

Quality of Life, Anxiety, and Depression in Patients with Autoimmune Hepatitis: A Cross-Sectional Study in a Mexican Cohort

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Abstract

Purpose

To describe the health-related quality of life, depressive symptoms, and anxiety symptoms in a Mexican cohort of people with autoimmune hepatitis and to analyze the differences in these outcomes according to biochemical remission status.

Methods

This cross-sectional study included adults assessed between March and June 2026. Participants completed the 36-Item Short Form Health Survey, 9-item Patient Health Questionnaire, and 7-item Generalized Anxiety Disorder questionnaire. Scores were compared by biochemical remission status. Correlation analyses and multiple linear regression were performed.

Results

Fifty patients were included (mean age, 53.2 ± 12.3 years; 78% women); 62% were in complete biochemical remission. General health had the lowest mean quality-of-life score (40.6 ± 15.7). Clinically significant depressive and anxiety symptoms were present in 40% and 24%, respectively. Patients in remission had higher physical functioning (70.0 ± 24.4 vs. 53.4 ± 32.1 ; $p = 0.044$) and social functioning scores (71.0 ± 22.7 vs. 55.3 ± 22.9 ; $p = 0.022$). Depressive and anxiety symptom scores did not differ significantly between groups and correlated inversely with several quality-of-life domains.

Conclusion

Depressive and anxiety symptoms were prevalent in this Mexican cohort. Higher physical and social functioning scores were associated with biochemical remission, but no significant changes in affective symptom scores were seen. These exploratory results support the assessment of patient-reported outcomes alongside biochemical control of disease.

Introduction

Autoimmune hepatitis (AIH) is a chronic immune-mediated inflammatory disorder of the liver, characterized by increased aminotransferase and immunoglobulin G (IgG) concentrations, fluctuating autoantibody positivity, and interface hepatitis on histological examination. If not treated, AIH can progress to advanced fibrosis, cirrhosis, and liver failure. Many individuals can achieve biochemical remission with immunosuppressive medication, improving the natural course of the disease [1, 2].

Nevertheless, normalization of biochemical indicators does not necessarily reflect the entire experience of living with AIH. Studies have reported reduced health-related quality of life (HRQoL) in the physical, emotional, and social dimensions, as well as persistent fatigue, depressive symptoms, and anxiety [3–7]. These challenges may persist despite biochemical remission [5, 6].

Psychological variables appear especially crucial. Schramm et al. identified a significant prevalence of depressive and anxiety symptoms and their connection with worse HRQoL in individuals with AIH [7]. Subsequent studies have demonstrated the impact of psychological factors, sickness beliefs and trust in therapy on the patients well-being. illness [8]. Patient-reported outcomes are progressively integrated into the modern guidelines as part of a holistic assessment of AIH [9, 10].

There is little evidence of HRQoL and mental health in Latin American individuals with AIH and few epidemiological research are available in Mexico [11]. Hence, this study analyzed HRQoL and the prevalence of depression and anxious symptoms in a Mexican sample and their connection with biochemical remission.

Methods

Study Design and Participants

We conducted an observational, analytical, cross-sectional study with prospective questionnaire administration and review of clinical records at Centro Médico Nacional “20 de Noviembre,” Mexico City. We assessed participants between March and June 2026, after obtaining ethics approval on March 2, 2026. Reporting was guided by the Strengthening of the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for cross-sectional studies.

Eligible participants were adults older than 18 years with AIH diagnosed according to International Autoimmune Hepatitis Group criteria, complete clinical records, and available quality-of-life, depression, and anxiety questionnaires. Patients completed the questionnaires during their outpatient visit after providing verbally informed consent, documented in their medical records. We used convenience sampling to recruit patients who met the eligibility criteria during the study period.

Patients with AIH-related cirrhosis were eligible if they were compensated, without ascites, hepatic encephalopathy, or gastrointestinal bleeding related to portal hypertension. Concomitant metabolic dysfunction-associated steatotic liver disease (MASLD) and a history of treated hepatitis C with sustained virologic response were permitted. Exclusion criteria were overlap syndromes, other coexisting liver diseases apart from those explicitly permitted, and previously diagnosed psychiatric disorders documented in the medical record. We excluded records with incomplete clinical information or questionnaires.

Clinical and Biochemical Variables

Demographic and clinical variables included age, sex, time since diagnosis, comorbidities, and immunosuppressive treatment. We obtained aspartate aminotransferase (AST), alanine aminotransferase (ALT), and IgG levels five days before the outpatient visit when patients completed the questionnaires. We defined complete biochemical remission as normalization of AST, ALT, and IgG levels sustained for at least six months before questionnaire completion, verified by reviewing previous laboratory results in the medical records. We classified patients who did not meet these criteria as not having complete biochemical remission.

Health-Related Quality of Life

We assessed HRQoL using the Spanish-language version of the 36-Item Short Form Health Survey (SF-36). This validated instrument comprises eight domains: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. Each domain is scored from 0 to 100, with higher scores indicating better perceived health [12].

