Effect Of Implementing a Teaching Unit On The Severity Of The Side Effects Of Interferon And Ribavirin And Sofosbuvir Triple Therapy Among Hepatitis c Patients

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Abstract

Background: Hepatitis C virus is treatable disease, but the current triple therapy is with several well-described side effects that are dominated by fatigue, influenza-like symptoms, hematologic abnormalities, and neuropsychiatric symptoms. Developing strategies that maximize adherence will likely improve the efficacy of currently available HCV therapy. One of the most effective strategies is patients' education related treatment especially side effects of the HCV therapy and self-care practices to manage them. Aims: to determine the effect of implementing a teaching unit on the severity of the side effects of (triple therapy), interferon, ribavirin and sofosbuvir among patients with hepatitis C. Study Design: quasi experimental design was utilized (Pre posttest control trial). Setting: The present study was conducted at the Outpatient Clinics of Hepatology Center in El-. kabary General Hospital and in The Main University (El-Miry) hospital. Subjects: Forty adult patients with HCV infection were assigned randomly and were scheduled for the first dose of triple therapy. Tools: three tools were used for this study. Tool I: Hepatitis C Virus Patient's Knowledge Structured Interview Schedule to assess patients' knowledge related to HCV, and its therapy, side effects, as well as self-care practices for each side effect. Tool II: Triple therapy side effects, severity of side effects and Patients' self - care practices structured interview schedule. Tool III: Fatigue Severity Scale. Results: there is a highly statistically significant difference between the studied patients' total knowledge scores pre implementation of teaching unit and 4- and 8-weeks post implementation of teaching unit. There is no significant difference between score of self-care practices with scores of severities of side effects pre and 4 weeks post implementation of teaching unit. While there is significant difference between them 8 weeks post implementation of teaching unit. Conclusion: all knowledge scores of the studied patients with hepatitis C virus related to HCV infection were highly statistically improved post implementation of the teaching unit, since all Ps were < 0.001 except for genotypes of HCV (P= 0.004). There is significant difference between score of self-care practices with scores of severities of side effects pre and post 8 weeks after implementation of teaching unit (p=0.023). Recommendations: well developed and specific teaching unit should be employed to all patients in suitable environment that supported with more audiovisual materials and should be initiated and ended before implementation of HCV triple therapy.

Keywords: Teaching unit, side effects of triple therapy, hepatitis C patient.

Introduction

Hepatitis C virus (HCV) is a chronic and potentially deadly disease that is considered as a major public health problem that has a significant global impact. It often known as a 'silent killer' because many HCV patients don't know they are infected until they've suffered from the long term, life-threatening effects of a chronic infection as cirrhosis or liver cancer (**Ghany et al, 2009)**

Infection with HCV is a major public health problem in the Nile Delta of Egypt. Over 200 million people around the world are infected with hepatitis C. An overall incidence is around 3.3% of the world's population. Figures from epidemiological studies in different regions of the world show wide variance in HCV prevalence patterns. Though it is clearly evident that the incidence of HCV is higher among developing nations. The prevalence of hepatitis C is lowest in Northern European countries, including Great Britain, Germany and France. However alarming rates were reported for many African nations, reaching as high as 14.5% in Egypt (**Rao et al, 2002)**.

A very high prevalence of HCV and a high morbidity and mortality from chronic liver disease, cirrhosis, and hepatocellular carcinoma is in Egypt. Approximately 20 % of Egyptian blood donors are anti-HCV positive. Egypt has higher rates of HCV than neighboring countries as well as other countries in the world with comparable socioeconomic conditions and hygienic standards for invasive medical, dental, or paramedical procedures (**Seyedian et al, 2017).**

The most recent treatment for chronic hepatitis C is the triple combination of sofosbuvir (Sovldi), pegylated interferon (IFN) alfa and ribavirin which is the treatment of choice according to the Food and Drug Association (FDA) for genotype 4 of hepatitis C. The efficacy endpoint of hepatitis C treatment is to cure hepatitis C via a sustained elimination of the virus. A sustained elimination of HCV is achieved if the HCV RNA remains negative six months after the end of treatment (**Seyedian et al, 2017).**

Sustained virological response (SVR) is defined by the absence of detectable HCV RNA in serum as assessed by an HCV RNA assay with a

lower limit of detection of 50 IU/ml or less 24 weeks after the end of treatment (**Smeltzer et al, 2008).** Follow-up studies document that more than 99% of patients who achieve an SVR remain HCV RNA negative 4-5 years after the end of treatment and no signs of hepatitis have been documented. Importantly, long-term benefits of SVR are the reduction of HCV-related hepatocellular carcinoma and overall mortality (**Kinkel et al, 2015).**

Therefore, it is important to reduce side effects and motivate patients to adhere to treatment to optimize treatment responses. Developing strategies that maximize adherence will likely improve the efficacy of currently available HCV therapy. One of the most effective strategies is patients' education related treatment especially side effects of the HCV therapy and self-care practices to manage them (**Fried, 2002).**

Before beginning HCV therapy, patients should be educated about the transient expectations from treatment, particularly the likelihood of experiencing one or more adverse events that could impact transiently on their quality of life. Instructions in self-management techniques can enable HCV patient to play an active role. Simple interventions such as maintaining adequate hydration, lighter workdays or weekend activities, maintaining mild to moderate exercise schedules and judicious use of analgesics and antipyretics can ameliorate some of these side effects. Equally important is providing the patient with regular follow-up visits within a supportive environment (**Fried, 2002).** Hence, this study was developed to determine the implementation of a teaching unit on the severity of the side effects of interferon, ribavirin and sofosbuvir triple therapy among patients with hepatitis C.

Patients and Methods:

Research Design:

Quasi experimental research design was utilized (Pre posttest control trial)

Setting:

The present study was conducted at the Outpatient **Clinics of Hepatology Center in El-kabary General Hospital and in the Main University** (El-Miry) hospital. In El-kabary General Hospital outpatient clinics, drugs are provided for patients for free. Clinics of these hospitals are composed of 7 rooms and one reception station. Two rooms are used for physical examination and follow up of patients, 3 rooms for administration of interferon injections while ribavirin and sofosbuvir were taken from the outpatients' pharmacy, one room for initial assessment and one room for administrative work.

Subjects:

Forty adult patients with HCV infection were assigned randomly. They scheduled for the first dose of triple therapy. Based on the program of **Epi Info 7** which was used to estimate the sample size using a population size of 2400 in 2014, prevalence rate of 10 %, confidence at 95 % and acceptable error of 10 %. The minimum sample size required is 34 patients.

- **The study group** was subjected to a designed teaching unit in addition to the routine hospital care.
- **Inclusion criteria:** The subjects were selected according to the following criteria:
  - Adult patients 21-60 years.
  - Free from any other associated disease as uncontrolled diabetes, hypertension.
  - Able to communicate verbally, and able to follow instructions.
  - Willing to participate in the study.

