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Evaluation of sexual dysfunction and its predictive factors in female and male patients with rheumatoid arthritis

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Abstract

Background: Rheumatoid arthritis (RA) is a common disabling joint disease affecting both males and females. Sexual dysfunction (SD) is a common association with RA. The aim of this work was to study the prevalence and predictors of sexual dysfunction in male and female patients with rheumatoid arthritis.

Results: The mean age of female patients was 32.1 years and 39.7 years for males. The prevalence of sexual dysfunction was higher in RA female patients than controls, 62.1% versus 41.2% respectively ($P \leq 0.05$). The prevalence of global sexual dysfunction was higher in RA male patients than controls, 63.8% versus 47.5% respectively ($P \leq 0.05$). Predictors of sexual dysfunction in female RA patients were the number of children, BMI, disease duration, DAS score, HADs-D score, HAQ score, VAS score, joint deformity, and the number of drugs. Predictors of sexual dysfunction in male RA patients were age, disease duration, DAS score, HAQ score, VAS score, and the number of drugs.

Conclusion: SD is prevalent in RA patients. Disease activity, pain, depression, and disturbed quality of life affect nearly all domains of sexual functions in female and male patients.

Keywords: Rheumatoid arthritis, Female sexual dysfunction, Male sexual dysfunction, Disease activity and depression

Background

Rheumatoid arthritis (RA) is a distressing chronic, inflammatory autoimmune systemic disease affecting 0.3 to 1% of the adult population [1]. RA is considered the most prevalent rheumatic disease worldwide and it is more common in women than men [2]. The prevalence of RA in the Egyptian population is approximately 0.3% [3].

RA involves autoimmune inflammation of the joint synovial membrane that in turn damages the articular cartilage and juxta-articular bone; this leads to ongoing joint functional impairment and even complete destruction [4]. RA can influence all aspects of life as it causes chronic pain, joint stiffness and deformity, marked disablement, and difficulties in performing work with obvious economic, social, psychological, and sexual consequences [5].

Sexual dysfunction (SD) or sexual malfunction refers to a difficulty experienced by a subject, male or female, or a couple, during any stage of sexual activity, including desire, preference, arousal, orgasm, and or satisfaction [6].

RA influences the quality of sexual life, through their physical and psychological symptoms such as pain, stiffness, fatigue, depression, anxiety, negative body image, loss of libido, hormonal imbalance, chronic medications, and functional disability [7]. A patient usually also experiences physical difficulties in sexual activities due to pain associated with the joint movement that causes difficulty in finding suitable sex positions due to pain or

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discomfort which leads also to sexual problems [2, 7, 8]. Sexual problems that were described to be affected in RA were dyspareunia, decrease in sexual desire and sexual arousal, difficulty in reaching an orgasm, or being unable to reach an orgasm [9, 10].

Several researchers studied the prevalence of SD in RA patients. Female sexual dysfunction (FSD) was prevalent in Egyptian women with RA, cardiovascular disease was a risk factor [7], older age, hypercholesterolemia, hypertension, diabetes mellitus, and high disease activity increase the sexual dysfunction risk in Egyptian females [11]. Pain, fatigue, and morning stiffness were the main determinant factors in Tunisian females with RA [12]. Male sexual dysfunction was also commonly prevalent in Egyptian males suffering from RA [7]. Predictors of sexual dysfunction were quality of life, depression, disease activity, and low testosterone levels [13]. As well as Indian men suffering from RA, sexual dysfunction was a common complaint. Pain, stiffness of joints, functional limitations, fatigue, depression, drug therapy, and altered body image were the major determinant factors [14].

SD in RA patients was found to be related to some predictors like disease activity (DAS 28 score), quality of life (HAQ score), disease duration, joint deformity, depression, mood disorders, and the number of drugs [15, 16].

The current work aimed at discovering the prevalence of sexual dysfunctions in RA patients, to find out gender differences, commonly affected sexual domains, and clinical predictors of sexual dysfunctions in female and male RA patients. Identification of these sexual dysfunctions in RA patients helps to understand the actual disease effect on sexual functions of the affected patient that helps in turn to early management of those dysfunctions, which leads to more improvement of psychosocial aspects, interpersonal relations, and response to treatment.

Methods

This study was carried out as a cross-sectional case-control study on 342 patients suffering from RA attending rheumatology, physical medicine and rehabilitation, orthopedic surgery, andrology outpatient clinics, and rheumatology clinics in health insurance complex during the period from October 2019 to July 2020. Patients included in the study had been diagnosed as RA according to the criteria of the American College of Rheumatology/European League against Rheumatism (ACR/EULAR 2010) [17].

The study included 248 female and 94 male patients who accepted to participate in the study, were randomly chosen according to the planned eligibility criteria.

Inclusion criteria:

Premenopausal married female patients aged 18–45 years and married males aged 18–60 years with a confirmed diagnosis of RA at least 2 years before participation in the study and with a regular stable sexual relationship in the last 6 months with a normal partner. Exclusion criteria included pregnant and menopausal women, females with sex hormones abnormalities, females with gynecological or urological problems, partner sexual dysfunction, irregular sexual relationship, patients receiving antidepressants, tranquilizers, or hormonal treatment in the last 3 months before the study, and patients with chronic debilitating diseases affecting sexual functions (diabetes mellitus, cardiovascular diseases, chronic renal disease, chronic liver disease, malignancy, etc...).