Depressive and Anxiety Symptoms

Depressive symptoms were measured using the 9-item Patient Health Questionnaire (PHQ-9) ranging in total values from 0 to 27. Scores of 10 or more indicated clinically severe depressive symptoms. We classified symptom severity as minimal/absent (0–4), mild (5–9), moderate (10–14), fairly severe (15–19), or severe (20–27) [13].

Anxiety symptoms were evaluated using the 7-item Generalized Anxiety Disorder scale (GAD-7) with total values ranging from 0 to 21. Scores ≥ 10 indicated clinically meaningful anxiety symptoms. The severity was graded as minimum or none (0–4), mild (5–9), moderate (10–14) and severe (15–21) [14]. The two instruments were considered screening instruments, not diagnostic instruments.

Statistical Analysis

Continuous variables were summarized as means and standard deviations (SDs) or medians and interquartile ranges (IQRs), as appropriate. Categorical variables were expressed as counts and percentages. We used independent-samples t tests to compare SF-36, PHQ-9, and GAD-7 scores between patients with and without complete biochemical remission. We calculated Cohen's d for statistically significant between-group differences. We used Spearman rank correlation coefficients to examine associations between symptom scores and SF-36 domains.

We performed multiple linear regression with the SF-36 general health score as the dependent variable and PHQ-9 score, age, current prednisone use, and complete biochemical remission as explanatory variables. Prednisone use and complete remission were coded as 1 for presence and 0 for absence. Unstandardized coefficients and 95% confidence intervals are reported. We considered $p < 0.05$ statistically significant. We interpreted domain comparisons as exploratory because the reported p-

values were not adjusted for multiple testing. The original analyses were performed using GraphPad Prism version 8.0 for Windows (GraphPad Software, San Diego, CA, USA). We then checked data consistency, regression estimates, and figure calculations using Python and NumPy; we prepared figures using Python and ReportLab. We calculated confidence intervals for the means shown in the figures using the Student t distribution.

Ethics Approval and Consent to Participate

The protocol was approved by the Research, Research Ethics, and Biosafety Committees of Centro Médico Nacional “20 de Noviembre” (approval number RPI.CMN.056.2026; letter No. 96.230.1.3.2/115/2026; March 2, 2026). Participants provided verbally informed consent, which was documented in their medical records, and completed the questionnaires during their scheduled outpatient visit to our clinic. We collected study data after ethics approval. We handled clinical information confidentially and anonymized data for analysis.

Results

Participant Characteristics

We included 50 patients (Table 1). Mean age was 53.2 ± 12.3 years, and 39 patients (78%) were women. Mean time since diagnosis was 4.7 ± 4.4 years, with a median of 3.0 years (IQR, 2.0–7.0). Forty-two patients (84%) had at least one comorbidity (Table 2). The most frequent conditions were diabetes mellitus (34%), hypertension (32%), cirrhosis (26%), hypothyroidism (20%), and systemic lupus erythematosus (20%). Five patients (10%) had MASLD, and one (2%) had a history of hepatitis C treated with sustained virologic response.

Immunosuppressive Treatment

Most participants were receiving prednisone and azathioprine. Overall, 48 patients (96%) received prednisone, 36 (72%) azathioprine, 13 (26%) mycophenolic acid, and four (8%) tacrolimus (Table 3). These categories were not mutually exclusive.

Biochemical Remission and Laboratory Parameters

Thirty-one patients (62%) were in complete biochemical remission, whereas 19 (38%) did not meet the criteria for complete remission. Mean AST, ALT, and IgG levels were 38.8 ± 25.0 U/L, 45.2 ± 44.3 U/L, and 1353.6 ± 469.2 mg/dL, respectively (Table 4).

Health-Related Quality of Life

General health had the lowest mean SF-36 score (40.6 ± 15.7), followed by vitality (54.6 ± 20.9). Mean scores in the remaining domains were social functioning, 65.0 ± 23.8 ; role emotional, 64.7 ± 41.7 ; mental health, 63.8 ± 19.1 ; physical functioning, 63.7 ± 28.5 ; bodily pain, 61.6 ± 25.7 ; and role physical, 61.5 ± 42.0 (Fig. 1).

Depressive and Anxiety Symptoms

The mean PHQ-9 score was 7.8 ± 5.8 , with a median of 6.0 (IQR, 4.0–11.8). Twenty patients (40%) had clinically significant depressive symptoms (PHQ-9 ≥ 10). Symptoms were minimal or absent in 17 patients (34%), mild in 13 (26%), moderate in 13 (26%), moderately severe in four (8%), and severe in three (6%).

The mean GAD-7 score was 6.2 ± 5.9 , with a median of 5.0 (IQR, 2.0–8.8). Twelve patients (24%) had clinically significant anxiety symptoms (GAD-7 ≥ 10). Symptoms were minimal or absent in 23 patients (46%), mild in 15 (30%), moderate in five (10%), and severe in seven (14%) (Fig. 2).

