

A primary analysis of sexual problems in Chinese patients with ankylosing spondylitis

Biyu Shen · Aixian Zhang · Jinwei Liu ·
Zhanyun Da · Xujuan Xu · Zhifeng Gu

Received: 13 April 2012 / Accepted: 21 October 2012
© Springer-Verlag Berlin Heidelberg 2012

Abstract While the physical impact of ankylosing spondylitis (AS) is central to clinical treatment, the sexual problems associated with AS are often overlooked. Sexual problems may be related to a variety of undocumented demographic parameters, physical impairments, and psychological problems. These associations were examined through a single-center cross-sectional study of 103 AS patients (78 males and 25 females) and 121 healthy individuals (73 males and 48 females). All participants provided information pertaining to sexual problems, sociodemographics, and clinical characteristics via written questionnaires including multiple-choice questions conducted independently in the clinical setting under physician supervision. Rates of both prevalence and severity of sexual

dysfunctions in AS patients were much higher than those observed in healthy individuals. Bath Ankylosing Spondylitis (BAS) Disease Activity Index and two parameters of body image disturbance (distress and impairment in social functioning) correlated with impaired partner relationships ($P < 0.05$). BAS mobility index, impaired social functioning, and BAS functionality index were the most significant causes of impaired sexual function ($P < 0.05$) in AS patients. Both physical and psychological factors were shown to impact sexual relationships and function in Chinese AS patients. To more effectively manage AS in clinical settings, rheumatologists and nursing specialists should be aware of the condition's impact on sexual health, considering both physical outcomes, such as disease activity and physical function, as well as psychological well-being.

Biyu Shen and Aixian Zhang contributed equally to this work.

B. Shen · J. Liu
Department of Nursing, The Second Affiliated Hospital
of Nantong University, Nantong, China
e-mail: biyuifeier@yahoo.cn

J. Liu
e-mail: moshengren1013@163.com

B. Shen · X. Xu (✉)
School of Nursing, Nantong University, Nantong, China
e-mail: xxj_1124@126.com

A. Zhang · Z. Da · Z. Gu (✉)
Department of Rheumatology, Affiliated Hospital
of Nantong University, Nantong 226001, Jiangsu,
People's Republic of China
e-mail: guzhifeng@126.com

A. Zhang
e-mail: jsntzax@163.com

Z. Da
e-mail: zhanyunda@yahoo.com.cn

Keywords Ankylosing spondylitis · Sexual problem ·
Disease activity · Body image disturbance · Depression ·
Anxiety

Abbreviations

AS	Ankylosing spondylitis
BID	Body image disturbance
BIDQ	Body Image Disturbance Questionnaire
BASDAI	Bath Ankylosing Spondylitis Disease Activity Index
BASFI	Bath Ankylosing Spondylitis Functional Index
BASMI	Bath Ankylosing Spondylitis Metrology Index
VAS pain	VAS pain measure
HAQ	Health Assessment Questionnaire
SAS	Self-Rating Anxiety Scale
SDS	Self-Rating Depression Scale
SF-36	Short Form (SF)-36 Questionnaire
ESR	Erythrocyte sedimentation rate
CRP	C-Reactive protein level

Background

Ankylosing spondylitis (AS) is a chronic rheumatic disorder primarily affecting the axial skeleton. Throughout the course of the disease, spinal mobility becomes increasingly limited, and physical symptoms may increase in severity. AS may affect spinal mobility, resulting in joint stiffness, fatigue, moderate to severe pain, and sleep disturbances. While these physical impairments are generally considered when designing treatment strategies for AS patients, the psychological problems associated with AS, including depression, anxiety, and stress, are often overlooked [1, 2]. Determination and provision of standard and accurate information on sexual health, particularly in patients living with various illnesses, has garnered more attention in recent decades [3]. Despite reports that over 50 % of AS patients experience abnormalities in their sex lives, including decreased desire, satisfaction, and intercourse frequency, sexual health is rarely considered when designing treatment strategies for AS patients [4]. In these patients, joint pain, functional limitations, increased disease activity, and decreased health quality are just some of the many factors contributing to impairments in both quality of life and sexual health [5].

