The Relationship Between Medication Adherence Based on The Morisky Medication Adherence Scale 8 (MMAS-8) and The Degree of Disease Activity Based on The Disease Activity Score-28 (DAS28) in Rheumatoid Arthritis Patients at Royal Prima Hospital

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Abstract:
Rheumatoid arthritis (RA) poses a major health challenge due to poor medication adherence impacting disease control. This study aimed to analyze the relationship between medication adherence (MMAS-8) and disease activity (DAS28) in RA patients. A quantitative cross-sectional design was employed at RS Royal Prima Medan (May-July 2025), targeting outpatient RA patients with consecutive sampling (n=69). Data were collected using validated MMAS-8 and DAS28-CRP instruments, analyzed via Kolmogorov-Smirnov normality tests and Spearman's correlation. Results showed moderate adherence (47.8%), low disease activity predominant (31.9%), and significant moderate positive correlation (r=0.400, p<0.001). Higher adherence is linked to better disease control. Conclusion: Medication adherence moderately influences RA disease activity; multifaceted interventions are recommended.

Keywords: *Disease Activity Score; Medication Adherence; Morisky Scale; Rheumatoid Arthritis and Spearman Correlation.*

I. INTRODUCTION

Rheumatoid arthritis (RA) represents a significant global health burden as a chronic autoimmune disease characterized by systemic inflammation primarily affecting joints and leading to progressive disability. Globally, the prevalence of RA ranges from 0.3% to 1%, with notable increases in incidence and healthcare costs over the past decade, reflecting a substantial impact on public health worldwide (Sparks, 2019; Radu & Bungau, 2021). The disease is disproportionately prevalent in women and older populations, underscoring the importance of targeted management strategies.At a macro level, RA management aligns with the biopsychosocial model, which considers complex interactions among biological, psychological, and social factors in chronic disease progression and treatment adherence (Engel, 1977). Modern theoretical frameworks emphasize the role of patient adherence in therapeutic outcomes, with medication adherence emerging as a critical determinant of disease control in chronic illnesses such as RA (Vrijens et al., 2022). Despite advances in pharmacologic therapies including DMARDs and biologics that effectively reduce disease activity, poor adherence undermines treatment success, leading to increased disease activity, functional impairment, and economic burden (Chowdhury et al., 2022). However, studies offer conflicting findings on consensus adherence measurement methodologies and their predictive validity, revealing gaps in standardization and regarding assessment tools such as the Morisky Medication Adherence Scale (MMAS-8) (Li et al., 2017) and Disease Activity Score-28 (DAS28) as outcomes.

Regionally, Indonesia faces distinct challenges in RA management, including varied socio-economic factors, limited healthcare access, and cultural influences affecting medication adherence (Albiss et al., 2025). Previous research has focused predominantly on clinical aspects but less on the correlation between adherence levels and disease activity in the Indonesian context, signifying a research gap particularly

relevant to local rheumatology practice.This study aims to address this gap by analyzing the relationship between medication adherence, measured by MMAS-8, and RA disease activity, assessed via DAS28, among patients in a tertiary hospital setting in Medan, Indonesia. By integrating epidemiologic data with behavioral and clinical assessments, the research contributes new insights into adherence patterns and disease control in this population.The study's findings are expected to offer theoretical contributions to the understanding of adherence-disease activity dynamics within the biopsychosocial framework. Practically, it provides evidence for tailored interventions to enhance medication adherence, thereby optimizing RA management and patient quality of life in similar socio-cultural contexts.In summary, this investigation responds to the urgent need for empirical data on adherence and disease activity in RA in Indonesia, supporting global efforts to improve chronic disease outcomes through integrated patient-centered care.

II. METHODS

This study employed a quantitative research design with a descriptive analytic and cross-sectional approach, which is observational and non-experimental in nature. The research was conducted at RS Royal Prima Medan from May to July 2025. The target population comprised all rheumatoid arthritis (RA) patients attending the hospital's outpatient clinic during the study period. Sample selection used consecutive sampling to include all patients meeting inclusion criteria until the minimum required sample size was reached. The sample size was calculated using the Lemeshow formula, with a confidence level of 95%, estimated adherence proportion from previous studies, and a precision of 0.1, resulting in a minimum of 69 respondents (Riyanto, 2020; Mahran et al., 2021).Inclusion criteria were patients aged over 20 years, diagnosed with RA according to ACR/EULAR criteria, undergoing outpatient treatment at RS Royal Prima, willing and able to complete the MMAS-8 questionnaire, and providing informed consent. Exclusion criteria included significant comorbidities affecting adherence or DAS28 assessment, recent changes in treatment plan within three months, pregnancy or lactation, mental disorders impairing comprehension, and refusal to participate.