Comparisons by Biochemical Remission Status

Exploratory comparisons between patients with complete remission ($n=31$) and those without complete remission ($n=19$) identified statistically significant differences in two SF-36 domains. Patients in remission had higher physical functioning scores (70.0 ± 24.4 vs. 53.4 ± 32.1 ; $p=0.044$; Cohen's $d=0.60$) and social functioning scores (71.0 ± 22.7 vs. 55.3 ± 22.9 ; $p=0.022$; Cohen's $d=0.69$).

No statistically significant differences were detected in general health, vitality, mental health, or role emotional scores. PHQ-9 scores (7.3 ± 6.1 vs. 8.6 ± 5.4 ; $p=0.422$) and GAD-7 scores (6.1 ± 5.9 vs. 6.4 ± 6.1 ; $p=0.839$) also did not differ significantly between the groups (Fig. 3).

Associations Between Affective Symptoms and Quality of Life

PHQ-9 and GAD-7 scores were strongly positively correlated (Spearman $\rho=0.808$; $p<0.001$). PHQ-9 scores correlated inversely with vitality ($\rho=-0.705$; $p<0.001$), mental health ($\rho=-0.668$; $p<0.001$), social functioning ($\rho=-0.513$; $p<0.001$), physical functioning ($\rho=-0.429$; $p=0.002$), and general health ($\rho=-0.404$; $p=0.004$).

GAD-7 scores correlated inversely with mental health ($\rho=-0.606$; $p<0.001$), vitality ($\rho=-0.565$; $p<0.001$), social functioning ($\rho=-0.432$; $p=0.002$), and general health ($\rho=-0.410$; $p=0.003$). The correlation between GAD-7 and physical functioning was not statistically significant ($\rho = -0.178$; $p = 0.215$). Correlation coefficients for all eight SF-36 domains are shown on Fig. 4.

Factors Associated with General Health

The multiple linear regression model was statistically significant ($F=6.82$; $p=0.0002$) and explained 37.7% of the observed variance in general health scores ($R^2=0.377$; adjusted $R^2=0.322$). Higher PHQ-9 scores were independently associated with lower general health scores ($B=-1.14$; 95% CI, -1.79 to -0.49 ; $p=0.001$). Current prednisone use was also associated with lower scores ($B=-23.39$; 95% CI, -43.32 to -3.46 ; $p=0.022$). The associations with age ($B=0.311$; 95% CI, -0.004 to 0.627 ; $p=0.053$) and complete biochemical remission ($B=-4.26$; 95% CI, -11.98 to 3.46 ; $p=0.273$) were not statistically significant (Fig. 5).

Discussion

In this Mexican cohort of people with AIH, the domains of general health and vitality had the lowest mean scores of quality of life and the symptoms of depression and anxiety were frequent. Higher physical functioning and social functioning ratings were linked to complete biochemical remission, but there were no statistical significant differences in general health scores or affective symptom scores. In the multivariable model, higher depressed symptom scores and current usage of prednisone were related with lower overall health scores. Such results imply that biochemical disease control and patient experienced well-being may not be entirely aligned.

The demographic characteristics of our cohort were consistent with the known epidemiology of AIH. Mean age was approximately 53 years, and 78% of participants were women, reflecting the female predominance reported globally [15]. The substantial burden of comorbidity is also relevant. Other autoimmune diseases commonly coexist with AIH and may reflect shared immunological susceptibility [16]. Diabetes and hypertension may be related both to underlying patient characteristics and to cumulative corticosteroid exposure; prolonged corticosteroid treatment has been associated with adverse effects and lower health utility [17].

Most participants had been given prednisone and azathioprine, and 62% were in complete biochemical remission. These treatments are consistent with current recommendations for AIH care [9,10]. However, remission was not consistently associated with improved patient-reported outcomes. Normalization of aminotransferases and IgG is an important therapeutic aim but does not reflect the experience of living with AIH.

The somewhat low general health and vigor scores are consistent with prior work [18]. Janik et al. [3] observed decreased HRQoL in AIH patients compared with controls. A later comprehensive analysis highlighted disease burden beyond biochemical abnormalities [4]. Takahashi et al. [5] similarly documented quality-of-life issues in patients in remission. A link between biochemical remission and disease specific quality of life was reported by Michel et al although the relationship was less consistent across generic measures [6].

Our comparison of remission groups adds evidence from a population underrepresented in this literature. Complete remission was associated with higher physical and social functioning scores, but not with statistically significant differences in general health, vitality, mental health, or affective symptom scores. These exploratory findings are consistent with biochemical activity accounting for only part of the variation in HRQoL [5–7]. They do not diminish the importance of achieving biochemical remission; rather, they support complementing biochemical assessment with outcomes that matter to patients. The absence of statistically significant differences should not be interpreted as evidence of equivalence between groups.

This approach is consistent with the increasing attention paid to patient-reported outcomes, treatment adverse effects, and quality of life in guidelines from the European Association for the Study of the Liver and the British Society of Gastroenterology [9,10].

