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Biopsychosocial Determinants of Quality of Life in Patients with Hepatitis B and C

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ABSTRACT

Hepatitis B and C are highly contagious viral diseases that impact the liver. Past research findings have identified that in addition to the physical burden of disease, there are numerous psychopathological consequences of these diseases including depression, anxiety, stress and other psychiatric comorbidities. **Objectives:** To assess the prevalence of psychiatric comorbidities in patients, perceived immune status, social support, resilience, health and physical lifestyle and the predictive role of these factors in impacting quality of life in patients with Hepatitis B and C. **Methods:** a correlational research design was used with an independently drawn sample of 400 participants (196 with chronic HBV and 204 with chronic HCV) with the mean age of 40.8 years and a balanced gender distribution. The sample size was finalized using G power analysis with 95 % confidence intervals. Normality checks were also performed on the data through assessing skewness, kurtosis and shape of the distribution. Cross Cutting Symptoms Measure, Essential Resilience Scale, Immune Status Questionnaire, Health and Life Style Scale and WHO QoI BREF scale were used. **Results:** The findings showed that cross cutting symptoms (depression, anger, anxiety, somatic symptoms, suicidal ideation, psychosis, sleep problems, memory, repetitive thoughts and behaviors, dissociation, personality functioning, substance abuse) had a significant negative predictive association with health and lifestyle, perceived immune status, resilience. **Conclusions:** It has been assessed that cross cutting symptoms, perceived immune status, health and lifestyle factors, social support and resilience significantly impact quality of life.

INTRODUCTION

Hepatitis B and Hepatitis C are highly contagious viral diseases that have a notable impact on the liver. These ailments are widespread, chronic in nature, and affect a sizable portion of the global population [1]. Recent research by the World Health Organization has shown that chronic hepatitis B infection has a significant global impact. More than 240 million people are affected by the disease which is now viewed as a debilitating condition contributing towards 686,000 deaths on an annual basis [2]. Similarly, Hepatitis C has been associated with more than 300,000 deaths on an annual basis [3]. Despite significant advancements in antiviral medicine, a considerable portion of those with hepatitis B and C infection still endure severe psychological distress. Hepatitis B and C are viral illnesses that primarily affect the liver; yet, their ramifications extend beyond the realm of physical health [4]. Recent research has shed light on the considerable influence of these conditions on mental well-being, since individuals afflicted with these disorders encounter a diverse array of psychological challenges, encompassing emotions such as melancholy, worry, tension, and in some cases, psychosis [5]. The relevant literature has identified patients with Hepatitis B and C may experience higher levels of stress, depression, anxiety, psychosis, sleep problems, memory disturbances etc. Similarly, the relevant evidence has shown how these psychiatric disturbances impact quality of life outcomes. Findilki *et al.*, conducted a case control study and found

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that higher scores on harm avoidance and low self-directness [6]. It was also found that poor personality functioning marked by a lack of meaning and purpose in life and being unable to have close enjoyable relations is associated with poor mental health outcomes in HBV patients. Daida *et al.*, found that overt hepatic encephalopathy (OHE) may be experienced by HBV and HCV patients. Research has also shown depression, anxiety and psychiatric comorbidities such as substance abuse are marked for being the leading disorders affecting those with chronic Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) [7]. However, despite of the availability of effective treatments and screening measures, depression and chronic stress are underdiagnosed. Also, there is a general lack of understanding about the neuropsychological effects of HBV and HCV in those chronically affected with these fatal viruses [8]. There is also limited research evidence in Pakistan documenting biopsychosocial determinants of Hepatitis B and C especially the role of resilience and perceived immune status in quality of life of those diagnosed with HBV and HCV [9]. Apart from this, the present study assesses the protective role that resilience and social support may play in the quality of life of individuals with HBV and HCV. Moreover, there are no studies in Pakistan that have documented the frequency and prevalence and predictive association of cross cutting symptoms with quality of life in patients with Hepatitis B and C.

