

## Factors Affecting Compliance with Therapeutic Regimen among Patients with Rheumatoid Arthritis

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### Abstract

**Background:** Rheumatoid arthritis (RA) patients' compliance with therapeutic regimens is crucial for desired clinical outcomes. Non-compliance behavior is associated with various factors related to patient, socioeconomic status, health condition, therapy, healthcare team, and system. These factors can lead to ineffective disease control, increased morbidity, and recurrent hospitalization. **Aim of the study:** Assess factors affecting compliance with therapeutic regimen among patients with rheumatoid arthritis. **Research design:** A descriptive research design was used to conduct this study. **Setting:** Rheumatology Outpatient Clinic at Damanhour National Medical Institute in Elbehira governorate, Egypt. **Subjects:** A convenient sample of 120 male and female RA patients. **Tools of data collection:** Three tools was used to collect data for the current study. **Tool one:** Demographic and Clinical Data Structured Interview Schedule. **Tool Two:** Factors Affecting Compliance of RA Patients with Therapeutic Regimen Questionnaire. **Tool Three:** Rheumatoid Arthritis Patients' Compliance Questionnaire. **Results:** Revealed that patient-related factors were rated as the most significant factors negatively affecting the compliance level, while social factors were rated as the least significant. Additionally, more than half of the studied RA patients exhibited poor compliance levels, which are considered a strong indicator of non-compliance with recommended therapeutic regimens. **Conclusion:** Patient-related factors were rated as the highest factors affecting therapeutic regimen compliance among studied RA patients while social factors were rated as the lowest. More than half of studied RA patients showed poor compliance with their therapeutic regimens. **Recommendations:** Conduct regular scientific meetings for healthcare providers directly involved in RA patient care to discuss patient issues and detect factors affecting therapeutic compliance.

**Keywords:** Rheumatoid Arthritis, Compliance, Factors affecting, Therapeutic Regimen.

### Introduction

Rheumatoid arthritis (RA) is a heterogeneous, multifactorial inflammatory polyarticular autoimmune disease described by chronic synovitis, which develops into arthralgia, erosion of bone, or cartilage, and gradually leads to joint impairment and disability. It causes symptoms such as symmetrical polyarthritis, reduced mobility, physical weakness, general tiredness, and trouble sleeping. (Gravallese et al., 2023)

The incidence of RA occurs by two to three times more often in females than in male and affects all age groups but is more prevalent among the 40-60-year-old population (Shi et al., 2023) In rural Egypt, a prevalence of up to 0.3% was identified in the adult population. Additionally, RA not only has long-term effects on patients but also escalates the cost of care, imposing a substantial financial burden on both the patient's family and society. (Seyam., 2018)

The etiology of RA is multifaceted, involving genetic, hormonal, reproductive, and comorbid host factors, in addition to

environmental influences such as smoking, pollution, infection, diet, and socioeconomic factors. (Venetsanopoulou et al., 2022)

Rheumatoid arthritis is characterized by symmetrical polyarthritis, which involves joint pain, swelling, and stiffness. It can affect any synovial joint, but most commonly begins in the small joints of the hands and feet. Additionally, it can cause extra-articular manifestations with complications such as pulmonary fibrosis, nodules, Raynaud's disease, uveitis, scleritis, splenomegaly, and ischemic heart disease. All of these symptoms can significantly impact everyday life and overall well-being. (Subagio et al., 2023)

The therapeutic regimen of RA includes alternative approaches such as medications, diets, exercise, and strict adherence to medical advice to minimize joint damage and improve quality of life, as bone erosions are irreversible. (Fraenkel et al., 2021)

RA medications are crucial for managing symptoms and disease progression. They are most effective when started soon after diagnosis. Common medications include Disease-modifying anti-rheumatic Drugs (DMARDs), Biological response modifiers, Glucocorticoids, Nonsteroidal anti-inflammatory Drugs (NSAIDs), and Analgesics. (Prasad et al., 2023)

Regarding the recommended diet for RA patients, several studies have reported that the pro-inflammatory properties of red meat, coffee, sugars, and sweets worsen RA symptoms, and impede therapy attempts. On the other hand, diets high in fruits, vegetables, fiber, and omega-3 fatty acids contain anti-inflammatory qualities, lower BMIs, and improve RA symptoms. (Hartmann et al., 2023)

Furthermore, regular exercises such as walking, swimming, and bicycling are essential for delaying joint deformities and the onset of disability from RA. It can also help reduce joint pain, boost muscle strength, slow disease progression, and improve overall physical function (Sobue et al., 2022). Additionally, follow-up is crucial for identifying early complications, addressing compliance issues,

managing treatment resistance, and recognizing symptom relapses (Ferucci et al., 2022).

