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Does Alexithymia Predict the Psychiatric Comorbidity Among Healthy Carriers of Hepatitis B?

ABSTRACT

Objective: The psychiatric disorders among healthy carriers of hepatitis B (HBsAg), who have no severe physical disability or any medical treatment, have clinical importance. We aimed to research the comorbid psychiatric disorders and alexithymia and to identify whether alexithymia and accompanying somatic symptoms predict the presence of psychiatric diagnoses or not among HBsAg carriers.

Methods: Eighty-nine healthy carriers of Hepatitis B patients and nınety-three healthy individuals were included to study. Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (*DSM-IV*) (SCID-I), Hamilton Depression Rating Scale (HAM-D), Hamilton Anxiety Rating Scale (HAM-A), and Toronto Alexithymia Scale (TAS) were applied.

Results: When the distribution of SCID I psychiatric diagnoses among healthy HBsAg carriers examined, majority of the patients (n = 53, 59.6%) had any psychiatric diagnosis. The logistic regression model evaluating whether number of somatic symptoms and alexithymia predict the psychiatric diagnosis, we observed that number of somatic symptoms predicted the presence of psychiatric diagnosis (odds ratio = 2.762, $P < .001$).

Conclusion: Our findings revealed that alexithymia may potentiate the occurrence of psychiatric disorders in such patients and that it requires more consideration. So, our results suggest that HBsAg carriers need multidisciplinary evaluation including hepatology, infection clinics and psychiatric liaison.

Keywords: Healthy carriers of hepatitis B, alexithymia, depression, anxiety, somatization

Introduction

Hepatitis B virus (HBV) infection is one of the main causes of chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Patients who have HBV surface antigen (HBsAg) positive for more than 6 months, HBV DNA below 2000 IU/mL, Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST) levels consistently normal, and liver biopsy showing no hepatitis-specific findings are defined as healthy HBsAg carriers.[1] Psychiatric disorders are common in chronic HBV patients.[2-8] Patients with HBV assume that the disease is mortal, live with disease stigma, and become socially isolated due to the supposed transmissibility of the disease, which easily accounts for the occurrence of psychiatric disorders.[9]

Investigating the literature, we observed that studies generally were performed among heterogeneous groups infected with HBV including both carriers and chronic HBV.[3,6-8] There are few studies carried among only asymptomatic HBsAg carriers.[2,5,6,10] These patients have insufficient or mistaken information about transmission routes of the virus, which may cause isolation of the patients in social, family, and professional life and this eases the occurrence of psychiatric disorders.[2-4] Additionally, early diagnosis and treatment of psychiatric diseases in patients with chronic HBV is important for the treatment of psychiatric disorders itself in addition to the progression and management of HBV.[2,5]

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Studying the psychiatric comorbidity among asymptomatic HBsAg carriers, who have no severe physical disability or any medical treatment, has clinical importance too.[2,5] Investigating psychiatric comorbidity provides insights into the overall health impacts of hepatitis B carriers beyond the physical symptoms associated with the virus. So, it will help us to understand overall health impacts about these patients. Psychiatric comorbidities such as depression or anxiety can significantly impact the quality of life for hepatitis B carriers.[11,12] Studying these conditions helps identify areas for intervention to improve well-being.[12] Recognizing psychiatric comorbidities is crucial for treatment planning. It allows healthcare providers to address both physical and mental health needs comprehensively, leading to more effective and holistic care. Psychiatric comorbidities may increase the risk of complications or exacerbate existing liver-related issues in hepatitis B carriers. Understanding these risks can guide preventive measures and early interventions. Studying psychiatric comorbidity in hepatitis B carriers contributes to a broader understanding of the public health burden associated with the virus. It informs public health policies and resource allocation for screening, prevention, and management programs.[13] Addressing psychiatric comorbidities reduces stigma associated with mental health conditions among hepatitis B carriers. It promotes destigmatization and encourages individuals to seek appropriate care without fear of judgment. Exploring psychiatric comorbidity in hepatitis B carriers fills existing research gaps and expands knowledge in the field of hepatology and psychiatry. It may lead to the development of tailored interventions and treatment approaches for this population.[14]

The alexithymia concept has gained clarity and integrity as a result of clinical and phenomenological observations of psychosomatic patients experiencing difficulty in recognizing and expressing feelings.[15] Alexithymia can be conceptualized as: difficulty identifying one's own feelings, difficulty describing one's own feelings, and externally oriented thinking. Difficulty identifying feelings means not being able to recognize emotions that arise, such as happiness or sadness, while difficulty describing emotions means not being able to put into words how one feels. Externally oriented thinking refers to a thinking style in which the person focuses on stimuli in the external environment rather than his/her emotional state. The inability to recognize and/or identify one's emotions can become particularly problematic when individuals experience unwanted or distressing inner experiences.[16] Evidence determined alexithymic deficiency in processing feelings is a nonspecific susceptibility factor and is a categoric subdimension rather than being a specific category. The clearest trait is difficulty in finding the right words to identify feelings and as a result expressing feelings with many physical symptoms. The role of sensory perception in emotional processes has been repeatedly demonstrated. Patterns of excessive sensory processing encompass difficulties in registering/modulating sensory information and regulating sensory input to provide adaptive responses to situational demands. Also, sensory processing patterns may influence the contribution of alexithymia to the development of psychopathology.[17]