Tools of the study:

Three tools were used for data collection based on a thorough review of relevant literature (**Potter & Perry 2009, Terrault et al, 2013**).

Tool One: Hepatitis C Virus patient's knowledge structured interview schedule:

This tool was developed in Arabic language by the researcher after the review of relevant recent literature [(10)] to assess patients' knowledge related to HCV, and its therapy, side effects, as well as self-care practices for each side effect. It was divided into two parts:

Part I: Sociodemographic characteristics as patients' age, level of education, occupation, marital status, residence, and smoking behavior…etc.

Part II: patients' knowledge related to the following categories:

- ***HCV (disease process):*** such as definition, risk factors, signs and symptoms, mode of transmission, diagnosis, and complications.
- ***HCV therapy*** such as, name, dose, route, action of therapy, duration, contraindication, patients' follow up, response to therapy, and side effects of therapy.
- ***Knowledge related to Self-care practices for each side effect*** such as, diet, rest, sleep, exercise, caffeinated beverages, oral care, and fluid intake.

***Scoring system (*Chopra et, al 2013):**

Patients' knowledge answers were scored on 3 points likert scale (1= no, 2= not sure, and 3= yes). After that all scores were summed up together for each patient. Total score was classified as the following:

- **Good:** More than 70% of the total patients' knowledge scores.
- **Fair:** Less than 70% up to 50% of the total patients' knowledge scores.
- **Poor:** Less than 50% of the total patients' knowledge scores**.**

Tool Two: Triple therapy side effects, severity of side effects and Patients' self - care practices structured interview schedule:

This tool was developed in Arabic language by the researcher after the review of relevant recent literature (**Younossi et al, 2007)** to assess current side effects of triple therapy such as constitutional, dermatological, musculoskeletal, cardiovascular, gastrointestinal, respiratory, hematologic, and the severity of each side effects, self-care practices performed by the patients for a given side effect, and its effectiveness. It was consisted of four parts as the following:

Part I: Side effects of triple therapy

This part aims to collect data about side effects of triple therapy experienced as Influenza –like symptoms, Muscoskeletal side effects **(**myalgia, back pain, arthralgia), cardiovascular side effects (hypotension, tachycardia), Gastrointestinal side effects (nausea, anorexia, diarrhea, constipation), Respiratory side effects (cough, dyspnea), Hematologic side effects (anemia, thrombocytopenia).

Part II: The severity of side effects of triple therapy

This part was used to determine the severity of each side effect on a 5-point likert scale, with responses ranging from 1(not at all) to 5 (extremely severe).

Part III: Self-care practices as performed by the patients for a given side effect

This part was concerned with describing the actions or self-care practices that is taken by patient to deal with each side effect as adequate rest, regular exercise, increased fluid intake to 2-3 liters per day as soon as treatment starts, oral care, and the effectiveness of each action taken to relieve the side effects according to the following (0=not used, 1 used but not relief, 2=used, partially relieved, 3=used, completely relieved).

Part IV: Medical Data

This part was used to assess Complete blood count (CBC), Vital signs (temperature, pulse, respiration, blood pressure).

Scoring system **(Aguado et al, 2018)*:***

All scores were added for each patient. Total score was classified as the following:

- **Mild: From zero to less than 30%** of the total patients' side effects severity scores.
- **Moderate: From 30% to less than 70%** of the total patients' side effects severity scores.
- **Severe: From 70% up to 100%** of the total patients' side effects severity scores.

Tool Three: Fatigue Severity Scale:

It was developed by (**Krupp et al 1989**) and was translated into Arabic by the researcher, to measure fatigue severity .It consisted of nine statements concerning with response to fatigue that includes decreased motivation associated with fatigue, how fatigue affects exercise, physical functioning, easily fatigability, frequent problems associated with fatigue, carrying out duties, interfering with work, family, or social life with score ranged from 1-7, where 1 indicates strongly disagree (low fatigue level) and 7 indicates strongly agree (high fatigue level) (**Hegazy et al 2013)**.

Scoring system:

The total score was ranged from 9 - 45. From 13.5 - 22.5 is categorized as mild fatigue level, and from 23-31.5 is categorized as moderate, while more than 31.5 – 45 is categorized as severe fatigue level.

The original likert scale ranges from 1-7for each item. The scoring system was readjusted to likert scale 5 ranging from 1-5 here 1 indicates strongly disagree (low fatigue level) and 5 indicates strongly agree (high fatigue level). using the following formula: **Adjusted score = Patient Score x 45 / 63**

I. METHOD

1. Written approval:

Before conduction of the study an official letter from the faculty of nursing was submitted to the general director and head of the hepatic outpatient clinics of El-kabary General Hospital and The Main University Hospital to take approval for data collection. Permission to carry out the study was obtained from the director of the chosen setting after explanation of the purpose of the study.

2. Development of the study tools:

- Hepatitis C Virus patient's knowledge structured interview schedule (Tool I) and Interferon, ribavirin and sofosbuvir triple therapy side effects, severity of side effects and patients' self-care practices structured interview schedule (Tool II) were developed by the researcher after thorough review of relevant literature.
- Fatigue Severity Scale (Tool III) was adopted by the researcher and was translated into Arabic language to assess severity of fatigue among HCV patients.

3. Validity:

The study tools and teaching unit were tested for content validity by a jury of nine experts in medical surgical nursing specialty and the necessary modifications was carried out accordingly.

4. Reliability:

Reliability of tools were done using Cronbach Alpha Test. Reliability coefficient for tool I was **0.784**, for part I of tool II was **0.7** while part II and III of it was **0. 78** and for tool III was **0.87**.

5. Pilot study:

A pilot study was conducted on 4 patients for testing clarity; feasibility and applicability of the developed tools and modification were done

accordingly, some items were added as genotypes of HCV in tool I part II, other self-care practices for fatigue, hematological side effects and depression in tool II part II, others were deleted as type of interferon and some sentences were rephrased in tool I part I and II. Data obtained from the pilot study were excluded from the study.

The study was carried out in four phases:

I. Assessment phase:

- **Initial assessment** was carried out immediately once the patients scheduled for the first dose of triple therapy using the three tools to collect baseline data and to identify patients' need for teaching.
- **Subsequent assessment** was done 4 weeks, and then 8 weeks post implementation of teaching unit to evaluate patient's progress.

II. Planning Phase:

- Ideal teaching unit was designed by the researcher based on assessment phase and recent literature review related to HCV, triple therapy, and management of side effects.
- It included goals, contents, priorities and expected outcomes that were tailored and developed by the researcher based on patients' individual needs and problems.
- Illustrative booklet also was developed by the researcher to be distributed to each patient in the implementation phase.

