

## Exploring Effect of Medication Adherence on Quality of Life among Newly Treated Hepatitis “C” Virus Patients

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### Abstract

Medication adherence and Quality of Life (QoL) are two integral factors for sustaining optimal health; where medication non-adherence of Hepatitis C virus patients predisposes them to poor prognosis and remarkably low QoL. This study aimed to explore the effect of medication adherence practices on the quality of life among newly treated hepatitis “C” virus (HCV) patients. **Methods:** The researchers used a quasi-experimental research design. **Setting:** The study was conducted at the Hepatology Outpatient Clinic of Alexandria Main University Hospital. **Subjects:** A purposive non-probability sample of 100 adult newly treated HCV patients ( $\leq 12$  months) were enrolled. **Tools:** The researchers used three tools for collecting data. Firstly, Sociodemographic and Clinical Data sheet, secondly Morisky Medication Adherence Scale 8 items (MMAS-8), and thirdly, the World Health Organization Quality of Life abbreviated version (WHOQoL-BREF) Questionnaire. **Results:** A highly significant difference was obvious between all medication adherence items of studied patients at the pre, one-month, and three months post-tests. Where the mean total QoL score was increased after three months of follow-up than from the pre-intervention with a highly significant difference. Additionally, a highly positive correlation between medication adherence and QoL was detected in pre, one-month, and three months follow-up periods. **Conclusion:** the mean total QoL score of the studied HCV patients was improved, with a high positive correlation between medication adherence and QoL in newly treated studied HCV patients.

**Keywords:** Hepatitis C virus, Effect, Medication adherence, newly treated, Quality of life.

### Introduction

Hepatitis C virus (HCV) infection is a chronic inflammatory blood-born infectious liver disease, ranging from minimal histological changes to extensive fibrosis and cirrhosis with or without hepatocellular carcinoma (HCC) (Abdelrheem, Saleh, Abdelatif, & Elbadry, 2020; Shahid et al., 2021).

Additionally, HCV is considered a global public health concern in both developed and developing countries, where in 2016, 325 million estimated cases of HCV infection worldwide. While, in Egypt, the HCV prevalence rate reached 13% of the total population in 2018, equating to 8-12 million Egyptians, with approximately 8 million living with uncomplicated chronic HCV. The HCV prevalence in rural Egypt is 10 to 20-fold higher than in the United States, ranging from 2.01 to 25.47 HCV cases per 1000 person-years. The highest HCV prevalence among Egyptians

was attributed to previous schistosomiasis treatment with unsafe injections (Kamal, 2017; Noreen et al., 2022)

Considering this higher HCV infection prevalence in Egypt, studies declared that it represents a complicated network of social, economic, psychological, and political factors. The possible causes of hepatitis include autoimmune hepatitis or secondary to dental, obstetric, injection administration, blood transfusion, and alcohol consumption (Ayoub & Abu-Raddad, 2017; Kouyoumjian, Chemaitelly, & Abu-Raddad, 2018)

Acute HCV infection is usually asymptomatic or accompanied by mild flu-like symptoms, weight loss, fatigue, muscle or joint pain, irritability, nausea, malaise, anorexia, and jaundice which rarely occurs after 2 to 26 weeks post-infection. It develops over years to be chronic in 70% of patients with the presence of various symptoms related to liver damage. Acute hepatitis C symptoms are more short-

term, lasting six months or less; whereas, chronic hepatitis can last for the entire life requiring long-term treatment (Hirano et al., 2021; Hudson et al., 2022).

Latterly, advances in HCV therapy have resulted in steadily higher cure rates preventing virus transmission, reducing the risk of Hepatic Cell Carcinoma (HCC) development among liver fibrosis persons; sequentially, slowing the disease progression and improving quality of life (QoL). The best approach in HCV treatment focuses on protecting and supporting the liver and keeping the immune system healthy (Hudson et al., 2022; Noreen et al., 2022). Studies have revealed in long-term conditions that medication non-adherence in developed countries is a common problem estimating around 50%, and is expected to increase; portraying poor immunological consequences (Kleinsinger, 2018; Tay, 2019).

Medication adherence is sustained when HCV patients follow the clinically prescribed doses and maintain healthy lifestyle behaviors; which predispose to QoL improvement and minimize complication risk incidence (Khayyat et al., 2019). As chronic HCV is a complex condition; thus patients in the long term may face unfavorable medication side effects, financial burden, frequency of dosing, anxiety, or depression, all of which have profound negative consequences; making medication adherence difficult (Cho & Park, 2017; Barreira, Marinho, Bicho, Fialho, & Ouakinin, 2019).

The negative effects of chronic HCV medication non-adherence can be controlled by changing patients' behaviors toward better QoL through; encouraging healthy lifestyle practices such as: eating a healthy diet, drinking plenty of water, exercising daily, managing stress, enforcing medication adherence, and getting enough rest (Neiman et al., 2018).