MAIN POINTS

- *Psychiatric disorders are common among healthy HBsAg carriers.*
- *Alexithymia may potentiate the occurrence of psychiatric disorders among healthy HBsAg carriers.*
- *The most specific finding of our study was that the increase in the number of symptoms was predictive for psychiatric diagnoses.*
- *In these patients who are frequently referred to internal medicine, gastroenterology and infectious diseases because of their physical symptoms, it is important to consider the presence of psychiatric diagnosis in patients with fatigue, symptoms involving more than one system and high number of symptoms and to make psychiatric referral by the relevant branch physicians.*

The prevalence of alexithymia was found to be high in many chronic medical disorders,[18] as well as in many psychiatric disorders such as major depressive disorder,[19] anxiety disorders,[20] non-suicidal self-injury[21] and childhood maltreatment.[16] The inability to recognize and/or describe one's emotions can become particularly problematic when individuals experience unwanted or distressing internal experiences. For instance, an individual with a high level of alexithymia may not be able to identify or articulate the emotion of anxiety and may instead attribute it to a somatic complaint such as abdominal pain or fatigue. An increasing body of research supports the claim that alexithymia is associated with childhood maltreatment. Moreover, there is preliminary empirical support suggesting that childhood maltreatment is especially significant in the relationship between alexithymia and somatic symptoms.[16,21]

Currently, the validity and association with many other common medical and psychiatric diseases of the alexithymia concept has found notable experimental support. Fatigue, sleep disorders, difficulties in attention, and depressive complaints are frequently reported complaints among patients with chronic HBV. So, it is not surprising that depression and anxiety are common in these patients.[2,5,7]

To date, there is no study researching alexithymia and the questioning whether alexithymia predicts the psychiatric disorders among HBsAg carriers. As a result, we aimed to research the comorbid psychiatric disorders and alexithymia and to identify whether alexithymia and accompanying somatic symptoms predict the presence of psychiatric diagnoses or not among HBsAg carriers.

Material and Methods

The study included eighty-nine patients who were healthy carriers of hepatitis B who applied to the outpatient clinic of Internal Medicine and ninety-three otherwise healthy subjects. This study was performed between June 2016 and December 2016. Patients who were admitted to the internal medicine department and who had HBsAg positive for more than 6 months, HBV DNA below 2000 IU/mL, ALT and AST levels were consistently normal, and liver biopsy showed no hepatitis-specific findings were defined as healthy HBV carriers and included in the study. Patients who were illiterate, co-infected with hepatitis C virus (HCV), patients with portal hypertension or cirrhosis, patients with Human Immunodeficiency Virus (HIV) infection, patients with hepatitis A virus, patients with intellectual disability, with active manic episode or psychotic disorder, those using steroids, those with substance use, those using antiviral therapy were excluded. The healthy control group was determined as ninety-three participants comprising relatives of hospital personnel matched with the patient group in terms of age and gender, without psychiatric or physical disease requiring use of regular medication at present. The patient group was evaluated with the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (*DSM-IV*) (SCID-I). The healthy control group was not evaluated with

SCID-I. The scales were applied to 2 groups. The study was approved by the Training and Research Hospital Ethics Committee for clinical trials.

Instruments

Sociodemographic Data Form: Participants were asked about personal information like age, marital status, educational status, working status, smoking, psychiatric history, and psychiatric family history.

Hamilton Depression Rating Scale: This scale has 17-items questioning depressive complaints in the last week. The scoring is as follows: 0-7 points indicates no depression, 8-15 points indicates "mild depression," 16-28 points indicates "moderate depression," and 29 and above indicates "severe depression."[22] The reliability and validity of the Turkish version is available.[23] In the Turkish validity and reliability study, the Cronbach's alpha value was found to be 0.75 and the coefficient was found to be between 0.86 and 0.91.[23]

Hamilton Anxiety Rating Scale: This scale consists of 14 questions about both psychological and physical symptoms of anxiety within the last 72 hours. It is evaluated as follows: "no anxiety" between 0 and 5 points; "minor anxiety" between 6 and 14 points; and "major anxiety" 15 points and over.[24] The reliability and validity of the Turkish form is available.[25] In the Turkish validity and reliability study, the Cronbach's alpha value was found to be 0.72 and the coefficient was found to be between 0.72 and 0.94.[25]

Toronto Alexithymia Scale: This scale was developed by Bagby et al,[26,27] the Turkish adaptation was performed by Güleç et al.[28] A 3-factor solution for difficulty identifying feelings (DIF), difficulty describing feelings (DDF), and externally oriented thinking (EOT) was identified.[26,27] The Turkish TAS-20 showed a 3-factor model. The Cronbach alpha for the total TAS-20 scale was 0.78 and for the 3 subscales (factors 1–3): 0.80, 0.57, and 0.63, respectively.[28]

Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition): This is a semi-structured clinical interview developed for the use of mental health professionals.[29] The SCID-I allows for the diagnosis of both present and lifetime Axis I mental disorders. In this study, we used modules for depression and anxiety disorders only and focused on the current diagnoses.

