Association of depressive/anxiety symptoms with quality of life and work ability in patients with systemic lupus erythematosus

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Abstract

Objective

To study the association of depressive/anxiety symptoms with health-related quality of life (HRQoL) and work ability in Chinese patients with systemic lupus erythematosus (SLE).

Methods

Consecutive patients with ≥4 ACR criteria for SLE were recruited. Depressive and anxiety symptoms were assessed by the Hospital Anxiety and Depression scale (HADS). HRQoL was assessed by the Chinese version of MOS-Short Form (SF)-36. Disease activity of SLE was assessed by the SLE disease activity index (SLEDAI) and organ damage was assessed by the ACR/SLICC damage index (SDI). The relationship between HAD scores, work ability and HRQoL was studied.

Results

A total of 367 SLE patients were studied (95% women; age 40.2±12.9 years; disease duration 9.3±7.2 years). Fifty-five (15%) patients had HADS-depression score ≥10 and 70 (19%) patients had HADS-anxiety score ≥10. Patients with either score ≥10 had significantly lower SF36 score (physical and mental component) than those with score <10. In separate linear regression models, the mental and physical component scores of SF36 were significantly associated with the HAD-depression and HAD-anxiety score after adjustment for age, sex, SLE duration, years of education, religious belief, marital status, employment status, poverty, SDI and mean SLEDAI score in the preceding year. Among those who were working in the preceding year (n=190), 30 (16%) patients either quitted their job (n=22) or reduced working hours (n=8). Patients with work disability had significantly higher HAD-depression score than those without (6.31±5.51 vs. 3.93±3.72; p=0.03).

Conclusion

Depressive/anxiety symptoms were fairly common in SLE patients and independently associated with poorer HRQoL. Patients with more depressive symptoms were more likely to experience work disability.

Key words

psychiatric, depression, anxiety, quality of life, work disability, lupus

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Introduction

Systemic lupus erythematosus (SLE) is a chronic multi-systemic autoimmune disease that predominantly affects women of the reproductive age. Despite the improvement in survival of SLE in the past few decades as a result of better medical care for disease activity and complications (1), organ damage and dysfunction such as cerebrovascular events, cognitive decline, pulmonary hypertension, disfiguring skin lesions, renal failure, avascular bone necrosis, fragility fractures and premature menopause is still prevalent, and leads to substantial physical and psychological morbidities, as well as reduced life expectancy (2, 3). As SLE commonly affects younger women, physical and mental impairment caused by organ damage may seriously affect their ability to achieve certain life goals, disruption of social functioning and work disability, leading to psychosocial stress (4). Moreover, reaction to a chronic illness, adjustment problems, poor coping strategies, uncertainty about disease flare and prognosis may further predispose SLE patients to mood disorders (5).

According to the 1999 American College of Rheumatology (ACR) nomenclature of neuropsychiatric (NP) manifestations of SLE (6), a prevalence of NP-SLE from 14% to 89% has been reported in the literature (7). Mood disorder is the most common psychiatric manifestation of SLE (17% to 27%) whereas depression is the commonest form of mood disorder in SLE patients (2%–60%). The wide range of prevalence figures for mood disorders in SLE is multifactorial and dependent on a number of factors such as patient selection and case mix, sample size, study design (retrospective *vs*. longitudinal), whether psychiatric symptoms were routinely screened, and the variation in the assessment techniques for the identification of psychiatric disorders (questionnaires *vs*. structured interview).

A systematic review (6) summarises that the commonest depressive symptoms reported by patients with SLE were fatigue/weakness, irritability, somatic preoccupation, insomnia and sadness. Depressive symptoms in SLE may reduce sleep quality, aggravate pain, reduce medication compliance and increase the utilisation of the health care system (8-10). We recently reported that 12% of our Chinese SLE patients had suicidal thoughts in the month preceding the study, and the intensity of suicidal ideation was independently associated with higher depressive scores (11). The current study is a further analysis of the data for the association of anxiety/depressive symptoms with health-related quality of life (HRQoL) and work ability in our cohort of patients.

Patients and method

Study population

Between April and July 2012, consecutive patients fulfilling ≥4 of the 1997 ACR criteria for the classification of SLE (12, 13) who attended our outpatient rheumatology clinics or were admitted to our hospital were recruited for this study. Written consent was obtained from all participants. Patients were excluded when informed consent could not be obtained or in whom who were unable to read questionnaires (*e.g*. illiterate, mental deficiency). The current study was approved by the Research and Ethics Committee of Tuen Mun Hospital, Hong Kong.