III. Implementation phase:

- After the completion of patient assessment and obtaining the complete picture about patient's needs, the developed teaching unit was implemented and applied individually before beginning of the first dose of triple therapy in the outpatient clinics using verbal instructions and was supported by written booklet as an illustrative guide for more clarification. It was given individually. Patients were asked to bring one of the family members to attend the teaching sessions for reinforcement of the prescribed instructions.
- The teaching unit was consisted of three consecutive sessions; each session was conducted in around 45 minutes; the teaching sessions begin just before the initiation of first dose of the triple therapy in first week of therapy and ended before initiation of therapy because the triple therapy cause memory and concentration impairment as the following:

  first session included the following:

  - **HCV infection (**Definition, Risk factors, Signs and symptoms, Mode of transmission, Diagnosis**, and** Complications).
  - **Treatment of HCV (**Treatment of HCV infection, goal of using triple therapy, Duration of the triple therapy, Contraindication of the triple therapy, Follow up of patients' response during and after triple therapy, Action of triple therapy).

  Second session included Side effects of HCV therapy and self-care practices to relive each side effect of HCV therapy. Patients were asked to repeat the knowledge learned several times until the researcher make sure that given knowledge was successfully mastered in each of the first and second sessions.

  Third session was done for reinforcement and answer to any patients' questions.

- The illustrative booklet was given to each patient in the study as a reference before the first session of health education. A time to read and understand the information included in the booklet was given and the researcher clarify any question and information if needed post sessions.

III. Evaluation phase:

All patients were evaluated immediately 4 weeks, then 8 weeks post implementation of teaching unit using the study tools (I, II, II) to assess the impact of education related to self-care practices performed and its effectiveness for a given side effects among the studied patients with hepatitis C. The time consumed for each patient's evaluation was about 20-30 minutes.

6. Statistical analysis:

A. After data were collected and transferred into specially design formats, to be suitable for computer feeding. Data were analyzed using computer with statistical package for social sciences (SPSS) version 18.

B. Data processing:

Complete confidentiality was maintained while the data were being processed.

This stage had two major objectives:

1. Clean data by performing a series of comprehensive checks, making corrections whenever possible. Different statistical procedures (frequencies, median, Interquartile Range (IQR) and cross tabulations) were used to check the validity of data and spot any error.
2. Produce analytic results. This involved the recording of variables into forms required for analysis (**Prasad & Ganesh 2014)**.

Results

Table (1) found that the half of studied patients age were between 50- <60 years. More than half (57.5%)

of the studied patients were from rural area, and the majority (87.5%) of them were married. Illiterate patients formed more than half (60%) of the subjects, while the minority (5 %) of them had university education.

Table (2) exhibited that pulse rate, respiratory rate, and systolic blood pressure showed significant difference between pre, 4- and 8-weeks post implementation respectively with significant difference between pre, post ($p < 0.05$). Hemoglobin, WBCs, and platelets showed significant difference between pre, 4- and 8-weeks post implementation respectively with significant difference between pre, post ($p< 0.05$).

Table (3) clarifies that all the knowledge scores of the studied patients with HCV related to HCV infection were highly statically significantly improved 4- and 8-weeks post implementation of the teaching unit, since all Ps were < 0.001 except for genotypes of HCV (P= 0.004).

Table (4) shows that all the knowledge scores of the studied patients with HCV infection related to triple therapy, its side effects and self-care practices were highly statically significantly improved after applying the teaching unit, since all Ps were < 0.001.

Table (5) showed that as regard to Myalgia/ joint pain, there was a significant difference regarding the Severity of side effect between pre, 4, 8 weeks Post implementation of teaching unit.

Table (6) indicates that all the studied patients (100%) did not have tachycardia pre implementation of teaching unit while equal percentages (10 %) of the patients had this problem post 4 and 8 weeks after application of teaching unit. Regarding the effect of self-care practices, results revealed that (50 %) of the studied patients 4 weeks post implementation of teaching unit compared to (100%) of them 8 weeks post implementation of teaching unit reported partial relief. In relation to hypotension, the results showed that equal percentages (5 %, 5 %) of the studied patients experienced hypotension and reported it as not at all or a little pre and 4 weeks post implementation of teaching unit respectively. While 2.5 % of them experienced this problem and reported it as moderate 8 weeks post implementation of teaching unit. As regards the effect of self-care practices, all (100%) of the studied patients who had hypotension reported it as partial relief pre, 4- and 8-weeks post implementation of teaching unit.

Table (7) showed that (5 %, 40 %, and10 %) of the studied patients experienced nausea pre and 4- and 8-weeks post implementation of teaching unit respectively. Regarding to severity of side effects, (2.5 %, 10%, and 2.5%) of them who had this problem reported it as moderate pre-4, and 8 weeks post implementation of teaching unit respectively. According to the effect of self-care practices, the results revealed that (50%, 12.5%, and 25%) of the studied patients reported partial relief pre, 4- and 8-weeks post implementation of teaching unit respectively without significant difference between before and after implementing teaching unit on the subjects (P=0.791). In relation to vomiting, the table shows that (2.5 %, 17.5 %, and2.5 %) of the studied patients experienced vomiting pre and 4- and 8-weeks post implementation of teaching unit respectively. As regards self-care practices, all (100 %) of the studied patients performed chew mint and teeth brush before meals pre implementation of teaching unit compared to (57 %) of them 4 weeks post implementation of teaching unit and (100%) of them 8 weeks post implementation of teaching unit performed chew mint only. In addition to (14.3%, 28.6%) of the studied patients performed eating warm meals and teeth brush before meal respectively 4 weeks post implementation of teaching unit.

Table (8) displayed that (7.5 %, 32.5 %, and 40 %) of the studied patients experienced anemia pre, 4- and 8-weeks post implementation of teaching unit respectively. Regarding leucopenia, the finding revealed that (5 %, 27.5 %, and 42.5 %) of the subjects experienced leucopenia respectively pre, 4- and 8-weeks post implementation of teaching unit.

Table (9) showed that the studied patients with HCV undergoing triple therapy according to psychological side effects and effectiveness of self-care practices at 3 different intervals: pre, 4, 8 weeks post implementation of teaching unit as experienced by the patients. This table also shows that (25 %, 17.5 %, and 2.5 %) of the studied patients experienced depression pre implementation of teaching unit and 4- and 8-weeks post implementation of teaching unit respectively.

Table (10) demonstrated presence of a highly statistically significant difference between the studied patients' total knowledge scores pre implementation of teaching unit and 4- and 8-weeks post implementation of teaching unit (P<0.0001*).

Table (11) shows that there is no significant difference between the scores of severities of side effects among the studied patients pre implementation of teaching unit and 4- and 8-weeks post implementation of teaching unit (P=0.991).

