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Exploring the influence of social support, disease activity, and fibromyalgia on the emotional well-being of women with systemic lupus erythematosus

Fatima Alnaimat[1*], Omar Hamdan[2], Tala Natsheh[2], Raghad Bani Hamad[2], Zain Abu Amrieh[2], Dania Ahmad[2], Mahdi H. Mohammed[2] and Nada Al-Awamleh[2]

Abstract

Background Systemic Lupus erythematosus (SLE) is an autoimmune disorder in which females are affected more commonly than males. In addition to the physical burden of the disease, patients with SLE are at higher risk of psychological disorders. In Jordan, there is a paucity of studies assessing the emotional well-being and psychosocial burden of SLE. This study aims to explore fibromyalgia, mental health-related problems and their association with SLE disease activity and its various manifestations.

Methods This cross-sectional study enrolled all sequential female patients diagnosed with SLE who attended a single-provider rheumatology clinic at the Jordan University Hospital (JUH), in Amman, Jordan. Data was collected between September 2023 and March 2024. A structured questionnaire was utilized to collect demographic data as well as SLE disease features. Comorbid psychiatric disorders were assessed using PHQ-9 and GAD-7 for depression and anxiety, respectively, fibromyalgia by FiRST, disease activity by SLEDAI score, quality of life by SF-12 and perceived social support were evaluated using MSPSS.

Results We analyzed the data of 63 female patients diagnosed with SLE. The mean age was 40.3 ± 15.3 years with a mean age of 28.3 ± 12.1 years at diagnosis. The most common manifestations were mucocutaneous and hematological manifestations each affecting 84.1% of patients. Regarding treatments, 79.4% of patients were using hydroxychloroquine and 73.0% of patients were using glucocorticoids. According to PHQ-9, 34.9% of patients had depression and 7.9% of patients had severe depression. positive FiRST screening suggestive of fibromyalgia was found in 31.7%. The mean PCS-12 scores were 41.9 ± 9.8 and the mean MCS-12 was 51.9 ± 3.4 indicating a moderate level of physical and mental health, respectively. Using multivariate logistic regression, vascular involvement (OR = 14.9, 95% CI: 1.1-202.4) were associated with depression while patients with high PCS-12 scores (OR = 0.889, 95% CI: 0.79–0.96) had lower odds of positive FiRST screening.

*Correspondence:
Fatima Alnaimat
f.naimat@ju.edu.jo

Full list of author information is available at the end of the article

Conclusion Our study showed that patients with SLE are at an increased risk of comorbid psychiatric disorders, which adds to the complexity of the disease. The management of SLE should adopt a multidisciplinary approach to address both the physical and psychosocial burdens.

Keywords Systemic lupus erythematosus, Depression, Fibromyalgia, Quality of life, Anxiety

Introduction

Systemic lupus erythematosus (SLE) is an autoimmune disorder characterized by the production of autoantibodies targeting cellular antigens. This disease affects multiple organs inside the human body, presenting with a wide range of symptoms and manifestations such as arthritis, kidney disease, vasculitis, mucocutaneous manifestations and nerve involvement [1, 2]. The incidence of SLE differs between different regions in the world, ranging from 0.3 to 31.5 cases per 100,000 [3]. SLE most commonly affects females at the child-bearing age, with a female-to-male ratio of 9 – 1 [4–6]. Historically, SLE was first recognized for its dermatological manifestations, such as the characteristic malar rash. However, in 1872 Kaposi expanded our understanding of SLE and paved the way for a broader view of lupus as a complex, multisystem disease with significant psychiatric and psychological dimensions [1].

SLE patients are at higher risk of depression compared to the general population, with a prevalence ranging between 17% and 75% [2], whereas the prevalence of fibromyalgia among patients with SLE ranges between 16.7% and 61% [7, 8]. The prevalence of anxiety among SLE patients ranges from 1.1% to 71.4% and this wide variability may be attributed to inconsistencies in measurement methods across different studies [9]. The prevalence of anxiety among SLE patients increases as the disease progresses over time which significantly impacts patients' lives [10]. The presence of such comorbidities among SLE patients significantly contributes to the symptoms and disabilities associated with the disease [8]. The presence of poor social support, low self-efficacy and ineffective coping strategies can aggravate distress among patients [11]. The presence of strong social support is associated with psychosocial well-being [12]. This protective effect of social support on patients' well-being was also illustrated among patients with SLE by affecting patients' level of depression and health-related quality of life [13]. On the other hand, patients' low disease activity is associated with a better health-related quality of life and fewer depressive symptoms among patients with SLE [14].

There is a lack of research regarding emotional well-being and mental health among female patients with SLE in the Middle East and, especially in Jordan. In this study, we aim to explore the relationship between emotional well-being and SLE by examining how depression, anxiety, fibromyalgia, and social support interact with each other and impact disease characteristics and activity. This research aims to elucidate the intricate interplay between psychological well-being and disease progression in SLE to guide future interventions to improve patient outcomes.