Epidemiological studies conducted in both clinical and community settings have indicated that sexual dysfunctions are more common in individuals with depression than in the general population [6]. Several symptoms of underlying psychological disorders, such as depression and anxiety, have been frequently observed in AS [1, 7, 8], suggesting that these patients may be at higher risk for sexual dysfunction. Furthermore, studies by Ozgul et al. [4] and Healey et al. [9] confirmed that psychological disorders play an important role in the development of impairments in sexual performance and relationships [4, 9]. For AS patients, physical limitations may impact overall quality of life much less than impairments in interpersonal relationships resulting from the psychophysiological effects of the disease.

While sexual health in AS patients is clearly impacted by limitations to physical functions, the psychological impact of patient perceptions about the effects of disease on sexual intercourse is paramount in the development of sexual dysfunctions [5]. Due to symptomatic presentation of the disease, including inflammation and pain in the entheses, joints, and spine, even mildly impaired AS patients exhibit greater concern with possible physical deficits and express insecurity as feelings of being less attractive, particularly to sexual partners [10]. Clinically, body image disturbance (BID) is generally recognized by reports of patient dissatisfaction, concern, or distress, most commonly related to appearance or vitality, particularly when these concerns impact normal ability to function in

social relationships, daily activities, or occupational settings [11]. Numerous psychological pathologies have shown close associations with BID in healthy individuals and, more prominently, in patients with disabling or disfiguring diseases [12–14]. In arthritic patients, psychological distress, altered body image, and fear of insufficiency or injury have been shown to affect sexual performance [15]. Because AS impacts both physical and psychological functions, BID is likely to be more common in AS patients than in healthy individuals, possibly due to increased stress and anxiety levels coupled with poor self-perceptions.

The psychological problems of anxiety and depression as well as BID occurrence may impair sexual function and relationships. The current study examines the independent association of BID occurrence with sexual function in a Chinese population in order to provide a preliminary analysis of the clinical parameters, disease activity, physical functions, and psychological parameters associated with sexual problems in AS patients. As a result, the factors most closely linked to a patient sexual status can be documented and considered in the design of appropriate clinical treatment strategies.

Methods

Participants

AS patients were recruited from Affiliated Hospital of Nantong University between January 2010 and July 2011. A total of 112 AS patients and 127 healthy individuals were consecutively invited to participate in a single-center cross-sectional study, resulting in the enrollment of 103 AS patients (78 males and 25 females) and 121 healthy individuals (73 males and 48 females) in the current study. Healthy individuals were used as the control group. All patients included in the AS group had a confirmed diagnosis of AS. Patients were excluded based on the following: (1) They did not complete the sexual functions questionnaire; (2) they had comorbidities (e.g., serious infections or cardiac, respiratory, gastrointestinal, neurological, or endocrine diseases) that could influence AS activity; or (3) they had a history of anxiety disorders or depression prior to AS onset. This study was approved by the Ethics Committee of Affiliated Hospital of Nantong University, and written informed consent was obtained from all patients.

Clinical measurement of psychological parameters

The revised Self-Rating Anxiety Scale (SAS) [16] was used to evaluate the level of anxiety-related symptoms during the week prior to the survey. This self-administered

test has 20 questions with 15 items reflecting increasing anxiety levels and five questions reflecting decreasing anxiety levels. Each question was scored on a scale of 1–4 (rarely, sometimes, frequently, and always). The scores range between 20 and 80. Higher scores reflect more severe anxiety. Scores of >50 indicate anxious symptoms.

The revised Self-Rating Depression Scale (SDS) [17] is a 20-item questionnaire designed to assess mood symptoms over the past week (e.g., ‘I feel downhearted, blue and sad’). Each item is scored on a Likert scale ranging from 1 to 4. Scores greater than 70 suggest severe depressive symptoms, scores from 60 to 69 indicate moderate to marked depression, scores from 53 to 59 suggest minimal to mild depression, and scores less than 53 indicate no depressive symptoms.

The Body Image Disturbance Questionnaire (BIDQ) [11] contains seven scaled items that pertain to appearance-related concerns, mental preoccupation with these concerns, associated experiences of emotional distress, resulting impairment in social, occupational, or other important areas of functioning, interference with social life or with school, job or role functioning, and consequential behavioral avoidance.

Clinical measurement of physical parameters

Disease activity was measured using the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) [18]. This scale is based on six questions designed to quantitatively and qualitatively assess fatigue, spinal pain, peripheral arthritis, enthesitis, and morning stiffness (both). Symptoms are reported for 1 week directly prior to assessment, and scores are generated using a 10-cm visual analogue scale (VAS) for each of five major symptoms. The individual scores are averaged to form a 0–10 scale, with lower scores indicating less active disease.