We recruited 102 sexually active age-matched premenopausal females and 80 sexually active age-matched males as a control group. The control group was randomly chosen from normal volunteers or patients attending the hospital for complaints rather than RA, sexual dysfunctions, or general medical diseases affecting sexual functions and with an available normal partner.

All patients and controls were subjected to:

Medical history:

All patients recruited in the study were subjected to full history taking including personal history, rheumatologic history, drug history, sexual history, general medical and surgical history, and gynecological history for female participants.

Clinical examination:

All patients were subjected to general examination for chronic diseases and local rheumatologic examinations for the number of swollen and tender joints, deformities, and functional disabilities.

Disease Activity Assessment (DAS28 score):

To assess the activity of RA in studied patients we used the DAS28-ESR (erythrocyte sedimentation rate) score. This was done by counting the number of swollen and tender joints (out of the 28), measurement of the (ESR) or C reactive protein (CRP), and global assessment of health fulfilled by the patient (marked from 0 to 10 indicating a range from very bad to very good). These results had been used then by specific formula to produce the overall disease activity score. A DAS28 score of fewer than 2.6 means remission, 2.6 to 3.2 means mild disease activity, 3.2–5.1 means moderate disease activity, and a score greater than 5.1 implies severe disease activity [18].

Quality of life assessment:

A validated Arabic version of the Health Assessment Questionnaire (HAQ) Disability Index (DI) [19] was used to assess the quality of life and functional status for patients with RA. The HAQ-DI consists of 20 items and the score was categorized according to the severity of disability into mild to moderate (HAQ score of 0–1.0), moderate to severe (1.1–2.0), and severe to very severe (2.1–3.0) [20].

Visual analogue scale (VAS):

VAS was used to assess arthritis-related pain on a 15-cm-long horizontal linear scale, which was labeled from zero (no pain) at the left anchor point to 100 (severe pain) at the right anchor point. Patients either recorded a percentage to describe their pain or placed a vertical mark on the VAS scale. The higher the number on the scale, the more the arthritis pain [21].

Assessment of psychological status:

The Arabic version of the Hospital Anxiety and Depression Scale (HADS): The HADS included anxiety (HADS-A) and depression (HADS-D) subscales, and each subscale had seven items. The Arabic version of HADS was used to assess the psychological well-being of the participants [22]. Each item was rated from 0 to 3. The total score for depression and anxiety between 0 and 7 means normal person, a score between 8 &10 means Borderline abnormal person, and from 11 to 21 means abnormal person [23].

Female sexual function assessment:

All-female patients and controls were subjected to the validated Arabic version of the Female Sexual Function Index (ArFSFI). The ArFSFI is a 19-item scale grouped into six domains that had been used to assess the sexual functions in female participants during the past four weeks [24]. Each item was scored on a scale of 0 to 5. Each domain score was calculated by summing up the scores of that domain's questions and multiplying the obtained number by a multiplier factor of that domain. Participants were categorized into either sexually functional or sexually dysfunctional considering the cutoff score of 26.55. The cutoff scores in a particular domain were as follows: less than 4.28, less than 5.08, less than 5.45, less than 5.05, less than 5.04, and less than 5.51 in the desire, arousal, lubrication, orgasm, satisfaction, and pain domains, respectively [25].

Male sexual function assessment:

The validated Arabic version of the International Index of Erectile Function (IIEF-15) was used to assess sexual functions in male patients and controls. It consists of 15 questions covering the main sexual domains of male, which were erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. Six questions about erectile function, two about orgasmic function, two about sexual drive, three about intercourse satisfaction, and two about overall satisfaction [26].

The maximum total IIEF score is 75 and the minimum IIEF score is 5, with higher scores indicating greater sexual function. The Erectile function domain consists of 5 questions; each question has a value ranging from 0 to 5, adding the sum score of these 5 questions to the score of question 15 results in an IIEF5 score (= 30) which expresses the status of erectile function in males. A score more than 26 indicated normal erectile functions, 22 to 25 indicated mild dysfunction, 17 to 21 indicated moderate dysfunction, 11 to 16 indicated severe moderated dysfunction, and less than 10 indicated severe dysfunction [27].

Laboratory investigations:

All male and female patients who participated were subjected to laboratory measurement of rheumatoid factor, CBC, ESR, CRP, RBS, liver, and kidney function tests. Serum total testosterone, free testosterone, and sex hormone-binding globulin were measured in all male patients and controls to exclude androgen deficiencies that could affect sexual functions.

Ethics approval and consent to participate:

This study was approved by the Institutional Review Board and the Ethics Committee. All participants signed an informed written consent form included study aims, objectives, and applications at the beginning of the study.

Statistical analysis of the data

Data were managed using IBM Statistical Package of Social Sciences (SPSS) version 25. Descriptive statistics were presented as (mean ± standard deviation) for quantitative variables and as (%) for qualitative variables. For relations between qualitative variables, a chi-square test was used. The significance value was $P \leq 0.05$.

Results

This study was carried out on 342 patients (248 premenopausal females and 94 males) with RA of more than 2 years duration and 182 age-matched control subjects (102 females and 80 males).