Methods

Study design

This study adopted a cross-sectional design and enrolled all sequential female patients diagnosed with SLE who attended a single-provider rheumatology clinic at the Jordan University Hospital (JUH), a tertiary care and teaching hospital in Amman, the capital of Jordan, that received referral for rheumatology consultations and care from across the country. Data was collected between September 2023 and December 2024. A structured questionnaire was utilized to collect demographic data and SLE disease features. The patients' electronic medical records were reviewed to complete and confirm the data.

The study methods were in concordance with the Consensus-based Standards for the selection of health status Measurement Instruments (COSMIN) checklist [15] and complied with published guidelines [16].

Sample size and inclusion criteria

Sequential sampling was done for all consecutive female patients who met the 2019 EULAR/ACR Classification Criteria for SLE [17]. This study was approved by the ethics committee of the University of Jordan Hospital (https://doi.org/10/2023/30525), and all participants signed an informed consent form before participating in the study.

Data collection

A structured questionnaire (Supplementary) was designed and administered to patients in person after completing their regular follow-up visit to the rheumatologist, who was not present at the time of the interview. Patients' demographic and clinical data were collected, including their sociodemographic profile (age, educational status, and occupation), SLE duration, presence of systemic illnesses or comorbid conditions, treatment regimens, smoking status, past medical history, and surgical history. The following laboratory data were extracted from the file if recent within 1 week of the interview or collected at the time of the interview: complete blood count, creatinine, urine analysis, erythrocyte sedimentation rate (ESR), c- c-reactive protein (CRP), C3, C4 and ds-DNA.

Measurement of SLE disease activity

SLE disease activity was assessed using the SELENA-SLEDAI (Safety of Estrogens in Lupus Erythematosus National Assessment-Systemic Lupus Erythematosus Disease Activity Index) [18]. SELENA-SLEDAI is a twenty-four-item tool that is used to assess SLE activity. Each item has a weight quantified numerically from 1 to 8; scores of each item are summed, yielding the final score, with 0 and 105 being the minimum and maximum scores possible, respectively. Even though the maximum possible score is 105, scores above 45 are rarely observed in clinical practice [19].

Measurement of the psychological well-being of the patients

Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) scales were utilized to assess depression and anxiety among patients, respectively, and the Fibromyalgia Rapid Screening Tool (FiRST) was used to screen for fibromyalgia. Patients were administered the validated Arabic version of these questionnaires which have Cronbach's alpha scores of 0.857 amd 0.87 for PHQ-9 and GAD-7, respectively [20, 21].

PHQ-9 is a nine-item tool used to screen and determine the severity of depression. Patients with scores equal to or above ten were considered positive [22]. Regarding depression categorization, scores from 0 to 4 considered minimal depression, 5–9 considered Mild depression, 10–14 regarded moderate depression, 15–19 considered moderately severe depression and 20–27 considered severe depression [23]. GAD-7 is a seven-item tool to assess the severity of GAD [24]. Scores 0–4 indicate minimal anxiety, 5–9 indicate mild anxiety, 10–14 indicate moderate anxiety, and 15–21 indicate severe anxiety. The Fibromyalgia Rapid Screening Tool (FiRST) is a six-item tool used to screen for fibromyalgia in patients with widespread pain or fatigue. All items are yes or no questions, with patients answering five or more questions as yes, being considered positive for fibromyalgia screening with a Cronbach's alpha score of 0.7 [25].

Measurement of the social support and quality of life

The Multidimensional Scale of Perceived Social Support (MSPSS) is composed of twelve items that evaluate social support. The MSPSS grades each of its items out of 7, starting at 1 ("very strongly disagree") and ending at 7 ("very strongly agree"), allowing for a total score between 12 and 84; higher scores correspond to the patient perceiving a higher level of social support [26]. The scale was provided in an Arabic-translated form, which is applicable, reliable, and culturally valid for measuring perceived social support among Arabic-speaking populations in both clinical and research settings which had a high internal consistency with McDonald's ω values between 0.94 and 0.97 [27].

The Short Form 12-item Survey (SF-12) was used to assess both mental and physical health-related quality of life. The SF-12 is a twelve-item tool, where six items are related to physical health, five are related to mental health, and one addresses both dimensions. Each of the domains is scaled from 0 to 100. The validated Arabic version was used in this study which shows a satisfactory Cronbach's alpha for both the physical health-related quality of life (Cronbach's alpha = 0.743) and mental health-related quality of life (Cronbach's alpha = 0.707) [28].

Statistical analysis

The data analysis was performed using IBM-SPSS v27. Demographic data, laboratory values, organ involvement, treatment regimens, FiRST, MSPSS, PHQ-9, SF-12 and GAD-7 scores were reported as counts and percentages or means and standard deviation. The association between variables and FiRST screening, GAD-7 and PHQ-9 results were tested using Chi-square, Fischer-Exact test or T-test as appropriate. Statistically significant associations on univariate analysis (P-value < 0.05) were reassessed using multivariate binary logistic regression. Multivariate logistic regression results were reported using odds ratios (OR) and 95% confidence intervals (95% CI).

