



Research Article

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Impact of Pharmacist-Led Intervention on Adherence and Self-Care Practices in a Sample of Iraqi Patients with Rheumatoid Arthritis

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Abstract

Background: Rheumatoid arthritis significantly impacts patients' daily lives and quality of life, which highlights the need for effective medication adherence and self-care practices. **Objectives:** To evaluate the impact of pharmacist-led intervention on adherence to medication and self-care practices among patients with RA. **Methods:** A one-group pre-post interventional study conducted at the rheumatology unit, Baghdad Teaching Hospital. Participants were given educational counseling and an educational booklet. Each participant received two educational sessions; the initial session was conducted immediately after obtaining the baseline evaluation of adherence using the General Medication Adherence Scale (GMAS) and self-care practices using the self-care questionnaire through a face-to-face interview, which lasted around 20-25 min, and the second session was held one month later as a 5-minute phone call. The evaluation of adherence using the GMAS and self-care practices using the self-care questionnaire was obtained again at the end of the study. **Results:** The study recruited 75 patients with a mean age of 47.12 ± 10.15 years. The mean scores for adherence ($p=0.022$), self-care practices ($p=0.002$), and disease activity ($p=0.012$) were significantly enhanced after the intervention. **Conclusions:** This pharmacist-led educational intervention improved RA patients' medication adherence, self-care practices, and CDAI score. Which highlights the potential value of integrating clinical pharmacists into rheumatology clinics to support patient management.

Keywords: Adherence; Pharmacist; Rheumatoid arthritis; Self-care.

تأثير التدخل الذي يقوده الصيدلي على الالتزام وممارسات العناية الذاتية في عينة من المرضى العراقيين المصابين بالتهاب المفاصل الروثوي

الخلاصة

الخلفية: يؤثر التهاب المفاصل الروثوي بشكل كبير على حياة المرضى اليومية وجودة حياتهم، مما يبرز الحاجة إلى الالتزام بالفعال بالأدوية وممارسات العناية الذاتية. **الأهداف:** تقييم تأثير التدخل الذي يقوده الصيدلي على الالتزام بممارسات الأدوية والعناية الذاتية بين مرضى التهاب المفاصل الروثوي. **الطرائق:** دراسة ما قبل وبعد التدخل من مجموعة واحدة أجريت في وحدة الروماتيزم، مستشفى بغداد التعليمي. تم تقديم استشارات تعليمية للمشاركين وكتيبات تعليمية. حصل كل مشارك على جلستين تعليميتين؛ أجريت الجلسة الأولى مباشرة بعد الحصول على التقييم الأساسي للالتزام باستخدام مقياس الالتزام العام للأدوية (GMAS) وممارسات العناية الذاتية باستخدام استبيان العناية الذاتية من خلال مقابلة وجها لوجه استمرت حوالي 20-25 دقيقة، وأجريت الجلسة الثانية بعد شهر كمكالمة هاتفية مدتها 5 دقائق. تم إعادة تقييم الالتزام باستخدام GMAS وممارسات العناية الذاتية باستخدام استبيان العناية الذاتية في نهاية الدراسة. **النتائج:** شملت الدراسة 75 مريضاً بمتوسط عمر 47.12 ± 10.15 سنة. تم تحسين متوسط درجات الالتزام ($p=0.022$)، وممارسات العناية الذاتية ($p=0.002$)، ونشاط المرض ($p=0.012$) بشكل ملحوظ بعد التدخل. **الاستنتاجات:** هذا التدخل التعليمي بقيادة الصيدلي حسن التزام مرضى التهاب المفاصل الروثوي بالأدوية وممارسات العناية الذاتية ودرجة CDAI لدى مرضى التهاب المفاصل الروثوي. وهذا يبرز القيمة المحتملة لدمج الصيداللة السريريين في عيادات الروماتيزم لدعم إدارة المرضى.

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INTRODUCTION

Rheumatoid arthritis (RA) is a chronic, symmetrical, inflammatory disorder that starts by affecting the small joints and will progress to bigger joints and ultimately the skin, eyes, kidneys, lungs, and heart [1]. RA has a prevalence of 0.5-1% according to most of the epidemiological research; it mostly affects the female gender, with a male to female ratio of 1:2 to 1:3, and can occur at any age, with a peak of 60 years of age [2]. The prevalence rate in Iraq is 1% [3]. The prevalence of RA among Iraqi patients in Diyala Province was 0.96% [4].

