What are the predictive factors of body image disturbance in patients with systemic lupus erythematosus? A cross-sectional study in China

Haoyang Chen, Songsong Shi, Hengmei Cui, Yunyun Li, Zuojia Liu, Lijuan Yao, Biyu Shen

ABSTRACT

Objectives Patients with systemic lupus erythematosus (SLE) may experience body image disorders, which can adversely affect their physical and mental health. Our aim was to assess the body-image-related quality of life of patients with SLE, explore the influencing factors and determine the potential predictors of body image disturbance (BID) in these patients.

Design Cross-sectional study.

Setting The department of rheumatology and immunology in Nantong.

Participants A convenience sample of 230 patients with SLE.

Interventions The study survey included an assessment of demographic information and evaluations using the Body Image Disturbance questionnaire (BIDQ), Hospital Anxiety and Depression Scale, Multidimensional Fatigue Inventory-20 and Body Image Quality of Life Inventory (BIQLI).

Primary and secondary outcome measures BID scores and their possible predictors. Data were analysed using descriptive statistics, correlation analysis and stepwise multiple linear regression analysis.

Results The mean BIDQ score and the mean scores for anxiety, depression, and fatigue were 23.04 (SD, 11.90), 6.94 (SD=4.53), 6.49 (SD=4.51) and 54.21 (SD=11.63), respectively. The mean BIQLI score was 0.31 (SD=16.59). The findings revealed significant correlations between education level, comorbidities, SLE Disease Activity Index (SDAI) and BIQLI. Fatigue, depression, presence of comorbidities and SLEDAI were predictors of worsening BID (p<0.05).

Conclusion In our study, the relationship between BIDQ and anxiety, depression, and fatigue was analysed, and predictors of BID were defined. When formulating interventional measures, the patient’s condition should be evaluated and effective interventions should be implemented to improve the patient’s body image and ultimately improve the patient’s quality of life.

INTRODUCTION

Systemic lupus erythematosus (SLE) is a common systemic autoimmune disease that occurs in young women and is characterised by clinical symptoms such as skin damage, hair loss and muscle pain. Up to 80% of patients with SLE experience skin symptoms that leave obvious scars. Currently, the cause of these symptoms is not clear, and patients require lifelong treatment. As a result, the quality of life of patients with SLE is lower and poorer than that of patients with other forms of rheumatism.

Body image (BI) refers to an individual’s perception and thoughts about their appearance and the functional state of their body. BI is gradually established in life, is affected by self-perception and feeling, and is related to social culture, aesthetics, public opinion and guidance by the media. It is a dynamically changing concept. BI is mainly composed of two factors: the standards used to evaluate one’s own body and the individual’s perception of their body at this stage. Abnormal evaluation in either of these aspects can result in BI disturbance (BID).

The onset of SLE is insidious, and the course of the disease is long, protracted and incurable, with some patients having poor prognoses. Facial erythema, pigmentation,
scars, cicatricial alopecia, tooth loss and other factors can affect the BI of patients with SLE. Furthermore, the use of hormonal drugs can also produce adverse reactions such as hirsutism, moon face and weight gain and can reduce the patients‘ self-evaluation. As a result, most patients with SLE show BI impairments due to these changes. Patients with BID may exhibit self-denial, low self-esteem, negative emotional experiences, anxiety, depression and behavioural disorders, all of which negatively influence the patients‘ physical, psychological and social interactions. The appearance of new skin rashes and high anxiety rates in patients with SLE are significantly related to BID. The appearance of erythema can reduce patients‘ self-image and adversely affect their physical and mental health, family and social functioning, and quality of life for up to 18 months. Monaghan et al showed that 53% of patients with SLE perceive themselves as unattractive, and these changes in the BI of adolescent female patients with SLE can lead to depression and reduced social interaction. Moreover, some patients with SLE experience severe fatigue, and these patients have a lower quality of life than those who do not experience fatigue.

Therefore, the relationship between BID and the physical and mental health and quality of life of patients with SLE has gradually attracted attention.