Results

Demographic and disease characteristics of the study sample

Sixty-three female patients with SLE were included. The mean age was 40.3 ± 15.3 years, with a mean age of 28.3 ± 12.1 years at the time of SLE diagnosis (Table 1). The most common SLE manifestations were mucocutaneous and hematological manifestations, each affecting 53 patients (84.1%), followed by joint involvement, which was present in 52 patients (82.5%). Constitutional symptoms were present in 40 patients (63.5%), kidney involvement in 19 patients (30.2%), and lung involvement was present in 20 patients (31.7%). The mean SLEDAI score for the patients was 7.6 ± 8.9.

The most used SLE therapy among our study participants was hydroxychloroquine, which was used by 50 patients (79.4%), while 46 patients (73.0%) were using glucocorticoids. Mycophenolate and azathioprine were also commonly used in 24 patients (38.1%) and 22 patients (34.9%), respectively. The mean ESR was 35.4 ± 25.7 mm/h, and the mean CRP was 6.5 ± 10.5 mg/dl. The mean neutrophils to lymphocytes ratio (NLR) was 2.6 ± 2.4, while the platelets to lymphocytes ratio (PLR) had a mean of 180.7 ± 111.6 (Table 1). Five patients (7.9%)

Table 1 Demographic and disease characteristics of the study sample

Variable	Frequency (%)	Mean (SD)
Age		40.3 (15.3)
Age at SLE diagnosis		28.3 (12.1)
Constitutional symptoms	40 (63.5)	
Organ involvement		
Kidney	19 (30.2)	
Eye	10 (15.9)	
Heart	36 (57.1)	
Mucocutaneous	53 (84.1)	
Joints	52 (82.5)	
Hematological	53 (84.1)	
Vascular	40 (63.5)	
Gastrointestinal	3 (4.8)	
Pulmonary	20 (31.7)	
Neuropsychiatry	9 (14.3)	
SLEDAI		7.6 (8.9)
Osteoporosis	9 (14.3)	
Osteopenia	17 (27.0)	
Treatment		
Glucocorticoids	46 (73.0)	
Mycophenolate	24 (38.1)	
Hydroxychloroquine	50 (79.4)	
Tacrolimus	7 (11.1)	
Azathioprine	22 (34.9)	
Methotrexate	1 (1.6)	
Leflunomide	1 (1.6)	
Cyclosporine	1 (1.6)	
Laboratory results		
ESR		35.4 (25.7)
CRP		6.5 (10.5)
Creatinine		0.82 (0.39)
Lymphocytes		1.8 (0.93)
Neutrophils		3.9 (2.5)
Platelets		2269.3 (88.8)
Hemoglobin		11.8 (1.6)
NLR		2.6 (2.4)
PLR		180.7 (111.6)
Ds-DNA	25 (39.7)	
Low C3	16 (25.4)	
Low C4	8 (12.7)	

were thrombocytopenic, thirty-two patients (50.8%) were anemic, and fifteen patients (23.8%) had leukopenia.

Psychosocial characteristics of the study sample

Only one patient (1.6%) was illiterate, while 30 patients (47.6%) had school-level education, and 32 patients (51.2%) had at least a college degree. Thirty patients (47.6%) were unemployed, and 41 patients (65.1%) were married. According to PHQ-9, 22 patients (34.9%) had scores equal to or above 10, which is suggestive of depression. According to PHQ-9 categories, 21 patients (33.3%) had minimal depression, 18 patients (28.6%) had mild depression, 11 patients (17.5%) had moderately severe depression, and five patients (7.9%) had severe depression. In addition, patients were also categorized according to their GAD-7 scores, with 28 (44.4%) patients having minimal anxiety, 16 patients (25.4%) having mild anxiety, 12 patients (19.0) having moderate levels of anxiety, and 7 patients (11.1%) had severe anxiety.

Patients were also assessed for perceived social support using MSPSS; out of a maximum score of 84, the mean scores were 68.0 ± 11.8, indicating high levels of perceived social support. SF-12 was also used to assess patients' quality of life for both physical and mental domains. Out of a maximum score of 100, the mean PCS-12 scores were 41.9 ± 9.8, and the mean MCS-12 was 51.9 ± 3.4, indicating a moderate level of physical and mental health, respectively. Screening patients for fibromyalgia using FiRST revealed that 20 patients (31.7%) had scores suggestive of fibromyalgia (Table 2).

Factors associated with positive screens for depression, anxiety or fibromyalgia

Testing variables associated with depression based on PHQ-9 scores showed that a significantly higher proportion of patients with FiRST scores suggestive of fibromyalgia have depression (15.4% Vs. 63.6%, *P*-value < 0.001). Furthermore, patients with depression had lower PCS-12 scores compared with those who didn't (44.0 Vs. 37.3, *P*-value = 0.009). Vascular involvement, including Raynaud's phenomenon, Deep vein Thrombosis (DVT), vasculitis and splenic or kidney infarction, was significantly more common among patients with depression (51.3% Vs. 81.8%, *P*-value = 0.011). Also, NLR was significantly higher among patients with depression (2.1 Vs. 3.5, *P*-value = 0.040). Using multivariate logistic regression vascular involvement (OR = 14.9, 95% CI: 1.1-202.4), GAD-7 scores equal or higher than 10 (OR = 38.9, 95% CI: 2.9-524.8) were associated with significantly higher odds of depression (Fig. 1. A).