Sociodemographic characteristics of studied female patients revealed that mean age was 32.1 ± 8.3 years, mean duration of marriage was 7.8 ± 6.4 years, 41.9% of them were not working, the mean number of children was 2.3 ± 1.8, 10.5 % were smokers, and mean BMI was 27.1 ± 4.5. In male patients, mean age was 39.7 ± 11.9 years,

mean duration of marriage was 11.0 ± 10.0 years, 21.3% of them were not working, the mean number of children was 2.6 ± 1.8, 53.2% were smokers, and mean BMI was 25.6 ± 4.7. There was a significant difference between female and male patients regarding age, age of partner, occupation, age of the youngest child, smoking, BMI, and frequency of sexual activity. Sociodemographic characteristics of the control subjects were quite matched to studied subjects in most of the variables (Table 1).

RA characteristics in the studied group revealed that disease duration in female and male patients was 7.5 ± 5.3 years versus 10 ± 6.7 years respectively ($P \leq 0.05$). DAS score was higher insignificantly in females than males 5.5 ± 8.2 versus 4.1 ± 1.9 respectively but the severity of DAS was statistically significant. Mean HADs A score was higher in females than males, 4.1 ± 3.2 versus 3.3 ± 2.1 respectively (P>0.05). Mean HADs D score was higher significantly also in females than males, 8.9 ± 5.8 versus 7.1 ± 4.9 respectively. The mean HAQ score was also higher but insignificantly in female than male patients 1.3 ± 1 versus 1.2 ± 1.1 respectively. VAS score mean was higher significantly in female patients than male patients, 44.4 ± 23.6 versus 36.7 ± 25.9 respectively. Joint deformity and number of drugs had no statistically significant difference between females and males (Table 2).

Prevalence of SD was significantly higher in RA female patients than controls 62.1% versus 41.2% respectively, while the mean sexual function score was higher in normal females than RA females 26.5 ± 6.7 versus 20.9 ± 9.7 respectively ($P \leq 0.05$). Regarding affected sexual domains, there was a significantly statistical difference between female patients and controls regarding desire, arousal, orgasm, and satisfaction (Table 3).

Prevalence of erectile dysfunction and global sexual dysfunction was significantly higher in RA male patients than controls 66% versus 42.5% for erectile dysfunction and 63.8% versus 47.5% for global sexual dysfunction respectively. Mean erectile function and mean total sexual function (IIEF-15) scores were higher in normal males than males with rheumatoid arthritis, 23.7 ± 6.8 versus 17.5 ± 7.7 respectively for erectile function score ($P \leq 0.05$) and 46.5 ± 16.3 versus 57.8 ± 15.8 respectively for total sexual function score ($P \leq 0.05$). There was a significantly statistical difference between male patients and controls regarding erectile function, intercourse satisfaction, and overall satisfaction while the mean serum level of sex hormones (SHBG, total testosterone, and free testosterone) in male patients and controls was insignificantly different (Table 4).

The study of the predictors of SD prevalence in RA patients revealed that in female patients; The prevalence of FSD was significantly related to disease duration ($U = 1654.0$–$P < 0.001$), DAS score ($U = 11416.0$–$P < 0.001$), HADs D score ($U = 12128.0$–$P < 0.001$), HAQ score ($U = 12250.0$–$P < 0.001$), VAS score ($U = 12064.0$–$P < 0.001$), joint deformity ($\chi^2 = 92.39$–$P < 0.001$) and the number of drugs ($\chi^2 = 119.8$–$P < 0.001$), while in male patients, the prevalence of male sexual dysfunction was significantly related to disease duration ($U = 1268.0$–$P < 0.001$), DAS score ($U = 1318.0$–$P < 0.001$), HAQ score ($U = 1522.0$–$P < 0.001$), and the number of drugs ($\chi^2 = 27.59$–$P < 0.001$) (Table 5).

Correlation between mean total sexual function scores in female and male RA patients and means of different predictors revealed that in female patients, number of children, BMI, mean disease duration, mean DAS score, mean HADs D score, mean HAQ score, and mean VAS score were the main predictors while in male patients, age, age of partners, frequency of sexual act, DAS score, and HAQ score were the main predictors (Table 6).

Discussion

The prevalence of sexual disorders in RA patients ranging from 31 to 70%, SD is an underestimated RA comorbidity due to the lack of multidisciplinary approaches [28]. Sexuality clearly constitutes a fundamental element in both personal and social behavior [7].

Sexual dysfunctions are closely related to the symptoms of RA, specifically chronic pain, physical disability, medication side effects, and low self-esteem that ultimately cause reduction of sexual desire and satisfaction [29].

SD in males and females is assessed by validated questionnaires that measure all aspects of sexual health as sexual desire, arousal, orgasm, and satisfaction [30]. The Arabic version of the Female Sexual Function Index (ArFSFI) was assumed to be a reliable, validated, and locally accepted tool to be used in the assessment of FSD in the Egyptian females [24], and the validated 15 item International Index of Erectile Function (IIEF-15) questionnaire had been found to have a high degree of specificity and sensitivity in assessment of sexual dysfunction in Egyptian male population [26].

Gender differences in sexual functions have been investigated in patients with chronic diseases as cardiovascular disease and diabetes [31, 32]. Studies have suggested that mental factors affect women's sexual functioning, while mainly physical factors affect men's sexual functioning [33].