Affective symptoms were highly connected with HRQoL. PHQ-9 and GAD-7 scores were strongly correlated and inversely associated with multiple SF-36 dimensions. Depressive symptoms were especially associated with worse ratings on vitality, mental health, social functioning, physical functioning, and general health. Previous work by Schramm et al. demonstrated a high burden of depression and anxiety symptoms and a close association with HRQoL in AIH [7]. Further study has identified psychosocial elements, such as confidence in therapy, that influence patient well-being [8].

Forty percent of participants had clinically severe depressive symptoms, and 24% had clinically significant anxiety symptoms. These numbers show the prevalence of screening-positive symptoms, not the prevalence of confirmed psychiatric diseases. But they do support the potential utility of systematic symptom assessment. Psychological morbidity in AIH was also observed by Schramm et al including previously unrecognized symptoms [7].

A distinctive contribution of this study is the simultaneous assessment of HRQoL, depressive symptoms, and anxiety symptoms, together with their relationship to biochemical remission, in a dedicated Mexican cohort of adults with AIH. To our knowledge, published evidence from Mexico addressing these outcomes together remains limited. This study therefore addresses a gap in locally generated evidence and extends the assessment of patient-reported outcomes to a population underrepresented in international literature

The association between depressive symptoms and general health persisted in the multivariable analysis. Because the study was cross-sectional, we cannot establish the direction of this association. Depressive symptoms may contribute to poorer perceived health, while a more difficult disease experience may also promote or sustain affective symptoms.

The relationship between autoimmunity and depression may extend beyond the psychological response to chronic illness. A recent meta-analysis involving more than 40 million participants reported a bidirectional association between autoimmune diseases and depression [18]. These findings concern

autoimmune diseases collectively and do not establish a mechanism specific to AIH; they therefore provide a potential conceptual framework rather than a mechanistic explanation for our results.

Current prednisone use was also associated with lower general health scores, consistent with previous reports relating corticosteroid exposure to poorer HRQoL and lower health utility in AIH [17,19]. This finding requires caution: 48 of 50 participants were taking prednisone, leaving only two unexposed patients. This imbalance substantially limits the estimate's stability and precludes causal inference. Confounding by indication is also possible, because persistent corticosteroid use may identify patients with more complex diseases.

Clinically, these data suggest a multimodal approach to the follow-up of AIH. Biochemical control remains key but assessment may encompass quality of life, symptom burden and mental health. Short instruments such as PHQ-9 and GAD-7 can be used to help identify those patients who may benefit from further examination but are still screening tools and not alternatives for a diagnostic psychiatric assessment [13,14].

One strength of this study was the simultaneous evaluation of HRQoL, depression, anxiety, biochemical status, and treatment in a Mexican population with standardized tools. These results provide useful regional data in view of the lack of local data on autoimmune liver disorders [11].

There are several limits to be aware of. The small, single-center convenience sample restricts precision, and generalizability. The design was cross-sectional which meant that no conclusions could be drawn about time or causality. The exclusion of patients with previously diagnosed psychiatric diseases may result in selection bias and limits extrapolation of symptom frequencies to the wider community of AIH. The PHQ-9 and GAD-7 are not psychiatric diagnoses. The lack of a control group prohibits direct evaluation of differences in quality-of-life with individuals without AIH. Due to many unadjusted comparisons, the possibility of chance findings is increased, and differences between individual domains should be interpreted as exploratory. Finally, the regression coefficient of prednisone is difficult to evaluate because to the very small number of individuals not on prednisone.

Conclusion

In this AIH patient population, overall health and vigor showed the lowest mean HRQoL scores. Depressive and anxiety symptoms were prevalent and linked with various dimensions of the SF-36. Complete biochemical remission was associated with greater physical and social functioning scores, but no statistically significant changes were found in general health or affective symptom scores.

Depressive symptoms were independently correlated with worse general health scores. There was also a relationship with prednisolone use, but its interpretation is constrained by the small number of unexposed patients. Longitudinal, multicenter studies are needed to validate these correlations and to explore whether affective symptom-focused therapies and treatment optimization increase quality of life.

Declarations

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Competing Interests

The authors declare no competing interests related to this study.

Author Contributions

Marcela Miguel Alamilla Pérez: investigation, data collection, analysis and interpretation of results, and writing the original draft. Mayra Virginia Ramos Gómez: conceptualization, supervision, methodology, and critical manuscript revision. Christian Gabriel Toledo Lozano: conceptualization, supervision, methodology, and critical manuscript revision. Luis José Pinto García: methodology, analysis and interpretation of results, and manuscript writing, review, and editing. All authors reviewed and approved the final manuscript and accept responsibility for its content.

Use of Generative Artificial Intelligence

During manuscript preparation, the authors used ChatGPT (OpenAI) to assist with language editing, translation, organization, and refinement of the text. The authors are responsible for reviewing and verifying the scientific content, data, analyses, references, and figures and take full responsibility for the final manuscript.