Relevant research tools for the study of BID affecting the quality of life of patients with SLE include the Lupus Quality of Life (LupusQoL) and the SLE-Specific Quality of Life (SLEQoL) questionnaires and the SLE symptom checklist (SSC). The LupusQoL is a validated tool for QoL assessment that has proven responsiveness and comprises 34 polytomous items with ascending categories. The eight QoL domains investigate physical health, pain, planning and fatigue, emotional health, body image, intimate relationships and burden to others. The SLEQoL includes 40 items investigating six QoL domains: physical functioning, symptoms, treatment, mood, self-image and activities. The SSC is an SLE disease-specific QoL assessment tool that was established in 2003 by Grootscholten in the Netherlands and consists of 38 queries for potential disease-related or treatment-related symptoms on a 4-point scale, with a maximum score of 152 points.

However, these scales cannot reflect factors directly related to BID, whereas the Body Image Quality of Life Inventory (BIQLI) directly measures the impact of BID on quality of life. The BIQLI was developed by the American psychologist Cash in 2002. It is a self-reported measure that quantifies the influence of the subjects‘ body image experiences on various relevant facets of psychosocial functioning and well-being in everyday life. A composite negative score indicates a negative influence of an individual’s body image on their quality of life while a positive score may indicate a positive influence. The inventory is a good fit for capturing illness-related body image concerns, as the focus is on body image as a situational variable trait, and for assessing the influence of one’s body image on one‘s quality of life. This makes the inventory especially relevant for measuring body image in relation to a broad range of health conditions and disciplines and also, possibly, to measure sensitivity to change due to healthcare interventions. Moreover, there are relatively few studies on BID in patients with SLE. Therefore, we aimed to investigate the quality of life in relation to the BI of patients with SLE and explore the influencing factors and potential predictors of BID in these patients. This study adopted a cross-sectional approach to investigate the effects of BID on the quality of life of patients with SLE in China and reveal the predictors of BID in patients with SLE.

METHODS
Patient population
We used convenience sampling to recruit patients with SLE from the outpatient department and inpatient ward of the department of rheumatology and immunology in Nantong between 2019 and 2020. The participants filled out the questionnaires by themselves in the clinic with a trained researcher. The information on comorbidities was self-reported or obtained from medical records. In total, 230 consecutive patients with SLE were invited to participate in this cross-sectional study. All patients met the 1997 American College of Rheumatology revised criteria for the classification of SLE, were aged ≥18 years old, and had disease duration over 6 months. Patients were excluded if they (1) did not complete the questionnaire or (2) had comorbidities that could influence SLE activity (eg, serious infections or cardiac, respiratory, gastrointestinal, neurological or endocrine diseases). This study primarily investigated the BID of patients with SLE using the Body Image Disturbance Questionnaire (BIDQ), which has a total of seven items. The minimum sample size required is 5–10 times that of the items; considering a 20% attrition rate, the minimum sample size was calculated to be 84.

Patient and public involvement statement
It was not appropriate or possible to involve patients or the public in the design, or conduct, reporting, or dissemination plans of our research.

Demographic and clinical characteristics
Demographic data included information regarding sex, age, body mass index, residential area, marital status, education, employment status, income, Medicare coverage, smoking, alcohol consumption and exercise. Clinical data, obtained through medical records and patients' self-reports, included information regarding disease duration.

Measures
1. Sociodemographic and disease-related data: we collected self-reported sociodemographic data, such as age, sex, disease-related data, such as disease course.

Chen H, et al. BMJ Open 2022;12:e060049. doi:10.1136/bmjopen-2021-060049
and comorbidities data, such as hypertension, diabetes, kidney disease; using questionnaires.

2. BIDQ\textsuperscript{16}: This scale evaluates seven items, namely, degree of attention attributed to appearance (BIDQ1); degree of behavioural intervention (BIDQ2); related disturbances caused by BI (BIDQ3); social and occupational problems caused by BI (BIDQ4); influence of BI on social life (BIDQ5); influence of BI on learning, work and other activities (BIDQ6); and avoidance behaviours caused by BI (BIDQ7). Each item is scored from 0 to 8 points to indicate severity. The higher the total score, the greater the degree of BID. The Cronbach’s $\alpha$ of the scale in this study was 0.834 ($n=215$).