The exact cause of the disease is not yet known, but it is obvious that RA is a multifactorial disease, with intricate interactions between the host and the environment influencing the total risk of illness susceptibility, persistence, and severity [5]. 'Medication adherence' is defined as the degree to which people adhere to the medication regimens provided by their healthcare providers, a term widely preferred over 'compliance' by healthcare professionals [6]. The medication adherence in RA patients is low, with a range of 30-80% [7]. Poor adherence has been demonstrated to have a detrimental

effect on RA outcomes, with patients who do not adhere to suggested treatment plans seeing higher rates of radiographic advancement and disease activity [8]. Same as with other chronic illnesses, poor lifestyle choices may worsen RA. Recent research suggests that diet and exercise play a part in this illness [9]. Despite therapeutic advancements, RA continues to disrupt patients' daily lives, affecting their employment, social interactions, and psychological well-being. To manage these problems, self-care is important; changes aimed at improving self-care in patients with RA may yield health benefits, including improving the quality of life [10]. Patient participation in appropriate self-care practices is crucial to the effective management of RA [11]. RA patients' physical function, health condition, and quality of life (QOL) may be enhanced by high levels of self-care activities (such as energy conservation and tiredness management techniques, controlling pain, pharmaceuticals, physical activity, dietary habits, and joint protection) [12,13]. Clinical pharmacists' intervention can greatly assist in the initial finding and adequate management of drug-related problems in patients with systemic autoimmune disorders [14]. A systematic review has concluded that educational programs may be beneficial in controlling disease activity. The pain, number of swollen and sensitive joints, and physical function of RA patients can all be improved concurrently by educational intervention, and it was also concluded that patient education may be effective in improving clinical outcomes and psychological status in patients with RA [15]. Another systematic review concluded that pharmacists led educational programs for diabetic patients in Arab countries tend to result in positive outcomes such as improved patient knowledge, better adherence to treatment, and ultimately better glycemic, lipid, and blood pressure control [16]. A pre-post interventional study conducted in Baghdad concluded that a clinical pharmacist-led educational intervention may enhance the quality of life of multiple sclerosis patients and play a crucial role in educating patients about disease-modifying therapy complications, adverse effects, and disease-related problems [17]. Additionally, a clinical pharmacist-led interventional study among Iraqi patients with liver cirrhosis concluded that clinical pharmacists are excellent at recognizing drug-related problems and reducing their incidence, and their interventions were well accepted [18]. Increased disease activity, irreversible joint damage, and a significant reduction in the patient's quality of life are all directly related to low adherence and insufficient self-care activities [19]. Additionally, inadequate patient education about the chronic nature of the illness frequently leads to inadequate clinical results and higher medical costs [20]. Pharmacists at hospitals are in a unique position to fill this gap. Through focused educational initiatives and therapeutic guidance, pharmacists can improve health literacy and enable patients to properly manage their

conditions [21]. The aim of the current study is to evaluate the impact of pharmacist-led intervention on adherence to medication and self-care practices among patients with RA.

METHODS

Study design and setting

This was a quasi-experimental, one-group pre-post interventional study that recruited patients with RA who were being treated at the rheumatology unit, Baghdad Teaching Hospital, from December 2025 until the start of April 2026.

Sample selection

The study participants were recruited using a consecutive convenient sampling of RA patients diagnosed by rheumatologists according to the ACR/EULAR 2010 Rheumatoid Arthritis Classification Criteria and attending the Rheumatology Department at Baghdad Teaching Hospital.

Inclusion criteria

Patients diagnosed with RA for at least 6 months according to the ACR/EULAR 2010 Rheumatoid Arthritis Classification Criteria, aged ≥ 18 years, and patients who agreed to participate in the study should be able to read, write, and understand the language of the questionnaire.