Statistical Analysis

The data obtained in the study were analyzed using the Statistical Program for Social Sciences (SPSS) version 16.0 (SPSS Inc., Chicago, IL, USA). Non-normally distributed numerical variables were expressed as median and interquartile range (IQR). Categorical data (nominal and ordinal data) were presented as count (n) and percentage (%). Pearson Chi-square test was used to compare categorical data. Normal distribution of continuous data was investigated by visual (histogram and probability graphs) and analytical methods (Shapiro-Wilk test). For the analysis of non-normally distributed continuous data and ordinal data, the Mann—Whitney U-test was used to compare continuous variables among 2 groups. The relationship between continuous variables with non-normal distribution was examined by the Spearman correlation coefficient. A *P* value of <.05 was considered statistically significant. A direct logistic regression analysis was performed on psychiatric disorder as outcome and 2 attitudinal predictors: number of symptoms and level of alexithymia. First, preliminary tests were applied to identify the variables to be included in the model, and the variables to be included in the model were determined. The Hosmer-Lemeshow test was used for model fit, and it was found that the model is suitable. Logistic regression analysis was performed with enter method.

Results

The study included eighty-nine healthy HBsAg carriers and ninety-three healthy controls. Healthy HBsAg carriers and healthy controls were similar compared with gender, age, marital status, educational level, employment status, smoking, and psychiatric history (respectively; $P = .714$, $P = .632$, $P = .912$, $P = .168$, $P = .056$, $P = .346$, $P = .164$) (Table 1).

Patients were questioned about gastrointestinal complaints, joint pain, fatigue, headache, hot flushes, sweating, and sleep problems, and the most commonly reported symptom was identified to be fatigue (77.5%). When the numbers of symptoms among patients were examined, the highest number of symptoms identified was 4 (23.6%) (Table 2).

Between groups, there were significant differences in terms of the mean HAM-D ($P < .001$), HAM-A ($P < .001$), TAS total scores ($P < .001$), TAS difficulty identifying feelings subscale mean points ($P < .001$), TAS difficulty expressing feelings subscale mean points ($P < .001$), and TAS externally oriented thinking subscale mean points ($P < .001$) (Table 3).

When the distribution of SCID I psychiatric diagnoses among healthy HBsAg carriers was examined, majority of the patients (59.6%) had

Table 1. Sociodemografic Characteristics of the Study Group

		Healthy Carriers of Hepatitis B (n = 89)	Healthy Controls (n = 93)	*P*
Gender	Female	34 (38.2%)	38 (40.9%)	.714*
	Male	55 (61.8%)	55 (59.1%)	
Marital status	Married	78 (87.6%)	81 (87.1%)	.912*
	Single	11 (12.4%)	12 (12.9%)	
Educational level	Literate	15 (16.9%)	14 (15.1%)	.168**
	Primary school	53 (59.6%)	44 (47.3%)	
	Secondary school	8 (9%)	24 (25.8%)	
	High school	12 (13.5%)	7 (7.5%)	
	University	1 (1.1%)	4 (4.3%)	
Employment status	Yes	49 (55.1%)	63 (67.7%)	.056*
	No	40 (44.9%)	30 (32.3%)	
Cigarette smoking	Yes	35 (39.3%)	43 (46.2%)	.346*
	No	54 (60.7%)	50 (53.8%)	
Psychiatric history	Yes	16 (18%)	10 (10.8%)	.164*
	No	73 (82%)	83 (89.2%)	
Age	Median	45.0	45.0	.632**
	IQR	19	18	

*Pearson Chi-square test.
**Mann–Whitney *U*-test.

Table 2. Somatic Complaints among Healthy Carriers of Hepatitis B

Complaint		n, %
Gastrointestinal complaints	Yes	58 (65.2%)
Joint pain	Yes	58 (65.2%)
Fatigue	Yes	69 (77.5%)
Headache	Yes	60 (67.4%)
Hot flushes, sweating	Yes	43 (48.3%)
Sleep problems	Yes	49 (55.1%)
Number of symptoms	0	1 (1.1%)
	1	8 (9%)
	2	11 (12.4%)
	3	16 (18%)
	4	21 (23.6%)
	5	15 (16.9%)
	6	17 (19.1%)

Table 3. Median Scores of the Scales Among Healthy Carriers of Hepatitis B and Healthy Controls

		Healthy Carriers of Hepatitis B	Healthy Controls	*P*
HAM-D	Median	11	7	<.001
	IQR	13	4	
HAM-A	Median	16	6	<.001
	IQR	17	4	
TAS DIF	Median	22	14	<.001
	IQR	14	9	
TAS DDF	Median	15	11	<.001
	IQR	11	6	
TAS EOT	Median	26	14	<.001
	IQR	9	6	
TAS total scores	Median	62	39.5	<.001
	IQR	33	16	

DIF, difficulty identifying feelings; DDF, difficulty describing feelings; EOT, externally oriented thinking; HAM-A, Hamilton Anxiety Rating Scale; HAM-D, Hamilton Depression Rating Scale; TAS, Toronto Alexithymia Scale.