3. Hospital Anxiety and Depression Scale \textsuperscript{19} (HADS): The HADS is a widely used scale consisting of 14 items, namely, 7 measures of anxiety and 7 measures of depression. The Cronbach’s $\alpha$ of the scale in this study was 0.834 ($n=215$).

| Variables | Patients with SLE |
|-----------|------------------|
| Demographic factors | n | % | r | P value |
| Sex | | | | |
| Male | 5 | 2.33 | | |
| Female | 210 | 97.67 | | |
| Age (years) | | | | |
| 18–35 | 112 | 52.1 | | |
| 36–60 | 98 | 45.58 | | |
| 60 | 5 | 2.32 | | |
| BMI (kg/m$^2$) | | | | |
| <18.5 | 24 | 11.16 | | |
| 18.5–24.9 | 155 | 72.1 | | |
| >24.9 | 36 | 16.74 | | |
| Marital status | | | | |
| Married | 177 | 82.33 | | |
| Unmarried | 38 | 17.67 | | |
| Education level | | | | |
| >9 years | 109 | 50.7 | | |
| ≤9 years | 106 | 49.3 | | |
| Employment | | | | |
| Yes | 117 | 54.42 | | |
| No | 98 | 45.58 | | |
| Income | | | | |
| <¥15000 | 61 | 28.37 | | |
| ¥15000–¥33000 | 103 | 47.91 | | |
| >¥33000 | 51 | 23.72 | | |
| Tobacco use | | | | |
| Yes | 3 | 1.4 | | |
| No | 212 | 98.6 | | |
| Alcohol use | | | | |
| Yes | 6 | 2.79 | | |
| No | 209 | 97.21 | | |
| Exercise | | | | |
| Yes | 85 | 39.53 | | |
| No | 130 | 60.47 | | |
| Clinical factors | | | | |
| Course of disease | | | | |
| ≤3 years | 66 | 30.7 | | |
| 3–10 years | 102 | 47.44 | | |
| >10 years | 47 | 21.86 | | |
| Comorbidities | | | | |
| Yes | 66 | 30.7 | | |
| No | 149 | 69.3 | | |
| SLEDAI | | | | |
| No | 135 | 62.79 | | |
| Mild | 56 | 26.05 | | |
| Moderate | 20 | 9.3 | | |

| Variables | Patients with SLE |
|-----------|------------------|
| Demographic factors | n | % | r | P value |
| Use of NSAIDs | | | | |
| ≤7.5mg/day | 172 | 80 | | |
| >7.5mg/day | 43 | 20 | | |

* $p<0.05$; ** $p<0.01$; *** $p<0.001$.

BID, body image disturbance; BMI, body mass index; NSAIDs, Nonsteroidal Antiinflammatory Drugs; SLE, systemic lupus erythematosus; SLEDAI, Systemic Lupus Erythematosus Disease Activity Index.

| Table 2 | BID, anxiety, depression, MFI-20 and BIQLI among patients with SLE |
|---------|----------------------|
| Variables | Mean | SD | Min, max |
| Body Image Disturbance questionnaire | 23.04 | 11.90 | 0, 54 |
| HADS-anxiety | 6.94 | 4.53 | 0, 21 |
| HADS-depression | 6.49 | 4.51 | 0, 21 |
| Fatigue | | | |
| Physical fatigue | 27.06 | 6.29 | 13, 39 |
| Mental fatigue | 11.14 | 3.03 | 4, 18 |
| Power drop | 8.31 | 2.87 | 3, 15 |
| Reduced activity | 7.70 | 2.64 | 3, 15 |
| MFI-20 | 54.21 | 11.63 | 26, 81 |
| Body Image Quality of Life Inventory | | | |
| Self-evaluation | −0.24 | 5.22 | −12, 12 |
| Relationship | −0.47 | 5.95 | −18, 18 |
| Emotional | −0.55 | 4.20 | −9, 9 |
| Lifestyle | 1.49 | 5.92 | −15, 15 |
| BIQLI | 0.31 | 16.59 | −51, 51 |

BID, body image disturbance; BIQLI, Body Image Quality of Life Inventory; HADS, Hospital Anxiety and Depression Scale; MFI-20, Multidimensional Fatigue Inventory-20; SLE, systemic lupus erythematosus.
of depression. The score ranges from 0 to 21. Scores ≥8 indicate either anxiety or depression. The higher the score, the more severe the anxiety or depression. In this study, the Cronbach’s α of this scale was 0.877 (n=215).