Physical function was measured using the Bath Ankylosing Spondylitis Functional Index (BASFI) [19]. This scale is based on 10 questions pertaining to daily functioning. Symptoms are reported for 1 month directly prior to assessment, and scores are generated on a 10-cm VAS. The individual scores are averaged to form a 0–10 scale, with higher scores denoting worse functional status.

Mobility of the spine and hip was measured using the Bath Ankylosing Spondylitis Metrology Index (BASMI) [20]. Briefly, the distance is from the tragus to the wall, lumbar flexion, cervical rotation, lumbar side flexion, and intermalleolar distance on a scale of 1–10. Additionally, general pain was measured using a VAS technique with a 10-cm horizontal analogue scale.

The degree of patient difficulty in performing tasks was measured using the Health Assessment Questionnaire (HAQ) for Spondyloarthropathies [21], a 25-item scale

examining 10 functional areas. Responses range from 0 (no difficulty) to 3 (inability to perform). The average of the 10 functional categories is the HAQ score. Additionally, two subscales were added to the original HAQ. These subscales were composed of five items derived from a separate survey of patients with AS representing functional status and focusing on specific aspects of activities associated with impaired spinal mobility.

Additional clinical variables of erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were assessed by the Westergren method (mm/h) and the nephelometric method (mg/l), respectively.

Questionnaire design

The questionnaire design was based on modified question numbers 13 and 14 of the Body Image Questionnaire provided in digital form by the Kings College of London, UK. (<http://psychology.iop.kcl.ac.uk/cadat/questionnaires/BIQ.pdf>). Briefly, the questionnaire first requires participants to report the magnitude of the effect of their current emotional status on sexual relationship(s) with current partners (Cronbach’s $\alpha = 0.79$). Secondly, participants were required to indicate the impact of their current status on sexual function, including sexual enjoyment and frequency (Cronbach’s $\alpha = 0.81$). For each question, participants provided ratings based on a 9-point scale ranging from 0 (not at all) to 8 (extremely).

Questionnaire and measurement administration

Questionnaires and other assessments were administered to participants between January 2010 and July 2011. Written questionnaires were provided on papers, and all participants completed the questionnaire under physician supervision in a clinical setting. BASDAI and BASFI assessment tools were all self-completed in the clinics, and BASMI was evaluated by the same clinician for all patients. Nurses counted results. Results were added to a computer database by two research assistants and double-checked against the original data prior to analysis.

Statistical analysis

All data were expressed as mean \pm SD for continuous variables and as frequencies (%) for categorical variables. The statistical package included in the STATA v.10.0 (StatCorp, USA) software for all data management and analysis. Descriptive analyses were performed to investigate participant characteristics. Student’s *t* tests were applied to assess parametric variables of independent groups, while Spearman’s correlation analysis was used to assess the correlation between parametric variables.

Stepwise regression analyses were conducted for sexual problems and SF-36 scores separately in order to identify significant predictors of dysmorphic concern. A *P* value of less than 0.01 or less than 0.001 ($P < 0.01$ or $P < 0.001$) was considered highly statistically significant, while a *P* value of less than 0.05 was considered statistically significant ($P < 0.05$).

Results

Characteristics of AS patients

Nineteen (18.4 %) AS patients were at high risk for anxiety, and 38 (36.9 %) exhibited signs of depression. Comparatively, only eight (6.6 %) healthy individuals had high risk for anxiety, and 16 (13.2 %) exhibited signs of depression. Elevated ESR and CRP levels were observed in 24 (23.3 %) and 41 (39.8 %) AS patients, respectively. AS patients also exhibited mean scores: BASDAI, 2.9 ± 2.4 ; BASFI, 0.9 ± 1.5 ; BASMI, 24 ± 1.8 ; HAQ, 2.8 ± 2.2 ; and VAS pain, 2.2 ± 4.1 (Table 1). These scores were not assessed in control subjects.