Exclusion criteria

Patients who have hearing, speech, or cognitive deficits that would impair understanding of the questions. Patients who have other autoimmune diseases (e.g., lupus, Sjögren's syndrome, and systemic sclerosis) were excluded to minimize confounding variables related to symptom crossover and complex medication regimens. Patients who have other inflammatory arthritis diseases, malignancy, connective tissue disease, or arthropathy. Patients who are pregnant or breastfeeding (as this may temporarily alter disease activity or treatment). Patients provide incomplete or conflicting information during the completion of the questionnaire.

Study protocol

This was a quasi-experimental, one-group pre-post interventional study that has 2 phases: the first phase is the baseline assessment and the pharmacist intervention. To start, written informed consent was obtained from each participant. Then each patient's baseline level of adherence and self-care practices were evaluated. In addition, physician measures the disease activity by using

the Clinical Disease Activity Index (CDAI) for rheumatoid arthritis. Afterwards, the patients received an educational counseling session through a face-to-face interview. The necessary counseling was provided to the patient, including the following areas: Information regarding RA and its symptoms; education about the importance of adherence and how to avoid nonadherence; information about the medications that the patient uses, including their significance and adverse effects, highlighting how to avoid or reduce them; and educating the patient about the benefits of exercise and how to perform simple exercises and joint protection techniques. Then, a booklet was given to the patients as written educational material. The content of the booklet was written in simple Arabic for the patients' understanding. The booklet was evaluated by the scientific committee at the Department of Clinical Pharmacy, College of Pharmacy, University of Baghdad, which comprises five academic staff members with PhD degrees, utilizing the face validation method. In addition, two rheumatologists from the Rheumatology Unit, Baghdad Teaching Hospital, reviewed the adopted draft. The booklet included the following information: Information about RA (nature, symptoms, and complications of the disease) and medications (steroids, conventional synthetic disease-modifying antirheumatic drugs (csDMARDs), biologics, and nonsteroidal anti-inflammatory drugs) Purpose of medications, adverse effects of medications and how to deal with them, lifestyle changes and preventative measures (diet and exercise), self-care guidelines for patients with RA, information about the importance of adherence, and information for female patients with RA during pregnancy. Each patient participated in two educational sessions; the first one lasted around 20 to 25 minutes and was held after the baseline evaluation of adherence and self-care behaviors was completed, and the second session was held one month later, as a 5-minute phone call. During the call, the researcher reminded the participants to review the educational booklet, delivered a summary that reinforced the information provided in the first session, and answered any questions the participants had. The second phase (the post-intervention phase) was held two months after the baseline, in which assessment of changes in adherence and self-care practices were assessed. Figure 1 demonstrates the study flowchart.

Data collection and study instruments

The data was obtained by a face-to-face interview with the study participants after written informed consent was obtained from each participant. The study's data were gathered with a specifically created data-collecting sheet with which the demographic and clinical data were obtained. The Arabic version of the General Medication Adherence Scale (GMAS) (developed by Naqvi *et al.*,

approval number 171025-N) was used to assess adherence [22].

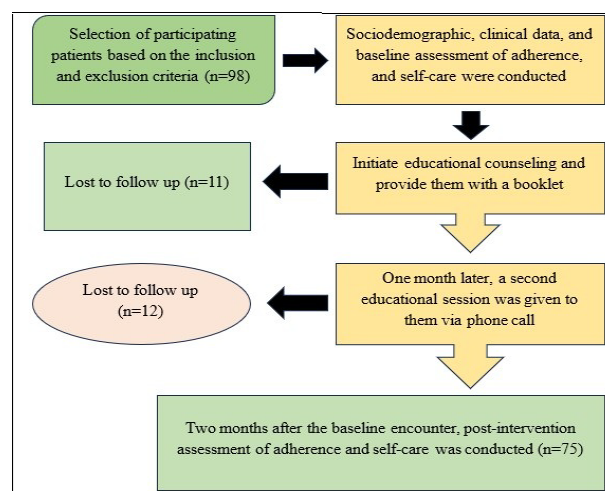


Figure 1: Study flowchart.

