

Using Rheumatoid Arthritis Disease Activity Index-5 questionnaire in the assessment of disease activity in patients with rheumatoid arthritis: correlation with quality of life, pain, and functional status

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Objective

The aim of our study was to assess the disease activity in patients with rheumatoid arthritis (RA) using Rheumatoid Arthritis Disease Activity Index-5 (RADAI-5) questionnaire and to find its correlation with Disease Activity Score-28 (DAS28), quality of life, pain, and functional status.

Patients and methods

A total of 40 patients with RA were included. Quality of life was evaluated by Quality of Life–Rheumatoid Arthritis scale. The severity of pain was measured by 100-mm visual analog scale-pain. Health Assessment Questionnaire Disability Index was used to evaluate functional status. Disease activity was measured by using the DAS28 and RADAI-5.

Results

Mean RADAI-5 score was 4.2 ± 1.7 (moderate disease activity). A total of seven (17.5%) patients were in remission, four (10%) patients had mild disease activity, 19 (47.5%) patients had moderate disease activity, and 10 (25%) patients had high disease activity. RADAI-5 was significantly correlated with DAS28, quality of life scale, pain scale, and functional status ($r=0.9$, $P<0.001$; $r=0.9$, $P<0.001$; $r=0.4$, $P=0.02$; and $r=0.6$, $P<0.001$, respectively). Moreover, RADAI-5 was found to be significantly correlated with morning stiffness duration, Ritchie articular index, tender 28-joint count, swollen 28-joint count, erythrocyte sedimentation rate, anticyclic citrullinated peptide, and rheumatoid factor positivity ($r=0.3$, $P=0.03$; $r=0.8$, $P<0.001$; $r=0.9$, $P<0.001$; $r=0.7$, $P<0.001$; $r=0.6$, $P<0.001$; $r=0.6$, $P<0.001$; and $r=0.4$, $P=0.008$, respectively).

Conclusion

RADAI-5 is a simple and low-cost self-report questionnaire that reflects patients' perception of signs and symptoms. The correlations of RADAI-5 with DAS28, quality of life, pain, and functional status reflect its value in the assessment of disease activity in patients with RA.

Keywords:

functional status, quality of life, Rheumatoid Arthritis Disease Activity Index-5, rheumatoid arthritis

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Introduction

Rheumatoid arthritis (RA) is a progressive inflammatory disease that causes damage and disability [1], which can be prevented by promptly initiated and effective therapy [2–4]. To ensure that therapy is effective, frequent clinical assessments are needed [5,6].

Various disease activity scales have been used for measuring disease activity in RA. Composite indexes, such as the Disease Activity Score (DAS), including a 44-joint or a 28-joint count (DAS28), have been successfully used, particularly in clinical trials [5,7]; however, they are long and may interfere with the flow of patient visits rather than contributing information to clinical care [8]. For busy clinical settings, Leeb *et al.* [9] developed a simplified version of the Rheumatoid Arthritis Disease Activity Index (RADAI) questionnaire, RADAI-5. RADAI-5

is a newly developed tool that is physician as well as patient friendly and can be completed within a minute [10].

Applying the RADAI-5 in daily routine provides the patient's view at any time by completing the questionnaire [11]. Practicing rheumatologists increasingly do not have enough time to perform joint counts at every patient visit or they think that they do not have. Thus, there is evidence that most visits by patients with RA to rheumatologists do not include a formal joint count, which, however, is a prerequisite for the calculation of the respective indexes [12].

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To our knowledge, there is no published Egyptian experience available with RADAI-5 till date. The aim of our study was to assess the disease activity in patients with RA using RADAI-5 and to find its correlation with DAS28, quality of life, pain, and functional status.

Patients and methods

A total of 40 consecutive patients (33 female and seven male) who fulfilled the 2010 American College of Rheumatology/European League Against Rheumatism RA classification criteria [13] were included in the present study. All patients were attending the outpatient rheumatology clinic, Minia University Hospitals. Informed consent was taken from all participants in the study. The study was approved by the ethics committee of the Faculty of Medicine.

Patients who had severe anemia, hypothyroidism, and pulmonary, cardiac, liver, or renal disease were excluded from the study.