4. The Multidimensional Fatigue Inventory-20 (MFI-20)20: This 20-item scale was designed by Professor Smets from the Netherlands and was revised for a Chinese population by Miao.21 Each item is divided into four dimensions; physical fatigue, mental fatigue, decreased motivation and decreased activity. The higher the score on the scale, the more severe the fatigue. The Cronbach’s α of the scale in this study was 0.779 (n=215).

5. BIQLI16: This scale has 4 dimensions and 17 items after revision into Chinese. It is used to quantify the influence of BI on the quality of life and can assess how an individual’s BI affects his/her life. The BIQLI assessment produces a comprehensive score, with item scores ranging from −3 to 3. A positive score indicates a positive effect, a score of 0 indicates no effect, and a negative score indicates that BI has a negative effect on the quality of life. The higher the score, the better the quality of life. The Cronbach’s α of this scale in this study was 0.922 (n=215).

6. The SLE Disease Activity Index (SLEDAI)22: The SLEDAI score is often used to evaluate the disease activity of SLE. The score rating is as follows, 0–4 points: little to no activity; 5–9 points: mild activity; 10–14 points: moderate activity and ≥15 points: severe activity.

Table 3: Correlation between BID, anxiety, depression and MFI-20

|        | BIDQ | HADS-anxiety | HADS-depression | Physical fatigue | Mental fatigue | Power drop | Reduced activity | Fatigue (MFI-20) |
|--------|------|--------------|----------------|------------------|---------------|------------|-----------------|-----------------|
| BIDQ   | 1    |              |                |                  |               |            |                 |                 |
| HADS-anxiety | 0.314** | 1              |                |                  |               |            |                 |                 |
| HADS-depression | 0.385** | 0.741**       | 1              |                  |               |            |                 |                 |
| Physical fatigue | 0.343** | 0.343**       | 0.319**       | 1                |               |            |                 |                 |
| Mental fatigue | 0.362** | 0.209**       | 0.256**       | 0.580**          | 1             |            |                 |                 |
| Power drop | 0.205** | 0.206**       | 0.185**       | 0.294**          | 0.501**       | 1          |                 |                 |
| Reduced activity | 0.314** | 0.298**       | 0.234**       | 0.589**          | 0.404**       | 0.307**   | 1               |                 |
| MFI-20  | 0.401** | 0.358**       | 0.337**       | 0.895**          | 0.787**       | 0.604**   | 0.724**         | 1               |

**p<0.01.
.BID, body image disturbance; BIDQ, Body Image Disturbance questionnaire; HADS, Hospital Anxiety and Depression Scale; MFI-20, Multidimensional Fatigue Inventory-20; MFI-20, Multidimensional Fatigue Inventory-20.

Table 4: Correlation between BID and BIQLI dimensions

|        | BIDQ | Self-evaluation | Relationship | Emotional | Lifestyle | BIQLI |
|--------|------|-----------------|--------------|-----------|-----------|-------|
| BIDQ   | 1    |                |              |           |           |       |
| Self-evaluation | -0.135* | 1                |              |           |           |       |
| Relationship | -0.199** | 0.585**       | 1            |           |           |       |
| Emotional | -0.180** | 0.619**       | 0.556**      | 1         |           |       |
| Lifestyle | -0.147* | 0.457**       | 0.467**      | 0.511**   | 1         |       |
| BIQLI   | -0.206** | 0.821**       | 0.812**      | 0.809**   | 0.775**   | 1     |

*p<0.05, **p<0.01.
BID, body image disturbance; BIDQ, Body Image Disturbance questionnaire; BIQLI, Body Image Quality of Life Inventory.

Statistical analysis
The Statistical Package for the Social Sciences V.24.0 (IBM) was used to analyse the data. Based on data and distribution characteristics, we also determined the correlation between BID and other variables to determine the presence of other significant correlations. We conducted descriptive analyses to investigate the patients’ characteristics. Continuous and normally distributed variables are presented as means and SD, and the independent-sample t-test was used to assess group differences. Descriptive statistics are reported as frequencies (%) for categorical variables and the χ² test was used to assess group differences. The relationships between demographic variables, clinical variables, patient-reported outcome and the severity of BIDs were examined using Spearman rank correlation analysis. Significant findings from the correlation analyses were further analysed using multiple regression. Variables shown to be significant in Spearman rank correlation analysis were included in the multivariate...
linear regression model to investigate the potential risk factors of BIDs. The level of significance in all analyses was set at p<0.05.