Table 4. Distribution of Psychiatric Diagnoses of Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) Among Healthy Carriers of Hepatitis B

Psychiatric Diagnoses of SCID I	n, %
No psychiatric diagnosis	36 (40.4%)
Anxiety disorder, not otherwise specified (NOS%)	19 (21.3%)
Adjustment disorder	7 (7.9%)
Major depressive disorder	10 (11.2%)
Generalized anxiety disorder	2 (2.2%)
Obsessive compulsive disorder	2 (2.2%)
Somatization disorder	5 (5.6%)
Depressive disorder, not otherwise specified (NOS)	2 (2.2%)
Sleep disorder, not otherwise specified (NOS)	2 (2.2%)
Panic disorder	4 (4.5%)

SCID I, Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition).

any psychiatric diagnosis. The most common diagnosis was anxiety disorder, not otherwise specified (NOS) (21.3%), and major depressive disorder (MDD) (11.2%) (Table 4).

There was a statistically significant positive correlation between the HAM-D and TAS identifying feelings subscale (rho = 0.586), TAS expressing feelings subscale (rho = 0.523), TAS externally oriented thinking subscale (rho = 0.385), TAS total points (rho = 0.563), and number of symptoms (rho = 0.623). There was a statistically significant positive correlation between the HAM-A and TAS identifying feelings subscale (rho = 0.562), TAS expressing feelings subscale (rho = 0.461), TAS externally oriented thinking subscale (rho = 0.354), TAS total points, and number of symptoms (rho = 0.644) (Table 5).

The logistic regression model evaluating whether the number of somatic symptoms and alexithymia predict the psychiatric diagnosis. We observed that the number of somatic symptoms predicted the presence of the psychiatric diagnosis (odds ratio = 2.762, *P* < .001) (Table 6).

Table 5. Correlations Between Scales Among Healthy Carriers of Hepatitis B

	HAM-D	HAM-A	TAS DIF	TAS DDF	TAS EOT	TAS total scores	Number of symptoms
HAM-D	1	rho = 0.774 *P* < .001	rho = 0.586 *P* < .001	rho = 0.523 *P* < .001	rho = 0.385 *P* < .001	rho = 0.563 *P* < .001	rho = 0.623 *P* < .001
HAM-A	rho = 0.774 *P* < .001	1	rho = 0.562 *P* < .001	rho = 0.461 *P* < .001	rho = 0.354 *P* < .001	rho = 0.513 *P* < .001	rho = 0.644 *P* < .001
TAS DIF	rho = 0.586* *P* < .001*	rho = 0.562 *P* < .001	1	rho = 0.850 *P* < .001	rho = 0.552 *P* < .001	rho = 0.925 *P* < .001	rho = 0.623 *P* < .001
TAS DDF	rho = 0.523 *P* < .001	rho = 0.461 *P* < .001	rho = 0.850 *P* < .001	1	rho = 0.568 *P* < .001	rho = 0.912 *P* < .001	rho = 0.584 *P* < .001
TAS EOT	rho = 0.385 *P* < .001	rho = 0.354 *P* < .001	rho = 0.552 *P* < .001	rho = 0.568 *P* < .001	1	rho = 0.771 *P* < .001	rho = 0.380 *P* = .001
TAS total scores	rho = 0.563 *P* < .001	rho = 0.513 *P* < .001	rho = 0.925 *P* < .001	rho = 0.912 *P* < .001	rho = 0.771 *P* < .001	1	rho = 0.609 *P* < .001
Number of symptoms	rho = 0.623 *P* < .001	rho = 0.644 *P* < .001	rho = 0.623 *P* < .001	rho = 0.584 *P* < .001	rho = 0.380 *P* = .001	rho = 0.609 *P* < .001	1

DIF, difficulty identifying feelings; DDF, difficulty describing feelings; EOT, externally oriented thinking; HAM-A, Hamilton Anxiety Rating Scale; HAM-D, Hamilton Depression Rating Scale; TAS, Toronto Alexithymia Scale.

Table 6. Logistic Regression Holter Data Predicting Psychiatric Diagnosis

	P	Exp (B) (95% CI for Exp (B) Lower–Upper)
Number of symptoms	<.001	2.762 (1.642–4.646)
TAS total scores	.127	1.030 (0.992–1.071)
Constant	<.001	0.006

Nagelkerke R^2: 0.529.
Omnimus test *P* value < .001.

Discussion

In this cross-sectional study, we found that psychiatric disorders are common among healthy HBsAg carriers. We also revealed that alexithymia may potentiate the occurrence of psychiatric disorders among this patient group.