Nursing care for hepatitis C patients requires a holistic approach and integration with physicians, pharmacists, nutritionists, and psychologists to meet these patients' physical, psychological, emotional, spiritual, and socio-economic needs (Upton, 2020). Nurses being health care provider who has continuous contact with patients and their families; can assess potential problems, discuss medical

regimen, encourage adherence to medication schedules, teach measures that maintain physical activity, as well as enforce dietary modifications (Verloo, Chiolo, Kiszio, Kampel, & Santschi, 2017).

Nurses also guide these patients to follow the medical prescriptions, make therapeutic decisions, and manage medications' side effects on patients' QoL. This holistic nursing approach entails counseling, support, and education about HCV patients' medication adherence are vital for successful management, healthier QOL, and prevention of serious disease complications (Girgis, Farahat, & Ahmed, 2012; Weber, 2021).

### Significance of the study:

Although the QoL and medication adherence in HCV patients have been discussed in the medical literature; there is a significant gap in the context of the multidisciplinary approach which includes the gastroenterology nurse practitioners' integration into the pharmacological management plan. Furthermore, In Egypt, despite HCV being considered one of the major public health concerns being difficult to manage; minimal research has evaluated HCV patients' adherence to prescribed medication and its consequence on all aspects of QOL. **Thus, the researchers aimed** in this research to explore the effect of medication adherence practices on the quality of life among newly treated hepatitis "C" virus patients.

### Research hypothesis:

Medication Adherence has positive effect on Quality of Life among Newly Treated Hepatitis "C" Virus Patients.

### Operational definition:

**Medication adherence** is the degree to which a person 's complies to accepted guidelines about medication consumption from a healthcare professional.

**Newly Treated Hepatitis "C" Virus Patients** who have just started receiving treatment with sofosbuvir, daclatasvir, and ribavirin, all of which have a half-life of less than or equal to 12 months, are referred to as recently treated patients.

## Materials and Method

**Research Design:** The study followed a quasi-experimental research design, (One group with pre, post-one-month, and post-three-month follow-up tests).

**Setting:** The study was conducted at the Hepatology Outpatient Clinic of Alexandria Main University Hospital. It is the main Hepatic University Clinic, with a specialty on evaluating and delivering follow-up instructions for HCV patients from Alexandria and the adjacent governorates. The clinic is a one-room facility on the first floor of a conventional one-day medical clinic. It is open Tuesdays and Wednesdays from 8 a.m. to 12 p.m.

**Subjects:** The study population comprised a purposive non-probability sample of 100 HCV patients. These patients were enrolled according to the following **inclusion criteria:** Able to communicate, from both gender, ages ranging between 18-60 years, have controlled chronic diseases, and free from associated complications i.e., Hepato Cellular Carcinoma, co-infection with HIV or hepatitis B virus. All subjects were randomly enrolled in the current study.

The researchers estimate the Sample size by using G\*power software version 3.1.9.7, based on F tests - ANOVA, one-way, Effect size (0.40),  $\alpha$  err prob (0.05), Power ( $1-\beta$  err prob) =0.90 for the difference between Pre, post, and follow up tests: the program revealed a total sample size (84) newly treated hepatitis C patients; however the researchers increased the sample to 100 patients to overcome the possibility of withdrawal of some patients.

**Tools:** Three tools were utilized for data collection:

**Tool I: Sociodemographic and Clinical Data Structured Interview Schedule. It was divided into two parts:**

**Part I Socio-demographic data:** It comprised age, gender, level of education, marital status, presence of medical insurance, and residence.

**Part II Clinical data:** which included the clinical history of patients and their family

history related to hepatitis C virus infection. Medical health history related to the presence of associated controlled associated diseases namely: hypertension, renal disorders, heart disease, and diabetes mellitus, in addition to its duration, and previous hospitalization.

## Tool II. Morisky Medication Adherence Scale (MMAS-8):

The MMAS-8 is a structured self-report eight-item scale; which was used to measure medication consumption behaviors, and to estimate the risk of medication non-adherence in patients with chronic illnesses. The researchers adopted the Arabic version by (Ashur, Shamsuddin, Shah, Bosseri, & Morisky, 2015), its internal consistency ( $\alpha = 0.70$ ).

**Scoring system:** The first 7 items of the 8-MMAS were answered with a dichotomous response "Yes" or "No". Where items 1–4 and 6–7 had a score of "0" for the "Yes" answer and "1" if the answer is "No"; considering that the 5<sup>th</sup> item was reverse-coded. Whereas; the 8<sup>th</sup> item responses had a Five-point Likert scale ranging between "Never forget" = "1" to "All the time" = "5".

**The total score for the scale** was the sum of each item's scores; ending up with a **dichotomous scale:** Adherent/Non-adherent; the values of 6-8 are computed corresponding to (adherence), and below 6 is (non-adherence). Whereas, the higher the score indicates better medication adherence.

## Tool III: World Health Organization Quality of Life Abbreviated Version (WHOQoL-BREF) Questionnaire:

The researchers adopted the Arabic reliable and valid version of the WHOQOL-BREF questionnaire (Dalky, Meininger, & Al-Ali, 2017). It is reliable at ( $r = 0.7$ ).