The World Health Organization (WHO) defines therapeutic regimen compliance as “the degree to which a person's behavior in taking medication, following a diet, and making lifestyle changes that align with their healthcare provider's recommendations”. Rheumatoid arthritis patient compliance with their prescribed therapeutic regimen is essential for tight control of the disease and symptom management, lower exacerbation rates, improved physical function, slower disease progression, and lower risk of aggressive treatment. (Berner et al., 2019)

Poor compliance of RA patients is caused by various factors, categorized by WHO into five dimensions: patient-related factors, socio-economic factors, condition-related factors, therapy-related factors, and healthcare team and system-related factors. (Abdallah et al., 2023) Non-compliance related factors change over time as the disease progresses and result in increased disease activity, poor patient outcomes, decreased quality of life, increased financial burden on the health care system, increased need for aggressive treatment, and risk of morbidity and mortality is increased. (Naghavi et al., 2019)

Rheumatology nurses play a crucial role in diagnosing, caring for, and following up with RA patients. They also plan, implement, and evaluate health programs, and provide consultations within the healthcare system to help RA patients comply with their recommended treatment and address any factors affecting their compliance. (Bednarek et al., 2023)

### **Significance of the study:**

Prompt assessment and recognition of multifaceted and complex factors that contribute to RA patient's poor compliance with their therapeutic regimen, can assist healthcare providers in identifying RA patients at risk and notify non-adherent behaviors that negatively affect long-term outcome goals. (Naghavi et al., 2019).

**Aim of the study:**

Assess factors affecting compliance with therapeutic regimen among patients with rheumatoid arthritis.

**Research questions.**

- What are the factors affecting compliance with therapeutic regimens among patients with rheumatoid arthritis?

**MATERIALS AND METHODS****MATERIALS**

**Research design:** A descriptive research design was utilized to conduct this study.

**Setting:** The study was conducted at the Rheumatology Outpatient Clinic at Damanhour National Medical Institute in Elbehira Governorate, Egypt. The hospital is affiliated with the General Organization for Teaching Hospitals and Institutes which provides public non-paid services. The rheumatology clinic is labeled with number 7 among outpatient clinic rooms, and it is attached to the outside waiting area. The clinic introduces services for RA patients on Monday weekly from 9 am to 12 pm.

**Subjects:** A convenient sample of 120 male and female patients with rheumatoid arthritis who attended the previously mentioned setting, were included in this study after meeting the specified inclusion criteria: adult patients aged between 20 to less than 60 years, diagnosed with RA for at least 6 months, able to communicate verbally and mentally oriented, agree to participate in the study.

**Exclusion criteria:** pregnant women, patients with severe chronic illness as a third stage of cancer, liver cirrhosis.

**Tools of the study:** Three tools were used to collect the necessary data for the current study.

**Tool One: Demographic and Clinical Data Structured Interview Schedule:**

This tool was developed by the researcher after reviewing the related literature (Ismail, Selim, & El-Khashab., 2017; Taha, Ibrahim & Elsayed., 2018; Lin, Anzaghe & Schülke., 2020). It consisted of two parts:

**Part I; Demographic characteristics of the studied patients:**

It included items concerning: age, sex, occupation, marital status, educational level, residence area, income, treatment payment system, and distance between residence area and health care institutions.

**Part II; Patients' clinical data:**

It contained items related to: history of chronic diseases, previous hospitalization, family history, and present history as disease duration, symptoms, sites of affected joints, current treatment methods, smoking status, weight, height, body mass index, and if they have any information about RA disease and source of this information.

**Tool Two; Factors Affecting Compliance of RA Patients with the Therapeutic Regimen Questionnaire:**

This tool was developed by the researcher after reviewing the related recent literature (Ismail Ismail, Selim, & El-Khashab., 2017; Taha, Ibrahim, & Elsayed., 2018; Wabe et al., 2019; Lin, Anzaghe, & Schülke., 2020; Naqvi et al., 2020; Phukan., 2022). This questionnaire included 68 closed-end questions to assess factors that affect the compliance of RA patients with their therapeutic regimen, and consisted of five parts as follow:

**Part I; Patient-related factors:** This part included 32 questions regarding patient knowledge, physical condition, psychological /behavioral condition, and health beliefs about disease and medication.