In the current work, the prevalence of SD in female patients with RA was 62.1% in comparison to 41.2% in controls with a statistically significant difference between both groups. Mean FSFI was significantly higher in female controls than studied female patients with RA, 26.5 ± 6.7 versus 20.9 ± 9.7 respectively ($P \leq 0.05$). Sexual desire, arousal, orgasm, satisfaction, and pain scores were significantly affected in females with RA in comparison

Table 1 Frequency distribution of the studied patients and controls according to sociodemographic characteristics

Variables	Cases			p	Controls	
	Female (*n* = 248)	Males (*n* = 94)	Test of sig.		Females (*n* = 102)	Males (*n* = 80)
Age						
Mean ± SD.	32.1 ± 8.3	39.7 ± 11.9	$U = 7528.0^*$	$< 0.001^*$	29.4 ± 8.6	35.9 ± 10.3
Median (min.–max.)	32 (18–45)	38 (21–60)			28 (18–45)	34 (22–55)
Age of partner						
Mean ± SD.	36.8 ± 9.2	30.9 ± 10	$U = 7578.0^*$	$< 0.001^*$	35.8 ± 10.9	30.6 ± 8.9
Median (min.–max.)	34 (24–60)	29 (18–47)			30 (24–60)	29 (18–47)
Marriage duration						
Mean ± SD.	7.8 ± 6.4	11.0 ± 10.0	$U = 10164.0$	0.067	7.4 ± 6.4	8.9 ± 6.9
Median (min.–max.)	5 (0.6–20)	6 (0.6–30)			5 (1–20)	6 (2–25)
Education						
High education	102 (41.1)	40 (42.6)	$\chi^2 = 1.044$	0.593	36 (35.3)	42 (52.5)
Up to secondary education	86 (34.7)	36 (38.3)			48 (47.1)	20 (25)
Not educated	60 (24.2)	18 (19.1)			18 (17.6)	18 (22.5)
Occupation						
Employer	68 (27.4)	24 (25.5)	$\chi^2 = 17.519^*$	$< 0.001^*$	36 (35.3)	28 (35)
Not employer	76 (30.6)	50 (53.2)			24 (23.5)	40 (50)
Not working	104 (41.9)	20 (21.3)			42 (41.2)	12 (15)
Residence						
Urban	152 (61.3)	56 (59.6)	$\chi^2 = 0.084$	0.772	60 (58.8)	50 (62.5)
Rural	96 (38.7)	38 (40.4)			42 (41.2)	30 (37.5)
Number of children						
Mean ± SD.	2.3 ± 1.8	2.6 ± 2.9	$U = 11140.0$	0.521	2.1 ± 1.6	2 ± 1.4
Median (min.–max.)	2 (0–6)	2 (0–7)			2 (0–5)	2 (0–5)
Youngest child						
Mean ± SD.	2.8 ± 2.5	6.6 ± 6.9	$U = 7978.0^*$	$< 0.001^*$	2.5 ± 2.5	4.4 ± 5.2
Median (min.–max.)	2 (0–10)	4 (0–25)			2 (0–8)	2 (0–18)
Smoking						
Smoker	26 (10.5)	50 (53.2)	$\chi^2 = 24.598^*$	$< 0.001^*$	14 (13.7)	40 (50)
Non smoker	222 (89.5)	44 (46.8)			88 (86.3)	40 (50)
BMI						
Mean ± SD.	27.1 ± 4.5	25.6 ± 4.7	$U = 9536.0^*$	0.009^*	28.1 ± 3.7	26.9 ± 4.7
Median (min.–max.)	27 (19–36)	25 (19–36)			29.0 (22–36)	27 (20–37)
Frequency of sex act (act per month)						
Mean ± SD.	7.0 ± 5.8	8.4 ± 5.4	$U = 10672.0$	0.224	8.7 ± 4.9	10.5 ± 4.7
Median (min.–max.)	6 (1–20)	8 (1–20)			8 (2–20)	10 (3–20)

Qualitative data were described using no. (%). χ^2 chi-square test, *U* Mann-Whitney test, *P p* value for comparing between the studied groups, *BMI* body mass index. *Statistically significant at $P \leq 0.05$

to controls, while lubrication score was not significantly affected. Statistically significant correlation between sexual function index score and BMI, mean disease duration, mean DAS score, mean HADs D score, mean HAQ score, mean VAS score, joint deformity, and the number of drugs were also had been found.

These results were in harmony with several similar studies, Yilmaz and colleagues in 2019, which studied sexual functions in 95 females with (RA) in comparison to 108 normal controls. They reported that 70% of females with RA assessed by FSFI score had SD and all subscales of FSFI were affected, they found a strong

Table 2 Frequency distribution of the studied patients according to rheumatoid arthritis characteristics