Data collection

All participants of this study were invited to complete questionnaires on depressive/anxiety symptoms and HRQoL. Clinical data of the participants and their disease status (disease activity and organ damage) were obtained from clinical assessment (see below) and medical record review. The work status of our patients at the time of the study and in the preceding year was enquired and the reasons for quitting their job or reducing working hours were obtained.

In addition, socio-demographic information that included age, sex, marital status, employment, years of education, religion (Catholic, Christian, Buddhist, Muslim) and utilisation of the comprehensive social security assistance (CSSA) (government financial assistance in our locality, reflecting poverty) was also collected from the participants at the time of questionnaire completion.

Assessment of depression and anxiety symptoms

Self-rated symptoms of depression and anxiety in the preceding week were assessed by the validated Chinese version of the Hospital Anxiety and Depression Scale (HADS) (14), which is a 14-item instrument to assess for anxiety and depression symptomatology. It consists of two subscales, depression and anxiety, each having seven questions on a 4-point scale (score 0–3), with possible total scores each ranging from 0 to 21 for each subscale. A score of 7 or less could be regarded as being in the normal range, whereas a score of >10 indicates the probable presence of anxiety or depression.

Assessment of HRQoL

HRQoL was measured by the Medical Outcomes Study Short-Form 36 (SF36) questionnaire, which is a validated generic self-administrated PRO instrument (15). It consists of 36 questions that measure patient's HRQoL in eight domains: physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH) that represent the physical HRQoL and; vitality (VT), social functioning (SF), role-emotional (RE) and mental health (MH) that represent the mental HRQoL. Each domain is scored from 0 (worst health status) to 100 (best health status), and this is linearly transformed into norm-based score using the US general population as a reference (each 10 points from 50 is a standard deviation from the mean). The scores of these domains are summarised into the physical component score (PCS) and mental component score (MCS). A validated Chinese version of the SF36 was used in this study (16).

Assessment of disease activity and damage of SLE

Disease activity of SLE was assessed by the Safety of Estrogens in Lupus Erythematosus National Assessment (SELENA)-SLE Disease Activity Index (SLEDAI), a validated instrument employed in the SELENA trials (17). Patients who participated in this study were followed up at intervals of 1 to 4 months, depending on disease activity and severity. The mean SLEDAI in the preceding 12 months, which was a better reflection of recent disease control than a one-time SLEDAI assessment at the time of questionnaire completion, was obtained. This was computed by summing the area under the curve of the SLEDAI (AUC-S) according to the following formula, divided by time:

$$\text{AUC-S} = \sum_{n=1}^{n=z} [\text{SELENA-SLEDAI}(n) + \text{SELENA-SLEDAI}(n+1)] \times [\text{time}(n+1) - \text{time}(n)] / 2$$

where z = the number of clinical assessments (1, 2, … z), and SELENA-SLEDAI(n) = SELENA-SLEDAI score at time n.

Organ damage of SLE was assessed by the SLICC/ACR Damage Index (SDI) (18). Damage in SLE can be due to disease activity or therapy-related complications. Damage (after SLE diagnosis) has to be present for ≥6 months before it is scored, irrespective of the cause.

Statistical analysis

Unless otherwise stated, results in this study were expressed as mean ± standard deviation (SD). Comparison between two groups were made by the Students' *t*-test for continuous variables and Chi Square test for categorical variables. Adjustment for other covariates was made by the Analysis of Covariance (ANCOVA) method. For multiple comparisons, correction was made by the Bonferroni method.

Linear regression models were estab-

Table I. Clinical characteristics of the SLE patients studied (N=367).