Testing factors associated with positive anxiety screening using GAD-7 (GAD-7 ≥ 10), positive FiRST screening were significantly higher among patients with anxiety (18.6% Vs 66.7%, *P*-value < 0.001). In addition, PCS-12 scores were significantly lower among patients with anxiety (45.3 Vs 34.2, *P*-value < 0.001). Hematological involvement was significantly higher among patients with anxiety (83.7% Vs 94.4%, *P*-value = 0.049) (Table 3). Using multivariate logistic regression, pstients with PHQ-9 scores ≥ 10 had significantly higher odds of anxiety (OR = 8.1, 95% CI: 1.4–47.6). On the other hand, high PCS-12 scores were significantly associated with lower odds of having positive screening for anxiety (OR = 0.89, 95% CI: 0.804–0.993).

Regarding factors associated with FiRST levels suggestive of fibromyalgia, kidney involvement was more

Table 2 Psychosocial characteristics of the study sample

Variable	Frequency (%)	Mean (SD)
Marital status		
Married	41 (65.1)	
Single	22 (34.9)	
Occupation		
Student	10 (15.8)	
White collar	15 (23.8)	
Unemployed	30 (47.6)	
Retired	8 (12.7)	
Educational level		
Illiterate	1 (1.6)	
School	30 (47.6)	
College	30 (47.6)	
Masters/PhD	2 (3.6)	
BMI		26.6 (5.1)
PHQ-9 ≥ 10	22 (34.9)	
PHQ-9		
Minimal depression	21 (33.3)	
Mild depression	18 (28.6)	
Moderate depression	11 (17.5)	
Moderately severe depression	6 (9.5)	
Severe depression	5 (7.9)	
Not available	2 (3.2)	
GAD-7		
Minimal Anxiety	28 (44.4)	
Mild Anxiety	16 (25.4)	
Moderate Anxiety	12 (19.0)	
Severe Anxiety	7 (11.1)	
FiRST suggestive of fibromyalgia		
Yes	20 (31.7)	
No	41 (65.1)	
Not available	2 (3.2)	
SF-12		
MCS-12		51.9 (3.4)
PCS-12		41.9 (9.8)
MSPSS		68.0 (11.8)

common among patients with negative FiRST screening (41.5% Vs. 10.0%, *P*-value = 0.017), but eye involvement was more common among those with positive screening (9.8% Vs. 30.0%, *P*-value = 0.039) (Table 4). Using multivariate logistic regression, patients with kidney involvement (OR = 0.058, 95% CI: 0.004–0.828) and higher PCS-12 scores (OR = 0.889, 95% CI: 0.79–0.96) had significantly lower odds of positive FiRST screening (Fig. 1C).

Discussion

This study describes the demographics, clinical, and psychosocial factors affecting a sample of female patients diagnosed with systemic lupus erythematosus (SLE) in Jordan. Our study's population had an average age at diagnosis of 28.3 ± 12.1 years, and these findings are similar to those reported by Gheita et al. [29], who found a median age at diagnosis of 25 years in Egyptian patients. In our study, mucocutaneous and hematological symptoms were the most common clinical manifestations, each affecting 84.1% of patients. These findings reflect the global trends, where mucocutaneous symptoms are reported in up to 72% of SLE patients [30], and hematological manifestations affect over 50% of patients [31]. Additionally, renal involvement was found in 30.2% of patients, which aligns with reported kidney involvement rates, which is around 30% in SLE cases [32]. In general, the rate of organ involvement reported in our study was similar to previous studies, including those of Adwan et al., which included 244 female SLE patients from Jordan [33]. Constitutional symptoms, such as fatigue, fever, and weight loss, were reported in 63.5% of patients in our study. Fatigue, the most common and often the most disabling symptom in SLE, significantly impacts patients' quality of life and contributes to both the physical and mental health burden associated with the disease [34].

Patients with eye involvement were significantly more likely to have fibromyalgia on univariate analysis (9.8% Vs 30.0%). In contrast, the presence of kidney involvement had lower odds of positive fibromyalgia screening (95% CI 0.004–0.828), reflecting the complex and poorly understood mechanism of fibromyalgia [35]. These findings may be explained by the fact that renal involvement is generally less physically perceived by patients compared to ocular manifestations. As a result, the psychological impact of kidney involvement may differ from that of eye involvement.

