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Evaluating on viral load quantification and quality of life in chronic HCV patients on antiviral treatment

S Kusuma Kumari[1]*; Kasula Satwika[2]; KB Vani[3]; C Umesh Chandra[4]; Shaikh Ayesha Jabeen[5]

[1]Associate Professor, Department of Pharmacy Practice, KV Subba Reddy Institute of Pharmacy, Kurnool, Andra Pradesh, India.

[2]Pharm D Students V Year, KV Subba Reddy Institute of Pharmacy, Kurnool, Andra Pradesh, India.

***Corresponding Author: S Kusuma Kumari**
Associate Professor, Department of Pharmacy Practice, KV Subba Reddy Institute of Pharmacy, Kurnool, Andra Pradesh, India.
Email: sathwikakasula@gmail.com; Kusumakumari16@gmail.com

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Abstract

Chronic Hepatitis C Virus (HCV) infection is a major global health concern that can lead to progressive liver damage, cirrhosis, hepatocellular carcinoma, and impaired quality of life. The introduction of Direct-Acting Antiviral (DAA) therapy has significantly improved treatment outcomes by achieving high rates of viral clearance with better tolerability. The present study was conducted to evaluate viral load quantification and its association with quality of life among chronic HCV patients receiving antiviral treatment. A prospective observational study was carried out in the Department of Gastroenterology, Government General Hospital, Kurnool. A total of 57 patients diagnosed with chronic HCV infection and undergoing antiviral therapy were enrolled according to predefined inclusion and exclusion criteria. Demographic, clinical, biochemical, and virological data were collected and analyzed. HCV RNA levels were measured at baseline and after treatment using quantitative polymerase chain reaction techniques. Quality of life was assessed using the Chronic Liver Disease Questionnaire (CLDQ). The study population consisted predominantly of males, with the majority of patients belonging to the 45–54 years age group. Baseline viral load assessment showed varying levels of HCV RNA among participants. Following 12 weeks of antiviral therapy, a substantial proportion of patients achieved undetectable viral load, while the remaining patients demonstrated significant reductions in HCV RNA levels. Improvements were also observed in liver function parameters and other biochemical markers. Quality of life scores improved significantly across all CLDQ domains, reflecting better physical, emotional, and social well-being. Statistical analysis revealed a significant association between viral load reduction and improvement in health-related quality of life. Antiviral therapy was generally safe and well tolerated with minimal adverse effects. The findings of this study indicate that viral load quantification is an essential tool for monitoring treatment response, and effective antiviral therapy not only achieves virological suppression but also enhances overall quality of life and clinical outcomes in patients with chronic Hepatitis C infection.

Keywords: Chronic hepatitis C virus (HCV); Viral load quantification; Direct-acting antivirals (DAAs); Quality of life (QOL); Health-related quality of life (HRQOL); Sustained virological response (SVR); Chronic liver disease questionnaire (CLDQ); Antiviral therapy.

Introduction

Hepatitis C Virus (HCV) infection is a major global public health concern and one of the leading causes of chronic liver disease worldwide. HCV is a small, enveloped, single-stranded positive-sense RNA virus belonging to the family Flaviviridae and genus Hepacivirus. The virus primarily infects hepatocytes, leading to liver inflammation and progressive hepatic damage. Globally, millions of people are living with chronic HCV infection, many of whom remain unaware of their disease due to its asymptomatic nature during the early stages. Acute HCV infection occurs within six months of exposure; however, most infected individuals fail to clear the virus spontaneously and progress to chronic infection. Chronic Hepatitis C is characterized by persistent viral replication, continuous hepatic inflammation, and gradual fibrosis of liver tissue. If left untreated, the disease may progress to cirrhosis, portal hypertension, liver failure, and Hepatocellular Carcinoma (HCC), resulting in significant morbidity and mortality. The virus is mainly transmitted through blood-to-blood contact, including transfusion of contaminated blood products, unsafe injections, intravenous drug use, needle-stick injuries, and inadequately sterilized medical equipment. Less common routes include sexual transmission and mother-to-child transmission during childbirth. Diagnosis of HCV infection relies on serological detection of anti-HCV antibodies and confirmation by HCV RNA testing using Polymerase Chain Reaction (PCR). Assessment of liver function and fibrosis is essential for determining disease severity and guiding treatment decisions. Recent advances in antiviral therapy have revolutionized the management of Chronic Hepatitis C. The introduction of Direct-Acting Antiviral (DAA) agents such as Sofosbuvir, Velpatasvir, and Daclatasvir has significantly improved treatment outcomes, achieving sustained virological response rates exceeding 95% with shorter treatment durations and fewer adverse effects. Early diagnosis, appropriate antiviral therapy, and regular monitoring are crucial for preventing complications and improving the quality of life of affected patients.