Clinical characteristics	HADS depression score			HADS anxiety score		
	≥10 (n=55)	<10 (n=312)	*p*	≥10 (n=70)	<10 (n=297)	*p*
Age, years	44.1 ± 14	40.0 ± 13	0.03	40.9 ± 15	40.0 ± 12	0.66
Women	50 (91)	299 (96)	0.17	63 (90)	286 (96)	0.03
SLE duration, years	9.9 ± 8.2	9.0 ± 7.0	0.17	9.0 ± 8.1	9.1 ± 7.0	0.96
SLE manifestations						
Facial rash	29 (53)	144 (46)	0.37	36 (51)	137 (46)	0.42
Discoid rash	8 (15)	26 (8)	0.14	10 (14)	24 (8)	0.11
Photosensitivity	12 (22)	91 (29)	0.26	17 (24)	86 (29)	0.43
Mucosal ulceration	9 (16)	51 (17)	1.00	11 (16)	49 (16)	0.87
Arthritis	42 (76)	213 (68)	0.23	55 (79)	200 (67)	0.07
Serositis	10 (18)	60 (19)	0.86	16 (23)	54 (18)	0.37
Renal	23 (42)	165 (53)	0.13	34 (49)	154 (52)	0.62
Seizure	5 (9)	16 (5)	0.24	5 (7)	16 (5)	0.57
Psychosis	3 (5)	11 (4)	0.45	2 (3)	12 (4)	1.00
Haemolytic anaemia	12 (22)	66 (21)	0.91	13 (19)	65 (22)	0.54
Leukopenia (<4x10^9/L)	17 (31)	115 (37)	0.40	21 (30)	111 (37)	0.25
Thrombocytopenia (<100x10^9/L)	12 (22)	75 (24)	0.72	18 (26)	69 (23)	0.66
Lymphadenopathy	9 (16)	45 (14)	0.71	11 (16)	43 (14)	0.79
Autoantibodies						
Anti-dsDNA	40 (73)	216 (69)	0.60	52 (74)	204 (69)	0.36
Anti-Sm	10 (18)	52 (17)	0.78	11 (16)	51 (17)	0.77
Anti-Ro	35 (64)	177 (57)	0.34	37 (53)	175 (59)	0.36
Anti-La	13 (24)	63 (20)	0.56	11 (16)	65 (22)	0.25
Anti-nRNP	13 (24)	96 (31)	0.29	21 (30)	88 (30)	0.95
*aPL	20 (36)	105 (34)	0.70	22 (31)	103 (35)	0.61
Medications (ever)						
Corticosteroids	47 (85)	275 (88)	0.58	63 (90)	259 (87)	0.52
HCQ	44 (80)	229 (73)	0.30	58 (83)	215 (72)	0.07
AZA	35 (64)	203 (65)	0.84	44 (63)	194 (65)	0.70
MMF	18 (33)	89 (29)	0.53	24 (34)	83 (28)	0.29
CYC	13 (24)	73 (23)	0.97	18 (26)	68 (23)	0.62
CNI	10 (18)	82 (26)	0.20	15 (21)	77 (26)	0.44

Values were expressed as number (%) or mean ± standard deviation.
SLE: systemic lupus erythematosus; HADS: Hospital Anxiety Depression Scale; *aPL: anti-phospholipid antibodies (anti-cardiolipin or lupus anticoagulant); HCQ: hydroxychloroquine; AZA: azathioprine; MMF: mycophenolate mofetil; CYC: cyclophosphamide; CNI: calcineurin inihibitor (cyclosporin A or tacrolimus).

Table II. SF36 scores in the SLE patients studied.

SF36 domains	HADS depression score		*p	HADS anxiety score		*p
	≥10 (n=55)	<10 (n=312)		≥10 (n=70)	<10 (n=297)	
	Mean (SD)			Mean (SD)		
Physical function	46.0 (28)	77.4 (21)	<0.001	51.8 (28)	77.8 (21)	<0.001
Role-physical	14.8 (29)	57.3 (42)	<0.001	15.9 (30)	59.5 (41)	<0.001
Bodily pain	41.6 (26)	66.6 (26)	<0.001	42.4 (26)	67.8 (26)	<0.001
General health	18.4 (13)	45.9 (22)	<0.001	21.7 (15)	46.6 (22)	<0.001
Vitality	26.4 (16)	54.3 (20)	<0.001	28.6 (17)	55.4 (20)	<0.001
Social function	36.3 (27)	77.5 (22)	<0.001	41.1 (25)	78.6 (22)	<0.001
Role-emotional	10.0 (26)	63.6 (41)	<0.001	11.6 (23)	66.6 (40)	<0.001
Mental health	38.7 (17)	68.4 (17)	<0.001	39.4 (16)	69.9 (16)	<0.001
PCS	28.8 (18)	60.5 (20)	<0.001	32.3 (19)	61.4 (20)	<0.001
MCS	25.2 (16)	61.9 (19)	<0.001	28.2 (15)	63.4 (19)	<0.001
Total score	28.0 (17)	64.1 (20)	<0.001	32.0 (17)	65.3 (19)	<0.001

SF36: short form 36; SLE: systemic lupus erythematosus; HADS: Hospital Anxiety Depression Scale; SD: standard deviation; PCS: physical component score; MCS: mental component score; *adjusted for age, sex, SLE duration, years of education, religious belief, marital status, poverty, employment status, SLE damage index and mean SLE disease activity score in the preceding year.

Table III. Linear regression of the relationship between HADS depression score and SF36.