Sexual status in AS patients

No significant difference in sexual relationship impairment was observed between AS patients and healthy individuals. Fifty-three (51.1 %) AS patients reported impaired

Table 2 Sexual problems of AS patients and control subjects

Variable	AS patients (<i>N</i> = 103)	Control subjects (<i>N</i> = 121)	<i>P</i> value
Effect on relationships with partner ^a	53 (51.1 %)	57 (47.1 %)	0.592
Effect on relationships with partner ^b	1.7 ± 2.1	1.3 ± 1.8	0.372
Effect on sexual function ^a	58 (56.3 %)	36 (29.8 %)	0.000***
Effect on sexual function ^b	1.6 ± 1.9	0.7 ± 1.3	0.000***

^a *n* (%), ^b Mean \pm SD scored according to the 0–8 scale

*** $P < 0.001$

relationships with a sexual partner or partners, with an overall mean score of 1.7 ± 2.1 in AS patients on the 0–8 scale. Interestingly, there is no significant difference between male (1.8 ± 2.3) and female (1.5 ± 1.7) AS patients. Comparatively, 57 (47.1 %) healthy individuals reported impaired relationships with a partner with an overall mean score of 1.3 ± 1.8 in AS patients. Fifty-eight (56.3 %) patients reported impaired sexual function, a significantly higher frequency than in healthy individuals (36, 29.8 %) ($P < 0.001$). The overall mean scores for AS patients regarding sexual function on the 0–8 scale were similarly significantly higher compared to those of healthy individuals (1.6 ± 1.9 vs. 0.7 ± 1.3 , respectively) (Table 2). There is no significant difference in sexual function between male (1.7 ± 2.1) and female (1.4 ± 1.6) AS patients.

Associations between sexual problems and overall variables

The effect of AS on sexual partner relationships showed significant correlation with scores for BASDAI ($P = 0.0180$), BASFI ($P = 0.0006$), HAQ ($P = 0.0005$), SAS ($P = 0.0143$), appearance-related concerns ($P = 0.0029$), distress ($P = 0.0000$), impairment in social functioning ($P = 0.0000$), impairment in social life ($P = 0.0000$), impairment in role function ($P = 0.0000$), and behavioral avoidance ($P = 0.0089$). The effects of AS on sexual function were significantly associated with scores of age ($P = 0.0292$), BASDAI ($P = 0.0058$), BASFI ($P = 0.0261$), BASMI ($P = 0.0435$), SAS ($P = 0.0059$), distress ($P = 0.0009$), impairment in social functioning ($P = 0.0002$), impairment in social life ($P = 0.0059$) and impairment in role function ($P = 0.0004$). These findings are detailed in Table 3.

Stepwise regression analysis for sexual problems

Stepwise regression analyses were used to confirm the variables most significantly correlated with psychological

Table 1 Demographic, psychological, illness characteristics of AS patients and control subjects

Variables	AS patients (<i>N</i> = 103)	Control subjects (<i>N</i> = 121)	<i>P</i> value
Sex male ^a	78 (75.7 %)	73 (60.3 %)	0.6213
Age, years ^b	32.9 (10.7)	37.0 (12.5)	0.3271
SAS (≥ 50) ^a	19 (18.4 %)	8 (6.6 %)	0.0000***
SDS (≥ 53) ^a	38 (36.9 %)	16 (13.2 %)	0.0000***
BASDAI ^b	2.9 (2.4)		
BASFI ^b	0.9 (1.5)		
BASMI ^b	2.4 (1.8)		
HAQ ^b	2.8 (2.2)		
VAS pain ^b	2.2 (4.1)		
ESR ^a (male ≥ 15 , female ≥ 20)	24 (23.3)		
CRP (≥ 6) ^a	41 (39.8)		

ESR erythrocyte sedimentation rate (mm/h), CRP C-reactive protein (mg/l)

^a Number (percentage)

^b Mean (SD)