RESULTS
Patient characteristics
The questionnaires were administered to 230 patients with SLE who met the inclusion criteria, and 215 valid questionnaires were returned (response rate, 93.48%). Most patients were female, 82.33% were married and 52.10% were aged between 18 and 35 years. Specific patient information is shown in Table 1.

Evaluations of BID, anxiety, and depression, and the MFI-20 and BIQLI scores
The mean BIDQ, anxiety, depression and fatigue scores were 23.04 (SD=11.90), 6.94 (SD=4.53), 6.49 (SD=4.51) and 54.21 (SD=11.63), respectively. In addition, the mean BIQLI score was 0.31 (SD=16.59). The detailed results are presented in Table 2.

Associations between demographic/clinical variables and BID
As shown in Table 1, Spearman rank correlation coefficients were computed to identify the relationships of BID (represented by the BIDQ score) with demographic and clinical variables in patients with SLE. The findings revealed significant correlations with education level (p=0.012), comorbidities (<0.001***) and SLEDAI scores (p=0.002).

Correlation between BID and anxiety, depression, and MFI-20 and BIQLI scores
The correlations of BID with anxiety, depression and MFI-20 and BIQLI scores are presented in Tables 3 and 4. The findings revealed that BID was significantly correlated with the HAD-anxiety, HAD-depression, MFI-20 subscale and BIQLI subscale scores.

Predictors of BID in patients with SLE
Stepwise multiple linear regression analysis was conducted to determine which factors best predicted BID (Table 5). Spearman rank correlation coefficients were computed to identify the relationships of these factors with BID (represented by the BIDQ scores). MFI-20 score, depression, comorbidities and SLEDAI values were predictors of worse BID. These predictors yielded a statistically significant model (F=21.937, p≤0.001) that explained 28% of the variance in the dependent variable (adjusted R²=0.281).

DISCUSSION
To our knowledge, this is one of the few studies to use BIQLI measures to assess body image quality of life, as well as used sociodemographic characteristics, including anxiety, depression and fatigue, to predict BID in patients with SLE. In this study, we found that fatigue, depression, presence of comorbidities and disease activity were predictors of BID.

Fatigue is multidimensional and affects the mental and physical strength of patients, causing the patients’ mobility to decline; as a result, more than 80% of patients experience disabilities. Fatigue is closely related to depression and disease activity. In addition, during illness, physical fatigue and decreased physical strength may prevent patients from performing tasks they could perform previously, which reduces patients’ self-esteem and affects their self-recognition and evaluation. In patients receiving psychosocial interventions, a reduction in perceived stress was shown to improve physical function. In other disease studies, fatigue has been shown to be related to dissatisfaction with BI. Among breast cancer survivors, patients who are dissatisfied with their BI experience more fatigue, and they think that they need to improve fatigue and exercise properly to have a better BI. Fatigue can easily induce physical and psychological pressure in patients, making it necessary to improve the patients’ negative self-perception and relieve their pain. Therefore, medical staff should provide support to patients with SLE while helping them reduce fatigue.

Patients with SLE have a higher incidence of anxiety and depression, which substantially affects their quality of life and imposes a heavy burden on the patients’ families and society. Anxiety and depression are the most common psychological symptoms in patients with SLE. One study found that the incidence of depression in patients with SLE was about 35.0% and that of anxiety was approximately 25.8%. In our study, anxiety and depression were...
both related to BID. In the multiple linear regression analysis, depression was one of the predictors of BID. This is consistent with the findings reported by Benrud. People who care more about their appearance show a higher incidence of depression, and depression may also lead to dissatisfaction with BI. In a long-term prospective study, people with a history of depression were shown to be 2.5 times more likely to develop SLE than people without a history of depression. Patients with SLE with anxiety and depression showed higher BID than those without anxiety and depression. In addition, some depressed patients use antidepressant drugs that may alter the patients’ self-cognition and positioning, thereby affecting their BI. The BI-related quality of life has been reported to play a mediating role between pain and depressive symptoms. The interventions for SLE pain and depressive symptoms include changes in appearance and body consciousness. Therefore, improving anxiety and depression in patients with SLE will help improve the patients’ recognition of their BI. Our results also suggest that medical staff should pay closer attention to the psychological states of patients with SLE and formulate effective psychological care and intervention.