The WHOQOL-BREF sheet contained 26 questions and aimed to provide a broad short form QoL assessment over the previous two weeks. The first two questions evaluated patients' self-perceived QoL (Q1) and satisfaction with health (Q2). The remaining 24 questions were divided into four domains: physical (seven questions), psychological (six

questions), and social relationships (three questions). In addition (eight questions) were approaching the environment parameters in the context of an individual's culture, value systems, personal goals, standards, and concerns.

#### Scoring system:

Each domain's question was rated on a five-point Likert scale: where for questions 1 and 2; "1" represents "Disagree or not at all" and "5" represents "Completely or extremely agree". Whereas, **questions:** "3, 4, and 26" were negatively phrased to be reversely scored. The **Total** QOL score was achieved by summing the scores of its domains; where a higher score denotes a higher perceived healthier QOL and vice versa.

#### Study framework:

##### The study was carried out in three phases:

##### I-Preparatory phase:

**a- Written approval:** The study was approved by the ethical Research Committee of the Faculty of Nursing, University of Alexandria. Also, an official letter from the Faculty of Nursing was submitted to the hospital director of the Hepatology Outpatient Clinic; at Alexandria Main University Hospital after explaining the study's purpose. In addition, permission and license agreement were obtained and signed by the appropriate authority and the researchers to use the WHOQoL-BREF tool in the current study.

**b-** A written instructional colored **pamphlets** containing illustrative pictures was developed by the researchers to clarify the study medication adherence practices for each patient individually.

##### II-Implementation phase:

1. Data collection started by greeting the patients, introducing self, and explaining the study aim for the subjects who fulfilled the inclusion criteria.
2. Prior to starting medication adherence practices sessions, the researchers employed the three study instruments to collect the necessary information on patients'

sociodemographic and clinical data, level of medication adherence, and QoL evaluation.

3. The researchers interviewed the study subjects individually during **the first visit** to take initial assessment (pre-test).
4. After that, the researchers tailored approaches encouraging the study subjects for complying with medication adherence practices. Thus, the following measures were planned by the researchers to achieve the study's goal:
  - Conducting researchers-patients individualized face-to-face simple language discussions engaging the clinic's health team members; as possible, to explain the seriousness of their condition, and medication non-adherence risks, in addition, to fortifying lifestyle modifications, manage patients' fears and concerns and clarify the positive effects of medication adherence practices.
  - Moreover; the researchers distributed written simplified "Image-based" instructional colored pamphlets; which was developed by the researchers supplementary as a home message for the newly treated HCV patients.

The pamphlet included: HCV definition, causes, prevention, mode of transmission, and complications. Moreover, it contained medication-related information regarding prescribed treatments pharmaceutical preparations/administration, dosage, and side effects. Likewise, it clarified the positive effects of adherence, and adverse effect of non-adherence. Additionally, to the advised safety measures enforcing medication adherence, i.e., explaining the HCV treatment regimen and its benefits, ensuring access to Hepatology clinic providers by providing patients with the researchers' phone number, providing alternatives for reducing medication adherence barriers, explaining the reason for avoiding the cessation of prescribed medication even when symptom relief occurs, and enforcing the avoidance of domestic utensils .... etc.

- For each study subject; the planned medication adherence practices were applied in two sessions over two weeks

period (1 sessions per week). Throughout the sessions, the researchers utilized the developed pictured pamphlet for each patient, emphasizing the consequence of executing medication adherence practices.

- Furthermore, a bi-weekly mobile phone calls were implemented throughout the 12 weeks study period as a reminder intervention to reinforce the study patients to follow the researchers' proposed medication adherence practices.
- 5. Patients interviews were conducted at a separate nursing staff room located in the Outpatient Clinic's. However, the pre and post tests interview data lasted approximately 30-45 minutes / each. Whereas, each individualized medication adherence instructional session required approximately 45-60 minutes.
- 6. Data collection was continued on the clinic's scheduled days for a period of five months starting from December 2021 to end of April 2022.

### III- Evaluation phase:

- After the initial assessment (pre-test) conduction, the researchers delivered the medication adherence instructional sessions. After that, they used tool II & III to evaluate the effect of the proposed medication adherence practices two times in two subsequent interviews (post-test after one month and follow-up test after 12 weeks); which have been conducted either face to face or through phone calls; if patient's attendance was not possible.

### Ethical consideration:

The researchers obtained written informed consent from all patients after an explanation of the study's aim. Confidentiality of data and privacy of personal information was ascertained, also the participants were informed that their participation in research was voluntary and they have the right to withdraw from the study at any time without any consequences.

### Statistical analysis of the data:

The analysis of data was performed utilizing the SPSS version 22. Data were presented using descriptive statistics in the form of frequencies, percentages, and Mean (SD). Correlation coefficients were used to measure the strength of the relationship between two variables. Multiple linear regression (MLR), and one-way analysis of variance (ANOVA) were also used. Statistically significant was considered at  $p$ -value  $< 0.05$  and highly significant at  $p$ -value  $< 0.01$ .