Materials and methods

The present study is prospective observational study with subjects are involved from in-patients and out-patient gastroenterology department at Government General Hospital, Kurnool. The subjects are selected on the basis of the inclusion and exclusion criteria.

Study design: The present study was designed as a Prospective study aimed at Evaluating on Viral Load Quantification and Quality of Life in Chronic HCV Patients on Antiviral Treatment.

Study site: The study was conducted in the Department of Gastroenterology in Government General Hospital (GGH), Kurnool, Andhra Pradesh, India.

Study duration: The study was carried out over a period of six months.

Sample size: During the study, A total of 58 Patients diagnosed with Hepatitis C were included in this study.

Study materials: Patient data collection proforma.

Inclusion criteria:

- Patients with chronic HCV ≥18 years.
- Patients with detectable HCV RNA levels-1000 IU\ml.
- Patients treated with Pangenotypic Fixed Dose Combination antivirals Sofosbuvir, Velpatasvir and Daclatasvir OD daily for 12 weeks.
- Patients with T2DM on antidiabetic medication & insulin.
- To asses QOL by using CLDQ

Exclusion criteria:

- Inability to complete the follow up.
- Missing SVR Data.
- Incomplete treatment information.
- Patients with psychiatric conditions, DCLD, HBV, Autoimmune.
- Patients with pregnancy & lactation.
- Patient with Extra Hepatic Manifestations
- Inability to understand & respond to questionnaire.

Ethical committee

The study was approved by the institutional ethical committee.

Results

Table 1: Gender wise distribution.

Gender	No. of patients	Percentage (%)
Female	23	40
Male	35	60

Age distribution of total study

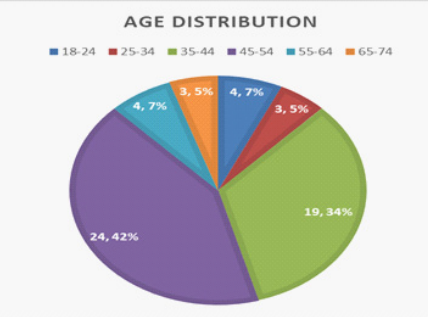

Figure 1: Comorbid conditions of total study.

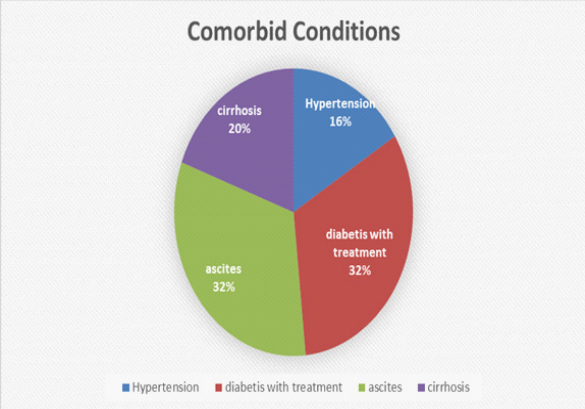

Figure 2: Showing comorbid conditions of patients.

Personal habits of total study

Figure 3: Showing percentage of personal habits of patients.

Treatment distribution

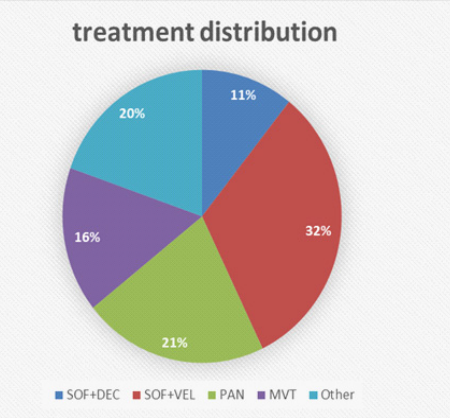

Figure 4: Showing treatment distribution among the patients.