	Female (*n* = 248)	Males (*n* =94)	Test of sig.	*p*
Disease duration				
Mean ± SD.	7.5 ± 5.3	10 ± 6.7	$U = 8828.0^{*}$	0.001^{*}
Median (min.–max.)	6 (2–23)	7 (2.5–28)		
DAS Activity				
Remission (<2.6)	106 (42.7)	28 (29.8)	$\chi^2 = 85.379^{*}$	$<0.001^{*}$
Mild (2.6–3.2)	20 (8.1)	24 (25.5)		
Moderate (3.2–5.1)	44 (17.7)	30 (31.9)		
Severe activity (>5.1)	78 (31.5)	12 (12.8)		
Mean ± SD.	5.5 ± 8.2	4.1 ± 1.9	$U = 11560.0$	0.906
Median (min.–max.)	2 (1–34)	3.1 (0.5–7)		
HADs A				
Normal (0–7)	214 (86.3)	78 (83.0)	$\chi^2 = 7.705$	0.071
Borderline (8–10)	18 (7.3)	4 (4.3)		
Abnormal (11–21(	16 (6.5)	12 (12.7)		
Mean ± SD.	4.1 ± 3.2	3.3 ± 2.1	$U = 10496.0$	0.148
Median (min.–max.)	3 (0–15)	3 (0–9)		
HADs D				
Normal (0–7)	136 (54.8)	64 (68.1)	$\chi^2 = 6.305^{*}$	0.043^{*}
Borderline (8–10)	52 (21.0)	10 (10.6)		
Abnormal (11–21)	60 (24.2)	20 (21.3)		
Mean ± SD.	8.9 ± 5.8	7.1 ± 4.9	$U = 11063.0^{*}$	0.026^{*}
Median (min.–max.)	6 (1–21)	7 (0–19)		
HAQ score				
No difficulty (0)	68 (27.4)	36 (38.3)	$\chi^2 = 8.652^{*}$	0.034^{*}
Some difficulty (1)	68 (27.4)	18 (19.1)		
Much difficulty (2)	86 (34.7)	24 (25.5)		
Unable to do (3)	26 (10.5)	16 (17)		
Mean ± SD.	1.3 ± 1	1.2 ± 1.1	$U = 11116.0$	0.491
Median (min.–max.)	1 (0–3)	1 (0–3)		
VAS score				
No pain (0–4)	18 (7.2)	8 (8.5)	$\chi^2 = 16.420^{*}$	$< 0.001^{*}$
Mild (5–44)	110 (44.5)	50 (53.2)		
Moderate (45–74)	94 (37.8)	16 (17.0)		
Severe (75–100)	26 (10.5)	20 (21.3)		
Mean ± SD.	44.4 ± 23.6	36.7 ± 25.9	$U = 10464.0^{*}$	0.043^{*}
Median (min.–max.)	40 (0–95)	35 (0–90)		
Joint deformity				
No deformity	144 (58.1)	52 (55.3)	$\chi^2 = 1.307$	0.253
Deformity	104(41.9)	42 (44.7)		
Number of drugs				
Monotherapy	60 (24.2)	20 (21.3)	$\chi^2 = 3.535$	0.316
Ditherapy	94 (37.9)	30 (31.9)		
Triple therapy	52 (21)	20 (21.3)		
Biological therapy	42 (16.9)	24 (25.5)		

χ^2 chi-square test, *U* Mann-Whitney test, *P p* value for comparing between the studied groups. *Statistically significant at $P \leq 0.05$

Table 3 Comparison between female patients and female controls regarding sexual functions domains and total score

	Female patients(n = 248)	Female controls(n = 102)	Test of sig.	P
Desire score				
Mean ± SD.	3.4 ± 1.7	4.6 ± 1.1	$U = 7758.0^*$	$< 0.001^*$
Median (min.–max.)	3 (0–6)	5 (1.5–6)		
Arousal score				
Mean ± SD.	3.9 ± 1.6	4.3 ± 1.4	$U = 10552.0^*$	0.013^*
Median (min.–max.)	4 (0–6)	5 (1–6)		
Lubrication score				
Mean ± SD.	4.1 ± 1.7	4.7 ± 1.6	$U = 11020.0$	0.053
Median (min.–max.)	5 (0–6)	5 (0–8)		
Orgasm score				
Mean ± SD.	2.9 ± 2	4.3 ± 1.3	$U = 8008.0^*$	$<0.001^*$
Median (min.–max.)	3 (0–6)	4 (1–6)		
Satisfaction score				
Mean ± SD.	3.4 ± 1.9	4.2 ± 1.1	$U = 9810.0^*$	0.001^*
Median (min.–max.)	4 (0–6)	4 (1–6)		
Pain score				
Mean ± SD.	3.1 ± 2	4.4 ± 1.6	$U = 8206.0^*$	$< 0.001^*$
Median (min.–max.)	4 (0–6)	5 (1–6)		
Total sexual function score				
No dysfunction (> 26.55)	94 (37.9%)	60 (58.8%)	$\chi^2 = 12.837^*$	$< 0.001^*$
Dysfunction (≤ 26.55)	154 (62.1%)	42 (41.2%)		
Mean ± SD.	20.9 ± 9.7	26.5 ± 6.7	$U = 8636.0^*$	$< 0.001^*$
Median (min.–max.)	23 (1.5–33)	28 (6.5–35)		
Menstrual cycle				
Regular	170 (68.5)	78 (76.5)	$\chi^2 = 2.197$	0.138
Irregular	78 (31.5)	24 (23.5)		

Qualitative data were described using no. (%). U Mann-Whitney test, χ^2 chi-square test, P p value for comparing between Control male and Cases male.
*Statistically significant at $P \leq 0.05$

negative correlation between total female sexual function score and DAS-28 score, there was a moderate negative correlation between total female sexual function score and HAQ, BDI, VAS scores, age, and morning stiffness and lastly, there was a weak negative correlation between total female sexual function score and BMI in females with RA [34]. In the same line, FSD was found in 64 of 140 Egyptian women (45.7%) with RA in an Egyptian study by El Miedany et al. [7]. Coskun and colleagues studied the relation between SD and RA on 32 females and 20 controls and reported that all sexual domains of FSFI including desire, arousal, lubrication, orgasm, and satisfaction were lower in the RA group than controls except for pain which was higher in controls than the RA group [8]. Khnaba et al. studied the prevalence of FSD on 60 Moroccan females with RA in comparison to normal controls, they found that the prevalence of FSD was 71.9% versus 54% in patients versus controls respectively ($P < 0.05$) and the total FSFI score was significantly higher in controls than patients with RA (23.05 ± 7.91 versus 18.29 ± 9.09) respectively ($P = 0.016$). Desire, arousal, orgasm, and satisfaction were significantly affected in patients than controls while pain and lubrication were not significantly affected; VAS, HAD, and quality of life assessed by SF36 scores were the determinant factors of sexual dysfunction. Pain and depression were the main independent factors affecting sexual function [6].