METHODS

The study used a cross sectional correlational research design. It was conducted from August 15, 2023, till September 15, 2023. The sample size for the study was determined through G power analyses. Kang has reported that sample size calculations using effect sizes, power estimation, confidence intervals and elimination of chances of Type 1 and Type 2 errors can be done through G power calculators [10]. G power analyses using 95 % confidence intervals revealed that a sample of 300+ participants would be sufficient. The method is used for sample size determination. For the conduct of the present study, a sample size of 400 individuals (196 with Hepatitis B and 204 with Hepatitis C) with 210 males and 190 females in the age range of 20 to 71 years of age were selected with the mean age of 40.48 years were selected through purposive sampling. The participants were recruited from two major outpatient settings in Lahore located at Thokar Niaz Baig, Lahore, and the second one at Allama Iqbal Town, Lahore. Individuals who were non-hospitalized and chronically affected with Hepatitis B and C were selected for the current [11]. For the purpose of data collection, Immunological Status Questionnaire (ISQ) was used to evaluate perceived immunological state during the previous year which comprised 7 items. Evidence suggests that the time restriction may be customized depending on the needs of the health condition [12]. Resilience was assessed through Essential Resilience Scale. According to Chen *et al.*, the Essential Resilience Scale assesses a person's capacity to prepare for, adapt to, and recover from three different types of stressful events: physical, emotional, and social [13]. The DSM-5 Level 1 Cross-Cutting Symptom Measure analyses characteristics of mental health that are essential for all psychiatric diagnoses. It measures 13 psychiatric domains [14]. The WHOQoL-BREF consists of 26 items [15]. It is widely used questionnaire aimed at assessing an individual's perception regarding their quality of life. The questionnaire covers a number of domains and aspects associated with quality of life including perceptions about physical health, psychological health, social relations and the environment. Urdu translated version of the scale was used [16]. To assess the level of biological wellbeing among those with HBV and HCV, items had been constructed in accordance with the findings of Tartaglia [17] and through consultation with experts. All of the scales used in the study had acceptable levels of Cronbach's alpha reliability. Ethical approval for the study was accorded during the Advanced Studies and Research Board of GC University, Lahore, convened on the 13th of September, 2023 vide Memo No. REG-ACAD-ASRB-55/23/037. Compliance was ensured with regard to the ethical guidelines of Declaration of Helsinki. Furthermore, informed consent was attained from all participants and their confidentiality and anonymity was further ensured. The booklet of the questionnaire took about 15 to 20 minutes to complete. The purpose of the study, right to anonymity and other ethical guidelines were complied with during this study. Data analysis was done using SPSS 21.0. Descriptive statistics, normality checks, reliability analysis, correlation analysis, hierarchical regression and structural equational modeling using path analysis were performed to identify predictive associations among the study variables. These statistical tests provide insights about the predictive associations among the constructs.

RESULTS

The results of the study showed the frequency and prevalence of cross cutting symptoms among the participants followed by correlations among cross cutting symptoms, health and lifestyle, resilience and its subscales and quality of life and its subscales. Table 1 shows prevalence rates of cross cutting symptoms among the participants with Hepatitis B and C in accordance with threshold (score of 1 or higher) for the psychopathology symptom criteria.

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Table 1: Frequency and Prevalence of Cross Cutting Symptoms among the Participants

Variable	Frequency (%)
Depression	178 (44.5)
Anger	97 (24.25)
Mania	67 (16.75)
Anxiety	145 (36.25)
Somatic Distress	191 (47.75)
Suicidal Ideation	57 (14.25)
Psychosis	24 (6)
Sleep Disturbance	45 (11.25)
Memory	77 (19.25)
Dissociation	65 (16.25)
Personality Functioning	87 (21.75)
Substance Abuse	31 (7.75)

Note. F=Frequency, participants scoring 1 or higher (cut-points) on any domain were identified as possessing the specific symptomatology as per recommendations of Narrow *et al.*, [14]

Table 2 indicates the results of a correlation analyses performed to assess the presence of significant associations among the study variables. The assumptions for running a Pearson product moment correlation were tested. Normality checks were performed and the criteria were met. The study found that cross cutting symptoms had significant positive associations with one another but significantly negative associations with resilience, immune function and quality.