Similar to our study, there is one study performed using SCID I in a homogeneous group of HBsAg carriers.[2] Another study conducted by Daryani et al among HBsAg carriers reported the prevalence of psychiatric disorders was 36%.[5] In addition, in our study, in accordance with the literature,[7,10] it was found that healthy HBsAg carriers had high depression and anxiety scale scores. Though healthy HBsAg carriers have no physical limitations or disability, the possibility of disease progression and the chronic nature of the disease may cause patients to perceive themselves as having a serious disease. The infectious character of HBV, insufficient knowledge about transmission routes, and excessive concerns about the infectiousness of the virus may cause isolation of carriers.[2] Concerns about diseases linked to HBV and feelings of threatened loss of bodily health may significantly contribute to the development of anxiety and depression in HBsAg carriers. Stigma about patients with HBV and seeing the disease as mortal and infectious may require the patient to avoid others. Patients' social, family, and professional lives are negatively affected by concerns about infectiousness and being a carrier.[6]

We decided to understand the fact that the patients did not seek psychiatric help despite the presence of the psychiatric diagnoses, especially anxiety and depression and to investigate the reason for this through the concept of alexithymia. However, we noticed that there were few studies searching the relationship between alexithymia and psychiatric diagnosis among healthy carriers of HBsAg in the literature. A review of studies evaluating alexithymia in the gastroenterology and hepatology fields in 2018 included 10 studies performed with healthy HBsAg carriers.[30] Two of these studies focused on the prevalence of alexithymia. The prevalence rates for alexithymia were reported as 22%[31] and 54%[32] in these studies.

We found a significantly positive correlation between alexithymia and depression among healthy HBsAg carriers, similar with the study by Rustgi et al[31] Alexithymia and depression share many clinical characteristics, such as negative affect, decreased ability to communicate affect to others, using less adaptive emotional regulation strategies, and suppression of affect.[31,33] These findings confirm the assumption that alexithymia is associated with depression and psychosomatic diseases.[33] There are different opinions about whether negative affect in depression and alexithymia is the same phenomenon or different phenomena. Some research in the last decades has shown a strong correlation between alexithymia and depression both in general and in clinical samples.[34,35] An individual with a high level of alexithymia may be unable to identify or describe the emotion of depression and instead attribute the physical sensations to a somatic complaint, such as gastrointestinal complaints or headache.[16] Alexithymic individuals' intense experience of somatic symptoms and the shallowness of their emotional transference may guide us as to why they do not seek psychiatric help. Alexithymia could significantly influence psychiatric comorbidity among healthy carriers of hepatitis B.[16] Alexithymia may lead to difficulties in recognizing and regulating emotions effectively. This can exacerbate psychiatric symptoms such as depression and anxiety among hepatitis B carriers, as they may struggle to cope with the emotional distress associated with their health condition. Individuals with alexithymia may have limited coping strategies to manage stress and psychological distress. As a result, they may be more vulnerable to developing psychiatric comorbidities, including mood disorders and adjustment difficulties, when facing the challenges of living with hepatitis B.[30,31] Alexithymia often involves challenges in verbalizing emotions and communicating inner experiences. This communication barrier may hinder individuals from seeking help or expressing their psychological symptoms to healthcare providers, leading to underdiagnosis or undertreatment of psychiatric comorbidities.[36] Alexithymia can impair social interactions and interpersonal relationships, contributing to feelings of isolation and loneliness.[37] Social support is crucial for mental health, and the lack of adequate support networks may exacerbate psychiatric symptoms among hepatitis B carriers with alexithymia.[14]Individuals with alexithymia may have lower treatment adherence and engagement in mental health interventions due to difficulties in understanding and expressing emotions. This could impede the effectiveness of psychiatric interventions aimed at managing comorbid conditions in hepatitis B carriers.[30,31] Alexithymic individuals may tend to somatize emotional distress, manifesting psychological symptoms as physical complaints.[38] This somatic presentation may complicate the recognition and diagnosis of psychiatric comorbidities in hepatitis B carriers, leading to delays in appropriate treatment.[30,31] The chronic nature of hepatitis B and the associated stressors may exacerbate alexithymic traits over time, creating a cycle of emotional dysregulation and psychiatric symptomatology. This ongoing interaction between alexithymia and hepatitis B-related stressors could contribute to the persistence and exacerbation of psychiatric comorbidities.[16]Understanding the influence of alexithymia on psychiatric comorbidity among healthy carriers of hepatitis B is crucial for developing tailored interventions that address both emotional and physical aspects of their health condition. Integrating strategies to improve emotion recognition and expression skills alongside traditional psychiatric treatments may enhance overall mental health outcomes in this population.[39]

In our study, it was identified that alexithymia and all 3 subscales of alexithymia had positive correlations with anxiety in the HBsAg carrier group. Anxiety increases a persons' attention and care of themselves causing exaggeration of present symptoms or previously unnoticed affect to reach conscious levels.[30,40] In parallel with this, patients with anxiety disorders, just like depressive patients, have a tendency to exaggerate bodily sensations and this plays an important role in somatization.[40] People who could not express feelings verbally or symbolically would express this affect or stress in only bodily reactions. Alexithymics were defined as being "individuals with emotional development disabilities" due to remaining trapped

in stages of primitive cognitive-affective development when feelings have not been separated from bodily expression. The affect processing and affect regulation capacity underlying alexithymia are equally disrupted.[30]