### Limitation of the study:

The researchers during the process of data collection confronted limitations as the result of the new Corona pandemic (COVID-19); nearly 22 patients did not attain to the clinic either for the second or the third follow-up visit; accordingly, their interviews were accomplished via phone calls. Moreover, following an extensive review of previous studies, the researchers found that the majority of research dealt with either the study of the QoL for hepatitis C patients or their therapeutic-Adherence separately, while there was no previous research linking medication adherence practices and its effect on HCV patients' QoL.

### Results:

**Table (1)** portrays that the mean age of studied patients was  $43.58 \pm 5.77$  years, 55% were males, and 70% were married. According to a resident, 72% of studied patients were from rural areas. Furthermore, the minority had a preparatory school education (12%). Concerning health insurance, 74% had no health insurance.

**Table (2)** shows that 98% of studied patients had a family history of HCV, 75% of them did not know the cause of HCV infection, 97% did not admit to hospital-related HCV, and 26% suffered from another chronic disease. Also, reveals that 38% and 100% of studied patients received medication for both renal and liver disease; respectively.

**Table (3)** declares that all of the studied patients reported forgetfulness as a cause of non-adherence, while 90%, 76%, and 64% of them reported that side effects of drugs,

financial reasons, and being too busy; are the causes of non-adherence; respectively.

**Table (4)** shows that there was a highly significant difference between all items of medication adherence of studied patients at pre, one month, and three months follow-up post researchers' intervention periods at p-value <0.01\*\*

**Figure (1)** reveals that 19% of studied patients were adherent to the medication in pre-intervention, while 63% of them were adherent at one-month post-intervention and increased to 75% at the three months follow-up period.

**Table (5)** shows that there was a highly significant difference between the Physical, Psychological, Social, Environmental, Overall QoL, and General health domains of studied patients' QoL at pre, one month, and three months post-intervention periods, at a p-value <0.01. Finally, the mean total quality of life

score was increased from 217.42(35.76) in pre-intervention to 286.77(28.53) in the three months follow-up period; with a highly significant difference at p-value <0.01.

**Table (6)** portrays that there was a highly positive correlation between medication adherence and quality of life in the three study periods at a p-value <0.01.

**Table (7)** reveals that high significant model was detected through the F-test value = 12.009 with a p-value of 0.001. This model explains that 59% of the variation in the quality of life was detected through  $R^2$  value of 0.59. Also, explained that both medication adherence and having health insurance had a high-frequency positive effect on the quality of life, at a p-value <0.010. While, age, high education level, and married had a slight frequency positive effect on the quality of life at a p-value <0.05.

**Table (1):** Distribution of studied patients according to their Sociodemographic characteristics (n=100)

Items	N	%
<b>Age:</b>		
25 - <35	16	16
35 - <50	56	56
50 or more	28	28
<b>Mean SD</b>	<b>43.58±5.77</b>	
<b>Gender</b>		
Male	55	55
Female	45	45
<b>Marital status:</b>		
Married	70	70
Not married	30	30
<b>Residence:</b>		
Rural	72	72
Urban	28	28
<b>Educational level:</b>		
Neither Read nor write	22	22
Read and write	26	26
Preparatory school	12	12
Secondary school	14	14
University	26	26
<b>Health insurance</b>		
Governmental	6	6
Private	20	20
No	74	74

**Table (2):** Distribution of studied patients according to their clinical data (n=100)

Items	Yes		No	
	n	%	n	%
<b>Family history of HCV</b>	60	60	40	40
<b>HCV infection due to: #</b>				
Hepatic Disease	0	0	100	100
Surgery	6	6	94	94
Blood transfusion	19	19	81	81
I don't know	75	75	25	25
<b>Treatment period</b>				
< 6 months	57	57	43	43
6 to 12 months	43	43	57	57
<b>Repeated hospital admission:</b>	3	3	97	97
<b>Associated diseases: #</b>				
Cardiac disease	14	14	86	86
DM	16	16	84	84
Renal disease	28	28	72	72
Other diseases	26	26	74	74
<b>Prescribed medication: #</b>				
Hypertension	18	18	82	82
Cardiac	24	24	76	76
Renal	38	38	62	62
Hepatic	100	100	0	0

# More than one answer.

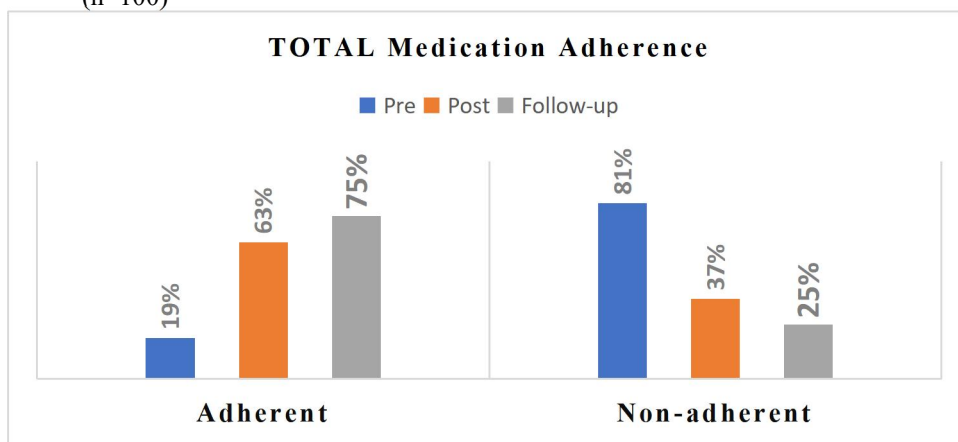
**Table (3):** Distribution of studied patients according to their reason of non-adherence (n=100)