Table 2: Distribution of biochemistry parameters

AST	2.8	200.0	59.018	33.4315
AST3rd	2.5	75.0	29.767	14.8223
SR.ALBUMIN	.5	55.0	9.386	14.5123
SR.ALBUMIN 3rd	.5	22.0	4.018	3.0871
TYROTROPIN	.5	4.2	2.173	.9533
TYROTROPIN 3rd	.1	8.1	2.111	1.6556
PTINR	.50	3.00	1.3897	.45510
PTINR 3rd	.8	2.4	1.321	.4734
Plt count	.60	23.60	2.2039	3.25560
plt count 3rd	.10	4.00	2.3028	.77763
Sr creatine	.0	2.5	.987	.5421
Sr creatinine 3rd	.3	38.0	2.179	6.0410
BU	.8	82.0	26.633	15.8812
BU3	20	47	29.64	5.489

Distribution of HCV RNA level at baseline

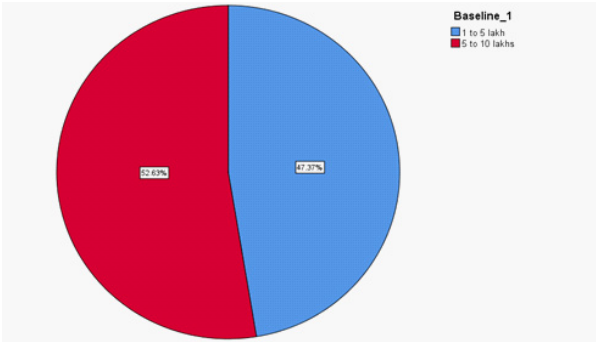

Figure 5: Distribution of HCV RNA baseline.

Distribution of HCV RNA levels at 12 weeks:

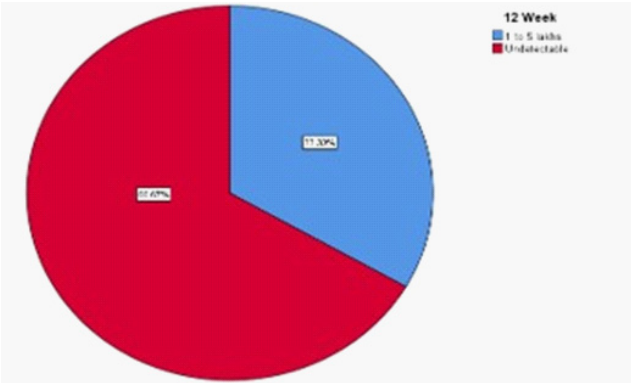

Figure 6: Distribution of patients based on treatment duration.

Table 3: Distribution of blood biochemistry after treatment.

	Treatment Group	Mean	Std. Deviation	P value
Age	sofosbuvir/ daclatasvir	40.50	11.010	0.018
	Sofosbuvir/ velpatasvir	47.35	9.607	
DB	sofosbuvir/ daclatasvir	1.400	2.38	0.364
	Sofosbuvir/ velpatasvir	0.97	0.94	
DB3rd	sofosbuvir/ daclatasvir	3.850	9.3042	0.038
	Sofosbuvir/ velpatasvir	.467	.3139	
IDB	sofosbuvir/ daclatasvir	5.231	15.5939	0.862
	Sofosbuvir/ velpatasvir	6.336	20.4846	
IDB3rd	sofosbuvir/ daclatasvir	.689	.4457	0.382
	Sofosbuvir/ velpatasvir	5.516	16.2161	
ALT	sofosbuvir/ daclatasvir	52.000	50.0812	0.143
	Sofosbuvir/ velpatasvir	69.282	31.7987	
ALT3rd	sofosbuvir/ daclatasvir	37.56	18.875	0.682
	Sofosbuvir/ velpatasvir	35.18	14.227	
AST	sofosbuvir/ daclatasvir	53.438	43.0642	0.422
	Sofosbuvir/ velpatasvir	61.724	28.0011	
AST3rd	sofosbuvir/ daclatasvir	35.550	17.2550	0.220
	Sofosbuvir/ velpatasvir	28.274	14.0569	
SR.ALBUMIN	sofosbuvir/ daclatasvir	16.767	20.1460	0.037
	Sofosbuvir/ velpatasvir	6.619	10.9144	
SR.ALBUMIN 3rd	sofosbuvir/ daclatasvir	5.344	6.2972	0.144
	Sofosbuvir/ velpatasvir	3.620	.9155	
TYROTROPIN	sofosbuvir/ daclatasvir	2.417	.9642	0.476
	Sofosbuvir/ velpatasvir	2.081	.9642	
TYROTROPIN 3rd	sofosbuvir/ daclatasvir	1.817	.5601	0.613
	Sofosbuvir/ velpatasvir	2.246	1.9793	
PTINR	sofosbuvir/ daclatasvir	1.4125	.38707	0.875
	Sofosbuvir/ velpatasvir	1.3832	.47900	
PTINR 3rd	sofosbuvir/ daclatasvir	1.500	.5686	0.267
	Sofosbuvir/ velpatasvir	1.274	.4460	
Plt count	sofosbuvir/ daclatasvir	1.6946	.56720	0.512
	Sofosbuvir/ velpatasvir	2.4045	3.82587	
plt count 3rd	sofosbuvir/ daclatasvir	2.4344	.82549	0.571
	Sofosbuvir/ velpatasvir	2.2645	.77311	
Sr creatine	sofosbuvir/ daclatasvir	1.000	.6429	0.918
	Sofosbuvir/ velpatasvir	.981	.5070	
Sr creatinine 3rd	sofosbuvir/ daclatasvir	1.330	.6499	0.613
	Sofosbuvir/ velpatasvir	2.472	7.0032	
BU	sofosbuvir/ daclatasvir	28.576	22.4111	0.542
	Sofosbuvir/ velpatasvir	25.662	11.6492	
BU3	sofosbuvir/ daclatasvir	33.25	7.573	0.035
	Sofosbuvir/ velpatasvir	28.71	4.518	