Saad et al. studied sexual functions in Tunisian females with RA versus controls on 71 females with a diagnosis of RA according to the (ACR/EULAR) 2010 Criteria and 71 normal females. They found that FSD prevalence was 49% and 23.9% in patients versus controls respectively ($P \leq 0.05$). There was also a statistically significant difference between patients and controls according to FSFI score (24 ± 6.7 versus 27.05 ± 5.34 respectively; $P \leq 0.05$). A statistically significant difference between patients and controls regarding sexual desire,

Table 4 Comparison between male patients and male controls regarding sexual function domains, sexual scores and androgens levels

	Male patients (*n* = 94)	Male controls(*n* = 80)	Test of sig.	*P*
Domain A (30)				
No (26–30)	32 (34.0)	46 (57.5)	$\chi^2 = 31.311^*$	$< 0.001^*$
Mild (17–25)	14 (14.9)	22 (27.5)		
Moderate (11–16)	34 (36.2)	4 (5)		
Severe (0–10)	14 (14.9)	8 (10)		
Mean ± SD.	17.5 ± 7.7	23.7 ± 6.8	$U = 1898.0^*$	$< 0.001^*$
Median (min.–max.)	14 (2–28)	27 (5–30)		
Domain B (10)				
Mean ± SD.	6.3 ± 2	7.4 ± 2	$U = 1738.0$	< 0.074
Median (min.–max.)	5 (1–9)	8 (1–10)		
Domain C (10)				
Mean ± SD.	7.0 ± 2.3	7.5 ± 2.4	$U = 3214.0$	0.095
Median (min.–max.)	7 (1–10)	8 (1–10)		
Domain D (15)				
Mean ± SD.	9.7 ± 3.9	11.4 ± 4.2	$U = 2768.0^*$	0.0421^*
Median (min.–max.)	10 (2–15)	13 (1–15)		
Domain E (10)				
Mean ± SD.	6.5 ± 2.8	7.9 ± 2	$U = 3022.0^*$	0.044^*
Median (min.–max.)	7 (1–10)	9 (3–10)		
Sexual function total score				
No dysfunction (> 60)	34 (36.2%)	42 (52.5%)	$\chi^2 = 4.685^*$	0.030^*
Dysfunction (≤ 60)	60 (63.8%)	38 (47.5%)		
Severe (0–15)	2 (2.1%)	4 (5.0%)	$\chi^2 = 48.403^*$	$< 0.001^*$
Moderate (16–30)	6 (6.4%)	4 (5.0%)		
Mild to moderate (31–45)	44 (46.8%)	4 (5.0%)		
Mild (46–60)	8 (8.5%)	26 (32.5%)		
No dysfunction (61–75)	34 (36.2%)	42 (52.5%)		
Mean ± SD.	46.5 ± 16.3	57.8 ± 15.8	$U = 2206.0^*$	$< 0.001^*$
Median (min.–max.)	40 (13–71)	64 (12–75)		
SHBG level				
Mean ± SD.	27.8 ± 13.4	27.6 ± 9	$U = 3572.0$	0.569
Median (min.–max.)	28 (10–63)	26 (14–59)		
Level of total testosterone				
Mean ± SD.	29.9 ± 12.3	30.2 ± 10.8	$U = 3480.0$	0.397
Median (min.–max.)	31 (9.1–51)	28.5 (14–64)		
Level of free testosterone				
Mean ± SD.	16.7 ± 6.4	17.9 ± 5.6	$U = 3444.0$	0.339
Median (min.–max.)	15 (6.1–30)	19 (8–27)		

Qualitative data were described using no. (%). *U* Mann-Whitney test , χ^2 chi-square test, *P P* value for comparing between Control male and Cases male.
*Statistically significant at $P \leq 0.05$

arousal, and satisfaction was also reported. However, insignificant differences were found for pain, lubrication, and orgasm. A significant association was found between SD and pain, tender joint counts, DAS28 ESR, fatigue, and functional disability. No association was found between SD and treatment [35].

In 2021 Zhou et al., studied sexual functions on 151 Chinese mainland female patients with RA (mean age:

Table 5 Correlation between sexual dysfunction prevalence in patients and their rheumatoid arthritis characteristics