Patients with SLE are at a higher risk of psychiatric comorbidities, including depression and anxiety [2]. In our study, 38.1% of patients had moderate to severe anxiety levels according to GAD-7, and 34.9% of patients had PHQ-9 scores suggestive of depression. These levels are higher than previously reported levels in Jordan [36]. The prevalence of psychiatric comorbidities, such as depression and anxiety, in our study closely aligns with findings from a study in Saudi Arabia, which reported rates of 45.5% for depression and 46.2% for anxiety [37]. Another study conducted in Egypt showed an even higher prevalence of depressive symptoms, reaching 64%. These consistent findings across the region suggest that the experience of women with SLE in Jordan reflects the broader trends seen in neighboring countries and reflects the drastic impact of SLE on the psychosocial aspects of its patients. This was also evident in patients' PCS-12 scores, where patients who had a positive screening for depression had significantly lower PCS-12 scores (44.0 Vs. 37.3). In addition, the presence of vascular involvement, such as Raynaud's phenomenon and other vascular manifestations was a predictor for depression on multivariate analysis (OR = 14.9). These findings clearly reflect the well-known link between physical symptoms and

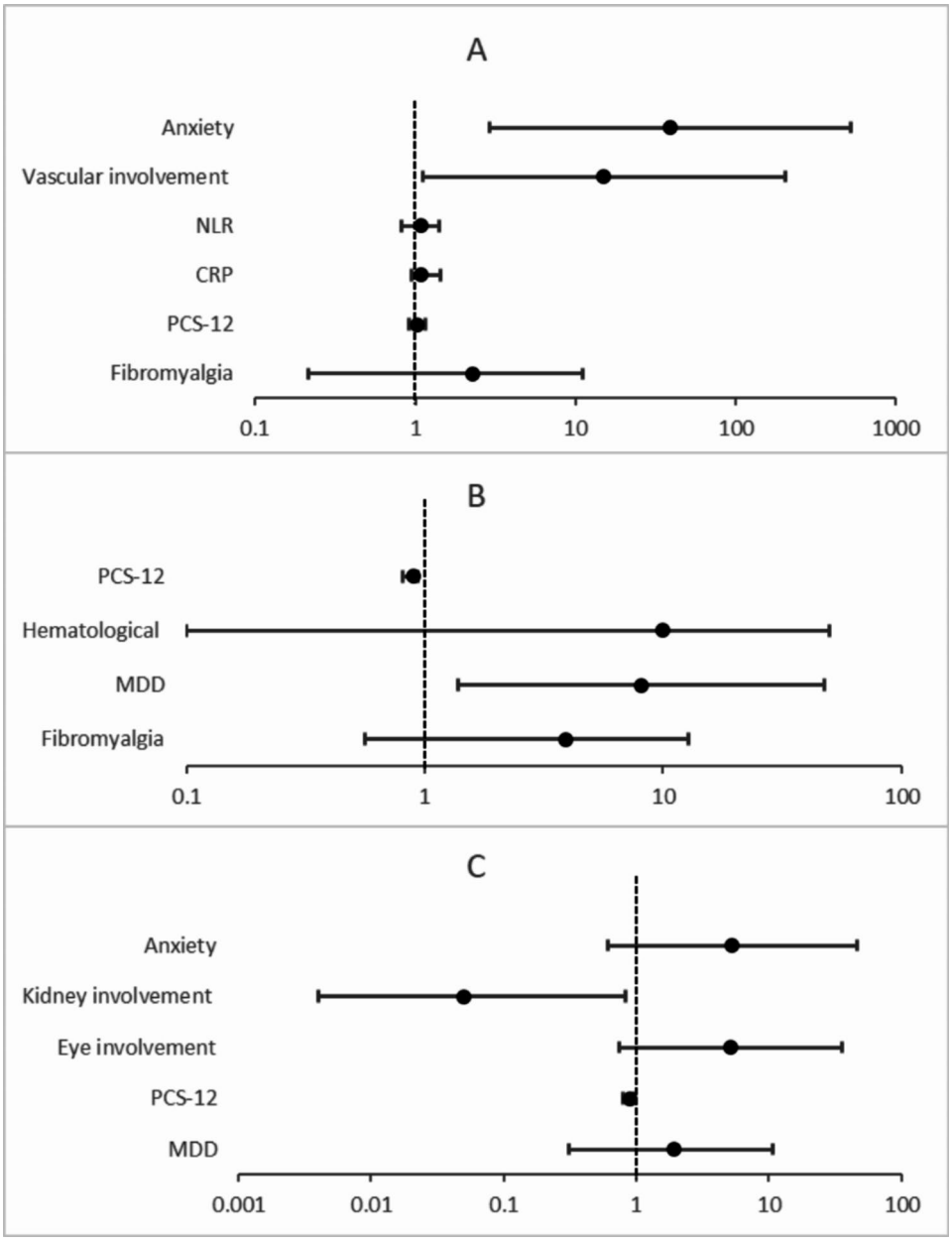

Fig. 1 Multivariate logistic regression of factors associated with **A**: PHQ-9 ≥ 10, **B**: GAD-7 ≥ 10, **C**: positive fibromyalgia screening

depression [38]. The significant association between NLR and depression on univariate analysis (2.1 Vs. 3.5) and the significantly higher scores of CRP among patients with depression further consolidate the association between depression and the current physical status among patients. The association between NLR and depression was also previously reported by Papachristodoulou et al. [39].