*** $P < 0.001$

Table 3 Association between sexual problems and overall variables

Variables	Effect on relationships with partner		Effect on sexual function	
	<i>t</i>	<i>P</i>	<i>t</i>	<i>P</i>
Age	−0.13	0.3956	−0.32	0.0292*
BASDAI	0.34	0.0180*	0.40	0.0058**
BASFI	0.48	0.0006***	0.33	0.0261*
BASMI	0.25	0.1023	0.31	0.0435*
VAS pain	0.13	0.3940	0.25	0.0921
HAQ	0.49	0.0005***	0.27	0.0677
SAS	0.36	0.0143*	0.40	0.0059**
SDS	0.29	0.0542	0.21	0.1633
ESR	0.15	0.3327	0.21	0.1793
CRP	0.24	0.1202	0.26	0.0939
BID				
Consider appearance unattractive	0.43	0.0029**	0.17	0.2474
Preoccupation with appearance	0.19	0.1978	0.12	0.4403
Distress	0.66	0.0000***	0.47	0.0009***
Impairment in social functioning	0.63	0.0000***	0.52	0.0002***
Impairment in social life	0.62	0.0000***	0.40	0.0059**
Impairment in role function	0.58	0.0000***	0.50	0.0004***
Behavioral avoidance	0.38	0.0089**	0.23	0.1197

problems. The results showed that BASDAI and two parameters of BID (distress and impairment in social functioning) were the most powerful predictors of impaired partner relationships ($P < 0.05$) (Table 4). In contrast, BASMI, impaired social functioning, and BASFI were the most significant causes of impaired sexual function ($P < 0.05$) in AS patients (Table 5).

Discussion

The associations between demographics, disease-related variables, psychological problems, and BID in Chinese AS patients were examined, revealing that these AS patients are much more likely to have impaired sexual health and partner relationships than their healthy counterparts. The current study is novel in that it assesses these parameters in a group representative of the Chinese AS population. These findings should be considered in clinical settings, where sexual health is often overlooked during the treatment of physical symptoms.

Questionnaires, as applied in the current study, have been shown to be effective methods of psychological and sexual health. Healey et al. used questionnaire methods to show that 38.0 % of AS patients in the UK reported their sexual relationships as ‘moderately,’ ‘quite a bit,’ or ‘extremely’ affected by their condition [9]. Similarly, Ozgul et al. [4] surveyed 101 Turkish AS patients and reported that 52.7 % of these patients reported decreased sexual intercourse frequency. Additionally, this study reported that AS patients

reported decreased sexual pleasure (53.3 %) and sexual drive (47 %). As in other geographic populations, the current study reveals that Chinese AS patients experience impairments in relationships with sexual partners (51.1 %) and impaired sexual function (56.3 %).

The underlying cause of disturbed sexual function in AS patients is multifaceted, though the physical aspects are most easily assessed [22]. The physical symptoms of impaired function, pain, fatigue, and stiffness as well as psychological responses to chronic disease, such as depression and insecurity, can all contribute to sexual dysfunction [22, 23]. It has been previously reported that disease activity has great impact on sexual relationships in both genders [24, 25]. Hill et al. [26] reported that pain, fatigue, and stiffness may interfere with normal sexual functions. These findings are consistent with the current results showing that the BASDAI, BASFI, BASMI, and VAS pain scores are significantly associated with sexual problems in AS patients.

Psychological symptoms in patients with chronic illnesses, such as AS, are much more difficult to assess and may progress along with physical symptoms based on disease severity and duration. It has been reported that depression may be the principal factor contributing to sexual dysfunction in AS patients [27]. Depression is a major cause of reduced quality of life in AS patients of both genders [24]. Interestingly, the current study reported that distress along with impairments in social functioning, social life, and role function correlated significantly with impaired sexual function. This suggests that a link between

Table 4 Stepwise regression analysis of medical and psychological variables associated with effect on relationships with partner in AS patients

Effect on relationships with partner	Coef.	SE	<i>t</i>	<i>P</i> < <i>t</i>	[95 % CI]
BASDAI	−0.26	0.11	−2.44	0.019*	−0.48, −0.05
Distress	0.33	0.12	2.82	0.007**	0.09, 0.57
Impairment in social functioning	0.60	0.15	4.01	0.000***	0.30, 0.90
_cons	0.07	0.35	0.19	0.848	−0.64, 0.78

* *P* < 0.05; ** *P* < 0.01; *** *P* < 0.001

Table 5 Stepwise regression analysis of medical and psychological variables associated with effect on sexual function in AS patients

Effect on sexual function	Coef.	SE	<i>t</i>	<i>P</i> < <i>t</i>	[95 % CI]
BASMI	0.29	0.14	2.04	0.048*	0.00, 0.58
Impairment in social functioning	0.60	0.14	4.21	0.000***	0.31, 0.88
BASFI	−0.42	0.20	−2.09	0.043*	−0.82, −0.01
_cons	−0.17	0.48	−0.36	0.723	−1.14, 0.80

* *P* < 0.05; *** *P* < 0.001

physical function and psychological factors may play a role in the sexual health, and perhaps even the overall quality of life, of AS patients. Future studies will be required to assess whether psychological factors progress over time in Chinese AS patient or whether these symptoms have direct relationships to physical variables in such patients.