The GMAS is a self-reporting adherence instrument. It consists of 11 questions, each containing four possible options. The total score ranges from 0 to 33, a higher score indicating a high adherence level. The final score is stratified into five groups: high (30–33), good (27–29), partial (17–26), low (11–16), and poor (≤ 10). Prior to conducting this study, permission to use the tool was obtained. The self-care practices were assessed by using a questionnaire developed by Kataib and Ahmed [23]. The questionnaire includes 25 items. Each item was measured on a 3-point Likert scale, with responses weighted as follows: 'Always' (3 points), 'Sometimes' (2 points), and 'Never' (1 point). To categorize the level of self-care, a mean score was calculated for each participant, ranging from 1.0 to 3.0. Based on the distribution of possible scores, three equal intervals (class length= 0.67) were established to define the self-care levels. Scores were categorized as follows: 1-1.66 = low level of self-care, 1.67-2.33 = moderate level of self-care, and 2.34-3.00 = high level of self-care. Permission to use the questionnaire was obtained before conducting the study. The disease activity was assessed by a physician and was measured by using the CDAI score, which consists of 4 components: the number of tender joints (0-28), the number of swollen joints (0-28), patient global assessment (0-10) Visual Analog Scale VAS, evaluator (physician) global assessment (0-10 VAS scale). The resulting score ranges from 0 to 76, where a value of 2.8 or less signifies clinical remission and a score exceeding 22 indicates high disease activity [24,25].

Ethical considerations

The Scientific and Ethical Committee of the College of Pharmacy, University of Baghdad, approved the study; additionally, ethical approval was obtained from the Directorate of Medical City. A written informed consent

was obtained from all study participants before including them in the study.

Statistical analysis

A priori sample size calculation for a paired design ($\alpha=0.05$, power= 80%, effect size $d = 0.5$) indicated a minimum of 34 participants. Considering potential attrition, 98 patients were recruited, and 75 completed the study. This sample size is adequate for detecting moderate pre–post intervention effects [26]. Data input and analysis were done using SPSS (Statistical Package for Social Science) version 27. Categorical variables were presented as numbers and frequencies, whereas continuous variables were presented as mean±standard deviation. The Shapiro-Wilk test was used to assess the normality of data distribution. Results showed that self-care scores were normally distributed while the adherence and CDAI scores were not normally distributed. The changes between before and after pharmacist intervention were assessed using a paired t-test and Wilcoxon signed rank tests, with a significance level established at a p -value below 0.05.

RESULTS

The study recruited 75 patients with RA (85.3% females). The average age of the participants was 47.12 ± 10.15

years. Over three-quarters (81.3%) were married, 88% lived in urban areas, and 74.7% were unemployed. Approximately 38.7% had a college degree. Approximately 42.7% of the participants reported having somewhat enough monthly income (Table 1).

Table 1: sociodemographic characteristics of the participants (n=75)

Characteristics	Subgroup	Results
sex	Female	64(85.3)
	Male	11(14.7)
Social status	Married	61(81.3)
	Unmarried	14(18.7)
Educational level	Read and write	2(2.7)
	Elementary school	22(29.3)
	Middle school	14(18.7)
	High school	8(10.7)
Residency	College degree	29(38.7)
	Rural	9(12)
	Urban	66(88)
Employment	Yes	19(25.3)
	No	56(74.7)
Cigarette smoking	Yes	9(12)
	No	66(88)
Monthly income	Enough	23(30.7)
	Somewhat enough	32(42.7)
	Not enough	20(26.7)
Age (years)		47.12±10.15

Values were expressed as number, percentage, and mean±SD.

Approximately 42.7% of the participants had one or two additional chronic diseases. The patients exhibited moderate disease activity with an average of 15.81 ± 9.38 (Table 2).

Table 2: Clinical variables of study participants (n=75)

Variables		Subgroup	Results
No. of other chronic diseases	0		43(57.3)
	1		26(34.7)
	2		6(8)
RA medications	csDMARDs	Methotrexate	38(50.7)
		Sulfasalazine	3(4)
		Leflunomide	9(12)
		Hydroxychloroquine	5(6.7)
	bDMARDs	Etanercept	51(68)
		Infliximab	10(13.3)
		Golimumab	11(14.7)
	tsDMARDs	Tofacitinib	3(4)
		Glucocorticoids	prednisolone
Disease duration (years)		10±6.46	
Other chronic medications		0.77±1.27	
Disease activity (CDAI score)		15.81±9.385	

Values were expressed as number, percentage, and mean±SD.