The clinical manifestations of SLE are diverse and involve multiple organs. In the early stage of the disease, the pain may be aggravated due to the higher disease activity, but in long-term disease, the risk of comorbidities and other organ damage increases, affecting the patients’ quality of life and self-evaluation. The long-term outcomes may be disabling and teratogenic, which will impose a great burden on the patient and exacerbate the BID. Reducing comorbidities is also difficult in the current management of SLE, and sufficient attention should be paid to patients with comorbidities.

BID in patients with SLE was closely related to the SLEDAI scores. Most patients with SLE show obvious changes in appearance, such as butterfly erythema, pigmentation, desquamation, scars, tooth loss, bruises and Raynaud’s phenomenon. Rutter et al. used objective evaluation criteria to report that the lupus skin area and severity index could be related to the presence of BID. The hormonal drugs and immunosuppressants used in the treatment of diseases can also cause adverse effects, such as acne, facial hair, moon face and weight gain, which can change the patients’ perception of their body, causing BID. Jolly et al. found that patients with disease activity and skin damage are more likely to have BID. Thus, alleviation of disease activity is one of the indispensable elements in improving BID and is also one of the important ways to improve the quality of life of patients with SLE.

This is the first time the BIQLI was used to investigate the quality of life related to body image in patients with SLE in China. In our study, the mean BIQLI score was 0.31 (SD=16.59). In the study by Boomsma et al., although 68% of patients reported that their disease was not active at the time of data collection, more than half the patients responded that SLE had a negative influence on their social relationships, 89% reported that the symptoms of SLE impaired their daily life, 23% quit their jobs due to SLE symptoms, 47% reported experiencing depressive symptoms and 14% reported suicidal ideation. BID is also affected by hormone levels and lifestyle. Our findings also suggested that BID negatively influenced patients’ self-evaluation, relationships, emotional health and lifestyle. The negative influence of BID on the quality of life of patients with SLE simultaneously encompasses physical, psychological and social aspects. Thus, the implementation of interventions for BID is essential to improve the quality of life of patients with SLE.

The generalisation of the study’s results may be limited for several reasons. First, it is important to note that the sample could have had wider representation. However, the prevalence of SLE is relatively low, limiting the available data that could be collected. Thus, future research should expand the sample size. Second, since BID is a highly subjective target of analysis, the next step should incorporate objective measurements.

CONCLUSION

Patients with SLE are very concerned about changes in their appearance caused by the disease. Due to changes in their BI, these patients exhibit avoidance behaviours, unwillingness to interact with others, reduced mobility, fatigue and increased psychological pressure. In this regard, attention should be paid to the patients’ BI, psychological pressure and the impact on their quality of life. Our study showed that the level of education, SLEDAI, comorbidities, anxiety, depression, fatigue and body-related quality of life are all related to BID in patients with SLE. Multidimensional fatigue, depression, comorbidities and the SLEDAI are potential predictors of BID, and these factors should be assessed thoroughly to identify interventions tailored to the patients’ characteristics. The patients’ education level affects their BID; therefore, the intervention plan should be easy to understand. The patients’ disease activity and comorbidities are also related to BID. Therefore, identification of interventions should be based on the patients’ conditions and mental states. Furthermore, fatigue, other symptoms and quality of life should be considered when proposing interventions for BID.

Contributors BS and HCh performed the study, analysed the data and prepared the manuscript. HCh, SS, HCu, YL and ZL collected the data. HCh, SS and HCu analysed the data. BS and LY are the guarantors and accepts full responsibility for the work and conduct of the study and had access to the data. All authors controlled the decision to publish. All the authors have read and approved the manuscript.

Funding The study was supported by the Innovation Research Team of High-level Local Universities in Shanghai (grant number SHSMU-ZDKC20212800); Shanghai Jiao Tong University School of Medicine: Nursing Development Program (no award/grant number); and Jiangsu Province Six Talent Peak High-level Personnel Training Project Foundation (grant number WSN-234).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, conduct, or reporting, or dissemination plans of this research.

Chen H, et al. BMJ Open 2022;12:e060049. doi:10.1136/bmjopen-2021-060049
Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the Ethics Committee of Nantong First People’s Hospital approved this study (2017-016). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. Data are available on reasonable request. All data relevant to the study are available on reasonable request to the corresponding author.

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ORCID iD
Biyu Shen http://orcid.org/0000-0002-1991-8968

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