BID may adversely affect quality of life and result in psychosocial consequences, such as depression, social anxiety, impaired sexual functioning, and poor self-esteem. The effect has been previously demonstrated in body dysmorphic conditions and eating disorders, and it may similarly affect AS patients with significant and chronic physical impairments [28]. Günther et al. and Stürz et al. found that AS patients in Australia reported poor body image due to current or potential physical deficits [10]. Similarly, a UK-based study showed that body image was inversely correlated with depression in AS patients [29]. Despite these initial indications, few published studies address the correlation between BID and sexual problems in AS patients. The current results showed that, except for ‘preoccupation with appearance,’ all other aspects of BID were significantly associated with impaired relationships with sexual partners.

Sexual problems associated with both disease status and psychological problems were shown to be common in Chinese AS patients. The results of stepwise regression analysis in the current study demonstrated that disease status and BID are most closely linked to impairments in the relationships of AS patients and their sexual partners, while disease severity, BID, and physical impairments were most closely linked with impaired sexual functioning in AS patients. Increased awareness of the physical and psychological factors associated with sexual problems in Chinese AS patients will aid rheumatologists and nursing specialists in initiating proper management of this

subgroup of AS patients. Sexual health and quality of life may be improved by treating BID, anxiety, and depression along with the physical symptoms of AS.

Acknowledgments We would like to thank Liren Li, Xinghang Zhu, Genkai Guo, Jie Qian, Haixia Cao, and Yunfei Xia for their assistance with this paper. This work was supported by the Natural Science Foundation of China, Grant (No. 81172841), the Natural Science Foundation of Jiangsu Colleges and Universities Grant (No. 09KJB320010), and the Jiangsu province’s Outstanding Medical Academic Leader Program (LJ201136). This work was also supported by Science Foundation of Nantong city Grant (No.HS2011054; HS12966); Beijing Medical Award foundation (FSMYYSNT-001); a project of College graduate research and innovation of Jiangsu Province (CXLX12_0891); Nantong University Graduate Innovation Program (YKC12037) and a project from Bureau of Jiangsu Province (Z2010005); and Preventive Medicine Projects from Bureau of Jiangsu Province (Y2012083).

Conflicts of interest The author(s) declare no conflicting interests.

References

1. Martindale J, Smith J, Sutton CJ, Grennan D, Goodacre L, Goodacre JA (2006) Disease and psychological status in ankylosing spondylitis. *Rheumatology* 45:1288–1293
2. Lim HJ, Moon YI, Lee MS (2005) Effects of home-based daily exercise therapy on joint mobility, daily activity, pain, and depression in patients with ankylosing spondylitis. *Rheumatol Int* 25:225–229
3. Serrant-Green L (2001) Inequality in provision of sexual health information. *J Prof Nurs* 16:1038–1042
4. Ozgul A, Peker F, Taskaynatan MA, Tan AK, Dincer K, Kalyon TA (2006) Effect of ankylosing spondylitis on health-related quality of life and different aspects of social life in young patients. *Clin Rheumatol* 25:168–174
5. Cakar E, Dincer U, Kiralp MZ, Taskaynatan MA, Yasar E, Bayman EO, Ozgul A, Dursun H (2007) Sexual problems in male ankylosing spondylitis patients: relationship with functionality,