Table 2: Correlation of Cross Cutting Symptoms Measure with Brief Symptom Inventory and Subscales of Essential Resilience Scale

Variable	I	II	III	IV	V	VI	VII	VIII	IX	X
1.Depression and Anger	-	.32**	.29**	.41***	.28**	.26**	.37***	-.29**	-.41**	-.33**
2.Mania and Anxiety		-	.31**	.29**	.40**	.28**	.21*	-.40***	-.29**	-.41**
3.Somatic Symptoms			-	.28**	.29**	.25*	.06	-.31**	-.14	-.38**
4.Suic.ide.Psychosis				-	.31**	.25*	.32**	-.30**	-.37**	-.35**
5. Sleep and Memory					-	0.07	0.05	-.21**	-.33**	-.51**
6. Repet.Tho. Behav						-	.35**	-.50**	-.48**	-.47**
7. Diss.Personality Fuc.							-	-.38**	-.39**	-.42**
8. Resilience								_	-.44**	-.31**
9. Immune Function									-	-.33**
10. Quality of Life										_

Note. *p<.05, **p<.01, Suic.ide.psychosis=suicidal ideation and psychosis, repet-tho.behav=repetitive thoughts and behavior, diss.personality.fun=dissociation and personality functioning

Table 3 shows hierarchical regression analysis to examine the relationship between sociodemographic variables, biological determinants, and psychosocial determinants. The first model showed that age and gender significantly predicted overall quality of life. The second model assessed biological determinants, including age, gender, time since diagnosis, liver function scores, stage of fibrosis, and health and lifestyle scores. The third model accounted for psychosocial determinants, including age, gender, ALT scores, AST scores, stage of fibrosis, resilience, depression, anger, mania, anxiety, somatic symptoms, suicidal ideation, psychosis, memory, repetitive thoughts and behaviors, dissociation, personality functioning, substance abuse, and social support. The three models explained 55% of the variance in the dependent variable, overall quality of life.

Table 3: Sociodemographic and Biopsychosocial Variables as Predictors of Quality of Life

Variable					t	p	95 % CI	
		B	*SE*	*β*			*LL*	*UL*
	Model 1							
Sociodemographic	Age	-.01	.03	-.01	-.37	.00	-.08	-.05
	Gender	-3.25	.83	-.12	-3.91	.00	-4.89	-1.62
	Socioeconomic Status	-.93	.62	-.05	-1.50	.13	-2.16	.29
	Other_Chronic_Disease	1.28	.93	.05	1.37	.17	-.55	3.12
	time in years	-.10	.09	.04	1.07	.01	-.08	-.27

DOI: https://doi.org/10.54393/pjhs.v4i10.1077

Model 2								
Biological	Age	-.01	.03	-.01	-.33	.00	-.06	-.05
	Gender	-3.82	.89	.14	4.29	.00	-2.07	-5.56
	Socioeconomic Status	-.50	.53	-.02	-.95	.34	-1.54	.53
	Other_Chronic_Disease	1.09	.96	.04	1.14	.26	-.80	2.99
	time in years	-.08	.07	.04	-1.11	.01	-.01	-.13
	Aspartate Aminotransferease	-.05	.02	-.12	-2.64	.01	-.09	-.01
	Fibrosis_Stage	4.76	.43	.29	11.09	.00	3.92	5.60
	Alanine Aminotransferease	-.01	.01	.05	1.10	.00	.01	.13
	Immune_System_Rating	-.03	.30	.00	-.09	.93	-.61	.56
	Health_LifestyleTotal	1.08	.08	.43	12.82	.00	.92	1.25
Model 3								
Psychosocial Factors	Age	.02	.02	.03	1.06	.00	.02	.06
	Gender	-5.04	.92	-.19	-5.50	.00	-6.84	-3.24
	Socioeconomic Status	-.26	.39	-.01	-.67	.50	-1.03	.51
	Other_Chronic_Disease	.54	.72	.02	.75	.46	-.87	1.94
	time in years	-.04	.06	.02	.78	.00	-.01	-.15
	Aspartate Aminotransferease	-.05	.02	.11	3.00	.00	-.02	-.08
	Fibrosis_Stage	2.46	.33	.15	7.43	.00	1.81	3.11
	Alanine Aminotransferease	-.05	.01	-.23	-6.76	.00	-.06	-.03
	Immune_System_Rating	-.27	.22	-.03	-1.22	.22	-.71	.17
	Health_LifestyleTotal	-.13	.12	-.05	-1.13	.26	-.36	.10
	Resilience_Total	.41	.02	.52	22.72	.00	.37	.44
	DepressionCCM	-.07	.17	-.01	-.38	.01	-.01	-.27
	Anger	-1.22	.29	-.10	-4.15	.00	-1.79	-.64
	Mania	-.85	.19	-.12	-4.35	.00	-1.23	-.46
	Anxiety	-.43	.16	-.08	-2.72	.01	-.75	-.12
	Somatic_Symptoms	-.40	.18	-.06	-2.19	.03	-.77	-.04
	Suicidal_Ideation	-.97	.25	-.08	-3.84	.00	-1.46	-.47
	Psychosis	.69	.17	.09	3.99	.00	.35	1.03
	Sleep_Problems	-.32	.37	-.03	-.86	.39	-1.04	.41
	Memory	.62	.36	.06	1.73	.08	-.08	1.32
	Repetitive_ThoughtsBehaviors	.34	.16	.04	2.15	.03	.03	.64
	Dissociation	.35	.21	.03	1.68	.09	-.06	.75
	Personality_Functioning	.38	.18	.04	2.13	.03	.03	.72
	Substance_Abuse	-.85	.18	-.11	-4.86	.00	-1.19	-.51
	Social Support	.21	.12	.19	3.21	.00	.05	.33