The swollen 28-joint count (SJC28) and tender 28-joint count (TJC28), Ritchie articular index (RAI) [14], anticyclic citrullinated peptide, rheumatoid factor, and erythrocyte sedimentation rate (ESR) were assessed. Quality of life was evaluated by Quality of Life-Rheumatoid Arthritis (QOLRA) scale [15]. The severity of pain was measured by 100-mm visual analog scale-pain [16]. Health Assessment Questionnaire Disability Index was used to evaluate functional status [17]. Disease activity was measured by using DAS28 [7] and RADAI-5 [18].

RADAI-5 is a five-item, self-administered RA-specific questionnaire that assesses global disease activity in the past 6 months and current disease activity in terms of joint swelling and tenderness, pain, duration of morning stiffness, and general health. The result can be easily calculated as follows: $(Q1+Q2+Q3+Q4+Q5)/5$ (Fig. 1). Scores between 0.0 and 1.4 indicate remission, 1.6 and 3.0 low disease

Figure 1

RADAI-5

How active was your arthritis the last six months?

completely inactive 0 1 2 3 4 5 6 7 8 9 10 **extremely active**

How active is your arthritis today with respect to joint tenderness and swelling?

completely inactive 0 1 2 3 4 5 6 7 8 9 10 **extremely active**

How severe is your arthritis pain today?

no pain 0 1 2 3 4 5 6 7 8 9 10 **unbearable pain**

How would you describe your general health today?

excellent 0 1 2 3 4 5 6 7 8 9 10 **extremely bad**

Did you experience joint (hand) stiffness on awaking yesterday morning? If yes, how long was this stiffness?

no stiffness 0 1 2 3 4 5 6 7 8 9 10 **stiffness the whole day**

The Rheumatoid Arthritis Disease Activity Index-5 (RADAI-5) questionnaire.

activity, 3.2 and 5.4 moderate disease activity, and greater than 5.6 high disease activity [9,18].

Statistical analysis

The statistical analysis was performed using SPSS 16.0 (USA). Descriptive statistics were done by number and percent as well as mean and SD. Correlations were calculated using Pearson's correlation coefficient. The level of statistical significance was set at a *P* value less than 0.05.

Results

A total of 40 patients with RA were included in the present study. Their mean age was 39.2 ± 12.3 years, and their mean disease duration was 5.2 ± 4.9 years. Table 1 shows demographic, clinical, and laboratory data.

Mean RADAI-5 score was 4.2 ± 1.7 (median: 4.4), indicating moderate disease activity. At the time of the study, seven (17.5%) patients were in remission (RADAI-5: 0–1.4), four (10%) patients had mild disease activity (RADAI-5: 1.6–3.0), 19 (47.5%) patients had moderate disease activity (RADAI-5: 3.2–5.4), and 10 (25%) patients had high disease activity (RADAI-5: >5.6).

Mean DAS28 was 4.3 ± 1.3 (median: 4.2), indicating moderate disease activity. According to DAS28, six

(15%) patients were in remission ($\text{DAS28} \leq 2.6$), two (5%) showed mild activity (DAS28: 2.6–3.2), 19 (47.5%) showed moderate activity (DAS28: 3.2–5.1), and 13 (32.5%) showed high activity ($\text{DAS28} \geq 5.1$).

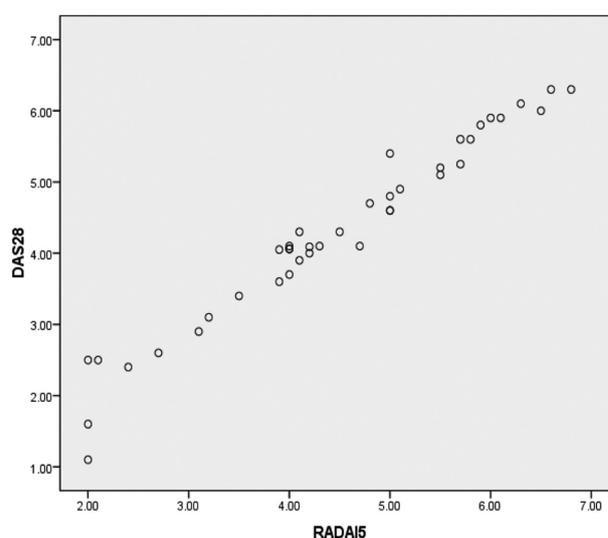
RADAI-5 was significantly correlated with DAS28 (Fig. 2), quality of life scale (Fig. 3), pain scale, and functional status ($r=0.9$, $P<0.001$; $r=0.9$, $P<0.001$; $r=0.4$, $P=0.02$; and $r=0.6$, $P<0.001$, respectively). Correlations of RADAI-5 score with other disease measures in patients with RA are shown in Table 2.