- disease activity, quality of life, and emotional status. *Clin Rheumatol* 26:1607–1613
6. Baldwin DS (2004) Sexual dysfunction associated with antidepressant drugs. *Expert Opin Drug Saf* 3:457–470
 7. Hakkou J, Rostom S, Aissaoui N, Berrada KR, Abouqal R, Bahiri R, Hajjaj-Hassouni N (2011) Psychological status in Moroccan patients with ankylosing spondylitis and its relationships with disease parameters and quality of life. *J Clin Rheumatol* 17:424–428
 8. Brionez TF, Assassi S, Reveille JD, Learch TJ, Diekman L, Ward MM, Davis JC Jr, Weisman MH, Nicassio P (2009) Psychological correlates of self-reported functional limitation in patients with ankylosing spondylitis. *Arthritis Res Ther* 11:R182
 9. Healey EL, Haywood KL, Jordan KP, Garratt AM, Ryan S, Packham JC (2009) Ankylosing spondylitis and its impact on sexual relationships. *Rheumatology* 48:1378–1381
 10. Günther V, Locher E, Falkenbach A, Gutweniger S, Kopp M, Pfaffenberger N, Stürz K, Mur E (2010) Body image in patients with ankylosing spondylitis. *Clin Exp Rheumatol* 28:341–347
 11. Cash T, Phillips K, Santos M, Hrabosky J (2004) Measuring “negative body image”: validation of the Body Image Disturbance Questionnaire in a nonclinical population. *Body Image* 1: 363–372
 12. Liao Y, Knoesen NP, Castle DJ, Tang J, Deng Y, Bookun R, Chen X, Hao W, Meng G, Liu T (2010) Symptoms of disordered eating, body shape, and mood concerns in male and female Chinese medical students. *Compr Psychiatry* 51:516–523
 13. Bowe WP, Doyle AK, Crerand CE, Margolis DJ, Shalita AR (2011) Body image disturbance in patients with acne vulgaris. *J Clin Aesthet Dermatol* 4:35–41
 14. Heinberg LJ, Kudel I, White B, Kwan A, Medley K, Wigley F, Haythornthwaite J (2007) Assessing body image in patients with systemic sclerosis (scleroderma): validation of the adapted satisfaction with appearance scale. *Body Image* 4:79–86
 15. Ehrlich GE (1998) Assessment of sexual function in patients with rheumatic disorders. *J Rheumatol* 25:821–822
 16. Zung WWK (1971) A rating instrument for anxiety disorders. *Psychosomatics* 12:371–379
 17. Zung WWK (1965) A self-rating depression scale. *Arch Gen Psychiatry* 12:63–70
 18. Garret S, Jenkinson T, Kennedy LG, Whitelock H, Gaisford P, Calin A (1994) A new approach to defining disease status in ankylosing spondylitis: the Bath Ankylosing Spondylitis Disease Activity Index. *J Rheumatol* 21:2286–2291
 19. Calin A, Garrett S, Whitelock H, Kennedy LG, O’Hea J, Mallorie P et al (1994) New approach to defining functional ability in ankylosing spondylitis the development of the Bath Ankylosing Spondylitis Functional Index (BASFI). *J Rheumatol* 21:2281–2285
 20. Jenkinson TR, Mallorie PA, Whitelock H, Kennedy LG, Garrett S, Calin A (1994) Defining spinal mobility in ankylosing spondylitis: the Bath Ankylosing Spondylitis Metrology Index. *J Rheumatol* 21:1694–1698
 21. Daltroy LH, Larson MG, Roberts NW, Liang MH (1990) A modification of the Health Assessment Questionnaire for the spondyloarthropathies. *J Rheumatol* 17:946–950
 22. Østensen M (2004) New insights into sexual functioning and fertility in rheumatic diseases. *Best Pract Res Clin Rheumatol* 18:219–232
 23. Panush RS, Mihailescu GD, Gornisiewicz MT, Sutaria SH (2000) Sex and arthritis. *Bull Rheum Dis* 49:1–4
 24. Demir SE, Rezvani A, Ok S (2012) Assessment of sexual functions in female patients with ankylosing spondylitis compared with healthy controls. *Rheumatol Int* [Epub ahead of print]
 25. Ozkorumak E, Karkucak M, Civil F, Tiryaki A, Ozden G (2011) Sexual function in male patients with ankylosing spondylitis. *Int J Impot Res* 23:262–267
 26. Hill J, Bird H, Thorpe R (2003) Effects of rheumatoid arthritis on sexual activity and relationships. *Rheumatology* 42:280–286
 27. Tristano AG (2009) The impact of rheumatic diseases on sexual function. *Rheumatol Int* 29:853–860
 28. Cash TF, Fleming EC (2002) The impact of body image experience: development of the body image quality of life inventory. *Int J Eat Disord* 31:455–460
 29. Hider S, Wong M, Ortiz M, Dulku A, Mulherin D (2002) Does a regular exercise program for ankylosing spondylitis influence body image? *Scand J Rheumatol* 31:168–171