Table 4 and Figure 1 depict path analysis executed via AMOS with 95 % confidence intervals and 2000 bootstrapped samples showing the indirect impact of social support on quality of life (β = .18, p < .01), which is significant, and the indirect effect of anger (β =-.61, p = .000), mania (β = -.44, p=.001), anxiety (β = -.21, p=.001), somatic symptoms (β =-.32, p = .000), suicidal ideation (β =-.62, p = .000), psychosis (β =-.42, p = .000), memory (β =-.03, p = .000), substance abuse (β =-.94, p = .000), and liver function/immune function test (β =-.01, p = .000) on quality of life is significant and thus provided evidence of a partial mediation. Please refer to figure 1 for more details.

Table 4: Social Support as a Mediator between the Relationship of Psychological Determinants (depression, anger, mania, somatic symptoms, psychosis, memory, repetitive thoughts and behaviors, dissociation, personality functioning and substance) and overall Quality of Life

X on Y	Mediator	Indirect Effect	Direct Effect
Dissociation	Social Support	.02	-.28**
Anger	Social Support	-.77**	-.61**
Mania	Social Support	-.02**	-.44**
Anxiety	Social Support	-.02**	-.21**
Somatic-Sympt.	Social Support	-.12**	-.32**
Suicidal Ideat.	Social Support	-.01**	-.62**
Psychosis	Social Support	-.01**	-.42**
Sleep Problems	Social Support	.18	-.27**
Memory	Social Support	-.04**	-.03**
Rep. Thot. Behv.	Social Support	-.01	.40**
Person. Func.	Social Support	-.28	-.15**

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Substance Abuse	Social Support	-.16**	-.94**
LFT/IS	Social Support	-.01**	-.09**

Note. **p < .01. Standardized coefficients are shown. Somatic-Sympt. =Somatic Symptoms, Rep. Thot. Behav. =Repetitive Thoughts and Behaviors, LFT/IS=Liver Function AST/ALT tests and Immune System Functioning

Figure 1 depicts the mediating role of social support in the association between cross cutting symptoms and quality of life. The findings showed that cross cutting symptoms significantly predicted social support which in turn significantly predicted quality of life. However, only the indirect effects of anger, mania, anxiety, somatic symptoms, suicidal ideation, psychosis, memory, substance abuse and liver function/immune function test on quality of life were significant thus providing evidence of partial mediation.