Table (12) shows that there is no significant difference between the scores of self-care practices of side effects among the studied patients pre implementation of teaching unit and 4- and 8-weeks post implementation of teaching unit (P=0.991).

Table (13) shows that there is significant difference between them 8 weeks post implementation of teaching unit (p=0.001). Also, there is significant difference between knowledge and self-care practices scores pre implementation of teaching unit (p=0.01).

Table (1): socio-demographic data of hepatitis C virus patients.

Socio-demographic characteristics	Studied patients(n=40)	
	No.	%
Age (years)		
20-	2	7
30-	7	15.5
40-	11	27.5
50-<60	20	50.0
Place of Residence		
Rural	23	57.5
Urban	17	42.5
Marital status		
Married	30	75
Single /Divorced/widow	10	25
Level of Education		
Illiterate	24	60.0
Read and write/ Basic education	7	17.5
Secondary education	7	17.5
University or higher	2	5.0
Occupation		
Manual	14	35.0
Professional	21	52.5
Housewife	5	12.5
Family income		
Not enough	30	75.0
Enough	10	25.0
No of children		
No	2	5.0
1-3	16	40.0
4-6	21	52.5
More than 6	1	2.5
Smoking habit		
Non-smoker	33	82.5
Smoker	7	17.5
Cigarette smokers	6	15.0
Shisha smokers	1	2.5
Number of cigarettes smoked daily [n=6]		
1 pack or less	5	83.3
3 packs or more	1	16.7

Table (2): Mean score and standard deviation of the studied patients with hepatitis C virus regarding their medical data pre post teaching unit

Medical data	Mean score and SD of Studied patients (n=40)			Friedman test
	Pre	Post 4 weeks	Post 8 weeks	
Vital signs				
Tempreture	36.5 ±0.4	36.5±0.4	37.0±0.5	P=0.907
Pulse rate	70.1±8.4	76.1±9.1	76.1±9.9	P=0.023*
Respiratory rate	18.2±3.0	18.5±2.8	21.0±5.1	P=0.002*
Systolic blood pressure	114.0±15.2	116.0±14.6	109.5±12.8	P=0.04*
Diastolic blood pressure	78.4±7.5	79.6±7.7	77.9±8.1	P=0.292
Hematologic parameters				
Hemoglobin	13.7±1.9	12.6±2.4	11.8±1.7	P<0.0001*
WBCs count	6.4±2.1	4.8±1.9	4.5±1.9	P<0.0001*
Platelets count	203.8±58.9	179.1±62.4	204.2±89.0	P=0.021*

Table (3): Knowledge of the studied patients regarding HCV infection at 3 different intervals pre, 4-, and 8-weeks post implementation of teaching unit.

Knowledge		Studied patients (n=40)						Chi-Square test
		Pre implementation of teaching unit		4weeks Post implementation of teaching unit		8weeks Post implementation of teaching unit		
		No.	%	No.	%	No.	%	
Knowledge about HCV infection	**Score**							
Nature of HCV infection	Correct	0	0.0	33	82.5	36	90.0	P<0.0001*
	Incomplete	2	5	1	2.5	3	7.5	
	Incorrect	38	95	6	15.0	1	2.5	
Genotypes of HCV	Correct	0	0.0	1	2.5	6	15.0	P=0.004*
	Incomplete	0	0.0	3	7.5	5	12.5	
	Incorrect	40	100.0	36	90.0	29	72.5	
HCV Signs and symptoms	Correct	0	0.0	6	15.0	9	22.5	P<0.0001*
	Incomplete	9	22.5	31	77.5	31	77.5	
	Incorrect	31	77.5	3	7.5	0	0.0	
HCV Risk factors	Correct	0	0.0	2	5.0	0	0.0	P<0.0001*
	Incomplete	12	30	37	92.5	40	100.0	
	Incorrect	28	70	1	2.5	0	0.0	
HCV transmission Modes	Correct	0	0.0	21	52.5	21	52.5	P<0.0001*
	Incomplete	8	20	16	40.0	18	45.0	
	Incorrect	32	80	3	7.5	1	2.5	
Diagnosis of HCV	Correct	0	0.0	7	17.5	6	15.0	P<0.0001*
	Incomplete	9	22.5	29	72.5	33	82.5	
	Incorrect	31	77.5	4	10.0	1	2.5	
Complications of HCV	Correct	0	0.0	0	0.0	1	2.5	P<0.0001*
	Incomplete	6	15.0	30	75.0	33	82.5	
	Incorrect	34	85.0	10	25.0	6	15.0	

Data are presented as frequency (percentage). ***: significant at P≤0.05**

Table (4): Distribution of the studied patients in relation to their knowledge about triple therapy, its side effects and self-care practices at 3 intervals; pre, 4-, and 8-weeks post implementation of teaching unit.

Knowledge		Studied patients (n=40)						Chi-Square test
		Before 1st dose		After 4 weeks		After 8 weeks		
		No.	%	No.	%	No.	%	
Knowledge about treatment								
Name of HCV therapy	Correct	5	12.5	13	32.5	13	32.5	P<0.0001*
	Incomplete	2	5.0	24	60.0	27	67.5	
	Incorrect	33	82.5	3	7.5	0	0.0	
The aim of HCV therapy	Correct	9	22.5	33	82.5	37	92.5	P<0.0001*
	Incomplete	0	0.0	4	10.0	1	2.5	
	Incorrect	31	77.5	3	7.5	2	5.0	
Duration of HCV therapy	Incorrect	1	2.5	3	7.5	1	2.5	P<0.0001*
	Incomplete	31	77.5	2	5.0	5	12.5	
	Correct	8	20.0	35	87.5	34	85.0	
Contraindication of triple therapy	Correct	0	0.0	3	7.5	3	7.5	P<0.0001*
	Incomplete	2	5.0	21	52.5	18	45.0	
	Incorrect	38	95.0	16	40.0	19	47.5	
Is there a risk when you stop taking triple therapy without physician's order	Yes	10	4	39	97.5	40	100	P<0.0001*
	No/ not know	30	96.0	1	2.5	0	0.0	
Assessment of the therapy toxicity or risks	Correct	0	0.0	6	15.0	1	2.5	P<0.0001*
	Incomplete	4	10.0	27	67.5	37	92.5	
	Incorrect	36	90.0	7	17.5	2	5.0	
Assessment patient's response to therapy	Correct	0	0.0	6	15.0	2	5.0	P<0.0001*
	Incomplete	3	7.5	29	72.5	36	90.0	
	Incorrect	37	92.5	5	12.5	2	5.0	
Knowledge about side effect and self care								
Are there some side effects that may be caused by triple therapy	No /not know	35	87.5	0	0.0	0	0.0	P<0.0001*
	Yes	5	12.5	40	100.0	40	100.0	
What are side effects of triple therapy	Incorrect	35	87.5	2	5.0	1	2.5	
	Incomplete	5	12.5	38	95.0	39	97.5	
	Correct	0	0.0	0	0.0	0	0.0	
Self-care practices	Correct	0	0.0	0	0.0	0	0.0	P<0.0001*
	Incomplete	0	0.0	37	92.5	38	95.0	
	Incorrect	40	100.0	3	7.5	2	5.0	

Data are presented as frequency (percentage). *Significant at P≤0.05

Table (5): Distribution of the studied patients with HCV undergoing triple therapy according to the constitutional side effects.