	Physical component score			Mental component score		
	Slope (SE)	Beta	*p*	Slope (SE)	Beta	*p*
Demographic factors						
Current age	-0.24 (0.10)	-0.14	0.01	0.03 (0.09)	0.02	0.76
Female sex	-7.60 (4.30)	-0.07	0.08	-5.27 (3.77)	-0.05	0.16
SLE duration	0.24 (0.14)	0.08	0.09	0.10 (0.13)	0.03	0.41
Psycho-social factors						
Years of education	0.18 (0.36)	0.03	0.62	0.01 (0.33)	0.002	0.97
Religious belief	-4.02 (1.84)	-0.09	0.03	-4.75 (1.65)	-0.10	0.004
Single / divorced	-0.17 (2.10)	-0.004	0.94	0.93 (1.90)	0.02	0.62
Receiving CSSA (poverty)	-4.74 (2.73)	-0.07	0.08	-2.63 (2.46)	-0.04	0.29
Currently unemployed	1.34 (1.68)	0.03	0.43	0.57 (1.72)	0.01	0.74
SDI score	-2.08 (0.86)	-0.11	0.02	-1.27 (0.75)	-0.07	0.09
Mean SLEDAI score in preceding year	-1.06 (0.34)	-0.13	0.002	-0.50 (0.29)	-0.07	0.09
HADS depression score	-3.33 (0.22)	-0.64	<0.001	-3.77 (0.20)	-0.75	<0.001
R^2 of the model		0.55			0.63	

HADS: Hospital Anxiety and Depression Scale; SF36: short form 36; SE: standard error; Beta is the regression coefficient; SLE: systemic lupus erythematosus; CSSA: comprehensive social security assistance; SDI: SLE damage index; SLEDAI: SLE disease activity index.

lished to study the association between HAD depression/anxiety scores (continuous data) and the mental/physical components of the SF36 scores (continuous data), with adjustment for covariates that included age, sex, disease activity in the preceding year, organ damage and psychosocial factors such as marital status, educational level, employment status and the need for CSSA. HAD depression and anxiety scores and other parameters were compared between patients who did or did not experience work disability. A forward stepwise logistic regression model was used to study the association of work disability with the HAD depression scores, and the clinical and psychosocial covariates described above, with inclusion of the variables when $p<0.05$ and exclusion of variables when $p>0.10$.

All statistical analyses were performed using SPSS 16.0 for Windows 7.

Statistical significance was defined as a *p*-value of <0.05, two tailed.

Results

Clinical characteristics of patients studied

Three hundred and seventy-five SLE patients were invited but 8 declined to participate. Finally, 367 patients were studied (95% women). The mean age was 40.2±13 years and the mean SLE duration was 9.3±7.2 years. Table I summarises the clinical characteristics of these patients and the immunosuppressive medications ever received according to the HADS scores. No significant differences could be observed between the groups after correction for multiple comparisons. Mild (SLEDAI 1-5), moderate (SLEDAI 6-10) and high (SLEDAI ≥11) SLE activity was present in 204 (56%), 39 (11%) and 16 (4%) of the patients, respectively. Organ damage (SDI ≥1) was present in 137 (37.3%) patients. Sixteen (4%) patients had a history of depressive disorders and 2 (0.5%) patients had a history of anxiety disorders. These patients were receiving psychotropic medications from the psychiatrists.

Association between depressive / anxiety symptoms and HRQoL

The mean HADS depression and anxiety scores of the SLE patients were 5.19±4.5 and 6.39±4.7, respectively. Fifty-five (15%) SLE patients had depression score of ≥10 and 70 (19%) of the patients had anxiety score of ≥10. Patients with depressive score of ≥10 had significantly lower scores in all domains of the SF36, PCS and MCS than those with score <10. Similarly, significant lower scores in all domains of SF36, PCS and MCS were also observed in patients with HAD-anxiety score ≥10 compared to those <10. The differences remained statistical significant after adjustment for other covariates that included age, sex, SLE duration, years of education, religious belief, marital status, dependence on CSSA (poverty), employment status, mean SLEDAI score in the preceding year and organ damage (SDI score) (Table II).

In separate linear regression models, both the MCS and PCS of SF36 score was significantly associated with HADS depression score (Beta -0.75, $p<0.001$ and Beta -0.64, $p<0.001$, respectively) and HADS anxiety score (Beta -0.74, $p<0.001$ and Beta -0.60, $p<0.001$, respectively) after adjustment for the same covariates as described above (Ta-

ble III and IV). Other factors independently associated with either the MCS or PCS of the SF36 in the regression models included older age, religious belief, poverty, organ damage and SLE disease activity in the preceding year.