Table 1 Characteristics of patients with rheumatoid arthritis

Parameters	Patients with rheumatoid arthritis (<i>n</i> =40) [mean±SD (range)]
Age (years)	39.2 ± 12.3 (18–62)
Sex (female : male)	33/7 (4.7 : 1)
DD (years)	5.2 ± 4.9 (0.3–17)
MS (min)	35.1 ± 34.4 (0–120)
RAI	10.7 ± 8.8 (0–30)
TJC	8.3 ± 7.2 (0–26)
SJC	3.3 ± 3.7 (0–14)
DAS28	4.3 ± 1.3 (1.1–6.3)
VAS-pain	4.4 ± 20.01 (1–100)
RADAI-5	4.2 ± 1.7 (1.2–6.8)
HAQ-DI	1.2 ± 0.7 (0–3)
QOLRA scale	4.9 ± 1.3 (2.3–6.9)
ESR (mm/1st h)	47.9 ± 29.03 (5–100)
Anti-CCP-positive [<i>n</i> (%)]	32 (80)
RF-positive [<i>n</i> (%)]	20 (50)

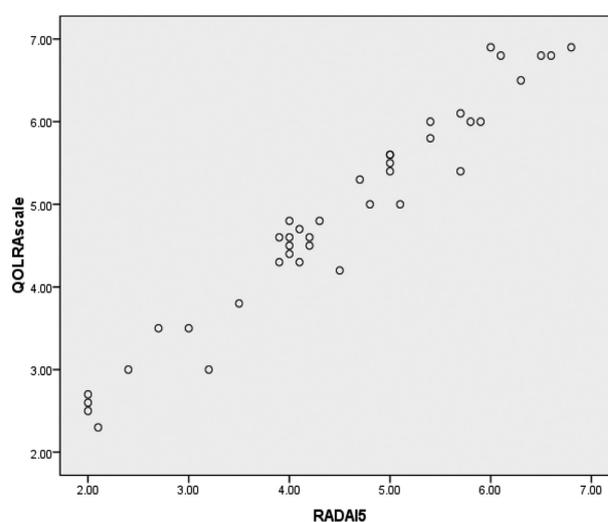
CCP, cyclic citrullinated peptide; DAS28, Disease Activity Score-28; DD, disease duration; ESR, erythrocyte sedimentation rate; HAQ-DI, Health Assessment Questionnaire Disability index; MS, morning stiffness; QOLRA, Quality of Life–Rheumatoid Arthritis; RADAI-5; Rheumatoid Arthritis Disease Activity Index-5; RAI, Ritchie articular index; RF, rheumatoid factor; SJC, swollen joint count; TJC, tender joint count; VAS, visual analog scale.

Figure 2



Correlation between Rheumatoid Arthritis Disease Activity Index-5 (RADAI-5) and Disease Activity Score-28 (DAS28).

Figure 3



Correlation between Rheumatoid Arthritis Disease Activity Index-5 (RADAI-5) and Quality of Life–Rheumatoid Arthritis (QOLRA) scale.

Table 2 Correlation between the Rheumatoid Arthritis Disease Activity Index-5 score and different disease measures in patients with rheumatoid arthritis

Parameters	RADAI-5	
	<i>r</i>	<i>P</i>
MS	0.3	0.03
RAI	0.8	<0.001
TJC	0.9	<0.001
SJC	0.7	<0.001
DAS28	0.9	<0.001
VAS-pain	0.4	0.02
HAQ-DI	0.6	<0.001
QOLRA	0.9	<0.001
ESR (mm/1st h)	0.6	<0.001
Anti-CCP	0.6	<0.001
RF-positive	0.4	0.008

CCP, cyclic citrullinated peptide; DAS28, Disease Activity Score-28; ESR, erythrocyte sedimentation rate; HAQ-DI, Health Assessment Questionnaire Disability Index; MS, morning stiffness; QOLRA, Quality of Life-Rheumatoid Arthritis; RADAI-5, Rheumatoid Arthritis Disease Activity Index-5; RAI, Ritchie articular index; RF, rheumatoid factor; SJC, swollen joint count; TJC, tender joint count; VAS, visual analog scale. $P < 0.05$, significant.