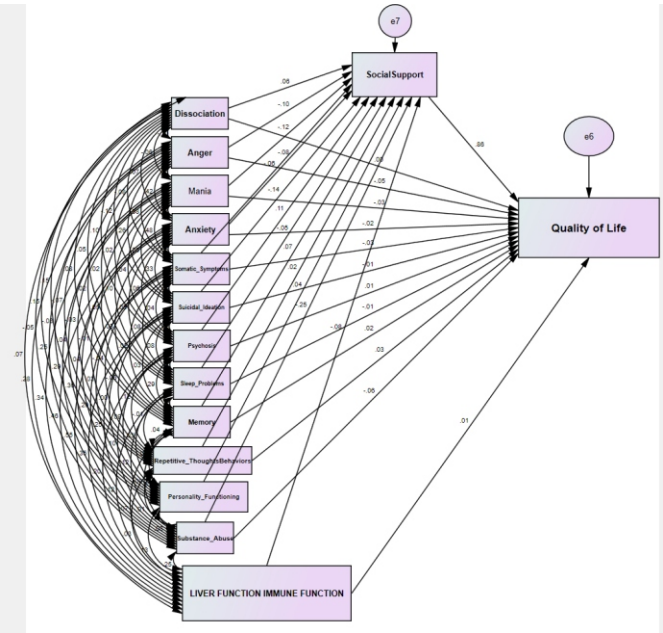

Figure 1: Social support as a Mediator between the Relationship of Psychological Determinants (depression, anger, mania, somatic symptoms, psychosis, memory, repetitive thoughts and behaviors, dissociation, personality functioning and substance) and overall Quality of Life

Table 5 and Figure 2 depict path analysis executed via AMOS with 95 % confidence intervals and 2000 bootstrapped samples showing the indirect impact of resilience on quality of life (β = .38, p < .01), which is significant, and the direct effect of anger (β=-.33, p = .000), mania (β = -.66, p=.001), anxiety (β = -.27, p=.001), suicidal ideation (β = -.92, p = .000), psychosis (β =-.49, p = .000), sleep problems (β=-.12, p = .000), substance abuse (β=-.28, p = .000), and liver function/immune function test (β = -.01, p = .000) on quality of life is significant and thus provided evidence of a significant partial mediation. Please refer to figure 2 for more details.

Table 5: Resilience as a Mediator between the Relationship of Psychological Determinants (depression, anger, mania, somatic symptoms, psychosis, memory, repetitive thoughts and behaviors, dissociation, personality functioning and substance) and overall Quality of Life

X on Y	Mediator	Indirect Effect	Direct Effect
Dissociation	Resilience	-.09	-.39
Anger	Resilience	-.39**	-.33**
Mania	Resilience	-.32**	-.66**
Anxiety	Resilience	-.20**	-.27**
Somatic-Sympt.	Resilience	-.50**	.01**
Suicidal Ideat.	Resilience	-.34**	-.92**
Psychosis	Resilience	-.70**	-.49**
Sleep Problems	Resilience	.93**	-.12**
Memory	Resilience	-.04**	-.02
Rep. Thot. Behv.	Resilience	-.09	-.28
Person. Func.	Resilience	-.16	-.19
Substance Abuse	Resilience	-.76**	-.28**
LFT/IS	Resilience	-.04**	-.01**

Note. **p < .01. Standardized coefficients are shown. Somatic-Sympt. =Somatic Symptoms, Rep. Thot. Behav. =Repetitive Thoughts and Behaviors, LFT/IS=Liver Function AST/ALT tests and Immune System Functioning

Figure 2 depicts the mediating role of social support in the association between cross cutting symptoms and quality of life. The findings showed that cross cutting symptoms significantly predicted resilience which in turn significantly predicted quality of life. However, only the indirect effect of anger, mania, anxiety, somatic symptoms, suicidal ideation, psychosis, memory, substance abuse and liver function/immune function test on quality of life were significant thus providing evidence of partial mediation.

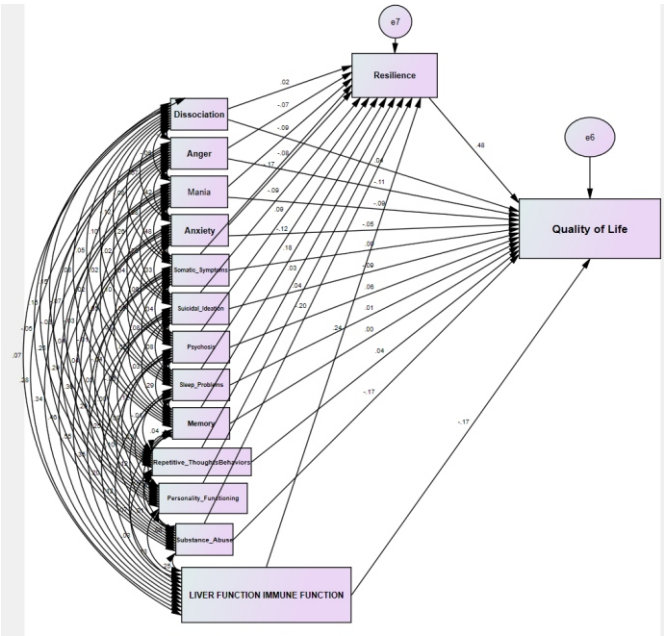

Figure 2: Resilience as a Mediator between the Relationship of Psychological Determinants (depression, anger, mania, somatic