Constitutional Side Effects		Studied patients (n=40)						Chi-Square test
		Pre implementation of teaching unit		4 weeks Post implementation of teaching unit		4 weeks Post implementation of teaching unit		
		No.	%	No.	%	No.	%	
Myalgia/ joint pain	Absent	25	62.5	21	52.5	27	67.5	
	Present	15	37.5	19	47.5	13	32.5	P=0.381
Severity of side effect	Not at all/ A little	3	7.5	8	20.0	0	0.0	
	Moderate	8	20.0	4	10.0	4	10.0	MCP=0.005*
	Quite a bit / V. severe	6	15.0	7	17.5	9	22.5	
Self-care practices	None	5	29.4	3	15.8	0	0.0	
	Exercises	0	0.0	3	15.8	2	15.4	
	Massage	2	11.8	7	36.8	8	61.5	
	Local creams	6	35.3	4	21.1	5	38.5	
	Rest	5	29.4	3	15.8	2	15.4	
	Others (icepacks, compressive bandage, warm compresses or shower)	1	5.9	5	26.3	11	84.6	
Effectiveness of self-care practices on decreasing the severity of the side effects	Not used	5	29.4	3	15.8	0	0.0	
	no relief	1	5.9	1	5.3	0	0.0	P=0.086
	Partial relief	11	64.7	12	63.2	13	100.0	
	Complete relief	0	0.0	3	15.8	0	0.0	
Headache	Absent	28	70.0	26	65.0	33	82.5	
	Present	12	30.0	14	35.0	6	15.0	P=0.125
Severity of side effects	Not at all / A little	6	15.0	3	7.5	0	0.0	
	Moderate	3	7.5	4	10.0	0	0.0	MCP=0.013*
	Quite a bit / V. severe	3	7.5	7	17.5	6	15.0	
Self-care practices	None	2	16.7	0	0.0	0	0.0	
	Head bandage	1	8.3	4	28.6	3	50.0	
	Coffee/tea	0	0.0	1	7.1	0	0.0	
	Rest/sleep	1	8.3	3	21.4	1	16.7	
	Fluids	0	0.0	0	0.0	1	16.7	
	Analgesics	8	66.7	8	57.1	5	83.3	
	Others	0	0.0	3	21.4	2	33.3	
Effectiveness of self-care practices on decreasing the severity of the side effects	Not used	2	16.7	0	0.0	0	0.0	
	no relief	7	58.3	0	0.0	1	16.7	**P=0.002***
	Partial relief	3	25.0	10	71.4	5	83.3	
	Complete relief	0	0.0	4	28.6	0	0.0	

Table (6): Distribution of the studied patients with HCV undergoing triple therapy according to the cardiovascular side effects and effectiveness of self-care practices at 3 different intervals pre, 4-, and 8-weeks post implementation of teaching unit as experienced by patients.

Cardiovascular Side Effects		Studied patients (n=40)						Chi-Square test
		Pre implementation of teaching unit		4 weeks post implementation of teaching unit		8 weeks post implementation of teaching unit		
		No.	%	No.	%	No.	%	
Tachycardia	Absent	40	100.0	36	90.0	36	90.0	
	Present	0	0.0	4	10.0	4	10.0	P=0.117
Severity of side effects	Moderate	0	0.0	3	7.5	2	5.0	^{FE}P=1.0
	Quite a bit	0	0.0	1	2.5	2	5.0	
Self-care practices	Bed rest	-	-	2	50.0	4	100.0	
	Squatting position	-	-	1	25.0	1	25.0	
	Avoid exertion	-	-	2	50.0	0	0.0	
	Lie on bed/raise foot	-	-	1	25.0	0	0.0	
	Lean forward	-	-	2	50.0	1	25.0	
Effect of self-care practices	Not used	-	-	0	0.0	0	0.0	--
	no relief	-	-	0	0.0	0	0.0	
	Partial relief	-	-	2	50.0	4	100.0	
	Complete relief	-	-	2	50.0	0	0.0	
Hypotension	Absent	38	95.0	38	95.0	39	97.5	
	Present	2	5.0	2	5.0	1	2.5	P=0.812
Severity of side effects	Not at all / a little	2	5.0	2	5.0	0	0.0	-NA-
	Moderate	0	0.0	0	0.0	1	2.5	
Self-care practices	Fluids	2	100.0	1	50.0	1	100.0	
	Squatting position	1	50.0	0	0.0	0	0.0	
	Medications	0	0.0	1	50.0	0	0.0	
Effect of self-care practices	Partial relief	2	100.0	2	100.0	1	100.0	
	Complete relief	0	0.0	0	0.0	0	0.0	

^self-care practices entail more than one answer P-value: P-value for Chi-Square test ^{MC}P: Monte Carlo corrected - NA-: Not applicable

^{FE}P: Fisher's Exact test ^{LR}P: P-value for Likelihood ratio test *significant at P≤0.05

Table (7): Distribution of the studied patients with HCV undergoing triple therapy according to the upper gastrointestinal side effects and effectiveness of self-care practices at 3 different intervals pre, 4-, and 8-weeks post implementation of teaching unit as perceived by the patients.