Prevalence of work disability and associated factors

Excluding retirees, housewives, students and those unemployed within 12 months prior to study, 190 patients were evaluated for work disability. Thirty patients (16%) who were working in 12 months prior to this study quitted their job (n=22) or reduced working hours (n=8) at the time of study entry (mean daily working hours was reduced from 6.4±2.5 to 1.2±2.3) because of perceived poor health. The commonest self-reported reasons for reducing/quitting work were joint/muscle aches (47%), fatigue (20%), anxiety/depressive symptoms (17%) and skin lesions causing cosmetic problem (7%).

Patients with work disability had significantly higher HAD-depression score than those without (6.31±5.51 *vs*. 3.93±3.72; p=0.03), but fewer years of education (10.4±2.22 *vs*. 11.9±2.79; *p*=0.03) (Table V). Other parameters such as age, sex, SLE duration, HAD-anxiety score, mean SLEDAI in the preceding 12 months, total SDI damage score and SF36 score were not significantly different between the two groups of patients. In a forward stepwise logistic regression model (data not shown), HADS depression score (odds ratio 1.14 [1.03–1.25] for each point increase; *p*=0.008) and single / divorced status (odds ratio 0.34 [0.14-0.83]; *p*=0.02) were associated with work disability.

Table IV. Linear regression of the relationship between HADS anxiety score and SF36.

	Physical component score			Mental component score		
	Slope (SE)	Beta	*p*	Slope (SE)	Beta	*p*
Demographic factors						
Current age	-0.33 (0.10)	-0.19	0.001	-0.09 (0.08)	-0.05	0.29
Female sex	-6.10 (4.32)	-0.06	0.16	-4.04 (3.54)	-0.04	0.26
SLE duration	0.27 (0.14)	0.09	0.05	0.11 (0.12)	0.03	0.38
Psycho-social factors						
Years of education	0.57 (0.36)	0.08	0.12	0.48 (0.31)	0.07	0.12
Religious belief	-1.33 (1.88)	-0.03	0.48	-1.85 (1.57)	-0.04	0.24
Single / divorced	-2.83 (2.11)	-0.06	0.18	-2.25 (1.78)	-0.05	0.21
Receiving CSSA (poverty)	-6.61 (2.74)	-0.10	0.02	-4.80 (2.31)	-0.07	0.04
Currently unemployed	-0.70 (1.67)	-0.02	0.67	-1.11 (1.61)	-0.03	0.49
SDI score	-3.08 (0.86)	-0.16	<0.001	-1.95 (0.70)	-0.10	0.005
Mean SLEDAI score in preceding year	-1.12 (0.35)	-0.14	0.14	-0.82 (0.28)	-0.11	0.03
HADS anxiety score	-2.97 (0.20)	-0.60	<0.001	-3.54 (0.17)	-0.74	<0.001
R^2 of the model		0.54			0.67	

HADS: Hospital Anxiety and Depression Scale; SF36: short form 36; SE: standard error; Beta is the regression coefficient; SLE: systemic lupus erythematosus; CSSA: comprehensive social security assistance; SDI: SLE damage index; SLEDAI: SLE disease activity index.

Table V. Depressive symptoms and work disability.

	Quitted job or reduced working hours (n=30)	Continued to work (n=160)	*p*
Age, years	40.1 ± 9.0	36.9 ± 9.8 21	0.09
Female sex	29 (97%)	150 (94%)	1.00
SLE duration, years	7.5 ± 5.3	9.0 ± 6.4	0.20
SF36 PCS	56.4 ± 26	61.7 ± 21	0.35
SF36 MCS	55.0 ± 25	62.2 ± 0.20	0.20
HADS – depression score	6.31 ± 5.51	3.93 ± 3.72	0.03
HADS – anxiety score	6.34 ± 4.06	5.35 ± 4.04	0.24
Mean SLEDAI in 12 months	4.42 ± 5.03	3.07 ± 2.35	0.16
SDI score	0.90 ± 1.60	0.47 ± 0.95	0.17
Years of education	10.4 ± 2.22	11.9 ± 2.79	0.003
Religious belief	9 (30%)	56 (35%)	0.60
Single / divorced	11 (37%)	85 (53%)	0.10

SLE: systemic lupus erythematosus; SF36: short form 36; PCS: physical component score; MCS: mental component score; HADS: Hospital Anxiety and Depression Scale; SLEDAI: SLE disease activity score; SDI: SLE damage index.