The predominant medication used for the treatment of RA among the participants was etanercept (68%). The educational intervention led by a clinical pharmacist resulted in a statistically significant improvement of the adherence levels (Table 3). A crossstabulation of adherence categories before and after pharmacist intervention showed an overall improvement in adherence. Patients with partial adherence (n= 25), 11 improved (7 to good and 4 to high), while 14 remained unchanged. Patients with good adherence (n= 19): 8 improved to high adherence while 9 remained stable, with 2 declining to partial. Most patients with high adherence (n= 27) remained stable (n= 20) while 7

declined (5 to good and 2 to partial). Patients with low adherence (n= 3) showed improvement, with 2 moving to partial.

Table 3: changes in adherence levels before and after pharmacist intervention

GMAS score	Before PI	After PI	p-value
Poor adherence	1(1.3)	—	0.028*
Low adherence	3(4)	1(1.3)	
Partial adherence	25(33.3)	20(26.7)	
Good adherence	19(25.3)	21(28)	
High adherence	27(36)	33(44)	0.022*
GMAS Total score	26.48±5.52	27.6±4.43	

Values were expressed as number, percentage, mean±SD. * Wilcoxon signed rank test. PI: pharmacist intervention.

Overall, improvements exceeded declines and this change was statistically significant. Similar to adherence, the educational intervention led by a clinical pharmacist resulted in a statistically significant improvement of the self-care practices of the study participants (Table 4).

Table 4: change in self-care level before and after pharmacist intervention

Self-Care level	Before PI	After PI	<i>p</i> -value
Low (1-1.66)	2(2.7)	—	0.025*
Moderate (1.67-2.33)	42(56)	36(48)	
High (2.34-3)	31 (41.3)	39(52)	
Self-Care mean score	2.254±0.272	2.339±0.242	0.002**

Values were expressed as number, percentage, mean±SD.*Wilcoxon signed rank test. **paired samples t-test. PI: pharmacist intervention.

A cross tabulation of self-care categories before and after pharmacist intervention showed an overall improvement in self-care practices: two patients who started with low self-care moved up to moderate, and 13 patients who started at moderate moved to high. 29 and 26 patients stayed in moderate and high levels, respectively; these patients didn't change category, but they likely increased their personal score ($p=0.002$). Only 5 patients dropped from high to moderate. Overall, improvements exceeded declines, and this change was statistically significant. Additionally, the educational intervention led by a clinical pharmacist resulted in a statistically significant improvement in disease activity of the patients (improved mean CDAI score) (Table 5).

Table 5: change in CDAI score before and after pharmacist intervention

Variable	Before PI	After PI	<i>p</i> -value
CDAI score	15.81±9.385	13.85±7.674	0.012*

Values were expressed as mean±standard deviation. * Wilcoxon signed rank test. PI: pharmacist intervention.

DISCUSSION

This study aimed to evaluate the impact of pharmacist-led intervention on medication adherence, self-care practices, and disease activity among patients with RA. Overall, the results showed consistent improvement across all the measured outcomes following the pharmacist intervention. This suggests that the educational program may play a supportive role in RA management. Regarding medication adherence, Although the baseline adherence scores were high, leaving little room for improvement, the cross-tabulation showed individual improvement: For instance, nearly half the patients who started with partial adherence moved up to better categories, and the number of patients in the high adherence category increased from 36% to 44%. This study showed high baseline adherence, similar to a study conducted in the Kurdistan region of Iraq [27]. In contrast, a cross-sectional study in Saudi Arabia reported low to medium medication adherence among RA patients [28]. A recent cross-sectional study in Jordan, which aimed to assess the adherence and factors affecting the adherence among patients with RA,