The prevalence of fibromyalgia in the general population, according to Heidari et al., is 1.78% with a 95% confidence interval of 1.65–1.9 [40]. In our study, 31.7% of the study population had a positive screening for fibromyalgia, which is also higher than Torrente-Segarra et al.'s finding, where only 6.2% of SLE patients had fibromyalgia [41]. The presence of fibromyalgia as a comorbid condition negatively affects the quality of life of SLE patients [42]. In our study, patients with better physical quality of life according to PCS-12 had significantly lower odds of fibromyalgia (OR = 0.889), reflecting the complex interplay between symptoms caused by both disorders.

Our study demonstrated that patients reported high levels of perceived social support, with a mean score of 68.0 ± 11.8 on the MSPSS. This underscores the critical role that strong social networks play in helping individuals cope with chronic illnesses like SLE. Similarly, Cheol Bae et al. [43] found that higher levels of social support

Table 3 Factors associated with depression (PHQ-9 ≥ 10) and positive GAD screen (GAD-7 ≥ 10)

Variable	PHQ-9 ≥ 10			GAD ≥ 10		
	No *N* = 39	Yes *N* = 22	*P*-value	No *N* = 43	Yes *N* = 18	*P*-value
Age	41.2 (15.4)	40.1 (15.2)	0.778	39.6 (15.6)	41.8 (14.8)	0.596
Age at SLE diagnosis	27.9 (11.4)	30.1 (13.4)	0.499	27.6 (11.8)	30.3 (12.9)	0.423
Married	25 (64.1)	16 (72.7)	0.491	26 (60.5)	11 (61.1)	0.796
Unemployed	22 (56.4)	7 (31.8)	0.065	23 (53.5)	6 (33.3)	0.094
White collar	9 (23.1)	6 (27.3)	0.472	9 (20.9)	6 (33.3)	0.341
BMI	27.4 (5.6)	25.6 (4.2)	0.200	26.8 (5.4)	26.1 (4.5)	0.625
PHQ-9 ≥ 10	-	-	-	8 (18.6)	14 (77.8)	**< 0.001**
GAD-7 ≥ 10	4 (10.3)	14 (35.9)	**< 0.001**	-	-	-
Fibromyalgia	6 (15.4)	14 (63.6)	**< 0.001**	8 (18.6)	12 (66.7)	**< 0.001**
MSPSS	68.0 (12.3)	67.9 (11.7)	0.979	68.3 (8.8)	67.2 (17.2)	0.746
SLEDAI	8.5 (9.7)	6.7 (8.0)	0.485	8.8 (9.8)	4.6 (5.8)	0.054
SF-12						
MCS-12	51.9 (3.5)	52.0 (3.6)	0.929	52.2 (3.7)	51.1 (2.3)	0.251
PCS-12	44.0 (8.8)	37.3 (10.2)	**0.009**	45.3 (8.1)	34.2 (9.1)	**< 0.001**
Constitutional symptoms	27 (69.2)	13 (59.1)	0.742	28 (65.1)	12 (66.7)	0.907
Organ involvement						
Kidney	14 (35.9)	5 (22.7)	0.361	13 (30.2)	6 (33.3)	0.704
Eye	4 (10.3)	6 (27.3)	0.069	6 (14.0)	4 (22.2)	0.370
Heart	25 (64.1)	10 (45.5)	0.222	24 (55.8)	11 (61.1)	0.432
Mucocutaneous	32 (82.1)	19 (86.4)	0.501	36 (86.0)	15 (83.3)	0.298
Joints	36 (92.3)	16 (72.7)	0.166	36 (83.7)	16 (88.9)	0.604
Hematological	34 (87.2)	17 (77.3)	0.817	34 (83.7)	17 (94.4)	**0.49**
Vascular	20 (51.3)	18 (81.8)	**0.011**	28 (67.4)	10 (61.)	0.929
Gastrointestinal	2 (5.1)	1 (4.5)	0.696	2 (4.7)	1 (5.6)	0.600
Pulmonary	13 (33.3)	6 (27.3)	0.894	13 (30.2)	6 (33.3)	0.839
Neuropsychiatry	5 (12.8)	4 (18.2)	0.372	6 (14.0)	3 (16.7)	0.718
Osteoporosis	6 (15.4)	3 (13.6)	0.506	4 (9.3)	5 27.8)	0.066
Osteopenia	11 (28.2)	6 (27.3)	0.676	14 (32.6)	3 (16.7)	0.131
Treatment						
Glucocorticoids	27 (59.2)	18 (81.8)	0.283	30 (69.8)	15 (83.3)	0.188
Mycophenolate	14 (35.9)	10 (45.5)	0.463	16 (37.2)	8 (44.4)	0.667
Hydroxychloroquine	30 (76.9)	19 (86.4)	0.295	33 (76.7)	16 (88.9)	0.532
Tacrolimus	6 (15.4)	1 (4.5)	0.200	5 (11.6)	2 (11.1)	0.647
Azathioprine	14 (35.9)	6 (27.3)	0.346	14 (34.9)	6 (38.9)	0.833
Methotrexate	3 (7.7)	2 (9.1)	0.599	4 (9.3)	1 (5.6)	0.521
Leflunomide	0 (0)	1 (4.5)	0.361	0 (0)	1 (5.6)	0.302
Cyclosporine	1 (2.6)	0 (0)	0.639	1 (2.3)	0 (0)	0.698
Laboratory results						
ESR	38.7 (26.1)	30.3 (25.0)	0.239	33.8 (24.7)	39.6 (28.2)	0.427
CRP	4.1 (6.0)	11.0 (14.9)	**0.016**	7.2 (12.3)	3.6 (3.8)	0.229
Creatinine	0.84 (0.34)	0.81 (0.49)	0.819	0.85 (0.35)	0.78 (0.47)	0.540
Lymphocytes	1.7 (0.93)	1.8 (0.85)	0.625	1.9 (1.0)	1.7 (0.74)	0.418
Neutrophils	3.6 (1.9)	3.6 (1.8)	0.935	4.2 (2.8)	3.1 (1.3)	0.098
Platelets	278.3 (94.1)	260.1 (77.6)	0.460	273.2 (95.7)	259.8 (71.2)	0.594
Hemoglobin	11.8 (1.5)	11.9 (1.6)	0.820	12.0 (1.6)	11.5 (1.4)	0.211
NLR	2.1 (0.99)	3.5 (3.8)	**0.040**	2.7 (2.9)	2.0 (1.2)	0.356
PLR	191 (112.5)	171.6 (109.9)	0.515	183.4 (125.5)	174.4 (70.4)	0.779
Ds-DNA	15 (38.5)	10 (45.5)	0.283	15 (34.9)	10 (55.6)	0.134
Low C3	10 (25.6)	5 (22.7)	0.609	10 (23.6)	5 (27.8)	0.859
Low C4	5 (12.8)	2 (9.1)	0.557	5 (11.6)	2 (11.1)	0.595