Discussion

Psychiatric symptoms are common in patients with SLE, with a reported prevalence of 17–71% (19). Bachen *et al*. showed that among 326 Caucasian women with SLE, 47% had a lifetime diagnosis of major depressive disorder and 49% had a lifetime diagnosis of anxiety disorder (specific phobia, panic disorder, obsessive-compulsive disorder) (20). A systematic review of 17 recent studies reported that major depression was diagnosed in 20-47% of patients with SLE (7). Using structured clinical interview, Uguz *et al*. (21) reported a 22% prevalence of major depression and 29% prevalence of anxiety disorders in 45 patients with SLE. A cross-sectional, population-based study in Finland revealed 43% of patients with SLE had mood disorders (22). A more recent study of childhood onset SLE patients also reported a high prevalence of depression (44%) using established cut-offs for standardised depression inventories (23). The prevalence of depressive and anxiety symptoms in our adult Chinese SLE patients appears to be lower when compared to these previous studies. While this may reflect a cultural difference in the expression of mood symptoms, the lack of confirmation of more subtle mood disorders by structured psychiatric interviews may also contribute.

A number of studies have shown that the HRQoL of SLE patients are poorer than that of healthy controls (24-26). Among various factors studied, depressive and anxiety symptoms were found to be one of the most important determinants for poor HRQoL in patients with SLE (24-29). Consistent with these studies, our results also showed that the HADS depressive and anxiety score was negatively associated with all domains of the SF36. Other factors shown to be independently associ-

ated with SF36 scores in the regression models were older age, religious belief, poverty, organ damage and mean SLEDAI score (reflecting disease activity control in the preceding year).

Loss in work ability is frequent in SLE patients and varies across studies of different localities and ethnic groups (19–38%) (4,30–35). Work absenteeism in SLE may lead to poverty, loss of self-esteem, social isolation, and depression. Risk factors identified in different studies for work disability included active disease, vascular thrombosis, musculoskeletal manifestations, older age, lower educational level or income, single marital status, organ damage and the presence of pain, fatigue, fibromyalgia symptoms (30-35). The 16% rate of work disability in our study was slightly lower than those reported in other studies because our figure referred only to a period of 12 months preceding the survey and a relatively low proportion (15%) of the patients had moderate to high disease activity.

The major risk factor for work disability identified in this study was the presence of depressive (but not anxiety) symptoms. This is consistent with a recent study in US which demonstrated a significant association between work absenteeism and depressive symptoms (34). Depression may aggravate somatic symptoms such as muscle and body aching, fatigue and the need for medical attendance, thus leading to the inability to stay on the same job. However, we were unable to identify other disease-related factors or clinical manifestations that were significantly associated with work disability. As we only studied longitudinally those patients who were working in the preceding year, other patients who quitted their job for more than 12 months because of more serious disease-related factors were not included for analysis. This might have undermined the sample size for statistical evaluation.

The strength of our study is a considerable cohort size of SLE patients, the use of mean SLEDAI score (AUC) in the preceding year as a surrogate for recent disease control and the affirmation of work disability over a longitudinal period. However, there are some limitations of our study design. First, a structured interview method for the identification of psychiatric disorders was not used and hence the actual prevalence of mood disorders cannot be accurately assessed. Second, as this was a cross-sectional study, the causal-relationship between depressive symptoms and work disability cannot be ascertained. It remains possible that work disability itself has led to depression in the subsequent 12 months' follow-up in our clinic. Third, fatigue and bodily pain in our patients could represent secondary fibromyalgia but this was not further assessed in our study for its relationship with HRQoL and work disability. Fourth, only 15% of the patients had moderate to high SLE activity at the time of assessment. This may have led to underestimation of the prevalence of depressive symptoms and work disability in our patients. Finally, we had utilised the generic SF36 tool for the measurement of HRQoL. Newer and more SLE-specific HRQoL tool such as the LupusPRO (32) consists of both health-related and non-health-related domains to enable an understanding of the broader burden of the disease. It is interesting to study the relationship between depressive/anxiety symptoms and the domains of the lupusPRO in a future study.