demonstrated a low level of medication adherence among the study participants its conclusion also involved choosing safe medications and providing guidance on managing adverse effects should be considered in future clinical pharmacy service programs, especially for patients with comorbidities and low-income patients [29]. Our interventional study addressed this problem by providing a pharmacist-led educational program that helped patients move from partial to high adherence, confirming that active guidance is important in achieving long-term outcomes for RA patients. A systematic review reinforced the role of pharmacists in achieving clinical outcomes, enhancing adherence, and dealing with drug-related problems among patients with autoimmune disorders [30]. Additionally, clinical pharmacists in rheumatology clinics play an important role in providing patient counseling and medication information and procurement, which will enhance medication safety and adherence and lower hospitalizations and disease flare-ups [31]. This finding is reinforced by a systematic review about the impact of clinical pharmacists in rheumatology practice, which concluded that integrating clinical pharmacists into rheumatology care can significantly improve the clinical outcomes and quality of care for the patients [32]. Regarding self-care practices Although the mean score increased only slightly, the results showed a statistically significant improvement in self-care mean scores of RA patients. The crosstabulation showed individual progress in which 15 patients moved to a higher self-care category, while most patients remained in their original categories; the change in their individual scores was strong enough to produce a statistically significant result ($p=0.002$). A study conducted in Babylon/Iraq using the same questionnaire as the current study sought to evaluate the self-care behaviors of rheumatoid arthritis patients and to ascertain the correlation between self-care and their demographic parameters. The study concluded that there was a low level of self-care behavior among patients with RA and that they needed to be educated about self-care [23]. Furthermore, a study conducted in Egypt sought to assess the impact of self-care instructions on the quality of life of women with rheumatoid arthritis and concluded that women with arthritis had a better quality of life and less discomfort after following the RA self-care guidelines [33]. This claim was reinforced by a study made in the Netherlands that revealed significant enhancements in the quality of life for individuals with RA who adhered to self-care regimens [10]. Additionally, a study conducted in Iran found that patients with RA have complicated needs with regard to self-care while facing multiple challenges and barriers in the process of self-care. By addressing these barriers and needs and strengthening facilitators, one can significantly improve patients' self-care abilities and improve their quality of life [34]. These previously mentioned studies highlighted the benefit of self-care among RA patients; our study sought to bridge this gap with a structured, pharmacist-

led educational program. This study also resulted in a statistically significant decrease in disease activity measured by CDAI score after the educational intervention. A systematic review that aimed to explore the impact of medication adherence on disease activity among RA patients concluded that patients with higher medication adherence tend to have lower disease activity [35]. Additionally, a study conducted in Turkey used the Health Assessment Questionnaire (HAQ) to measure self-care impairments; the study found that there is an association between the self-care domains of the HAQ and clinical disease activity [36]. These previous studies suggest that the improvement we observed in adherence and self-care may have contributed to the observed reduction in the CDAI score. While the intervention significantly reduced the CDAI score, the long-term decrease in CDAI score may be due to natural disease fluctuation or regression to the mean. Several studies were conducted in Iraq about the benefit of pharmacist-led interventions among patients with different chronic conditions [37-39]. One study resulted in that even a short educational program led to better knowledge about type 2 diabetes mellitus, along with improved control of blood sugar and blood pressure [37]. Another study sought to evaluate the effects of pharmacist-based program strategies on nutritional and medical outcomes for individuals with celiac disease. The findings showed that pharmacists led intervention Compared to usual care, it improved the severity of celiac symptoms and patients' adherence to a gluten-free diet and medication [38]. Additionally, an interventional study was recently carried out to ascertain the effectiveness of pharmacist intervention in improving medication adherence, quality of life, and self-efficacy among SLE patients and to evaluate the impact of pharmacist assistance on SLE patients' willingness and uptake of the flu shot. The study found that among SLE patients, pharmacist-led interventions greatly increased medication adherence, quality of life, self-efficacy, and the uptake and readiness to take the flu shot [39].

Study Limitations

The study limitations include short follow-up duration, and that in-person interviews may bring interviewer bias into the results.

Conclusion

This pharmacist-led educational intervention improved RA patients' medication adherence, self-care practices, and CDAI score. Which highlights the potential value of integrating clinical pharmacists into rheumatology clinics to support patient management.

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Conflict of interests

The authors declared no conflict of interest.

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Data sharing statement

The statistical data supporting the findings of this study are available from the corresponding author upon reasonable request. The GMAS (General Medication Adherence Scale) used in this study is a copyrighted instrument; access to the tool and its components remains subject to the permission of the original copyright holder.

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