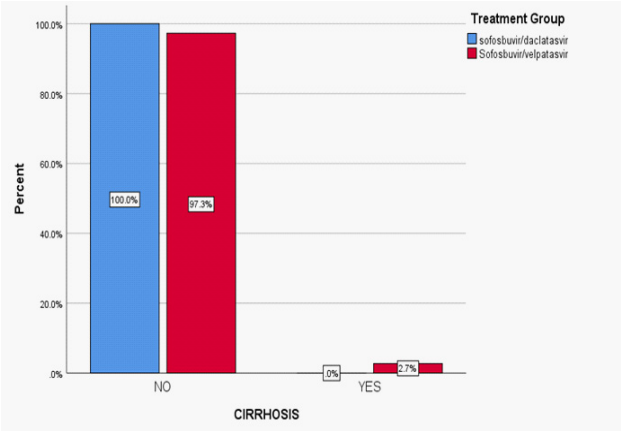

Figure 7: Bar graph showing cirrhosis among patients with HCV along with different treatment groups.

Table 4: Quality of life score at baseline and after 12 weeks

	Mean	Std. Deviation	P value	
Pair 1	Abdominal Bloating(1a)_Baseline	1.7458	.80072	<0.001
	Abdominal Bloating(1a)_12 weeks	5.3220	1.72647	
Pair 2	Abdominal pain(1b)_Baseline	2.4576	1.39361	<0.001
	Abdominal pain(1b)_12 weeks	5.0847	1.35555	
Pair 3	Abdominal discomfort(1c)_Baseline	2.6610	1.32105	<0.001
	Abdominal discomfort(1c)_12 weeks	5.4576	1.22224	
Pair 4	fatigued(2a)_Baseline	2.9153	1.02197	<0.001
	fatigued(2a)_12 weeks	5.0000	1.08278	
Pair 5	sleepiness during the day(2b)_Baseline	3.2203	1.48635	<0.001
	sleepiness during the day(2b)_12 weeks	5.0339	1.17394	
Pair 6	decreased energy(2c)_Baseline	2.5932	.74553	<0.001
	decreased energy(2c)_12 weeks	5.4068	.81195	
Pair 7	decreased strength_Baseline	3.2203	1.61958	<0.001
	decreased strength_12 weeks	5.7797	1.21865	
Pair 8	drowsiness (2d)_Baseline	3.2203	1.81058	<0.001
	drowsiness (2d)_12 weeks	4.5085	1.62282	
Pair 9	bodily pain(3a)_Baseline	2.8814	1.73289	<0.001
	bodily pain(3a)_12 weeks	5.0339	.80870	
Pair 10	SOB during daily activities(3b)_Baseline	3.6610	1.51555	<0.001
	SOB during daily activities(3b)_12 weeks	6.0000	1.09859	
Pair 11	muscle cramps(3c)_Baseline	2.4746	1.17965	<0.001
	muscle cramps(3c)_12 weeks	4.8983	1.15512	
Pair 12	dry mouth(3d)_Baseline	1.8814	.87266	<0.001
	dry mouth(3d)_12 weeks	4.7119	1.81042	
Pair 13	itching(3e)_Baseline	2.8814	1.27421	<0.001
	itching(3e)_12 weeks	5.1525	1.03079	
Pair 14	not eating enough (4a)_Baseline	3.0847	1.83160	<0.001
	not eating enough (4a)_12 weeks	5.6102	1.11443	
Pair 15	troubles in carrying objects(4b)_Baseline	3.8983	1.72901	<0.001
	troubles in carrying objects(4b)_12 weeks	5.7966	.88629	
Pair 16	limitation of diet(4C))_Baseline	2.4746	1.00612	<0.001
	limitation of diet(4C))_12 weeks	5.1356	.95516	
Pair 17	Anxiety(5a)_Baseline	3.3390	1.30794	<0.001
	Anxiety(5a)_12 weeks	5.2712	1.51806	
Pair 18	unhappyiness (5b)_Baseline	3.0169	.60148	<0.001
	unhappyiness (5b)_12 weeks	5.6949	.96943	
Pair 19	irritability(5c)_Baseline	2.4915	1.67510	<0.001
	irritability(5c)_12 weeks	4.8644	1.50238	
Pair 20	Difficulty in sleeping at night (5d)_Baseline	2.8814	1.86700	<0.001
	Difficulty in sleeping at night (5d)_12 weeks	5.3559	.90521	
Pair 21	mood swings(5e)_Baseline	3.8305	1.71356	<0.001
	mood swings(5e)_12 weeks	4.7458	1.35943	
Pair 22	difficultyfalling asleep at night (5f)_Baseline	3.2712	.92532	<0.001
	difficultyfalling asleep at night (5f)_12 weeks	6.2542	.97544	