In summary, this cross-sectional study showed that anxiety and depressive symptoms were fairly common in Chinese patients with SLE. Fifteen and nineteen percent, respectively, of our patients had probable depressive and anxiety disorders using a cut-off score of 10 points in the HADS. Patients with higher depressive or anxiety scores had significantly worse HRQoL in all domains of the MOS SF36. The HADS depressive and anxiety scores were independently associated with the physical and mental component scores of the SF36, with very high regression coefficients as compared to other clinical and psychosocial factors, indicating that self-perceived depression or anxiety symptoms were the strongest determinants of poorer HRQoL in patients with SLE. Within a period of 12 months, one-sixth of our SLE patients experienced work disability. Higher HADS depressive score and the marital status were the main factors associated with work disability in our patients. Thus, early detection of depression, psychological counseling and prompt referral to the psychiatrists or clinical psychologists may help improve HRQoL and work ability. High-risk patients, such as those with more active SLE and severe organ damage, should be screened for psychiatric symptoms during clinical consultations. Patients should also be encouraged to join self-help groups to enhance their sense of social support.

Key messages

- Depressive and anxiety symptoms are fairly common in Chinese patients with SLE
- Depressive / anxiety symptoms in SLE patients are independently associated with poorer health-related quality of life
- SLE patients with depressive symptoms are more likely to experience work disability

References

1. MOK CC: Emerging biological therapies for systemic lupus erythematosus. *Expert Opin Emerg Drugs* 2014; 19: 303-22.
2. MOK CC, HO CTK, WONG RWS, LAU CS: Damage accrual in southern Chinese patients with systemic lupus erythematosus. *J Rheumatol* 2003; 30: 1513-9.
3. MOK CC, KWOK CL, YIP SF: Effect of renal disease on the standardized mortality ratio and life expectancy of patients with systemic lupus erythematosus. *Arthritis Rheum* 2013; 65: 2154-60.
4. MOK CC, CHEUNG MY, HO LY, YU KL, TO CH: Risk and predictors of work disability in Chinese patients with systemic lupus erythematosus. *Lupus* 2008; 17: 1103-7.
5. MESZAROS ZS, PERL A, FARAONE SV: Psychiatric symptoms in systemic lupus erythematosus: a systematic review. *J Clin Psychiatry* 2012; 73: 993-1001.
6. ACR ad hoc committee on Neuropsychiatric Lupus Nomenclature The American College of Rheumatology nomenclature and case definitions for neuropsychiatric lupus syndromes. *Arthritis Rheum*:1999; 42: 599-608.
7. PALAGINI L, MOSCA M, TANI C, GEMIGNANI A, MAURI M, BOMBARDIERI S: Depression and systemic lupus erythematosus: a systematic review. *Lupus* 2013; 22: 409-16.
8. PALAGINI L, TANI C, BRUNO RM *et al*.: Poor sleep quality in systemic lupus erythematosus: does it depend on depressive symptoms? *Lupus* 2014; 23: 1350-7.
9. JULIAN LJ, YELIN E, YAZDANY J *et al*.: Depression, medication adherence, and service utilization in systemic lupus erythematosus. *Arthritis Rheum* 2009; 61: 240-6.