GIT side effects		Studied patients (n=40)						Chi-Square test
		Pre implementation of teaching unit		4 weeks post implementation of teaching unit		8 weeks post implementation of teaching unit		
		No.	%	No.	%	No.	%	
Upper GIT side effects								
1.Nausea	Absent	38	95.0	24	60.0	36	90.0	
	Present	2	5.0	16	40.0	4	10.0	**P<0.0001***
Severity of side effect	Not at all / A little	1	2.5	5	12.5	1	2.5	
	Moderate	1	2.5	4	10.0	1	2.5	LRP=0.823
	Quite a bit/ V. severe	0	0.0	7	17.5	2	5.0	
	None	1	50.0	10	62.5	3	75.0	
	Avoid strong odors	1	50.0	0	0.0	0	0.0	
	Avoid cold meals	0	0.0	2	12.5	0	0.0	
	Avoid excess sugar	0	0.0	1	6.3	0	0.0	
	Ice creams	0	0.0	6	37.5	1	25.0	
	Not used	1	50.0	10	62.5	3	75.0	
	no relief	0	0.0	2	12.5	0	0.0	P=0.791
	Partial relief	1	50.0	2	12.5	1	25.0	
	Complete relief	0	0.0	2	12.5	0	0.0	
2.Vomiting	Absent	39	97.5	33	82.5	39	97.5	
	Present	1	2.5	7	17.5	1	2.5	**P=0.013***
Severity of side effect	Not at all /A little	1	2.5	1	2.5	1	2.5	
	Moderate	0	0.0	1	2.5	0	0.0	
	Quite a bit/ V. severe	0	0.0	5	12.5	0	0.0	
	None	0	0.0	0	0.0	0	0.0	
	Chew mint	1	100.0	4	57.1	1	100.0	
	Eat warm meals	0	0.0	1	14.3	0	0.0	
	Teeth brush before meal	1	100.0	2	28.6	0	0.0	
	Not used	0	0.0	1	14.3	0	0.0	
	Partial relief	1	100.0	5	71.4	1	100.0	--
	Complete relief	0	0.0	1	14.3	0	0.0	
3.Anorexia	Absent	31	77.5	26	65.0	32	80.0	
	Present	9	22.5	14	35.0	8	20.0	P=0.259
Severity of side effects	Not at all/ A little	1	2.5	3	7.5	1	2.5	
	Moderate	2	5.0	2	5.0	2	5.0	MCP=0.727
	Quite a bit /V. severe	6	15.0	9	22.5	5	12.5	
	None	5	55.6	7	50.0	0	0.0	
	White meat, eggs, milk	2	22.2	5	35.7	2	25.0	
	Attractive meals	0	0.0	3	21.4	1	12.5	
	Eat favorite food	2	22.2	6	42.9	3	37.5	
	Avoid fluids before meal	0	0.0	1	7.1	0	0.0	
	Others	0	0.0	2	14.3	2	25.0	
	Not used	5	55.6	7	50.0	2	25.0	
	no relief	1	11.1	1	7.1	1	12.5	P=0.509
	Partial relief	2	22.2	6	42.9	5	62.5	
	Complete relief	1	11.1	0	0.0	0	0.0	

Table (8): Distribution of the studied patients with HCV undergoing triple therapy according to hematologic side effects and effectiveness of self-care practices at 3different intervals pre, 4-, and 8-weeks post implementation of teaching unit as experienced.

Hematologic side effects		Studied patients (n=40)						Chi-Square test
		Pre implementation of teaching unit		4 weeks post implementation of teaching unit		8 weeks post implementation of teaching unit		
		No.	%	No.	%	No.	%	
1.Anemia	Absent	37	92.5	27	67.5	24	60.0	
	Present	3	7.5	13	32.5	16	40.0	**P=0.003***
Severity of side effects	Not at all / A little	2	5.0	11	27.5	10	25	
	Moderate	1	2.5	1	2.5	4	10.0	^{MC}P=0.858
	Quite a bit / V. severe	0	0.0	1	2.5	2	5.0	
2.Leucopenia	Absent	38	95.0	29	72.5	23	57.5	
	Present	2	5.0	11	27.5	17	42.5	**P=0.0005***
Severity of side effects	Not at all/ A little	0	0.0	7	17.5	11	17.5	
	Moderate	2	5.0	3	7.5	5	12.5	^{MC}P=0.444
	Quite a bit / V. severe	0	0.0	1	2.5	5	12.5	
3.Thrombo—cytopenia	Absent	38	95.0	36	90.0	34	85.0	
	Present	2	5.0	4	10.0	6	15.0	P=0.329
Severity of side effects	Not at all/ A little	0	0.0	2	5.0	2	5.0	
	Moderate	2	5.0	0	0.0	1	2.5	^{LR}P=0.061
	Quite a bit / V. severe	0	0.0	2	5.0	3	7.5	
Self-care practices	None	2	66.7	11	55.0	7	33.3	
	Food rich in iron	1	33.3	4	20.0	8	38.1	
	Fish/egg/milk	1	33.3	2	10.0	6	28.6	
	Lemon/orange	1	33.3	4	20.0	6	28.6	
	Medications	0	0.0	2	10.0	5	23.8	
	Others (honey)	0	0.0	0	0.0	1	4.8	
Effect of self-care practices	Not used	2	66.7	11	55.0	7	33.3	
	no relief	1	33.3	4	20.0	8	38.1	P=0.496
	Partial relief	0	0.0	5	25.0	6	28.6	

Table (9): Distribution of the studied patients with HCV undergoing triple therapy according to psychological side effects.

psychological side effects		Studied patients (n=40)						Chi-Square test
		Pre implementation of teaching unit		4 weeks post implementation of teaching unit		8 weeks post implementation of teaching unit		
		No.	%	No.	%	No.	%	
1.Depression	Absent	30	75.0	33	82.5	39	97.5	
	Present	10	25.0	7	17.5	1	2.5	**P=0.045***
Severity of side effects	Not at all/ A little	0	0.0	1	2.5	0	0.0	
	Moderate	4	10.0	4	10.0	1	2.5	LRP=0.279
	Quite a bit/ V. severe	6	15.0	2	5.0	0	0.0	
Self-care practices	None	0	0.0	0	0.0	0	0.0	
	Hear Quran	3	37.5	3	42.9	0	0.0	
	Reading/TV	0	0.0	1	14.3	0	0.0	
	Light exercise	0	0.0	2	28.6	0	0.0	
	Open areas	3	37.5	0	0.0	1	100.0	
	Praying	3	37.5	4	57.1	0	0.0	
	Wash for praying	1	12.5	3	42.9	0	0.0	
	Visit relatives / friends	0	0.0	0	0.0	1	100.0	
	Al-Zekr	1	12.5	1	14.3	0	0.0	
	Make good things generally	1	12.5	1	14.3	0	0.0	
	Others	0	0.0	1	14.3	0	0.0	
Effect of self-care practices	Not used	1	12.5	0	0.0	0	0.0	
	Partial relief	5	62.5	6	85.7	1	100.0	P=0.775
	Complete relief	2	25.0	1	14.3	0	0.0	
2.Insomnia	Absent	35	87.5	31	77.5	38	95.0	
	Present	5	12.5	9	22.5	2	5.0	P=0.069
Severity of side effects	Not at all/ A little	1	2.5	0	0.0	0	0.0	
	Moderate	1	2.5	5	12.5	1	2.5	LRP=0.267
	Quite a bit / V. severe	3	7.5	4	10.0	1	2.5	
Self-care practices	None	3	60.0	3	33.3	0	0.0	
	Avoid day sleep	1	20.0	2	22.2	1	50.0	
	Light exercise	0	0.0	2	22.2	1	50.0	
	Go to bed late	0	0.0	1	11.1	0	0.0	
	Avoid coffee/tea	0	0.0	1	11.1	0	0.0	
	Warm bath before bed	0	0.0	7	77.8	1	50.0	
	Reading at bed	0	0.0	3	33.3	0	0.0	
	Sleep Zekr	1	20.0	1	11.1	0	0.0	
Effect of self-care practices	Not used	3	60.0	3	33.3	0	0.0	
	no relief	1	20.0	0	0.0	0	0.0	P=0.233
	Partial relief	0	0.0	5	55.6	2	100.0	
	Complete relief	1	20.0	1	11.1	0	0.0	

Table (10): Knowledge scores about HCV among the studied patients pre and post implementation of teaching unit.