Items	n	%
Forgetting	100	100
Side effects of drugs	90	90
Financial Reason	76	76
Too busy	64	64
Feeling that drugs are ineffective	60	60
Too many drugs	34	34
Lack of family care	20	20

**Table (4):** Mean score of studied patients related medication adherence pre, one month, and three months post- practices intervention (n=100)

Medication adherence items	Mean (SD) Pre- intervention	Mean (SD) One month Post-intervention	Mean (SD) Three months post-intervention	Anova P value
Forget to take your medication	0.96 (0.032)	0.82 (0.011)	0.70 (0.012)	6.778 <0.01**
During the past two weeks, were there any days when you did not take your medication	0.97 (0.013)	0.83 (0.012)	0.72 (0.013)	8.009 <0.01**
Have you ever taken a different dose or stopped your medication without telling your doctor, because you felt worse when you took it?	0.97 (0.032)	0.76 (0.020)	0.62 (0.010)	7.665 <0.01**
When you travel or leave home, do you sometimes forget to bring your medicines	0.58 (0.019)	0.51 (0.009)	0.46 (0.015)	6.901 <0.01**
Did you take all of your medicines yesterday?	0.72 (0.024)	0.79 (0.011)	0.85 (0.017)	8.192 <0.01**
Do you stop taking medications when you feel that your health condition is stable?	0.66 (0.017)	0.60 (0.008)	0.58 (0.010)	7.541 <0.01**
Have you ever felt bothered by sticking to your treatment plan?	0.94 (0.011)	0.81 (0.013)	0.63 (0.015)	9.052 <0.01**
Do you forget to take your medication?	2.84 (0.67)	2.25 (0.43)	2.04 (0.52)	7.355 <0.01**

\*\*High significant &lt;0.01

**Figure (1):** Distribution of studied patients-related medication adherence pre, post, and follow-up (n=100)**Table (5):** Mean score of studied patients' related quality of life pre, one month, and three months post practices-intervention (n=100)

Quality of life domains	Mean (SD) Pre-intervention	Mean (SD) One month Post-intervention	Mean (SD) Three months Post-intervention	ANOVA test P-value
Physical	53.08(10.78)	64.24(10.7)	69.64(12.3)	6.555 <0.01**
Psychological	51.92(9.76)	70.14(10.5)	72.55(11.09)	7.002 <0.01**
Social	57.07(12.5)	68.33(12.2)	70.42(13.46)	6.590 <0.01**
Environmental	49.22(13.6)	60.10(10.21)	63.41(13.40)	7.112 <0.01**
Overall QoL	3.01(0.65)	3.40(0.30)	3.98(0.43)	5.809 <0.01**
General Health	3.12(0.57)	3.51(0.22)	3.77(0.29)	5.333 <0.01**
Total quality of life	217.42(35.76)	269.72(25.08)	286.77(28.53)	13.908 <0.01**

\*\*high significant &lt;0.01

**Table (6):** Correlation between medication adherence and quality of life of the studied patients at the three follow-up periods (n=100)

Items	r.	P value
Medications adherence and QoL pre-intervention	<b>0.657</b>	<b>&lt;0.01**</b>
Medications adherence post and QoL post-intervention	<b>0.704</b>	<b>&lt;0.01**</b>
Medications adherence at three months post-intervention and QoL follow-up	<b>0.699</b>	<b>&lt;0.01**</b>

\*\*high significant &lt;0.01

**Table (7):** Multiple Linear regression model for quality of life (n=100).

Items	Unstandardized Coefficients		standardized Coefficients	T	P. value
	B		B		
Medication adherence	0.476		0.370	7.765	<b>0.000**</b>
Age	0.189		0.141	2.756	0.042*
Education level (High)	0.201		0.273	2.303	0.030*
Marital status (married)	0.253		0.176	3.018	0.031*
Health insurance (Yes)	0.324		0.213	6.001	<b>0.003**</b>
Model	R <sup>2</sup>	Df.	F	P. value	
Regression	<b>0.59</b>	4	12.009	<b>0.000**</b>	

a. Dependent Variable: Quality of life



b. Predictors: (constant): Medication adherence, Age, Education level (High), Marital status (married), and Health insurance (Yes)

## Discussion

Chronic hepatitis C virus (HCV) infection affects over 240 million people representing about 6% of the world's population, and it is considered one of the leading causes of cirrhosis, liver failure, and hepatocellular carcinoma (HCC). Medication adherence refers to the extent to which a patient takes their medication as prescribed and for the duration of treatment agreed between the patient and their physician (Chugh et al., 2022). Therefore, the present study aimed to explore the effect of medication adherence on the quality of life among newly treated hepatitis "C" virus patients.