**Part II; Social Factors:** This part included 6 questions to assess an individual's perceived level of social support from specific sources, such as family, friends, and significant others.

**Part III; Health Condition related factors:** This part included 5 questions related to repeated attacks of joint pain, the effect of symptoms such as pain and fatigue on daily life activities, the effect of sleeping disturbances on remembering to take drugs, and the loss of desire to take drugs).

**Part IV; Therapy-related factors:**

This part included 12 questions to cover the following topics: adverse effects of drugs, patient friendliness of the regimen, drug effectiveness, cost of medication, duration of the treatment, and availability and accessibility of medications.

**Part V: Healthcare team and system-related factors:**

This part included 13 questions regarding (poor nurse/or doctor patient relationships, long waiting times for clinic visits, lack of trust in health care providers, many prescribed medications by different physicians, drug availability, follow-up schedule, and related understandable instructions about the therapeutic regimen).

**Scoring system:** Each question out of 68 closed-ended questions was measured on a dichotomous scale of 1 = Yes and 0 = No. The responses to questions were represented statistically as numbers and percentages.

**Tool three: Rheumatoid Arthritis Patients' Compliance Questionnaire.**

This tool was developed by the researcher after reviewing the related recent literature (Metsios & Kitas., 2018; Jin et al., 2021; Ubaka et al., 2021) This tool included 31 items to assess patients' compliance with the recommended therapeutic regimens and consisted of four parts as follows:

**Part I: Patients' compliance with medication regimen:** This part included self-reported medication adherence. It included 7 items related to (remember taking antirheumatic drugs on time, taking them even if worsening health status, complying with drugs even when feeling better, following all RA drug instructions, avoiding skipping some drug

doses, avoiding taking replaced drugs instead of the prescribed without a doctor's order, abiding by the dates of treatment disbursement).

**Part II: Patients' compliance with diet regimen:** This part included 8- items regarding (eat fresh fruits and vegetables, drink 2-3 liters of water daily, decrease red meat and replace it with white meat, decrease sweets, eat low-fat dairy, Increase whole grains and nuts, eat three healthy meals and two snacks daily, and use olive oil instead of other oils and fats).

**Part III: Patients' compliance with exercise regimen:** This part included 8- items regarding (stay physically active even during disease exacerbation, practice swimming 3 times/week, walk daily for about 30 min, quit exercising when feeling exhausted, insert exercise into a daily routine, ride a bicycle, apply light gardening, avoid getting hurt when performing the exercise).

**Part IV: Patients' compliance with follow-up regimen.** This part included 8- items related to (comply with a follow-up time, visit the doctor if complications occur, ask for medical help if warning signs appear, make recommended diagnostic studies, apply lab investigation when ordered, apply scheduled physiotherapy on affected joints, follow body weight, and make eye examinations regularly).

**Scoring system:** Each item was measured on a three-point Likert scale of 1=Never, 2= Sometimes, and 3= Always. Total scores range from (31-93). It was categorized as follows:

- (31-51) indicates poor compliance.
- (52-72) indicates fair compliance.
- (73-93) indicates good compliance.

**METHODS:**

**The study was accomplished according to the following steps:**

**Approval:** Official approval to conduct this study was obtained from the Faculty of Nursing, Damanhour University, and was directed to the director of General Damanhour Hospital to obtain their permission to conduct the study after explaining the aim of the study.

**Tool development:** Study tools (I, II and III) were developed by the researcher based on recent and relevant literature. Tools were tested for content validity by a jury of 5 experts in medical-surgical nursing and rheumatology fields and the necessary modification was done. A pilot study was carried out on 12 patients (10% of the total sample size) to test the feasibility of the tool. Subjects who underwent the pilot study was excluded from the total study sample. Tools were checked for their reliability by using Alpha Cronbach's test. The Cronbach's coefficient alpha score was 0.856 for tool II and 0.877 for tool III.

**Data collection:** Data collection for this study was conducted by the researcher over five months (from July 2023 to November 2023). A structured interview schedule was accomplished with every patient individually in the waiting area of the outpatient clinic from 9 am to 12 pm either before or after the physician interviewing and examination of the patient in the clinic, to collect demographic and clinical data using Tool I, while enabling patients to answer a questionnaire regarding data of compliance and factors affecting it by using Tools II& III. Each patient interview lasted about 30-45 minutes.