10. PANOPALIS P, GILLIS JZ, YAZDANY J *et al*.: Frequent use of the emergency department among persons with systemic lupus erythematosus. *Arthritis Care Res* (Hoboken) 2010; 62: 401-8.
11. MOK CC, CHAN KL, CHEUNG EF, YIP PS: Suicidal ideation in patients with systemic lupus erythematosus: incidence and risk factors. *Rheumatology* (Oxford) 2014; 53: 714-21.
12. TAN EM, COHEN AS, FRIES JF *et al*.: The 1982 revised criteria for the classification of systemic lupus erythematosus. *Arthritis Rheum* 1982; 25: 1271-7.
13. HOCHBERG MC: Updating the American College of Rheumatology revised criteria for the classification of systemic lupus erythematosus. *Arthritis Rheum* 1997; 40: 1725.
14. LEUNG CM, WING YK, KWONG PK, LO A, SHUM K: Validation of the Chinese-Cantonese version of the hospital anxiety and depression scale and comparison with the Hamilton Rating Scale of Depression. *Acta Psychiatr Scand* 1999; 100: 456-61.
15. WARE JE JR, SHERBOURNE CD: The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992; 30: 473-83.
16. LAM CLK, LAUDER, IJ, LAM TP, GANDEK B: Population based norming of the Chinese (HK) version of the SF-36 health survey. *Hong Kong Practitioner* 1999; 21: 460-70.
17. BUYON JP, PETRI MA, KIM MY *et al*.: The effect of combined estrogen and progesterone hormone replacement therapy on disease activity in systemic lupus erythematosus: a randomized trial. *Ann Intern Med* 2005; 142: 953-62.
18. GLADMAN D, GINZLER E, GOLDSMITH C *et al*.: The development and initial validation of the Systemic Lupus International Collaborating Clinics/American College of Rheumatology damage index for systemic lupus erythematosus. *Arthritis Rheum* 1996; 39: 363-9.
19. WEKKING EM: Psychiatric symptoms in systemic lupus erythematosus: an update. *Psychosom Med* 1993; 55: 219-28.
20. BACHEN EA, CHESNEY MA, CRISWELL LA: Prevalence of mood and anxiety disorders in women with systemic lupus erythematosus. *Arthritis Rheum* 2009; 61: 822-9.
21. UGUZ F, KUCUK A, CICEK E, KAYHAN F, TUNC R: Mood, anxiety and personality disorders in patients with systemic lupus erythematosus. *Compr Psychiatry* 2013; 54: 341-5.
22. AINIALA H, LOUKKOLA J, PELTOLA J, KORPELA M, HIETAHARJU A: The prevalence of neuropsychiatric syndromes in systemic lupus erythematosus. *Neurology* 2001; 57: 496-500.
23. KOHUT SA, WILLIAMS TS, JAYANTHIKUMAR J *et al*.: Depressive symptoms are prevalent in childhood-onset systemic lupus erythematosus (cSLE). *Lupus* 2013; 22: 712-20.
24. SHEN B, FENG G, TANG W *et al*.: The quality of life in Chinese patients with systemic lupus erythematosus is associated with disease activity and psychiatric disorders: a path analysis. *Clin Exp Rheumatol* 2014; 32: 101-7.
25. CHOI ST, KANG JI, PARK IH *et al*.: Subscale analysis of quality of life in patients with systemic lupus erythematosus: association with depression, fatigue, disease activity and damage. *Clin Exp Rheumatol* 2012; 30: 665-72.
26. YILMAZ-ONER S, ONER C, DOGUKAN FM *et al*.: Anxiety and depression predict quality of life in Turkish patients with systemic lupus erythematosus. *Clin Exp Rheumatol* 2015; 33: 360-5.
27. MOLDOVAN I, KATSAROS E, CARR FN *et al*.: The Patient Reported Outcomes in Lupus (PATROL) study: role of depression in health-related quality of life in a Southern California lupus cohort. *Lupus* 2011; 20: 1285-92.
28. TAM LS, WONG A, MOK VC *et al*.: The relationship between neuropsychiatric, clinical, and laboratory variables and quality of life of Chinese patients with systemic lupus erythematosus. *J Rheumatol* 2008; 35: 1038-45.
29. DORIA A, RINALDI S, ERMANI M *et al*.: Health-related quality of life in Italian patients with systemic lupus erythematosus. II. Role of clinical, immunological and psychological determinants. *Rheumatology* (Oxford) 2004; 43: 1580-6.
30. YELIN E, TONNER C, TRUPIN L *et al*.: Longitudinal study of the impact of incident organ manifestations and increased disease activity on work loss among persons with systemic lupus erythematosus. *Arthritis Care Res* (Hoboken) 2012; 64: 169-75.
31. BAKER K, POPE J, FORTIN P, SILVERMAN E, PESCHKEN C; 1000 FACES OF LUPUS INVESTIGATORS; CANIOS (CANADIAN NETWORK FOR IMPROVED OUTCOMES IN SLE): Work disability in systemic lupus erythematosus is prevalent and associated with socio-demographic and disease related factors. *Lupus* 2009; 18: 1281-8.
32. AL DHANHANI AM, GIGNAC MA, SU J, FORTIN PR: Work disability in systemic lupus erythematosus. *Arthritis Rheum* 2009; 61: 378-85.
33. BERTOLI AM, FERNÁNDEZ M, ALARCÓN GS, VILÁ LM, REVEILLE JD: Systemic lupus erythematosus in a multiethnic US cohort LUMINA (XLI): factors predictive of self-reported work disability. *Ann Rheum Dis* 2007; 66: 12-7.
34. UTSET TO, BASKARAN A, SEGAL BM *et al*.: Work disability, lost productivity and associated risk factors in patients diagnosed with systemic lupus erythematosus. *Lupus Sci Med* 2015; 2: e000058.
35. EKBLOM-KULLBERG S, KAUTIAINEN H, ALHA P, LEIRISALO-REPO M, JULKUNEN H: Education, employment, absenteeism, and work disability in women with systemic lupus erythematosus. *Scand J Rheumatol* 2015; 44: 157-62.
36. MOK CC, KOSINSKI M, YIN HO L, CHAN KL, JOLLY M: Validation of the LupusPRO in Hong Kong Chinese patients with systemic lupus erythematosus. *Arthritis Care Res* (Hoboken) 2015; 67: 297-304.