The current study revealed that the mean age of studied patients was  $43.58 \pm 5.77$  years, more than half of the studied patients were males. These results are consistent with the study conducted by (Rodis & Kibbe, 2010) that aimed to evaluate changes in quality of life (QOL) of (HCV) infected patients and their medication adherence during the first 3 months, who stated that more than two-thirds of patients were male. Also, it is supported by the study by (Dalgard et al., 2022) who detected that the mean age of HCV patients was 47.4(9.9) years.

Likewise, most of the studied patients had a family history of HCV, and three-quarters of them did not know the cause of HCV infection. These results are in cohort with the study by (Liu et al., 2019) who stated that; less than one-fifth of the studied patient had a family history of liver disease and did not confirm their proposed cause of HCV infection. The current study reported selected the newly treated HCV patients; illustrating that less than half of patients were treated from 6 to 12 months, which disagreement with the study by (Papaluca et al., 2019) who declared that the majority of patients were treated for 8 to 12 months.

All of the studied patients reported that forgetting was the cause of medication nonadherence, followed by the presence of drug side effects, financial reasons, and being too busy. These results disagree with (Shin et al., 2018) who found with multivariate analyses that age was the only independent predictor of poor medication adherence. Where, in particular,

younger (<30 years) and elderly (>70 years) patients exhibited poor adherence. Also, (Antonia, 2011) reported that physical impairments and cognitive limitations may increase the risk for nonadherence in older adults.

Additionally, the study results revealed improvement in medication adherence among HCV patients; these results may be due to the effectiveness of the proposed researchers' tailored interventions utilizing the developed colored pamphlet. Where, (Anglada-Martinez et al., 2015) stated that; there was a highly significant improvement in patient medication adherence post-intervention than pre-intervention. Moreover, (Butt, Ali, Bakry, & Mustafa, 2016) reported that multidisciplinary-led interventions significantly improved patient adherence to medication regimes.

According to quality of life, the present study showed that there was a highly significant difference between all QoL domains of studied patients with a high and significant improvement in the mean QoL total score at the end of the three months follow-up period. Furthermore, a high positive significant correlation was declared between medication adherence and QoL at the pre, post, and follow-up tests. These findings were attributed to that improved medication adherence, which in turn enhanced VHC patients' QoL. However, these results are consistent with (Ali et al., 2019) who portrayed that the researchers' intervention had a significant impact on improving cure rates, HRQoL, and medication adherence for HCV patients. Correspondingly, (Naderifar, Tafreshi, Ilkhani, Akbarizadeh, & Ghaljaei, 2018) found that; there was a positive correlation between medication adherence and health-related QoL among hemodialysis patients. This study was carried out on hemodialysis patients while there is no study dealing with both QoL and Medication adherence in HCV. Additionally, (Cortesi et al., 2020) found that different subtypes of Chronic Liver Diseases affect the overall QoL domains and recommended the implementation of educational interventions for those patients. Moreover, (Alavinejad, Hajiani, Danyae, & Morvaridi, 2019) concluded that simple educational intervention and continuous monitoring for 6 months of the start of the therapeutic regimen can

affect clinical outcomes, QoL, hospital admissions days, and knowledge of patients with hepatic disorders. Besides, (Khorvash, Ataei, Baghersad, & Boroumandfar, 2021) found that educational programs with a strong emphasis on family support and companionship can improve some dimensions of the QoL and pharmaceutical compliance in patients with HCV. Also (Shin et al., 2018) reported poor medication adherence is associated with higher mortality and greater risk of HCC and cirrhotic complications, particularly among patients with liver conditions.

According to the Multiple Linear regression model, the current study explained that medication adherence and having health insurance had a high-frequency positive effect on the QoL. Whereas, age, high education level, and married had a slight frequency positive effect. These findings are supported by a cross-section study carried out by (Chen et al., 2021) who found that hepatic disease stage and income level were the factors most associated with HRQoL variables; while age, education level, and marital status were also slightly significantly associated with some HRQoL variables. Furthermore, (Kim, Chu, & Lee, 2018; Chugh et al., 2022) discovered that marital status, occupation, medication adherence, HCC, subjective health status, and depression are all factors influencing HRQoL.

### Conclusion:

Based on the findings of the current study the researchers concluded that: after three months of newly treated HCV patients' compliance to medication adherence taught practices; a declared an evident improvement in their level of adherence to medication at the post-tests compared to the pre-test. Furthermore, the mean total QoL score of the studied HCV patients was improved; declaring a high positive correlation between medication adherence and QoL in newly treated HCV patients.

### Recommendation:

The Researchers propose the provision of continuous educational programs for hepatitis patients regarding the importance of adherence to treatment to be followed up periodically to monitor the improvement in their quality of life. Additionally, replication of the current study

using a large study sample in various geographical areas.