	Female patients				Male patients			
	No dysfunction (> 26.55) (*n* =94)	Dysfunction (≤26.55) (*n* = 154)	Test of sig.	*P*	No dysfunction (> 60) (*n* =34)	Dysfunction (≤ 60) (*n* = 60)	Test of sig.	*P*
Disease duration								
Mean ± SD.	3.7 ± 1.6	9.8 ± 5.4	***U* = 1654.0***	**< 0.001***	5.7 ± 4.5	12.4 ± 6.6	***U* = 286.0***	**< 0.001***
Median (min.–max.)	4.0 (2.0–8.0)	9.0 (2.0–23.0)			4.0 (2.5–18.0)	10.0 (3.0–28.0)		
DAS Activity								
Mean ± SD.	2.6 ± 0.7	7.8 ± 9.7	***U* = 1416.0***	**< 0.001***	2.1 ± 0.9	4.3 ± 1.8	***U* = 318.0***	**< 0.001***
Median (min.–max.)	1.5 (1.0–3.5)	5.5 (1.0–34.0)			2.0 (1.0–3.5)	4.5 (0.5–7.0)		
HADs A								
Mean ± SD.	3.7 ± 1.9	4.4 ± 3.8	*U* = 7090.0	0.783	3.1 ± 1.3	3.3 ± 2.5	*U* = 972.0	0.701
Median (min.–max.)	3 (2–9)	3 (0–15)			3 (1–7)	3 (0–9)		
HADs D								
Mean ± SD.	4 ± 2.9	10.4 ± 5.7	***U* = 2128.0***	**< 0.001***	8.1 ± 4.7	6.5 ± 4.9	*U* = 823.0	0.118
Median (min.–max.)	3 (1–10)	10 (2–21)			7 (2–19)	7 (0–17)		
HAQ score								
Mean ± SD.	0.5 ± 0.7	1.7 ± 0.9	***U* = 2250.0***	**< 0.001***	0.6 ± 1.0	1.6 ± 1.1	***U* = 522.0***	**< 0.001***
Median (min.–max.)	0.0 (0.0–2.0)	2.0 (0.0–3.0)			0.0 (0.0–3.0)	2.0 (0.0–3.0)		
VAS score								
Mean ± SD.	26.4 ± 13.6	55.3 ± 21.5	***U* = 2064.0***	**< 0.001***	37.2 ± 28.8	42.6 ± 24	*U* = 853.0	0.188
Median (min.–max.)	20 (10–55)	60 (20–90)			25 (10–89)	40 (10–90)		
Joint deformity								
No deformity	74 (78.7)	60 (39)	***χ^2* = 92.39**	**< 0.001***	23 (67.6)	29 (48.3)	*χ^2* = 3.275	0.070
Deformity	20 (21.3)	94 (61)			11 (32.4)	31 (51.7)		
Number of drugs								
Monotherapy	35(37.2)	8 (5.2)	***χ^2* = 119.828***	**< 0.001***	11 (32.3)	8 (13.3)	***χ^2* = 27.586***	**< 0.001***
Ditherapy	26 (27.7)	52 (33.8)			14 (41.2)	12 (20)		
Triple therapy	18 (19.1)	52 (33.8)			5 (14.7)	20 (33.3)		
Biological therapy	15 (16.0)	42 (27.3)			4 (11.8)	20 (33.3)		

χ^2 chi-square test, *U* Mann-Whitney test, *P P* value for association between No dysfunction and Dysfunction. *Statistically significant at $P \leq 0.05$

46.3 ± 8.6 years) and 146 healthy control subjects (mean age 45.7 ± 7.6 years). The prevalence of FSD was 67.5% in RA patients versus 54.1% in controls ($P < 0.05$). Marital dysfunction, postmenopausal status, BMI, physical component summary, and resignation coping style were significant predictive factors [36].

In the current study, prevalence of SD in male patients with RA according to the IELF-15 score was 66% and 42.5% in male patients and control subjects respectively ($P \leq 0.05$) as well as the prevalence of erectile dysfunction in male patients with RA according to (IELF-5) score was 63.8% versus 47.5% in control subjects ($P \leq 0.05$). The mean total sexual function (IIEF-15) score was 46.5 ± 16.3 in males with RA versus 57.8 ± 15.8 in control subjects ($P \leq 0.05$). The mean erectile function score (IIEF-5) was 23.7 ± 6.8 in controls versus 17.5 ± 7.7 in patients ($P \leq 0.05$). This denotes that RA affects sexual functioning in affected males both on the level of erectile function and total sexual function aspects. Predictors of SD in male RA patients were mean disease duration; mean DAS28 score, mean HAQ score, and the number of drugs with a significant positive relationship.

Table 6 Correlation between mean total sexual function scores in female and male rheumatoid arthritis patients and different variables

Variables	Females (n = 248)		Males (n = 94)	
	r_s	P	r_s	P
Age	− 0.674	0.094	− 0.548	< 0.001*
Age of partner	− 0.636	0.056	− 0.54	< 0.001*
Number of children	− 0.617	< 0.001*	− 0.625	0.082
BMI	− 0.688	< 0.001*	− 0.223	0.064
Frequency of sex act	0.732	0.087	0.792	< 0.001*
Disease duration	− 0.833	< 0.001*	− 0.721	< 0.001*
DAS score	− 0.719	< 0.001*	− 0.790	< 0.001*
HADs A	0.096	0.133	− 0.191	0.065
HADs D	− 0.764	< 0.001*	− 0.097	0.351
HAQ score	− 0.762	< 0.001*	− 0.686	< 0.001*
VAS score	− 0.782	< 0.001*	− 0.027	0.798

r_s Spearman's coefficient. *Statistically significant at $P \leq 0.05$

In the same line, Ghareeb and colleagues in 2021 studied 60 males aged 18–45 years in a cross-sectional Egyptian study in comparison to normal controls. They found that there was a highly statistically significant difference between patients and controls regarding all sexual functions domains and the total IEEF score (mean score 42.73 ± 25.65 in the case group vs. 61.2 ± 14.41 in the control group) They reported that sexual dysfunction was significantly related to depression, quality of life, disease activity, and free and total testosterone levels [13].