Bold indicates *P*-value < 0.05

Table 4 Factors associated with positive fibromyalgia screen using FiRST

Variable	FiRST < 5 *N* = 41	FiRST > = 5 *N* = 20	*P*-value
Age	42.2 (15.4)	37.8 (14.8)	0.288
Age at SLE diagnosis	28.6 (12.5)	28.8 (11.6)	0.959
Married	28 (68.3)	13 (65.0)	0.797
Unemployed	21 (51.2)	8 (40.0)	0.410
White collar	9 (22.0)	6 (30.0)	0.351
BMI	27.1 (5.7)	26.0 (3.8)	0.471
PHQ-9 ≥ 10	8 (19.5)	14 (70.0)	**0.001**
GAD-7 ≥ 10	6 (14.6)	12 (60.0)	**< 0.001**
MSPSS	68.1 (12.0)	67.5 (12.2)	0.851
SLEDAI	8.2 (8.1)	6.9 (10.9)	0.663
SF-12			
MCS-12	52.1 (3.6)	51.6 (3.1)	0.622
PCS-12	44.9 (8.7)	34.9 (8.5)	**< 0.001**
Constitutional symptoms	28 (68.3)	12 (60.0)	0.902
Organ involvement			
Kidney	17 (41.5)	2 (10.0)	**0.017**
Eye	4 (9.8)	6 (30.0)	**0.039**
Heart	25 (61.0)	10 (50.0)	0.696
Mucocutaneous	35 (85.4))	16 (80.0)	0.510
Joints	36 (87.8)	16 (80.0)	0.906
Hematological	37 (90.2)	14 (70.0)	0.188
Vascular	23 (56.1)	15 (75.0)	0.108
Gastrointestinal	1 (2.4)	2 (10.0)	0.216
Pulmonary	14 (34.1)	5 (25.0)	0.727
Neuropsychiatry	5 (12.2)	4 (20.0)	0.282
Osteoporosis	6 (14.6)	3 (15.0)	0.571
Osteopenia	11 (26.8)	6 (30.0)	0.559
Treatment			
Glucocorticoids	29 (70.7)	16 (80.0)	0.328
Mycophenolate	6 (14.6)	18 (90.0)	0.297
Hydroxychloroquine	31 (75.6)	18 (90.0)	0.163
Tacrolimus	5 (12.2)	2 (10.0)	0.584
Azathioprine	13 (31.7)	7 (35.0)	0.797
Methotrexate	4 (9.8)	1 (5.0)	0.466
Leflunomide	0 (0)	1 (5.0)	0.328
Cyclosporine	1 (2.4)	0 (0)	0.672
Laboratory results			
ESR	37.0 (26.9)	33.2 (23.9)	0.611
CRP	7.2 (12.3)	5.2 (5.3)	0.512
Creatinine	0.84 (0.37)	0.79 (0.46)	0.609
Lymphocytes	1.8 (9.8)	1.7 (0.71)	0.654
Neutrophils	3.9 (2.0)	3.1 (1.3)	0.148
Platelets	281.9 (92.2)	249.8 (77.7)	0.203
Hemoglobin	11.8 (1.4)	11.9 (1.6)	0.917
NLR	2.5 (2.7)	2.8 (2.1)	0.663
PLR	121.3 (18.9)	84.2 (19.8)	0.447
Ds-DNA	18 (43.9)	7 (35.0)	0.473
Low C3	10 (24.4)	5 (25.0)	0.511
Low C4	5 (12.2)	2 (10.0)	0.639

