above reported these problems more frequently than younger patients [35].

In addition, Shah *et al.*, studied the patients in the advanced age category, specifically 85 years and above. The

study found that these patients had a poor QoL due to their frequent hospitalization, which had in turn, affected their social, emotional and family life. Many of those individuals, every time their condition worsened, experienced an intense death anxiety [36].

Further, according to Brink et al., individuals aged 65 years and less, who reported good levels of QoL, were following a healthy life style, had cut off smoking and had psychological and emotional support from their family. Moreover, individuals that returned to their work were less emotionally charged and were experiencing less stress than those who stayed at home or didn't work [37].

Regarding the effect of marital status, it was found that individuals living with their family participated in rehabilitation programs more frequently. It is a fact that most of the times, if not always, in the case of patients with chronic conditions, the family plays a crucial supporting role. According to our findings, unmarried patients exhibited more psychological problems and stress than married ones. In addition, they put in less time and efforts to improve their health status. Married people, on the other hand, devoted more time to improving their health, always in collaboration with their family.

In a study conducted in Japan by Suzuki et al., it was found that hepatitis C patients who participated in rehabilitation programs with their families reported better physical and mental health than patients who didn't. Furthermore, they reported better QoL in all dimensions. Patients who had participated in the study and were living with their families managed to overcome their condition easily and had less stress regarding the future than those who lived alone [38].

Rankin and Fukuoka found that social support can positively influence the QoL of patients. More supporting the patients receive from their family, friends and the wider network (public, medical and nursing), the more improved their QoL will be [39].

According to a study conducted by Fabbri et al., the frequency of hospital visits was found to adversely affect the patients' QoL. Admission and hospitalization of patients is a common problem for hepatitis C patients [40]. Moreover, readmissions are a heavy financial burden for each system health [41, 42].

The present study found that patients who were frequently readmitted to the hospital after their discharge reported worse QoL than those who had no readmissions. Patients with frequent admissions experienced depression and anxiety regarding their health, and a strong sense of death. In addition, their relationships with their family and friends were not good and they were mentally and emotionally charged.

According to the findings of Souza et al., patients who were hospitalized for a short period of time returned to their normal life more quickly. In addition, those who were younger in age, with a supporting family environment and good financial status, managed to have a satisfying QoL without excessive stress and anxiety [43].

Piotrowicz et al. argued that health care professionals contribute the most in patients' rehabilitation and they are the ones who urge patients to improve or reduce the factors that cause hepatitis C [44].

Boesma et al., in 2005, concluded that stress can also affect QoL in the long term. While in another study conducted by the same researcher, it was found that patients who aged 60 years or less could quickly adapted to rehabilitation programs, altering the factors that negatively affected their health such as smoking, incorrect diet, sedentary lifestyle, blood pressure, and hypercholesterolemia. These patients also managed to reduce anxiety and stress with positive results for them and their environment [18, 19].

In the present study, patients who were living alone, had a low educational status, and continued smoking, exhibited signs of depression and anxiety resulting in poor QoL and frequent hospital visits. Chronic anxiety could indicate poor physical status or poor QoL. Regardless of the intensity, anxiety should be evaluated, because according to Moser et al., it is related to complications and, in particular, patients who reported high levels of anxiety were 4.9 times more likely to develop complications after treatment [45].

According to researchers [46], patients who, after their treatment and admission to the hospital, exhibit no symptoms of depression or anxiety later in life, their QoL and all the other dimensions were adequate and upgraded [45]. Therefore, good mental health and emotional state are positive factors that contribute to the quality of life of patients [47]. According to another study conducted by Koskinas et al., interferon-induced depression during treatment of patients with chronic hepatitis C was found to be higher in these patients than in chronic hepatitis B patients, and the prevalence was higher in women than men, with the effect of adversely affecting their quality of life [46]. Ruo et al. argue that frequent nursing support and follow-up is important for patients with depressive and anxiety symptoms [48].

Furthermore, Garavalia et al. suggest that QoL of women differs from men, because women comply more easily with doctor's instructions, quit smoking, exercise and follow a proper and healthy diet. However, they exhibit more depressive and anxiety symptoms than men. The results of this study indicate that men had a lower score in the physical aspect than women. Also, women had significantly higher scores in the mental health component than men [49].

5. Conclusion

The present study, which lasted for more than a year, found that age, area of residence, educational level and hospital readmissions, affect the mental health of patients and their QoL. Patients who were discharged from hospital after the compliance of treatment and were not readmitted didn't exhibit depressive and anxiety symptoms and reported higher levels of QoL. In addition, the same observations apply to patients with a high educational level, in the young age category, non-smokers, and those living with their family.

Moreover, the present study, in accordance with other

studies, suggests the need to assess and treat depressive symptoms, provide support programs and frequent nursing care to patients, which can have a beneficial effect on their QoL.

In addition, it is worth mentioning that despite the weakness and limitations of QoL studies, there is a great agreement in the results, findings and conclusions. The contribution of this study emphasizes that treatment with interferon based treatment in patients with hepatitis C greatly affects the QoL and therefore supportive care is needed. However, an optimal goal would be the implementation of DDAs treatment in all patients with hepatitis C worldwide.

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