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Tables

Table 1
Demographic characteristics of patients with autoimmune hepatitis

Characteristic	Value
Age, years, mean ± SD	53.2 ± 12.3
Age, years, median (IQR)	53.5 (46.0–63.5)
Female, n (%)	39 (78.0)
Male, n (%)	11 (22.0)
Time since diagnosis, years, mean ± SD	4.7 ± 4.4
Time since diagnosis, years, median (IQR)	3.0 (2.0–7.0)
N = 50. SD, standard deviation; IQR, interquartile range.	

Table 2
Comorbidities of patients with autoimmune hepatitis

Characteristic	Value
At least one comorbidity, n (%)	42 (84.0)
No comorbidities, n (%)	8 (16.0)
Diabetes mellitus	17 (34.0)
Hypertension	16 (32.0)
Cirrhosis	13 (26.0)
Hypothyroidism	10 (20.0)
Systemic lupus erythematosus	10 (20.0)
Metabolic dysfunction-associated steatotic liver disease	5 (10.0)
Chronic kidney disease	4 (8.0)
Cushing syndrome	3 (6.0)
Sjögren syndrome	3 (6.0)
Rheumatoid arthritis	1 (2.0)
Fibromyalgia	1 (2.0)
History of treated hepatitis C with sustained virologic response	1 (2.0)
Chronic ischemic heart disease	1 (2.0)
Immune-mediated myopathy	1 (2.0)
Breast cancer	1 (2.0)
Panhypopituitarism	1 (2.0)
Values are n (%); N = 50. Comorbidities are not mutually exclusive.	

Table 3
Immunosuppressive treatment

Characteristic	Value
Prednisone	48 (96.0)
Azathioprine	36 (72.0)
Mycophenolic acid	13 (26.0)
Tacrolimus	4 (8.0)
Values are n (%); N = 50. Treatment categories are not mutually exclusive.	

Table 4
Biochemical remission status and laboratory parameters

Characteristic	Value
Complete biochemical remission, n (%)	31 (62.0)
Without complete biochemical remission, n (%)	19 (38.0)
AST, U/L, mean $\pm$ SD	38.8 $\pm$ 25.0
ALT, U/L, mean $\pm$ SD	45.2 $\pm$ 44.3
IgG, mg/dL, mean $\pm$ SD	1353.6 $\pm$ 469.2
N = 50. AST, aspartate aminotransferase; ALT, alanine aminotransferase; IgG, immunoglobulin G; SD, standard deviation.	

Figures

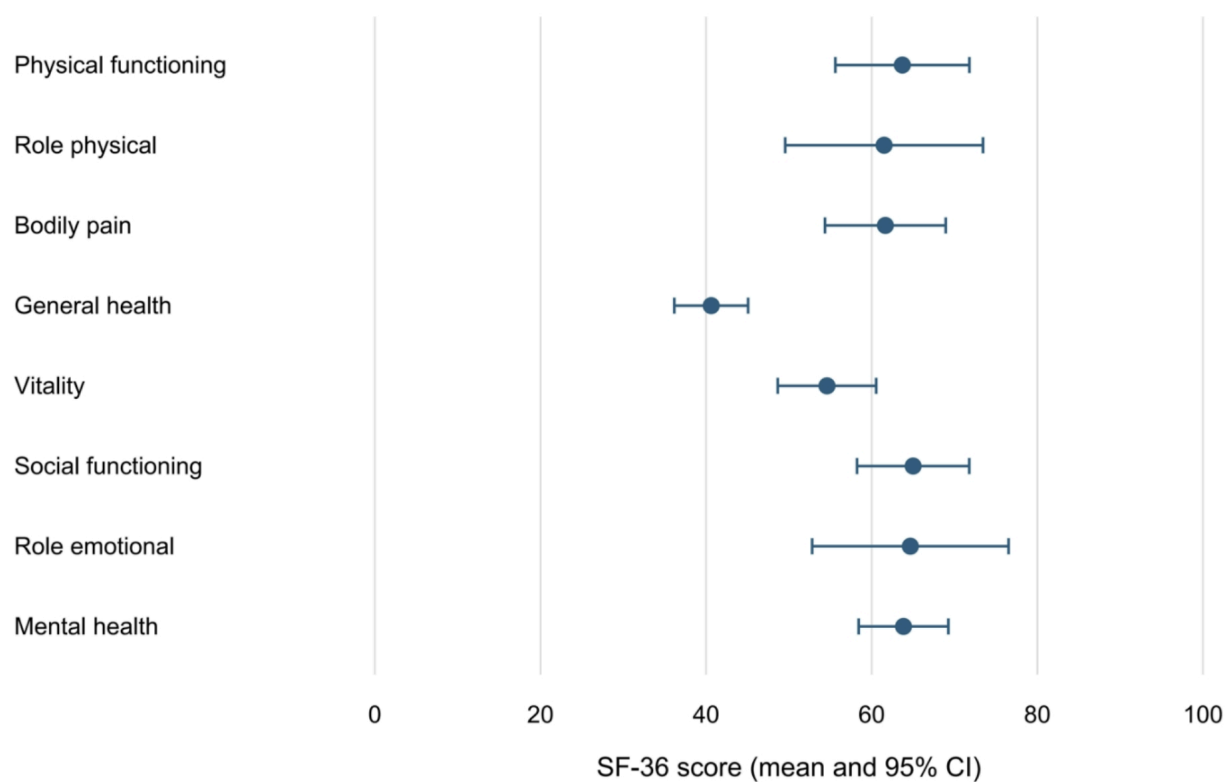
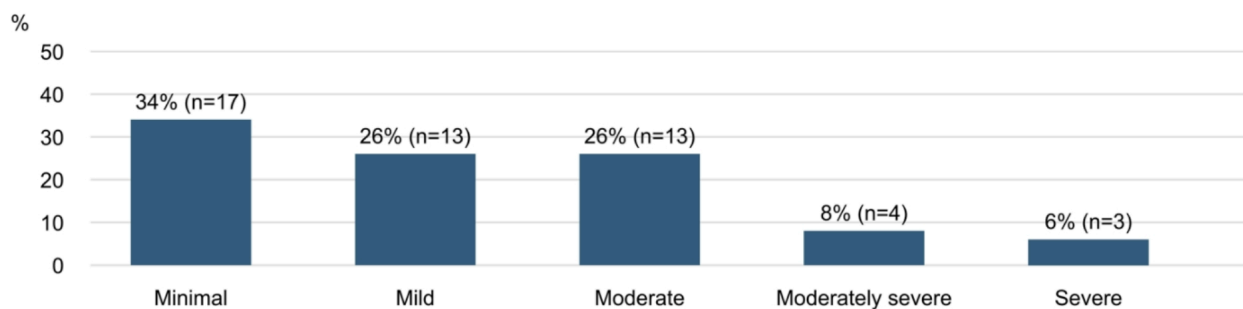