Pair 23	depression (5g)_Baseline	3.0169	1.60271	<0.001
	depression (5g)_12 weeks	5.1017	1.04543	
Pair 24	problems (5h)_Baseline	3.1864	1.66583	<0.001
	problems (5h)_12 weeks	6.2373	.75061	
Pair 25	worries about the impact of the liver disease (6a)_Baseline	2.3559	1.04655	<0.001
	worries about the impact of the liver disease (6a)_12 weeks	4.6610	1.44569	
Pair 26	worries that symptoms develop into major problems(6b)_Baseline	3.5593	1.63234	<0.001
	worries that symptoms develop into major problems(6b)_12 weeks	4.8983	1.97130	
Pair 27	worries that the conditions is getting worse(6c)_Baseline	4.3729	1.72105	<0.001
	worries that the conditions is getting worse(6c)_12 weeks	5.5932	1.34059	
Pair 28	worries about never feeling any better(6d)_Baseline	2.2034	.73765	<0.001
	worries about never feeling any better(6d)_12 weeks	5.2203	.78932	
Pair 29	concerned about the availabity of a live r(6e)_Baseline	2.5932	1.17618	<0.001
	concerned about the availabity of a live r(6e)_12 weeks	4.6102	1.74214	

All these changes were statistically highly significant ($p<0.001$), indicating that the intervention led to substantial overall improvement in both physical symptoms and mental well-being of the patients.

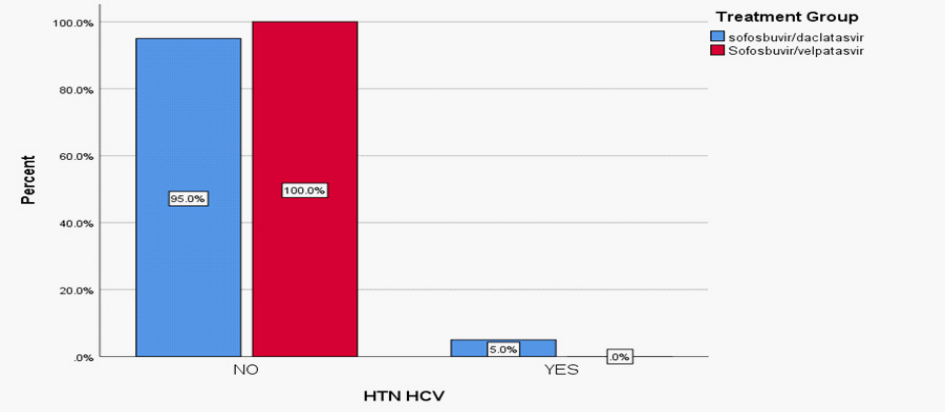

Figure 8: Bar graph showing hypertension in patients with HCV along with different treatment groups.