**Ethical considerations:** The research was approved by the ethical committee of the Faculty of Nursing at Damanhour University under ethical approval code 77-A. Additionally, an official approval letter was obtained from the Scientific Research Ethics Committee of Damanhour National Medical Institute in Elbehira Governorate, Egypt, with approval code HD-000200. Informed consent was obtained from all patients after explaining the aim of the study. Patient privacy and anonymity were respected and ensured, and data confidentiality was maintained throughout the study. Patients were also informed of their right to withdraw from the study at any time.

**Limitation of the study:** Interviews with patients took place in the outpatient clinic and the attached waiting area. However, this environment was unsuitable due to overcrowding, noise, lack of patient privacy, and intrusion by other patients.

**Statistical Analysis:** The collected data were organized, tabulated, and statically

analyzed using the Statistical Package for Social Studies (SPSS) Version 23.0. Qualitative data were described using numbers and percentages. Quantitative data were described by mean  $\pm$  standard deviation. Finally, analysis and interpretation of data were conducted. P-values of 0.05 or less were considered statistically significant. The Chi-square test (Monte Carlo) test was used to explore the relationship between demographic, clinical data, and compliance levels of studied patients. The Pearson coefficient was used to correlate between factors affecting RA patients' compliance and their compliance level with therapeutic regimens.

## Results

**Table (1):** Shows that nearly one-third (32.5%) of the studied patients were within the age group 40 to less than 50 years, the majority of the studied patients (81.7%) were female, three-quarters (75%) of them were housewives, more than three-quarters (76.7%) of them were married, more than one-third (39.2%) of the studied patients had secondary education, more than three-quarters (78.3%) of the studied patients were living in rural areas, more than three-quarters (91.7%) of the studied patients had insufficient income per month, more than half (57.5%) of the studied patients were self-paying, and more than one-third (42.5%) of the studied patients were lived far from healthcare institutions .

**Table (2):** Illustrates that more than one-third (44.2%) of the studied patients had a family history of RA, nearly half (49.2%) of the studied patients were obese, nearly half (48.3%) of them had RA since five years and more, 100% of the studied patients were suffering from joint pain, while more than three-quarters (80.8 %) of them were suffering from fatigue. As well, more than two-thirds (73.3%) of the studied patients were suffering from joint swelling, and two-thirds (66.7%) of them were suffering from early morning joint stiffness. Also the majority (90.8%) of the studied patients were subject to treatment with medication only, 98.3% of them received information about RA disease and its treatment from doctors, and only 2.5% of patients receive information from nurse.

**Table (3):** Indicates that health condition-related factors were a significant positive predictor of compliance. This means that health condition-related factors have a statistically significant impact on compliance with the therapeutic regimen according to the regression model.

**Figure (1):** Reveals that the patient-related factors rated the highest factors with a high mean score ( $11.67 \pm 3.37$ ), followed by therapy-related factors, healthcare team and system-related factors, condition-related factors, and social factors with mean scores of ( $8.40 \pm 2.24$ ,  $6.10 \pm 1.65$ ,  $3.26 \pm 1.28$ , and  $1.79 \pm 0.89$  respectively).

**Table (4):** Illustrates that the patient's compliance with the medication regimen rated the highest regimen compliance with a high mean score of ( $14.67 \pm 2.88$ ) followed by patients' compliance with the diet regimen, patients' compliance with the follow-up regimen, and patients' compliance with exercise regimen with mean scores of ( $14.66 \pm 3.79$ ,  $14.30 \pm 3.44$ , and  $12.31 \pm 2.94$ ) respectively with overall mean score of  $55.93 \pm 12.27$ .

**Figure (2):** Shows that more than half (60.8%) of the studied patients had poor compliance, while nearly one quarter (24.2%) of them had fair compliance and only 15% of them had good compliance with their therapeutic regimens.

**Table (5):** Reveals that there was a statistically significance positive correlation between health condition-related factors among studied patients and their compliance level to diet, exercise, and follow-up regimens as ( $p=0.041^*$ ,  $r= 0.187^*$ ), ( $p=0.037^*$ ,  $r= 0.191^*$ ) and ( $p<0.001^*$ ,  $r= 0.322^*$ ) respectively. In addition, there was a statistically significance positive correlation between therapy-related factors among studied patients and their compliance level to follow-up regimen. On the other side, there wasn't a statistically significant correlation between patient-related factors, social factors, and healthcare team and system-related factors among studied patients and level of compliance to their therapeutic regimens.