Nasr and El-Shafey compared serum androgen levels and erectile dysfunctions in 24 male patients with RA versus 18 healthy controls; they found that the occurrence of erectile dysfunction was prevalent more in RA patients (45.8%) than controls (11.1%). The Sexual Health Inventory for Men (SHIM) means was significantly higher in the control group than the patient's group. The SHIM score was significantly correlated to CRP, ESR, and DAS-28 in male RA patients [37]. We are in harmony in this study with an Egyptian study by El Miedany et al in 2012 who studied sexual dysfunction in 91 men with RA, they reported that SD was found in 49 out of 91 (53.8%) RA male patients (mean age 51.4 ± 9.4 years). Using the IIEF, a statistically significant correlation between SD and several factors that are usually present in RA patients was reported. These factors were; age, pain, tender joint count, disease activity, fatigue, cardiovascular disease, and psychological status. Interestingly, the intramuscular steroid injections number, but not the oral intake of prednisone, was correlated with more SD [7].

A newly published cross-sectional study by Madhukar et al. investigated sexual dysfunctions in 50 men with RA; the mean age was 42.28 years and the mean duration of the disease was 7 years. They reported that 40 patients had some kind of sexual dysfunction. In 35 out of 40 dysfunctional patients, pain or stiffness of joints, functional limitations, fatigue, and chronic medications were the cause of their sexual dysfunction [14].

Similarly, the prevalence of SD was assessed by Gaber et al. on 29 male patients with RA. The mean age was 45.2 ± 12.1 years and the mean duration of RA was 8.2 ± 7.6 years. They reported that the mean DAS28 score was 3.5, indicating moderate disease activity. SD was found in 48.3% of patients versus 33.3% of controls (P > 0.05). All SD parameters were significantly higher in RA patients compared to controls. Risk factors suggested by authors were DM, hypertension, hypercholesterolemia, old age, and high DAS28 and HAQ scores [11].

A similar more recent Colombian study carried out in 2020 by Santos-Moreno et al., studied sexual dysfunction prevalence in RA patients and associated predictive factors they reported that prevalence was 29.6% (425/1,436), among these 425 subjects, 322 (75.7%) were women and 103 (24.2%) were men. The order of affected domains was as follows dyspareunia (37.1%), dissatisfaction (29.4%), sexual dysfunction (20.9%), loss of sexual desire (14.8%), orgasmic disorder (10.1%), and premature ejaculation (8.4%). Predictive factors were the DAS28 score, HAQ score, sleep disorders, anxiety, and depression [15].

Limitations

The small number of patients, shyness, and harassment of patients especially females when sexual issues were discussed, due to religious and cultural restrictions towards sex in Egypt; this could affect the reliability of data obtained from patients. Assessment of partner's sexual functions was not applicable in most of the instances which might make a bias in the diagnosis of the patient's SD as it could be secondary to partner dysfunction not from dysfunction in the patient himself, and finally, an assessment of erectile function in males was dependent only on the IIEF-5 questionnaire which might give a false diagnosis; it had been better to use the intracavernosal injection test or penile duplex as a reliable method for diagnosis erectile dysfunction in those patients.

Conclusions

Rheumatoid arthritis is a prevalent inflammatory joint disabling disease affecting both males and females. Sexual dysfunction is a common association with RA. Sexual dysfunction is highly prevalent in females (62.1%) and males (63.8%) with RA than control subjects. Predictors of sexual dysfunction in RA female patients were the number of children, BMI, disease duration, DAS

score, HADs-D score, HAQ score, VAS score, joint deformity, and the number of drugs. Predictors of sexual dysfunction in male RA patients were age, disease duration, DAS score, HAQ score, and the number of drugs. We recommend that rheumatologists and orthopedicians should be aware of sexual dysfunctions associated with RA in females and males. Sexual function assessment should be considered an essential part of the clinical assessment of RA patients. Early diagnosis of sexual dysfunction and early referral to specialists leads to more improvement of patient psychological aspects and quality of life. On the other hand, to manage sexual dysfunction in RA patients appropriately, disease activity, joint pain and deformity, depression, and the number of drugs should be controlled.

Abbreviations

ArFSFI: The Arabic version of the Female Sexual Function Index; BMI: Body mass index; CBC: Complete blood picture; CRP: C-reactive protein; DAS28: Disease Activity Assessment score; ESR: Erythrocyte sedimentation rate; FSD: Female sexual dysfunction; HADS: Hospital Anxiety and Depression Scale; HADs-A: Hospital Anxiety and Depression Scale-Anxiety; HADs-D: Hospital Anxiety and Depression Scale-Depression; HAQ: Health Assessment Questionnaire; IIEF-15: International Index of Erectile Function questionnaire; RA: Rheumatoid arthritis; RBS: Random blood sugar; SD: Sexual dysfunction; VAS: Visual analogue scale

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Authors' contributions

MA: Conceptualization, Methodology, Software, Validation, Writing—reviewing and editing, Project administration, Funding acquisition. MAA: Data curation, Formal analysis, Writing—Original draft preparation, Investigation, Funding acquisition. MMA: Visualization, Investigation, Supervision, Writing—reviewing and editing, Funding acquisition. All authors have read and approved the manuscript

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Availability of data and materials

The data sets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board and the Ethics Committee of the Faculty of Medicine, Suez Canal University. All participants signed an informed written consent form included study aims, objectives, and applications at the beginning of the study. The reference number is 3708, September 2019.

Consent for publication

All participants in the study agreed to publish this paper.

Competing interests

The authors declare that there is no conflict of interest.

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