### Acknowledgments:

The researchers would like to thank all of the study participants for agreeing to participate and strictly following the provided instructions. Finally, the researchers would like to express their gratitude to all the healthcare personnel in the Hepatic clinic for their assistance and continuous support.

### Conflicts of interest:

The researchers of this study declared that they had no conflicts of interest.

### References

- Abdelrheem, S. S., Saleh, Y. Y., Abdelatif, H.-A., & Elbadry, M. M. (2020). Hepatitis C infection among health care workers in Aswan: seroprevalence and risk factors. *Journal of High Institute of Public Health*, 50(1), 58-64.
- Alavinejad, P., Hajiani, E., Danyae, B., & Morvaridi, M. (2019). The effect of nutritional education and continuous monitoring on clinical symptoms, knowledge, and quality of life in patients with cirrhosis. *Gastroenterology and hepatology from bed to bench*, 12(1), 17.
- Ali, S., Ali, M., Paudyal, V., Rasheed, F., Ullah, S., Haque, S., & Ur-Rehman, T. (2019). A randomized controlled trial to assess the impact of clinical pharmacy interventions on treatment outcomes, health related quality of life and medication adherence among hepatitis C patients. *Patient preference and adherence*, 13, 2089.
- Anglada-Martinez, H., Riu-Viladoms, G., Martin-Conde, M., Rovira-Illamola, M., Sotoca-Momblona, J., & Codina-Jane, C. (2015). Does mHealth increase adherence to medication? Results of a systematic review. *International journal of clinical practice*, 69(1), 9-32.
- Antonia, K. (2011). Factors affect in patient adherence to medication regimen. *Health Science Journal*, 5(3), 0-0.

- Ashur, S., Shamsuddin, K., Shah, S., Bosseri, S., & Morisky, D. (2015). Reliability and known-group validity of the Arabic version of the 8-item Morisky Medication Adherence Scale among type 2 diabetes mellitus patients. *Eastern Mediterranean Health Journal*, 21(10).
- Ayoub, H., & Abu-Raddad, L. J. (2017). Impact of treatment on hepatitis C virus transmission and incidence in Egypt: A case for treatment as prevention. *Journal of viral hepatitis*, 24(6), 486-495.
- Barreira, D. P., Marinho, R. T., Bicho, M., Fialho, R., & Ouakinin, S. R. S. (2019). Psychosocial and neurocognitive factors associated with hepatitis C—Implications for future health and wellbeing. *Frontiers in psychology*, 9, 2666.
- Butt, M., Ali, A. M., Bakry, M. M., & Mustafa, N. (2016). Impact of a pharmacist led diabetes mellitus intervention on HbA1c, medication adherence and quality of life: A randomised controlled study. *Saudi Pharmaceutical Journal*, 24(1), 40-48.
- Chen, P., Zhang, F., Shen, Y., Cai, Y., Jin, C., Li, Y., . . . Zhang, S.-F. (2021). Health-Related Quality of Life and Its Influencing Factors in Patients with Hepatitis B: A Cross-Sectional Assessment in Southeastern China. *Canadian Journal of Gastroenterology and Hepatology*, 2021.
- Cho, H. J., & Park, E. (2017). Quality of life of chronic hepatitis C patients and its associated factors. *Osong public health and research perspectives*, 8(2), 124.
- Chugh, Y., Katoch, S., Sharma, D., Bahuguna, P., Duseja, A., Kaur, M., . . . Prinja, S. (2022). Health-Related Quality of Life Among Liver Disorder Patients in Northern India. *Indian J Community Med*, 47(1), 76-81. doi:10.4103/ijcm.ijcm\_1033\_21
- Cortesi, P. A., Conti, S., Scalone, L., Jaffé, A., Ciaccio, A., Okolicsanyi, S., . . . Fagioli, S. (2020). Health related quality of life in chronic liver diseases. *Liver International*, 40(11), 2630-2642.
- Dalgard, O., Litwin, A. H., Shibolet, O., Grebely, J., Nahass, R., Altice, F. L., . . . Peng, C.-Y. (2022). Health-related quality of life in people receiving opioid agonist treatment and treatment for hepatitis C virus infection. *Journal of Addictive Diseases*, 1-12.
- Dalky, H. F., Meininger, J. C., & Al-Ali, N. M. (2017). The Reliability and Validity of the Arabic World Health Organization Quality of Life-BREF Instrument Among Family Caregivers of Relatives With Psychiatric Illnesses in Jordan. *The journal of nursing research : JNR*, 25(3), 224-230. doi:10.1097/jnr.000000000000146
- Girgis, N., Farahat, N., & Ahmed, H. (2012). Nursing Intervention to Promote Self Care Management Practices for Clients with Hepatitis"C"Virus. *Journal of American Science*, 8(7), 581-591.
- Hirano, J., Yoshio, S., Sakai, Y., Songling, L., Suzuki, T., Itoh, Y., . . . Oomori, H. (2021). Hepatitis C virus modulates signal peptide peptidase to alter host protein processing. *Proceedings of the National Academy of Sciences*, 118(22), e2026184118.
- Hudson, A. G., Bonacci, R. A., Moorman, A. C., Penley, M., Wilson, S. M., Hoffman, J. L., . . . Bixler, D. (2022). Hepatitis C virus infection preceding an outbreak of HIV among persons who inject drugs-Kanawha County, West Virginia, 2019-2021. *Clinical Infectious Diseases: an Official Publication of the Infectious Diseases Society of America*, ciac619-ciac619.
- Kamal, SM (2017). Hepatitis C in Egypt. Hepatitis C in Developing Countries: Current and Future Challenges. 1st Edition. London: Academic Press; Chapter 1:1-56.
- Khayyat, S. M., Mohamed, M. M. A., Khayyat, S. M. S., Hyat Alhazmi, R. S., Korani, M. F., Allugmani, E. B., . . . Abdul Hadi, M. (2019). Association between medication adherence and quality of life of patients with diabetes and hypertension attending primary care clinics: a cross-sectional survey. *Qual Life Res*, 28(4), 1053-1061. doi:10.1007/s11136-018-2060-8
- Khorvash, F., Ataei, B., Baghersad, Z., & Boroumandfar, Z. (2021). Effectiveness of the Educational-Supportive Program to Improve the Quality of Life Among Patients