Table (1): Distribution of the studied patients according to their demographic characteristics:

Demographic characteristics	N = 120	
	No.	%
<b>Age (years)</b>		
20 <30	21	17.5
30 <40	36	30.0
40 <50	39	32.5
50<60	24	20.0
<b>Sex</b>		
Male	22	18.3
Female	98	81.7
<b>Occupation</b>		
Employed	1	0.8
Manual work	28	23.4
Housewife	90	75.0
Retired	1	0.8
<b>Marital Status</b>		
Single	22	18.3
Married	92	76.7
Widowed	2	1.7
Divorced	4	3.3
<b>Educational level</b>		
Illiterate	26	21.7
Read and write	12	10.0
Primary	17	14.1
Secondary	47	39.2
University	18	15.0
<b>Residence Area</b>		
Rural Area	94	78.3
Urban Area	26	21.7
<b>Income</b>		
Sufficient	10	8.3
Insufficient	110	91.7
<b>Treatment payment system</b>		
Self-paid	69	57.5
State Expense	51	42.5
<b>Distance between residence area and health care institutions</b>		
Near	29	24.2
Far	51	42.5
Too far	40	33.3

Table (2): Distribution of the studied patients according to their clinical data:

Clinical data	N = 120	
	No.	%
<b>Presence of a family history of rheumatoid arthritis</b>		
Yes	53	44.2
No	67	55.8
<b>Body mass index (kg/m<sup>2</sup>)</b>		
18.5 – 24.9 (Normal weight)	21	17.5
25 – 29.9 (Overweight)	40	33.3
30 – 40 (Obese)	59	49.2
Min. – Max.	18.73 – 38.97	
Mean ± SD.	29.68 ± 4.41	
<b>Disease duration</b>		
6 months < 1 year	12	10.0
1 < 3 years	34	28.3
3 < 5 years	16	13.3
≥ 5 years	58	48.3
<b>Current complaint #</b>		
Joints pain	120	100.0
Early morning joint stiffness	80	66.7
Joints swelling	88	73.3
Decrease in joint movement.	16	13.3
Fatigue	97	80.8
<b>Current treatment methods #</b>		
Medications	109	90.8
Physiotherapy	1	.8
Physiotherapy and Medications	10	8.4
<b>Have information about Rheumatoid arthritis disease and its treatment</b>		
Yes	118	98.3
No	2	1.7
<b>Source of this information #</b>		
Doctor	118	100.0
Nurse	3	2.5
Relative	6	5.1
Another patient	38	32.2
Mass media	11	9.3

#: multiple responses

Table (3): Multivariate linear regression for factors affecting compliance of RA patients with their therapeutic regimen.

Factors Affecting Compliance of RA Patients with the Therapeutic Regimen	B	Beta	t	P	95% CI	
					LL	UL
Patient-related factors	0.585	0.161	1.625	0.107	-1.299	0.128
Social Factors	0.532	0.038	0.441	0.660	-1.860	2.924
Health Condition-related factors	3.570	0.409	2.960*	0.004*	1.181	5.958
Therapy-related factors	0.513	0.095	0.779	0.438	-0.792	1.817
Healthcare team and system-related factors	0.311	0.043	0.283	0.778	-2.488	1.867
R <sup>2</sup> = 0.171, Adjusted R <sup>2</sup> = 0.134, F = 4.698*, p < 0.001*						

F,p: f and p values for the model R<sup>2</sup>: Coefficient of determination

B: Unstandardized Coefficients Beta: Standardized Coefficients t: t-test of significance

CI: Confidence interval LL: Lower limit UL: Upper Limit \*: Statistically significant at p ≤ 0.05



Figure (1): Mean rank order of factors affecting compliance of RA patients with their therapeutic regimens:

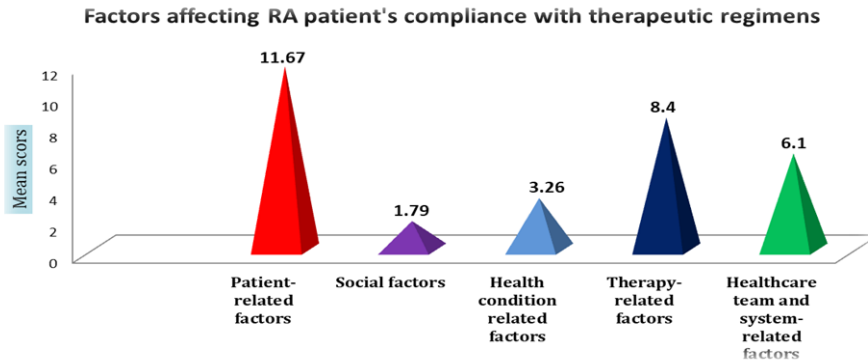


Table (4): Mean and standard deviation of RA patients' compliance with their therapeutic regimens:

Therapeutic regimens compliance of RA patients	Min. – Max.	Mean ± SD.
• Compliance with medication regimen	12.0 – 21.0	14.67 ± 2.88
• Compliance with diet regimen	11.0 – 23.0	14.66 ± 3.79
• Compliance with exercise regimen	9.0 – 21.0	12.31 ± 2.94
• Compliance with follow-up regimen	9.0 – 23.0	14.30 ± 3.44
Overall scores	47.0 – 87.0	55.93 ± 12.27

SD: Standard deviation

Figure (2): Distribution of compliance levels with therapeutic regimens among RA patients.

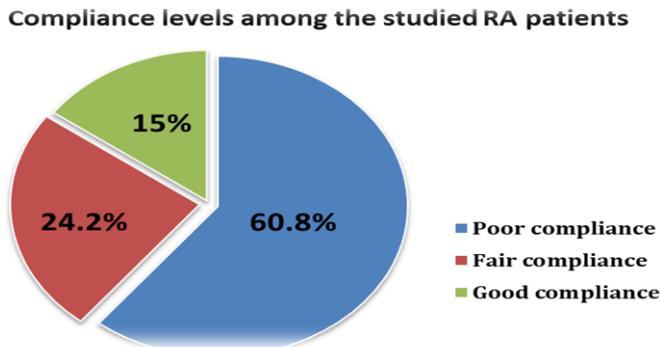


Table (5): Correlation between factors affecting RA patient's compliance and their compliance with therapeutic regimens.

Factors affecting RA patients' compliance with their therapeutic regimens		Compliance with Therapeutic Regimen				Overall total score
		Compliance with medication regimen	Compliance with diet regimen	Compliance with exercise regimen	Compliance with follow-up regimen	
Patient-related factors	r	-0.048	0.018	-0.122	0.138	0.004
	p	0.603	0.845	0.185	0.134	0.968
Social factors	r	0.055	0.056	0.057	0.004	0.045
	p	0.552	0.542	0.536	0.964	0.626
Health condition-related factors	r	0.138	<b>0.187*</b>	<b>0.191*</b>	<b>0.322*</b>	<b>0.226*</b>
	p	0.134	<b>0.041*</b>	<b>0.037*</b>	<b>&lt;0.001*</b>	<b>0.013*</b>
Therapy-related factors	r	0.000	0.025	0.054	<b>0.212*</b>	0.080
	p	1.000	0.785	0.559	<b>0.020*</b>	0.384
Healthcare team and system-related factors	r	-0.064	-0.017	-0.010	0.152	0.020
	p	0.489	0.850	0.915	0.098	0.829
Overall total score	r	-0.006	0.053	-0.002	<b>0.224*</b>	0.077
	p	0.950	0.568	0.986	<b>0.014*</b>	0.402

r: Pearson coefficient

\*: Statistically significant at p ≤ 0.05

## Discussion

Rheumatoid arthritis (RA) is a chronic, systemic, autoimmune, and inflammatory disease causing progressive joint damage. The disease process of RA can lead to lifelong disability secondary to synovial inflammatory cell infiltration, synovial hyperplasia, and cartilage damage, which in turn can lead to bone and joint destruction. Although RA itself is not life-threatening, it may cause amyloidosis, which carries a risk of extra-articular organ failure and death. (Kondo; Kuroda; & Kobayashi., 2021)

The therapeutic regimen of RA is aimed at achieving disease remission, avoiding joint damage and disability, maintaining the quality of life, and controlling extra-articular manifestations.(Hazlewood et al., 2020) The success of an RA therapeutic management plan depends on both therapeutic regimen efficacy and compliance. Therefore, patient compliance with their therapeutic regimen is essential to achieve desired clinical outcomes. Where non-compliance leads to poor disease control, increased morbidity, and recurrent hospitalization with consecutively increased utilization of health resources. (Wabe et al., 2019) Several interacting factors can influence RA patients' compliance with their therapeutic regimen including patient-related factors, socio-economic factors, condition-related factors, therapy-related factors, and healthcare team and system-related factors. (Oh; Park; & Moon., 2019) Therefore, this study was carried out to identify factors affecting compliance with therapeutic regimens among RA patients.