Questioning the patients about gastrointestinal complaints, joint pain, fatigue, headache, hot flushes, sweating, and sleep problems, the most commonly reported somatic symptom was identified to be fatigue. Rustgi et al reported that fatigue (general, daily activities, professional activities) was present in mean 46.4% of chronic HCV patients with 26% reporting sleep problems contributed to this.[31] Patients with HBV infections may have somatic symptoms like fatigue and headache. Additionally, it is believed that healthy HBsAg carriers are asymptomatic. But it is not clear whether the somatic symptoms identified in our patients are related to depression or anxiety or not, or completely related to the viral infection itself.[5]

According to *DSM-III*, 50%-80% of patients with a diagnosis of anxiety or depression attend doctors with somatic symptoms. When compared with psychiatry patients attending doctors with mental complaints, there is a significantly low degree of accurate diagnosis for psychiatry patients attending doctors with somatic complaints.[41] Patients with MDD frequently accompany with somatic symptoms. Many studies have revealed that depressive patients have more somatic findings compared to those without depression independent of method and those who are somatized are more depressive compared to those with diagnosed accurate bodily diseases. It is proposed that somatization and depression interact in 3 ways: (1) somatization is accepted as a unique and specific subtype of depression and anxiety, (2) depression and somatization accompany one another, and (3) somatization is one of the basic symptoms of depression.[41]

HBV infections form an interesting paradigm for a biopsychosocial model. These symptoms may be difficult for clinicians due to overlapping with somatization symptoms. These symptoms are frequently ignored due to being seen by internal medicine, infectious diseases, and gastroenterology clinicians working in the field as expected somatic findings during the progression of the disease and even by psychiatrists as biological findings of the disease. Thus, the organic-functional paradigm continues.[30]

Probable reasons for missed psychiatric diagnosis among most HBsAg carriers may include the following:

1. HBsAg carriers generally attend clinics with bodily complaints, so clinicians focus more on the patients' physical status rather than psychiatric problems.
2. Some culture-specific reasons cause patients not to directly question themselves, not to mention mental complaints or not to mention a psychiatric disorder and focus more on physical symptoms which can mislead clinicians.[6-8]

Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition)[42] removed the criteria of "medically unexplained" from the old diagnosis category of somatoform disorder in *DSM-IV* and added positive psychological features like health anxiety, symptom preoccupation and maladaptive disease behavior to new somatoform disorder criteria. Both research and clinical experience in the field show many clinical aspects are significantly and negatively affected like individual disease perception, somatic symptoms reported by patients, in addition to behavior related to clinical disease. These findings are reported in chronic HBV patients. Additionally, there is a mutual relationship between these psychological comorbidities and symptom activity and this was found to be predictive for acute relapse.

We created a logistic regression model to evaluate the prediction of psychiatric diagnosis by number of symptoms and alexithymia levels. Although we found that alexithymia did not predict the presence of psychiatric diagnosis, we determined that the number of somatic symptoms predicted the presence of psychiatric diseases. As the number of symptoms increase, the risk of psychiatric comorbid diagnosis increases. Unlike this finding of our study, study by Rustgi et al found that when logistic regression was used to predict the effects of personality, burden of disease and fatigue on whether an individual would be clinically depressed, alexithymia emerged as the only significant predictor of depression among chronic HCV patients, accounting for 43% of the total variance.[31]

Alexithymia probably affects health in different ways, including the following:

1. Affects mood, changing eating-related behavior, for example.
2. Causes low tolerance of painful stimuli by somatosensory amplification, as in chronic pain.
3. Causes posttraumatic shutdown of emotions (e.g., acute reaction to illness).

By altering autonomic, endocrine, and immune activity leading to tissue injury (e.g., increase susceptibility to inflammatory processes).[30]

The major limitation of our study is the relatively small sample size that could limit our ability to generalize the results to HBsAg carriers in general. So, our findings need to be replicated in larger populations. The other important limitation of the study is the cross-sectional design. Conducting prospective case-control studies in future studies will provide us with much more information about this patient group.

Unfortunately, infectious diseases and psychiatric disorders are still the most stigmatized disease groups. Although healthy HBsAg carriers represent the non-infectious patient group of chronic HBV patients, they are frequently stigmatized due to HBV in their definition. Moreover, this group often experiences distress due to physical complaints that may be medically negligible and do not require any medical treatment, and they have difficulty in identifying them.

Our study revealed that psychiatric diagnoses are important problems among healthy HBsAg carriers. So, we aimed to stress the importance of psychiatric evaluation of HBsAg carriers among treatment and surveillance planning and to evaluate whether numbers of comorbid somatic symptoms and alexithymia predict the presence of psychiatric diagnosis. The most specific finding of our study was that the increase in the number of symptoms was predictive for psychiatric diagnoses. In these patients who are frequently referred to internal medicine, gastroenterology, and infectious diseases because of their physical symptoms, it is important to consider the presence

of psychiatric diagnosis in patients with fatigue, symptoms involving more than one system, and high number of symptoms and to make a psychiatric referral by the relevant branch physicians.