Figure 1

Health-related quality of life across the eight SF-36 domains. Points represent means and horizontal bars represent 95% confidence intervals based on the Student t distribution (N=50). Domain scores range from 0 to 100; higher scores indicate better perceived health

a Depressive symptoms (PHQ-9)



b Anxiety symptoms (GAD-7)

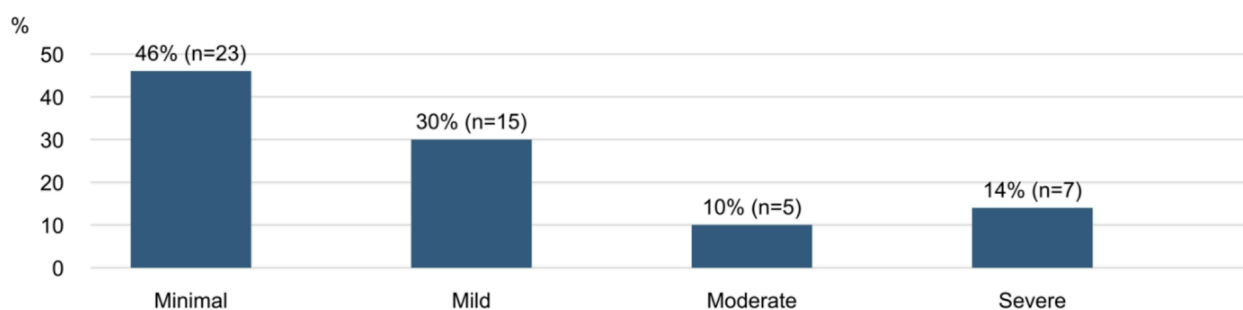


Figure 2

Severity of depressive and anxiety symptoms. Panel a shows PHQ-9 categories and panel b shows GAD-7 categories. Bars indicate percentages; labels provide percentages and counts (N=50). Minimal includes absent symptoms. Clinically significant symptoms were defined as a score ≥ 10 on either instrument