Concerning **demographic characteristics** of the studied patients, the present study showed that nearly one-third of the patients were in the age group of 40 to less than 50 years. This result may be due to this age being the age of comorbidities, increased responsibilities, and life stressors leading to changes in innate and adaptive immune responses which make any person at this age vulnerable to developing the autoimmune disease as RA. In this respect, (Chen et al., 2024) illustrated that the mean age of RA patients was 46.4 years due to biological aging could increase the risk of RA especially among

people with high genetic risk. Similarly,( **Intriago et al., 2019** ) reported that the mean age of their studied RA patients ( men were 49 years and women were 47 years ) because the role of environmental factors and sex hormone changes.

Regarding **sex**, the present study revealed that the majority of the studied patients were females. This finding may be related to that the female hormones change during early menopause, as well as stressful situations, and lack of adequate sleep leading to increased secretion of stress hormones which negatively affect the immune system. This finding was congruent with (Ceranic et al., 2023) who stated that females made up the majority of the RA survey sample and that female hormonal factors play an important role in the pathogenesis of RA.

In relation to **occupation**, this study showed that more than two-thirds of the studied patients were housewives. This may be related to that housewives do a lot of activities besides overthinking about their responsibilities makes them vulnerable to psychological stressors which lead to increased stress hormones and increased risk of autoimmune diseases. This finding comes in concordance with (Zeng et al., 2017) who found evidence of an association between physical workload and the risk of developing RA. Also, (Teuwen et al., 2024) concluded that the majority of studied RA patients were women and not employed due to health problems.

Concerning **marital status**, the present study found that more than three-quarters of the studied patients were married. This finding may be related to married women's extensive stressful responsibilities and tasks may increase their risk for chronic diseases due to elevated stress hormone levels. This finding was supported by (Ubaka, et al., 2021 ) who revealed that that the majority of their studied RA patient were married.

Concerning the **level of education**, the present study revealed that more than one-third of the studied patients had secondary education, from the researcher's point of view, the majority of studied patients were from rural areas where

agriculture, farming, animal husbandry, and bird breeding are the main aspect of their work; this is what makes them ignore higher education. In this context ( **Gamal, et al., 2021** ) clarified that most of their studied RA patients had non-university education, and the low educational level was associated with a poorer clinical outcome, increased erosions, and disability.

Concerning the **area of residence**, the present study revealed that more than three-quarters of the studied patients were living in rural areas. This may be justified because rural areas have fewer healthcare facilities and specialists in addition, most residents are likely to live farther away from health services with low socio-economic status. This finding agreed with ( **Taylor et al., 2018** ) who mentioned that the prevalence rates in rural areas were higher than in urban areas, and strategic planning for healthcare delivery needs to ensure proper access for RA patients. Similarly ( **Yang et al., 2018** ) stated that lower socioeconomic status as the nature of housing and living in rural regions might be a risk factor for developing RA when compared with living in urban areas.

As regards **income**, the present study declared that more than three-quarters of the studied patients had an insufficient income per month, this is because of increasing prices of living requirements and drug costs resulting in financial insufficiency. This finding was consistent with ( **Venetsanopoulou et al., 2023** ) who illustrated that higher RA disease rates were reported in individuals with lower socioeconomic status.

Regarding the **treatment payment system**, the present study revealed that more than half of the studied patients were self-paying. This is due to that some DMARD drugs (Azathioprine 50 mg and Hydroxychloroquine 200 mg) weren't being sometimes available in health care agencies. In addition, it is difficult to obtain approval to take biological therapy from an agency due to the high cost resulting in a financial burden on the patient. This finding corresponds with ( **Heidari et al., 2018** ) who reported that RA patients who have high out-of-pocket expenses are associated with non-therapeutic regimen compliance.

As regards **clinical data** of the studied patients, the current study revealed that nearly half of the studied patients had a **family history** of RA. This finding can be interpreted by certain human leukocyte antigen (HLA) is strongly associated with RA occurrence, so RA is considered a genetic disease. This finding corresponded with ( **Murata et al., 2020** ) who stated that family history is an indicator of an individual's genetic and environmental risk of developing RA, and is considered one of the strongest risk factors for the disease onset with a threefold to fivefold increase in risk. On the other hand, this finding was inconsistent with ( **Jarab et al., 2023** ) who illustrated that the majority of studied RA patients have a negative family history of RA.

In relation to **body mass index**, it was noticed that nearly half of the studied patients were obese. It could be due to the side effects of corticosteroid medications, and suffering from symptoms like joints pain and fatigue that resulting in decreased levels of activity in RA patients. On the other hand, obesity is a risk factor for developing RA. In this respect, ( **Dahmen et al., 2020** ) illustrated that nearly half of their studied RA patients were overweight due to inactivity status which results from suffering from joint pain.