- with Hepatitis C virus (HCV): A Quasi-Experimental Study. *Jundishapur Journal of Health Sciences*(In Press).
- Kim, H. J., Chu, H., & Lee, S. (2018). Factors influencing on health-related quality of life in South Korean with chronic liver disease. *Health and quality of life outcomes*, 16(1), 1-8.
- Kleinsinger, F. (2018). The unmet challenge of medication nonadherence. *The Permanente Journal*, 22.
- Kouyoumjian, S. P., Chemaitelly, H., & Abu-Raddad, L. J. (2018). Characterizing hepatitis C virus epidemiology in Egypt: systematic reviews, meta-analyses, and meta-regressions. *Scientific reports*, 8(1), 1-17.
- Liu, C. H., Su, T. H., Liu, C. J., Hong, C. M., Yang, H. C., Tseng, T. C., . . . Kao, J. H. (2019). Sofosbuvir-based direct acting antiviral therapies for patients with hepatitis C virus genotype 2 infection. *Journal of Gastroenterology and Hepatology*, 34(9), 1620-1625.
- Naderifar, M., Tafreshi, M. Z., Ilkhani, M., Akbarizadeh, M. R., & Ghaljaei, F. (2018). Correlation between quality of life and adherence to treatment in hemodialysis patients. *Journal of Renal Injury Prevention*, 8(1), 22-27.
- Neiman, A. B., Ruppar, T., Ho, M., Garber, L., Weidle, P. J., Hong, Y., . . . Thorpe, P. G. (2018). CDC Grand Rounds: Improving medication adherence for chronic disease management—Innovations and opportunities. *American Journal of Transplantation*, 18(2), 514-517.
- Noreen, A., Alam, N., Syed, Z., Aftab, A., Shamim, F., Najeebullah, S., . . . Adnan, F. (2022). Prevalence and assessment of associated risk factors of hepatitis B and C infections in low-socioeconomic communities. *Future Virology*, 17(5), 291-303.
- Papaluca, T., McDonald, L., Craigie, A., Gibson, A., Desmond, P., Wong, D., . . . Doyle, J. (2019). Outcomes of treatment for hepatitis C in prisoners using a nurse-led, statewide model of care. *Journal of Hepatology*, 70(5), 839-846.
- Rodis, J. L., & Kibbe, P. (2010). Evaluation of medication adherence and quality of life in patients with hepatitis C virus receiving combination therapy. *Gastroenterology Nursing*, 33(5), 368-373.
- Shahid, I., Alzahrani, A. R., Al-Ghamdi, S. S., Alanazi, I. M., Rehman, S., & Hassan, S. (2021). Hepatitis C diagnosis: simplified solutions, predictive barriers, and future promises. *Diagnostics*, 11(7), 1253.
- Shin, J. W., Jung, S. W., Lee, S. B., Lee, B. U., Park, B. R., Park, E. J., & Park, N. H. (2018). Medication nonadherence increases hepatocellular carcinoma, cirrhotic complications, and mortality in chronic hepatitis B patients treated with entecavir. *Official journal of the American College of Gastroenterology* | *ACG*, 113(7), 998-1008.
- Tay, L. K. (2019). *Factors Affecting Adherence with Medication among Hypertensive Patients Attending Kwahu Government Hospital*. University of Ghana.
- Upton, J. (2020). Activities of daily living (adl). *Encyclopedia of Behavioral Medicine*, 26-26.
- Verloo, H., Chiolero, A., Kiszio, B., Kampel, T., & Santschi, V. (2017). Nurse interventions to improve medication adherence among discharged older adults: a systematic review. *Age and ageing*, 46(5), 747-754.
- Weber, J. R. (2021). *Nurses' handbook of health assessment*: Lippincott Williams & Wilkins.