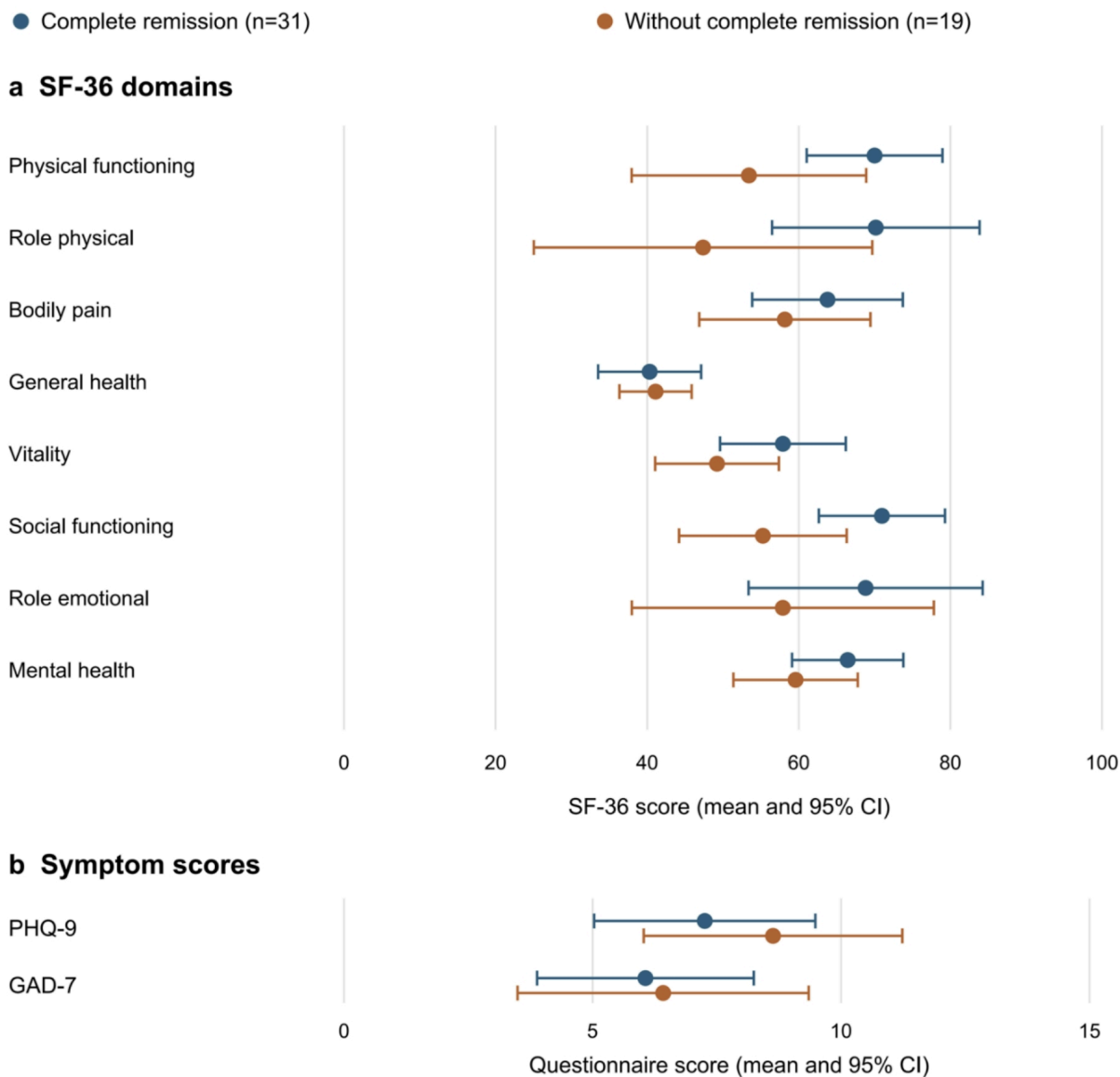


Figure 3

Patient-reported outcomes by complete biochemical remission status. Panel a shows SF-36 domains; panel b shows PHQ-9 and GAD-7 scores. Points indicate means and horizontal bars indicate Student t-based 95% confidence intervals. Complete remission: n=31; without complete remission: n=19. SF-36 scores range from 0 to 100, PHQ-9 from 0 to 27, and GAD-7 from 0 to 21. The two panels use different horizontal scales