Knowledge items	Knowledge Score						Friedman test
	Min-Max	Mean±SD	Poor (<60%)		Good (60%≤)		
			No.	%	No.	%	
About HCV infection							
• Pre implementation of teaching unit	0.0-35.7	8.4±10.7	40	100.0	0	0.0	P<0.0001*
• 4 weeks post implementation of teaching unit	14.3-74.4	51.2±13.4	31	77.5	9	22.5	
• 8 weeks post implementation of teaching unit	28.6-78.6	57.3±11.4	22	55.0	18	45.0	
About treatment							
• Pre implementation of teaching unit	0.0-68.8	10.2±18.7	38	95.0	2	5.0	P<0.0001*
• 4 weeks post implementation of teaching unit	12.5-81.3	59.4±14.8	14	35.0	26	65.0	
• 8 weeks post implementation of teaching unit	43.8-81.3	60.3±8.6	19	47.5	21	52.5	
About side effect and self-care							
• Pre implementation of teaching unit	0.0-25.0	3.1±8.4	40	100.0	0	0.0	P<0.0001*
• 4 weeks post implementation of teaching unit	0.0-50.0	46.9±11.6	40	100.0	0	0.0	
• 8 weeks post implementation of teaching unit	25.0-50.0	48.1±6.7	40	100.0	0	0.0	
Total score							
• Pre implementation of teaching unit	0.0-44.1	8.6±13.1	40	100.0	0	0.0	P<0.0001*
• 4 weeks post implementation of teaching unit	14.7-67.6	54.6±11.5	29	72.5	11	27.5	
• 8 weeks post implementation of teaching unit	35.3-73.5	57.6±7.4	24	60.0	16	40.0	

***Significant at P≤0.05**

Table (11): Severity of side effects scores among the studied patients pre and post implementation of teaching unit

Severity of side effects	Scores							Friedman test
	N	Min-Max	Mean±SD	Low (<60%)		High (60%≤)		
				No.	%	No.	%	
• Pre implementation of teaching unit	32	20.0-100.0	60.9±16.4	11	34.4	21	65.6	P=0.991
• 4 weeks post implementation of teaching unit	37	20.0-100.0	60.8±17.8	17	45.9	20	54.7	
• 8 weeks post implementation of teaching unit	40	20.0-93.3	60.5±17.3	18	45.0	22	55.0	

Table (12): Scores of self-care practices among the studied patients pre and post implementation of teaching unit

Self-care practice	Score							Friedman test
	N	Min-Max	Mean±SD	Low (<60%)		High (60%≤)		
				No.	%	No.	%	
• Pre implementation of teaching unit	32	0.0-100.0	46.0±27.8	12	37.5	20	62.5	P=0.991
• 4 weeks post implementation of teaching unit	37	0.0-83.3	46.5±24.5	12	32.4	25	67.6	
• 8 weeks post implementation of teaching unit	40	0.0-83.3	53.5±17.5	17	42.5	23	57.5	

Table (13): Correlation between knowledge score about severity of side effects and self-care practices scores among the studied patients.

Scores	Knowledge Score					
	Pre implementation of teaching unit		4 weeks post implementation of teaching unit		8weeks post implementation of teaching unit	
	R	**P**	**r**	**P**	**R**	**P**
Score of Severity of side effects	0.054	0.769	0.25	0.136	**-0.5**	**0.001***
Self-care practice score	**0.447**	**0.01***	0.162	0.337	0.048	0.7 69

r: Spearman Rho correlation coefficient. *: Significant at P≤0.05

Discussion

The current study suggests that the severity of triple therapy side effects will be decreased post implementation of teaching unit among hepatitis C patients. These side effects affect all body systems; constitutional, musculoskeletal, dermatological, respiratory, cardiovascular, gastrointestinal, hematological, psychological side effects. Constitutional side effects include fever, headache, joint ache, and muscular pain while musculoskeletal include joint ache, muscular pain and backache. Dermatological side effects of triple therapy are dermatitis, itching, and alopecia. Respiratory side effects involve cough, and dyspnea while cardiovascular involve tachycardia and hypotension. Gastrointestinal side effects represent upper and lower gastrointestinal tract (GIT) side effects; upper GIT include anorexia, nausea, and vomiting while lower GIT include constipation and diarrhea. Hematological side effects involve anemia, leucopenia, and thrombocytopenia while psychological include depression and insomnia.

Concerning sociodemographic data, the results of the present study revealed that half of the studied patient's age was in the age group of 50-late adult years. This finding agrees with (**Besely et al 2022**), (**Srinivas et al 2021**), and (**Danilovic. et al 2011**) who illustrated that the prevalence rate of HCV is higher in persons of more than 40 to 49 years old than in younger person. This finding may be related to the strong correlation between age and chronicity of HCV; and progression of HCV is accelerated over time. On the contrary reported that the high prevalence of HCV affects all age groups in Egypt, suggesting that an ongoing risk of HCV acquisition exists.

The finding of this study showed that more than half of patients came from rural areas. This finding is consistent with (**Fikry et al 2015**), (**Lehman and Wilson2009), (Strickland 2010)**, (Lavanchy 2011) and (**Mahmoud et al 2020**). It might attribute to the iatrogenic role of parental anti-Schistosoma therapy campaigns to control endemic schistosomiasis in rural areas, improper health practices, and lack of infection control among Egyptian rural units. Also, two thirds of the studied patients' family income was insufficient. This finding was matched with (**Stepanova et al 2011**); who stated that a high proportion of HCV positive patients had lowered income. In addition, (**Khattak. et al 2009**) illustrated that most HCV positive patients had low income or low socioeconomic status. This result may be related to increased poverty and unemployment in Egypt especially in rural regions.

The study revealed that most patients were married. This result comes in line with (**Khattak. et al (2009**) who emphasize that most patients were married or newly married. This finding may be related to increased risk of HCV infection among married patients. Marriage increases their exposure to sexual contact with HCV husband or wives, cesarean section, instrumental assisted delivery, episiotomy, uterine curettage, abortion, or insertion of intrauterine loop. The majority of the studied female's patients exposed to gynecological factors according to the results of (**Mahmoud et al 2020**).