Discussion

The present study was conducted to evaluate the demographic characteristics, clinical profile, laboratory parameters, treatment outcomes, and quality of life among patients with chronic Hepatitis C receiving Direct-Acting Antiviral (DAA) therapy. A total of 57 patients were included in the study, among whom males constituted the majority of the study population. The predominance of male patients indicates a higher burden of chronic Hepatitis C among men in the study setting. Most patients belonged to the middle-aged group, highlighting the greater prevalence of the disease during the productive years of life. The assessment of comorbidities revealed that diabetes mellitus and ascites were the most frequently observed conditions, followed by cirrhosis and hypertension. These findings emphasize the association of chronic Hepatitis C with metabolic and hepatic complications. Regarding personal habits, alcohol consumption and smoking were commonly reported among the study participants. The occupational distribution showed that farming was the most common occupation, followed by other labor-intensive professions, suggesting a predominance of patients from rural backgrounds. Clinical evaluation demonstrated that appetite loss and fatigue were the most frequently reported symptoms. Other symptoms were observed less commonly, indicating variability in disease presentation among patients. Ultrasonographic examination revealed fatty liver as the most common finding, followed by hepatomegaly, while ascites and splenomegaly were identified in a smaller proportion of patients. Baseline virological assessment showed that the majority of patients had elevated HCV RNA levels, indicating active viral replication at the time of diagnosis. Following treatment, a substantial proportion of patients achieved undetectable viral loads after 12 weeks, demonstrating an excellent virological response to DAA therapy. Comparison of treatment regimens showed that patients receiving sofosbuvir/velpatasvir had a slightly higher mean age than those receiving sofosbuvir/daclatasvir. Both treatment groups exhibited significant improvements in liver function parameters during the study period. Direct bilirubin and indirect bilirubin levels decreased following therapy, reflecting improved hepatic excretory function. Similarly, alanine Aminotransferase (ALT) and aspartate Aminotransferase (AST) levels showed marked reductions, indicating resolution of hepatic inflammation and hepatocellular injury. Serum albumin levels increased during treatment, suggesting recovery of hepatic synthetic capacity. Thyroid-stimulating hormone levels demonstrated improvement toward normal values, indicating stabilization of thyroid function following antiviral therapy.

Prothrombin Time–International Normalized Ratio (PT-INR) values also improved, reflecting better coagulation status and liver function. Platelet counts increased in both treatment groups, suggesting improvement in thrombocytopenia and portal hypertension-related complications. Renal function assessment showed increases in serum creatinine and blood urea levels during treatment, indicating the need for careful monitoring of renal parameters in patients receiving DAA therapy. Evaluation of demographic and clinical variables between treatment groups revealed no statistically significant differences in gender distribution, sleep patterns, appetite changes, ascites occurrence, or cirrhosis development. These findings suggest comparable safety and tolerability profiles between the two treatment regimens.

Subgroup analysis demonstrated that treatment response was slightly lower among patients with diabetes compared to non-diabetic patients, indicating that underlying metabolic disorders may influence therapeutic outcomes. Quality-of-life assessment showed considerable improvement following treatment. Patients reported reductions in abdominal symptoms, improved physical functioning, enhanced daily activity performance, and better psychological well-being. Improvements were also observed in disease-related concerns and overall health perception, reflecting the positive impact of successful antiviral therapy on patient-centered outcomes. Overall, the findings of the present study demonstrate that direct-acting antiviral therapy is highly effective in the management of chronic Hepatitis C. Both sofosbuvir/daclatasvir and sofosbuvir/velpatasvir regimens achieved favorable virological responses and produced significant improvements in clinical symptoms, biochemical parameters, liver function, hematological indices, and quality of life. These results support the use of DAA-based regimens as effective therapeutic options for achieving viral eradication and improving overall patient outcomes in chronic Hepatitis C.

Conclusion

Viral load quantification is a crucial marker for monitoring treatment response in CHCV patients. Antiviral therapy significantly reduces viral load levels over the treatment period. A sustained virological response is associated with improved clinical outcomes. Reduction in viral load correlates with better liver function and reduced disease progression. Patients on antiviral therapy show noticeable improvement in physical health. Quality of life improves in domains such as fatigue, emotional well-being, and daily functioning. Adherence to antiviral therapy plays a key role in achieving favorable outcomes. Psychological health also improves alongside reduction in viral load.

Declarations

Conflict of interest: The authors declare no conflict of intrest.

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