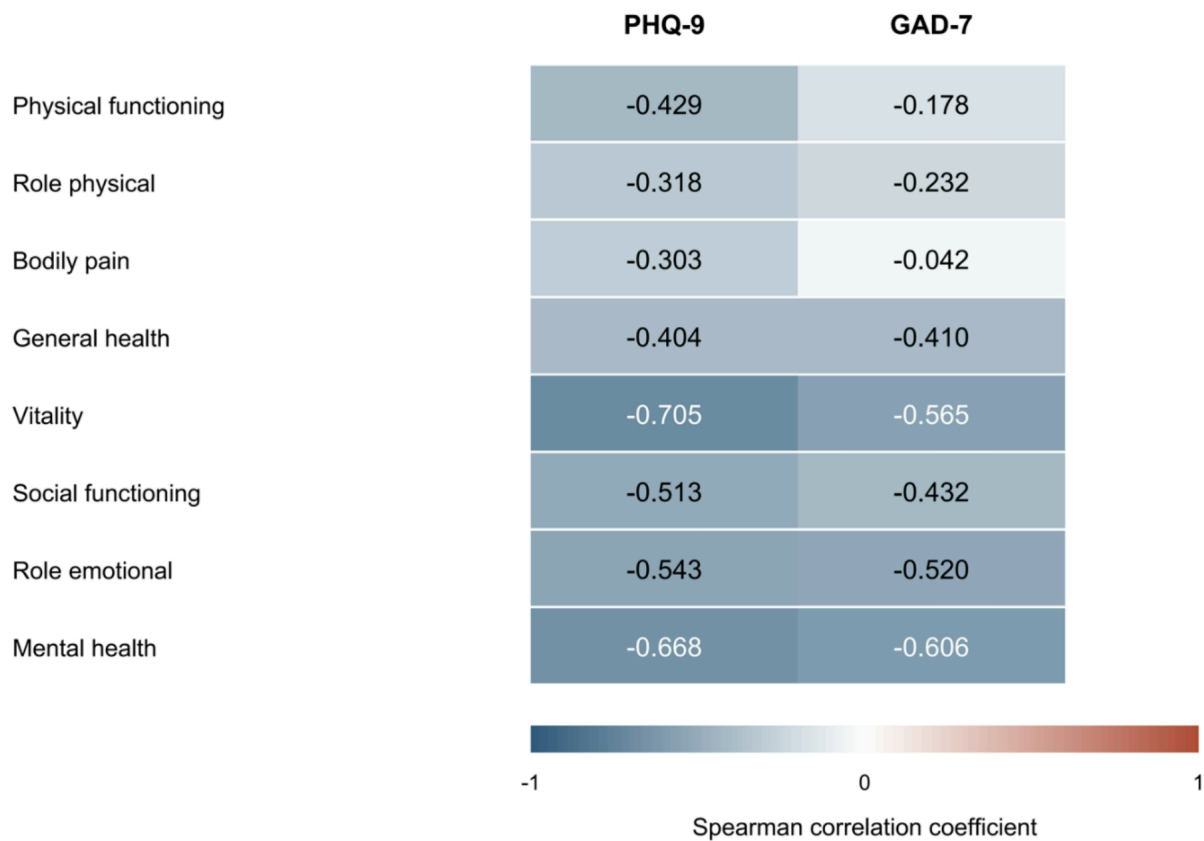


Figure 4

Associations between affective symptoms and SF-36 domains. Cell values are Spearman rank correlation coefficients computed using all 50 participants. Color indicates the direction and magnitude of the coefficient on a fixed scale from -1 to +1; statistical significance is not encoded by color

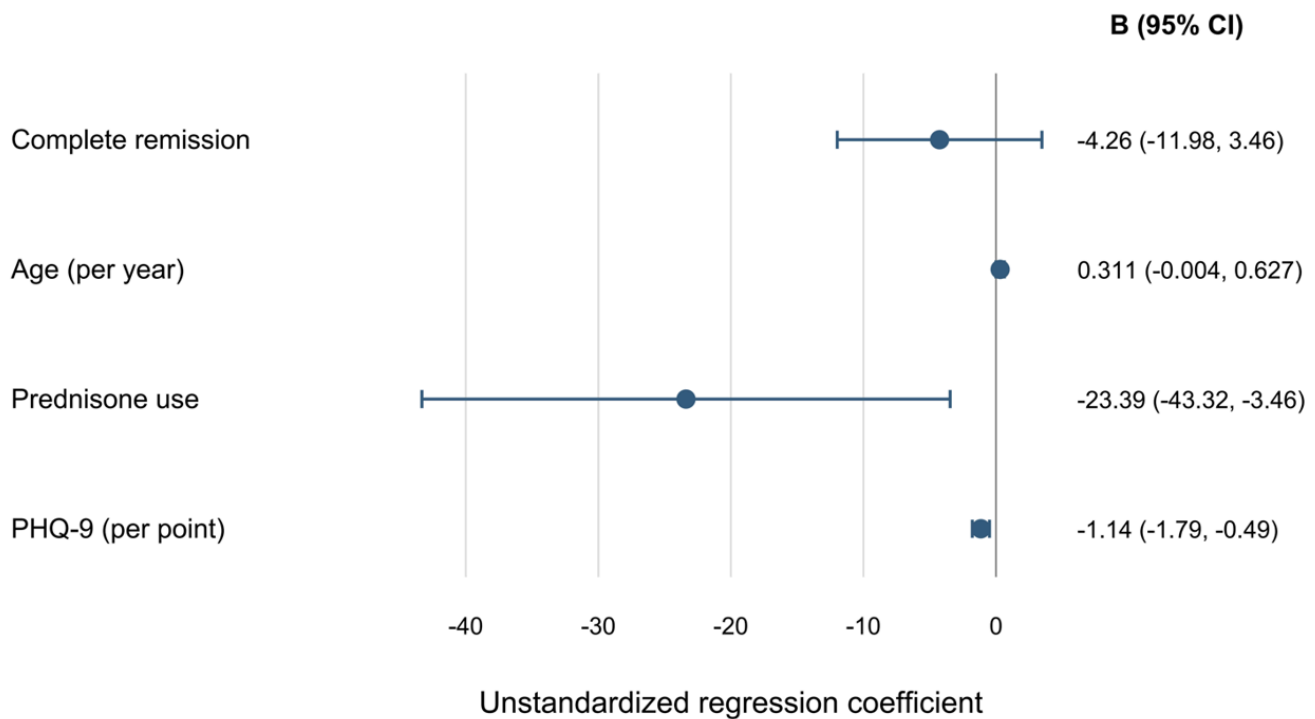


Figure 5

Factors associated with SF-36 general health scores in the multiple linear regression model. Points show unstandardized coefficients and horizontal bars show 95% confidence intervals (N=50; 45 residual degrees of freedom). Reference categories are no prednisone use and absence of complete biochemical remission. Age is expressed per year and PHQ-9 per point. $R^2=0.377$; adjusted $R^2=0.322$. The prednisone estimate is based on 48 exposed and two unexposed participants and should be interpreted cautiously