The present study finding revealed that illiterate patients formed more than half of the sample. This finding is supported by (**Khattak. et al (2009**). The finding may be related to the association between illiteracy and many false traditional practices and unhealthy behaviors as ear piercing with unsterilized instrument, circumcision by unqualified person or by unsterile instruments, delivery at home by dayah. In addition, illiteracy is genuinely associated with increased risk of HCV infection. Furthermore, Established Data base Health System (EDHS) revealed that persons with less than primary education were greatly more liable to be infected with hepatitis C than the more educated (**Paez et al 2009)**.

It was observed that housewives represented the lowest percentage of the studied subjects. These results justified by decreased exposure to infected blood through household works, and most of the studied patients were male. These results come in line with **Alavi *and* Hajiani 2011**; who illustrated that housewives were at low risk for HCV infection through household works. On contrast (**Mahmoud et al 2020**) and (**Kamel et al 2017**); illustrated that highest percentage of their studied subjects were not working and housewives.

The current findings illustrate that most of the studied patients were nonsmokers. It may be related to increased awareness of people related to

risks of smoking through mass media, internet and health care workers.

These results were contradicted with (**Mahmoud et al 2020**) who illustrated that there was no significant difference in knowledge score between patients who received information about their disease and therapy from specialized physicians and others and all the knowledge score was low. Moreover, the results of present study revealed that many of the studied patients did not receive information related to HCV and its treatment which contradicted with the results of (**Mahmoud et al 2020**).

Regarding side effects of triple therapy, in relation to constitutional side effects, the current study represented that all or most of the studied patients reported partial relief of side effects after implementation of teaching unit except fever, more than one third of them reported partial relief and complete relief. Furthermore, the mean body temperature of the studied patients pre-post implementation of teaching unit was within normal range. It may be related to the effect implementation of the teaching on the severity of side effects, and it may be due to Flu-like symptoms which usually diminish spontaneously over the first weeks of treatment. These results nearly matched with (**Mohsen et al. 2011**) who found that more than half of their studied patients had fever before this study done while it decreased to normal after implementation of nursing protocol.

Moreover (**Siebert et al. 2009**) mentioned that the most common adverse events reported for Interferon during the clinical studies were flu-like symptoms especially fever that varies from mild to severe.

In relation to upper GIT side effects, nausea and vomiting are known common side effects of sofosbuvir (**Mohsen et al. 2011**). The current finding showed that although there was no significant difference between the upper GIT side effects and their severity pre and post implementation of the teaching unit the percentage of the studied patients with upper GIT side effects and their severity had decreased and the majority reported partial relief post implementation of teaching unit. It may be justified by the effect of educational session that was provided to patients in the teaching unit. This was in line with results of (**Mohsen et a 2011**). who found that all studied Sample complained of anorexia before giving the proposed Intervention. While after the study by 8 weeks, there was significantly reduction of number of patients who had these side effects.

Patients who are treated with IFN may complain of anorexia, weight loss, or early satiety; this mentioned by (**Lavanchy, 2011**) and (**Smith et al 2008**). A nutritional assessment should be conducted before initiating therapy to determine ideal body weight, weight history, and eating habits, and the patient and family should be educated regarding proper nutrition and techniques to combat anorexia and related issues. Patients should be encouraged to eat small, frequent meals; to use high-protein supplements; and to take multivitamins. The patient and family should be counseled regarding realistic expectations about meal preparation, mealtimes, and changes in eating habits and food preferences.

In relation to lower GIT side effects, the results of present study explored that the number of the studied patients with constipation pre the implementation of teaching unit equal the number of them 4 weeks post implementation with less severity. While 8 weeks post implementation of teaching unit the number of them was decreased but the severity did not decrease. Furthermore, the results revealed that the percentages of the studied patients with constipation who reported partial relief increased afterwards due to their adherence to self-care practices.

These results may be justified as mentioned by (**El Gharib, 2015**) through performing combination of self-care practices at the same time may be more effective than performing only one self-care practices or more but separately 4 weeks post the implementation of teaching unit, the studied patients drank more fluids with performing other self-care practices while post 8 weeks, they drank more fluids only). Furthermore, constipation is a common complaint among the studied patients specifically and generally among HCV patients.

The hematological parameters of the studied patients confirmed that the mean of hemoglobin and WBCs and platelets count were decreased during the period of the study. The findings clarify that the mean hemoglobin of the studied patients was nearly decreased post implementation of teaching unit than pre implementation of it. It may be related to many factors such as triple therapy, nutrition, HCV infection, and disease and triple therapy together **(Dehesa, et al 2007).** Factors related to triple therapy include bone marrow suppression by interferon and erythrocytes destructive effect of ribavirin. The addition of sofosbuvir to peg interferon alfa and ribavirin is associated with additional decrease of hemoglobin concentration and neutrophil counts. Factors related to nutrition such as impaired nutritional status which are complicated by nausea, vomiting and anorexia. Factors related to HCV infection such as impaired metabolism and increased risk of bleeding. Factors related to disease and triple therapy involve impaired concentration, and lack of memorization as stated by (**Ghazy et al 2018**). Socioeconomic factors as poverty; that may be contradicted with buying the very expensive prescribed erythropoietin injection.

On the other hand, the findings of (**Mohsen et al 2011**) showed significant improvement of Hemoglobin level after application of the nursing intervention that is contradicted with the current study.

Although the findings of current study explored that there wasn't significantly decrease in the severity of psychological side effects; depression and insomnia, the number of the studied patients who had depression and insomnia and their severity post implementation of teaching unit were decreased. Additionally, the results revealed that the percentages of the studied patients who report partial relief were increased post implementation of teaching unit. These may be returned to the effect of performing combination of self-care practices which was educated during the teaching unit. Most of these self-care practices are religious beliefs which are identified and performed by most patients naturally.

Stress reduction techniques such as warm bath, yoga, meditation, and visualization can relieve patient's depression as reported by (**Kralj et al.2016**). Research suggests that yoga practice may decrease symptoms such as anxiety, depression, and pain. Yoga and meditation have been reported to increase physical endurance, fitness, mental wellbeing and quality of life. They may help people with hepatitis C overcome physical stress and fatigue. They may also help ease anxiety and tension during treatment**.**

Conclusions:

In conclusion, although this study illustrated that all of the knowledge scores of the studied patients with hepatitis C virus related to HCV infection, triple therapy, its side effects and self-care practices to deal with these side effects were highly statistically significant improved post implementation of the teaching unit, there is no significant difference between the scores of severity of side effects among the studied patients pre and post implementation of teaching unit.

Recommendations:

1. The teaching unit should be applied to all patients in suitable environment for teaching and supported with more audiovisual materials.

2. The teaching unit should be initiated and ended before implementation of HCV triple therapy.

3. Reinforcement sessions should be continuing during the therapy until the end of therapy.

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