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symptoms, psychosis, memory, repetitive thoughts and behaviors, dissociation, personality functioning and substance) and overall Quality of Life

DISCUSSION

The purpose of the present study was to assess the role of sociodemographic factors and biopsychosocial determinants in predicting quality of life in patients with hepatitis b and c. Moreover, the emphasis was on assessing how biopsychosocial determinants impact quality of life in the participants. The findings were beneficial in identification and analyses of the determinants and the predictive role of sociodemographic and associated factors. First, it was hypothesized cross cutting symptoms such as depression, anger, suicidal ideation, repetitive thoughts and behaviors, substance etc. will have significant associations with resilience, social support and quality of life in HBV and HCV patients. The findings offered a partial confirmation of this hypotheses in accordance with the relevant literature. The relevant literature identified that depression is a highly prevalent psychiatric outcome in patients with HBV and HCV [18]. Specifically, individuals with chronic HBV and HCV are often experience manic attacks, depression, anxiety and behavioral problems. These psychiatric outcomes may not be necessarily elicited as a side effect to alpha interferon therapy. Sertoz *et al.*, also showed an agreement with the fact that depression, anxiety, stress, mania and associated behavioral problems and issues are associated with poor quality of life outcomes in HBV and HCV patients [19]. Research has also shown that depression, anxiety, stress, mania and anger have significant predictive associations in patients with chronic liver disease [20]. Zhu, however, identified that depression, anxiety and stress may be seen as pre-existing problems among HBV and HCV patients. However, there is consistent evidence to show that a number of psychiatric conditions such as mania, suicidal ideation and psychosis may emerge during the course of treatment. The authors further raised the need of collaborative involvement and management of these conditions as they can lead to improvements in the wellbeing and quality of life of these patients. It has also been assessed the need of providing extensive psychiatric care for patients with Hepatitis C [21]. Oh and Lee argued that personality dysfunction may emerge in patients with decompensated liver cirrhosis and during hepatic encephalopathy (a serious condition marked by accumulation of neurotoxic substance in the bloodstream and brain primarily seen during advanced stage of liver cirrhosis) [22]. It was also hypothesized that sociodemographic factors such as gender, age, number of years, presence of other chronic diseases as well as biopsychosocial factors such as stage of fibrosis, liver function tests, health and life style factors, depression, social support, perceived immune status, resilience and cross cutting symptoms would significantly predict quality of life in HBV and HCV patients. Youssef *et al.*, identified that gender, presence or absence of cirrhosis or moderate to high level fibrosis (liver inflammation and injury) along with psychiatric comorbidities such as depression, anxiety, anger and substance abuse would significantly predict quality of life in patients with Hepatitis C [23]. Lieber *et al.*, identified how resilience and social support may play a protective role against different psychiatric and adverse physical outcomes in liver transplant survivors and in patients with chronic liver disease [24]. Furthermore, it was hypothesized that social support and resilience would mediate the association among cross cutting symptoms (depression, anxiety, mania, suicidal ideation, dissociation, personality functioning etc.) perceived immune status functioning and quality of life. The results of the current study supported the above hypothesis. Gormley *et al.*, assessed depression, social support and quality of life in drug users with Hepatitis B and C [25]. The findings showed that social support significantly mediates the predictive association with quality of life. The research literature further shows that resilience significantly predicts and mediates the impact of the depressive symptoms, liver function, perceived immune status on quality of life in those diagnosed with Hepatitis B and C [26]. The authors also found that resilience had a large indirect effect on emotional distress and quality of life in patients with Hepatitis C.

CONCLUSIONS

The quality of life in patients with Hepatitis B and C is significantly influenced by biological, psychological, and sociological factors. The biopsychosocial burden of the disease is high, and enhancing resilience, social support, gender, and health and lifestyle factors may improve outcomes. It has been assessed that cross cutting symptoms, alperceived immune status, health and lifestyle factors, social support and resilience significantly impact quality of life. Providing ongoing monitoring and multidisciplinary care may be beneficial in managing these conditions.

Authors Contribution

Conceptualization: SMA, RI
Methodology: SMA
Formal analysis: SMA, RI
Writing-review and editing: SMA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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