Availability of Data and Materials: *The data that support the findings of this study are available on request from the corresponding author.*

Ethics Committee Approval: *This study was approved by the Ethics Committee of Erzurum Regional Training and Research Hospital (Approval no: 37732058-53 Erzurum BEAH KAEK 2016/2-14, Date: January 19, 2016).*

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References

1. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *J Viral Hepat*. 2004;11(2):97-107. [CrossRef]
2. Atesci FC, Cetin BC, Oguzhanoglu NK, Karadag F, Turgut H. Psychiatric disorders and functioning in hepatitis B virus carriers. *Psychosomatics*. 2005;46(2):142-147. [CrossRef]
3. Kunkel EJ, Kim JS, Hann HW, et al. Depression in Korean immigrants with hepatitis B and related liver diseases. *Psychosomatics*. 2000;41(6):472-480. [CrossRef]
4. Ozkan M, Corapçioglu A, Balcioglu I, et al. Psychiatric morbidity and its effect on the quality of life of patients with chronic hepatitis B and hepatitis C. *Int J Psychiatry Med*. 2006;36(3):283-297. [CrossRef]
5. Daryani NE, Bashashati M, Karbalaeian M, et al. Prevalence of psychiatric disorders in hepatitis B virus carriers in Iranian charity for hepatic patients support (December 2004-August 2005). *Hepat Mon*. 2008;8(3):201-205.
6. Lok AS, van Leeuwen DJ, Thomas HC, Sherlock S. Psychosocial impact of chronic infection with hepatitis B virus on British patients. *Genitourin Med*. 1985;61(4):279-282. [CrossRef]
7. Altindag A, Cadirci D, Sirmatel F. Depression and health related quality of life in non-cirrhotic chronic hepatitis B patients and hepatitis B carriers. *Neurosciences (Riyadh)*. 2009;14(1):56-59.
8. Yi M, Choi EO, Paik SW, Kim KS, Kwak S, Lee HJ. Illness experience of people with chronic hepatitis B in Korea. *Taehan Kanho Hakhoe Chi*. 2007;37(5):665-675. [CrossRef]
9. Kraus MR, Schäfer A, Csef H, Scheurlen M, Faller H. Emotional state, coping styles, and somatic variables in patients with chronic hepatitis C. *Psychosomatics*. 2000;41(5):377-384. [CrossRef]
10. Demir NA, Çelik M, Kölgelier S, et al. İnaktif hepatit B Taşıyıcıları ve kronik hepatit B Hastalarının depresyon ve anksiyete Düzeylerinin Karşılaştırılması. *Türk Psikiyatr Derg*. 2013;24(4):248-252.
11. Diagne BJ, Hakima A, Harch IE, et al. Depression and anxiety in patients with hepatitis B and C in a Moroccan region: a cross-sectional study. *Open Access Libr J*. 2022;9:e9450.
12. Kačavenda-Babović D, Đurić P, Babović R, Fabri M, Ružić M, Bugarski Ignjatović VB. Depression, anxiety and quality of life in patients with chronic hepatitis C virus infection in Vojvodina. *Acta Clin Croat*. 2021;60(4):579-589. [CrossRef]
13. Tsai MK, Sytwu HK, Hsieh TY, Chien WC, Lai CH, Chen HC. Association between depression or anxiety and the risk of hepatitis B flares: a nationwide population-based cohort study. *J Inflam Res*. 2022;15:2983-2993. [CrossRef]
14. Ahmadi Sarbarzeh PA, Karimi S, Jalilian M, Mosafer H. Depression, anxiety, stress and social isolation in hepatitis patients. *SciMed J*. 2020;2(4):225-233. [CrossRef]
15. Sifneos PE. Alexithymia: past and present. *Am J Psychiatry*. 1996;153(7)(suppl):137-142. [CrossRef]
16. Adamowicz JL, Sirotiak Z, Thomas EBK. Childhood maltreatment and somatic symptoms: examining the role of specific types of childhood maltreatment and alexithymia. *Psychol Trauma*. 2024;16(suppl 1):S2-S9. [CrossRef]
17. Serafini G, Gonda X, Pompili M, Rihmer Z, Amore M, Engel-Yeger B. The relationship between sensory processing patterns, alexithymia, traumatic childhood experiences, and quality of life among patients with unipolar and bipolar disorders. *Child Abuse Negl*. 2016;62:39-50. [CrossRef]
18. Ghiggia A, Romeo A, Tesio V, et al. Alexithymia and depression in patients with fibromyalgia: when the whole is greater than the sum of its parts. *Psychiatry Res*. 2017;255:195-197. [CrossRef]
19. Bamonti PM, Heisel MJ, Topciu RA, Franus N, Talbot NL, Duberstein PR. Association of alexithymia and depression symptom severity in adults 50 years of age and older. *Am J Geriatr Psychiatry*. 2010;18(1):51-56. [CrossRef]
20. Berardis DD, Campanella D, Nicola S, et al. The impact of alexithymia on anxiety disorders: a review of the literature. *Curr Psychiatry Rev*. 2008;4(2):80-86. [CrossRef]
21. Serafini G, Canepa G, Adavastro G, et al. The relationship between childhood maltreatment and non-suicidal self-injury: a systematic review. *Front Psychiatry*. 2017;8:149. [CrossRef]
22. Williams BW. A structured interview guide for Hamilton Depression Rating Scale. *Arch Gen Psychiatry*. 1978;45:742-747.
23. Akdemir A, Örsel S, Dağ İ, Türkçapar H, İşcan N, Özbay H. Hamilton Depresyon Derecelendirme Ölçeği'nin geçerliği, güvenirliği ve klinikte kullanımı. *Psikiyatr Psikhol Psikofarmakol Derg*. 1996;4(4):251-259.
24. Hamilton M. The assessment of anxiety states by rating. *Br J Med Psychol*. 1959;32(1):50-55. [CrossRef]
25. Yazıcı MK, Demir B, Tanrıverdi N, Karaağaoğlu E, Yolaç P. Hamilton Anksiyete Değerlendirme Ölçeği'nin değerlendiriciler arası güvenirlik ve geçerlik çalışması. *Türk Psikiyatr Derg*. 1998;9:114-117.
26. Bagby RM, Parker JDA, Taylor GJ. The twenty-item Toronto alexithymia Scale: I. Item selection and cross-validation of the factor structure. *J Psychosom Res*. 1994;38(1):23-32. [CrossRef]
27. Bagby RM, Taylor GJ, Parker JDA. The twenty-item Toronto alexithymia Scale: II. Convergent, discriminant, and concurrent validity. *J Psychosom Res*. 1994;38(1):33-40. [CrossRef]
28. Güleç H, Yenel A. 20 maddelik Toronto Aleksitimi Ölçeği Türkçe uyarlamasının kesme noktalarına göre psikometrik özellikleri. *Klin Psikiyatr*. 2010;13:108-112.
29. Spitzer RL, Williams JB, Gibbon M, First MB. *The Structured Clinical Interview for DSM-IV Axis I Disorders, Clinician Version (SCID-CV)*. Washington: American Psychiatric Press Inc.; 1996.
30. Carrozzino D, Porcelli P. Alexithymia in gastroenterology and hepatology: a systematic review. *Front Psychol*. 2018;9(9):470. [CrossRef]
31. Rustgi NK, Yu C, Sheridan MJ. Alexithymia in Patients with hepatitis C: relationship to depressive like symptoms. *Clin Neuropsychiatry*. 2010;7(3):111-115.
32. Palmieri VO, Santovito D, Margari F, et al. Psychopathological profile and health-related quality of life (HRQOL) in patients with hepatocellular