Discussion

Since many years, the measurement of disease activity in RA has been done by DAS28, which is measured by assessing TJC28 (range: 0–28), SJC28 (range: 0–28), ESR, and general health on visual analog scale (0–100 mm) [19]. However, the formula to calculate the DAS28 score is complicated, requiring the use of a calculator or computer program [20].

Patient self-report questionnaires provide an easily implemented approach for quantitative assessment of patients with RA in usual care settings [21], but published reports indicate that they are used infrequently in clinical practice [22]. Questionnaire scores distinguish active from control treatments in clinical trials at similar levels to SJC and TJC or laboratory tests [23].

The study was aimed to assess the disease activity in patients with RA using RADAI-5 score and to find its correlation with DAS28, quality of life, pain, and functional status.

RADAI-5 is a self-administered tool that comprises only five patient-reported measures, thus supporting the suggestion of Pincus *et al.* [24]. The RADAI-5 does not require any physician's intervention, laboratory parameter, biochemical parameter, or radiological investigation for assessment of disease activity. The variables used in RADAI-5 are easily available at a point of care in the clinical setting assessed by patients themselves, which in turn can produce more

consistency in timing and completeness of disease measurement [10].

In the present study, RADAI-5 score of patients with RA indicated moderate disease activity. Overall, 17.5% of patients were in remission, 10% had mild, 47.5% had moderate, and 25% had high disease activity. These rates were 15, 5, 47.5, and 32.5%, respectively, according to DAS28. Sunar *et al.* [25] compared the results of RADAI-5 with DAS28 and showed similar data.

RADAI-5 score in the current study was strongly correlated with DAS28 ($r=0.9$, $P < 0.001$). RADAI-5 has proven to be in line with more time-consuming tools such as DAS28 and Clinical Disease Activity Index [9,10,18,25].

Health-Related Quality of Life (HRQL) refers to the effect of disease and treatment on the individual's welfare. Patients diagnosed as having RA have significant decreases in HRQL, resulting from pain, impaired physical function, and fatigue [26]. In the present study, English version of the QOLRA scale was used to assess HRQL [15], and a significant correlation between disease activity and quality of life scale (QOLRA scale) was found. Similarly, Cadena *et al.* [27] conducted a study among 79 patients with RA in Colombia and they evaluated quality of life by using the same scale. They demonstrated that RA activity significantly influenced quality of life. Similarly, this finding was confirmed in previous studies by Sunar *et al.* [25], Prajs *et al.* [28], and Houssien *et al.* [29].

Disease activity was significantly correlated with pain scale which reflect patient pain perception ($r=0.4$, $P=0.02$). A similar relationship was previously shown in the study of Sunar *et al.* [25].

Several studies have reported the relationship between functional status and disease activity in RA [25,30,31]. In the present study, a statistically significant correlation between disease activity and functional status was found ($r=0.6$, $P < 0.001$).

In the present study, disease, RADAI-5 was found to be significantly correlated with morning stiffness duration, RAI, TJC, and SJC ($r=0.3$, $P=0.03$; $r=0.8$, $P < 0.001$; $r=0.9$, $P < 0.001$; and $r=0.7$, $P < 0.001$, respectively). In previous studies [9,10], RADAI-5 was found to be significantly correlated with TJC and SJC, but no studies showed its correlations with morning stiffness or RAI.

The current study proved a significant correlation of RADAI-5 with ESR and rheumatoid factor positivity ($r=0.6$, $P<0.001$ and $r=0.4$, $P=0.008$, respectively). In concordance with this finding, Pincus *et al.* [32] reported significant correlations of self-reported questionnaire scores with data from laboratory tests, traditional joint counts, radiographs, as well as physical measures of functional status. However, several studies reported no or relatively low correlations of patient questionnaires with laboratory determinants of disease activity such as ESR or CRP [29,33,34].

Finally, self-report questionnaires, such as the RADAI-5, have been shown to be capable of substituting physician-derived DAS, which were developed primarily for research purposes [35].

Conclusion

RADAI-5 is a simple and low-cost self-report questionnaire that reflects patients' perception of signs and symptoms. The correlations of RADAI-5 with DAS28, quality of life, pain score, and functional status reflect its value in the assessment of disease activity in patients with RA. Further longitudinal studies are recommended to test both RADAI-5 and DAS28 for sensitivity and specificity in early detected mild cases.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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