Bold indicates *P*-value < 0.05

were associated with better mental health and improved quality of life in SLE patients. A strong support network, along with factors such as higher social class, can help alleviate the emotional stress associated with the disease and enhance overall well-being.

Furthermore, to the best of the author's knowledge, this is the first study in this region to examine the psychological state of women diagnosed with SLE and to establish the relationship between their disease activity and different clinical manifestations in Jordan. On this basis, our study contributes to understanding the specific features of the life experiences of women with lupus and exploring the relationship between mental health status, disease activity, and health-related quality of life. By administering reliable and validated questionnaires to the participants to determine their MSPSS and SF-12 scores, the study learns how SLE affects women in their day-to-day living, state of health and psychological well-being. Some of our findings corroborate the findings of the literature involving female lupus patients in this part of the world, and this study is unique in that it includes emotional and psychological aspects of lupus that have not been previously explored.

We acknowledge some limitations in our study, including the small sample size. In addition, this study's cross-sectional design limits the dynamic follow-up of how patients' symptoms and mental status change over time. Our patients had a low mean SLEDAI score, which can make our sample less representative of populations with higher disease activity, limiting the generalizability of the results. In addition, the absence of measures assessing the cumulative damage attributed to SLE and its associations can limit the interpretation of the disease burden and its impact on patients' well-being. Data was also collected from one center in Amman, the capital of Jordan. We believe further multicentric studies that evaluate the psychosocial burden of SLE are needed. Even though females are affected with SLE more commonly than males, we recommend further studies evaluating the emotional and psychological well-being of males diagnosed with SLE.

Conclusion

In conclusion, our study provides an overview of the demographics, clinical manifestations, and psychosocial and emotional factors affecting female patients with an SLE diagnosis in Jordan. Our results showed a significant impact of SLE on physical and mental health. Our study participants had high rates of depression, anxiety and fibromyalgia, which negatively affects patients' quality of life. The findings of our study were limited by the small sample size and cross-sectional design. Therefore, there is a need for larger, multicentric, and longitudinal studies to allow a better and more comprehensive understanding

of the psychological well-being of SLE patients and how it changes over time.

Abbreviations

SLE	Systemic Lupus Erythematosus
JUH	Jordan University Hospital
PHQ-9	Patient Health Questionnaire-9
GAD-7	Generalized Anxiety Disorder-7
FiRST	Fibromyalgia Rapid Screening Tool
SLEDAI	Systemic Lupus Erythematosus Disease Activity Index
SF-12	Short Form 12-item Survey
MSPSS	Multidimensional Scale of Perceived Social Support
PCS-12	Physical Component Summary (from SF-12)
MCS-12	Mental Component Summary (from SF-12)
EULAR/ACR	European Alliance of Associations for Rheumatology/ American College of Rheumatology
SELENA-SLEDAI	Safety of Estrogens in Lupus Erythematosus National Assessment-Systemic Lupus Erythematosus Disease Activity Index
ESR	Erythrocyte Sedimentation Rate
CRP	C-reactive Protein
C3	Complement Component 3
C4	Complement Component 4
ds-DNA	Double-stranded DNA
NLR	Neutrophils to Lymphocytes Ratio
PLR	Platelets to Lymphocytes Ratio
DVT	Deep Vein Thrombosis
COSMIN	Consensus-based Standards for the selection of health status Measurement Instruments
IBM-SPSS	International Business Machines Statistical Package for the Social Sciences
OR	Odds Ratio
CI	Confidence Interval

Supplementary Information

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Supplementary Material 1

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Author contributions
FA: principal investigator, supervising data collection, data synthesis, manuscript drafting and finalizing the final draft. OH: data analysis, manuscript drafting and approving the final draft. ZAA, RBH, DA: literature review, designing data collection sheet, data Collection. TN, MM and NA: literature review, drafting the manuscript and approving the final draft.

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Data availability
Data is available upon reasonable request.

Declarations

Ethics approval and consent to participate
Jordan University Hospital approved the study, and IRB approval number was (10/2023/30525). All procedures followed the ethical standards of the institutional research committee and adhered to the principles of the World Medical Association Declaration of Helsinki. Written informed consent was obtained from all participants.

Consent for publication
Not applicable.

Clinical trial number
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Department of Internal Medicine, Division of Rheumatology, The University of Jordan, Amman 11942, Jordan
[2]School of Medicine, The University of Jordan, Amman, Jordan

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