carcinoma (HCC) and cirrhosis. *Clin Exp Med*. 2015;15(1):65-72. [CrossRef]
33. Murri MB, Cecere AC, Masotti M, et al. Biopsychosocial predictors of interferon-related depression in patients with hepatitis C. *Asian J Psychiatr*. 2017;26. 24-28.
34. Grynberg D, Luminet O, Corneille O, Grèzes J, Berthoz S. Alexithymia in the interpersonal domain: a general deficit of empathy? *Pers Individ Dif*. 2010;49(8):845-850. [CrossRef]
35. Leventhal H, Meyer D, Nerenz D. The common sense representation of illness danger. In: Rachman S. ed. *Medical Psychology*. New York, NY: Pergamon Press; 1980:7-30.
36. Hogeveen J, Grafman J. Alexithymia. *Handb Clin Neurol*. 2021;183:47-62. [CrossRef]
37. Zhao Y, Zhang K, Griffiths MD. Serial mediation roles of alexithymia and loneliness in the association between family function and Internet addiction among Chinese college students. *Front Psychol*. 2022;13:874031. [CrossRef]
38. Rady A, Alamrawy RG, Ramadan I, El Raouf MAE. Prevalence of alexithymia in patients with medically unexplained physical symptoms: a cross-sectional study in Egypt. *Clin Pract Epidemiol Ment Health*. 2021;17:136-145. [CrossRef]
39. Quinto RM, De Vincenzo FD, Graceffa D, Bonifati C, Innamorati M, Iani L. The relationship between alexithymia and mental health is fully mediated by anxiety and depression in patients with psoriasis. *Int J Environ Res Public Health*. 2022;19(6):3649. [CrossRef]
40. McLean LM, Toner B, Jackson J, Desrocher M, Stuckless N. The relationship between childhood sexual abuse, complex post-traumatic stress disorder and alexithymia in two outpatient samples: examination of women treated in community and institutional clinics. *J Child Sex Abus*. 2006;15(3):1-17. [CrossRef]
41. Bridges KW, Goldberg DP. Somatic presentation of DSM III psychiatric disorders in primary care. *J Psychosom Res*. 1985;29(6):563-569. [CrossRef]
42. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Washington DC: American Psychiatric Association; 2013.