Regarding RA **disease duration**, this study detected that nearly half of the studied patients had RA for five years or more. This finding was in line with ( **Xin; Zhang; & Peng, 2020** ) who concluded that the proportions of patients with a course of RA were more than ten years. Furthermore, the current study results denoted that the majority of the studied patients discovered RA disease by **suffering from symptoms** such as joint pain, fatigue, swelling, and stiffness in the early morning, this finding was supported by ( **Ouboussad et al., 2019** ) who mentioned that joint pain and stiffness in the early morning are the main reason for seeking medical consultation among RA patients.

In relation to the **source of information about RA disease and its treatment**, the current study revealed that the majority of the studied patients receive information from doctors, and only a few numbers of the studied

patients receive information from a nurse, this may be due to most nurses have over workload, shortage of staff, and have a lack of interest in participating in patient education. This finding corresponds with (Bozbas & Gurer., 2018) who reported that their studied patients had gained information about RA only from their physicians. Similarly, (Murphy et al., 2021) mentioned that the teaching role of nurses has been largely unrecognized as most nurses believed that RA patient education was not their duty but a rheumatologist's duty.

Regarding **multivariate linear regression** for factors affecting compliance of RA patients with therapeutic regimens, the study finding revealed that health condition-related factors were a significant positive predictor of compliance. This finding was consistent with (Hope et al., 2020) who illustrated that there was a positive association between high disease activity, fatigue, joint pain, and non-compliance level.

Regarding the **rank order of overall factors** affecting compliance of RA patients with their therapeutic regimens, the study findings revealed that the patient-related factors rated as the highest factors negatively affecting the compliance level followed by therapy-related factors, the healthcare team, and system-related factors, then condition-related factors, and finally social factors which rated the lowest factors. This result is opposed to (Gast & Mathes 2019) who conducted research entitled "Medication adherence influencing factors" found that therapy-related factors were rated as the highest factors associated with compliance levels among adult patients with physical chronic diseases.

Concerning the **overall compliance levels of RA patient with their therapeutic regimens**, the current study revealed that more than half of the studied patients had poor compliance levels which are considered a high predictor for present non-compliance with recommended therapeutic regimens. While nearly one-quarter of them had fair compliance and less than one-quarter of them had good compliance with therapeutic regimens. This poor compliance level may be related to patients not perceiving the benefit of medications,

having recurrent disease flares, having poor knowledge, increasing the cost of therapeutic regimens, lack of belief in the efficacy of the RA treatment, lack of social support, and poor psychological status. This result was incongruent with (Mora et al., 2021) who found that half of the studied RA patients had good therapeutic regimen compliance, and most patients had remission or low disease activity.

Concerning the **correlation between factors affecting compliance and therapeutic regimens compliance**, the study finding revealed that there was a statistically significance positive correlation between health condition-related factors among studied patients and their compliance to diet, exercise, and follow-up regimens. In addition, there was a statistically significance positive correlation between therapy-related factors and compliance with follow-up regimen. This finding was consistent with (López et al., 2021) concluded that worsened joint pain, joint stiffness, and anxiety, potentially lead to non-compliance with medication and follow up. On the other side, this result was in contrast with (Wabe et al., 2019) who mentioned that no statistically significant correlation between compliance level to medications and therapy-related factors among their studied RA patients.

Based on the current study results, identifying these factors as potential predictors of non-compliance among RA patients with recommended therapeutic regimens is crucial for developing strategies to enhance patient compliance. This can help prevent ineffective disease management, reduce higher morbidity, and decrease frequent hospitalizations.

### **Conclusion:**

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The study results concluded that patient-related factors were rated as the highest factors affecting therapeutic regimen compliance among studied RA patients while social factors were rated as the lowest. There was a significant positive correlation between health condition-related factors and compliance with diet, exercise, and follow-up regimens among the studied patients. Additionally, more than half of studied RA patients showed poor compliance with their therapeutic regimens.

## Recommendations

Based on the results of this study, the following recommendations were suggested:

- Conduct regular scientific meetings for healthcare providers directly involved in RA patient care to discuss patient issues and detect factors affecting therapeutic regimen compliance.

- Develop and apply educational sessions to improve patients' knowledge regarding RA disease and its therapeutic regimens.

- A colored illustrated booklet should be available and distributed for each patient with RA about the disease, complications, and therapeutic regimen instructions.

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