Data were collected using two validated instruments: the Morisky Medication Adherence Scale 8 (MMAS-8) to assess medication adherence behavior, and the Disease Activity Score-28 (DAS28) to measure RA disease activity. MMAS-8 consists of eight items evaluating specific behaviors related to medication-taking, scoring to classify adherence into high, medium, or low categories. DAS28 integrates 28-joint counts of tender and swollen joints, patient global health assessment via visual analog scale (VAS), and laboratory markers such as C-reactive protein (CRP) or erythrocyte sedimentation rate (ESR) to quantify disease activity on a scale from 0 to 10.Data processing involved editing, coding, entry into IBM SPSS version 27, cleaning, and saving for analysis. Descriptive univariate statistics summarized patient demographics and variable distributions. Bivariate analysis tested the correlation between medication adherence and disease activity using Spearman's rank correlation due to non-normal data distributions confirmed by Kolmogorov-Smirnov tests. A significance level of $p < 0.05$ was applied (Achmad et al., 2020; Li et al., 2017; Vrijens et al., 2022).

III. RESULT AND DISCUSSION

A. Univariate Analysis

Table 1. Characteristics of AR Patients Based on Age, Gender, Education Level, BMI, and Ethnicity

Characteristics	Category	Frequency (n)	Percentage (%)
Age	20 – 40 years	12	17.4
	40 – 60 years	41	59.4
	>60 years	16	23.2
Gender	Man	10	14.5
	Woman	59	85.5
Level of education	Elementary School	1	1.4
	JUNIOR HIGH SCHOOL	1	1.4
	High School/Vocational	37	54
	School/Senior High School	1	1.4
	D1	9	13
	D3	18	26

	S1 S2	2	2.8
Body Mass Index (BMI)	Thin	7	10.1
	Normal	18	26
	Overweight	16	23.1
	Obesity I	20	28.9
	Obesity II	8	11.5
Characteristics	**Category**	**Frequency (n)**	**Percentage (%)**
Ethnic group	Batak	32	46.3
	Nias	6	8.6
	Mandailing	5	7.2
	Java	19	27.5
	Chinese	6	8.6
	Padang	1	1.4
Total		**69**	**100**

Table 1 illustrates the characteristics of respondents based on age, gender, and race/ethnicity. Based on age distribution, the majority of respondents were in the 40–60 age group, totaling 41 respondents (59.4%). The age group >60 years old came in next with 16 respondents (23.2%), while the 20–40 age group had the smallest number, at 12 respondents (17.4%).In terms of gender, respondents were dominated by women, namely 59 people (85.5%), while there were 10 male respondents (14.5%).The distribution by ethnicity showed that the largest group of respondents were Batak, with 32 respondents (46.3%). The Javanese followed with 19 respondents (27.5%), followed by Nias and Chinese, each with 6 respondents (8.6%). The Mandailing ethnic group had 5 respondents (7.2%), while the Padang ethnic group had the smallest number, with 1 respondent (1.4%).

Table 2. Frequency Distribution of Compliance

Compliance Level	Frequency (n)	Percentage (%)
Not obey	7	10.1
Currently	33	47.8
Obedient	29	42
Total	**69**	**100**

TableFigure 2 shows the distribution of respondents' compliance levels in this study. Based on the table, the majority of respondents fell into the moderate compliance category, namely 33 respondents (47.8%). The compliant group comprised 29 respondents (42%), ranking second. Meanwhile, the non-compliant group had the lowest number of respondents, namely 7 respondents (10.1%).

Table 1. Frequency Distribution of AR Disease Activity

Disease Activity	Frequency (n)	Percentage (%)
Remission	9	13
Low	22	31.9
Currently	18	26.1
Tall	20	29
Total	**69**	**100**

Table 3 presents the distribution of respondents based on disease activity level. The table shows that the low category had the largest number of respondents, with 22 (31.9%). The high category came in second with 20 (29%), followed by the moderate category with 18 (26.1%). The remission category had the smallest number of respondents, with 9 (13%).

B. Bivariate Analysis

The bivariate analysis in this study was preceded by a normality test to determine the appropriate type of statistical test.

Table 4. Normality Test

Variables	KS Statistics	df	p-value	Information
Compliance	0.272	69	< 0.001	Abnormal
Disease Activity	0.228	69	< 0.001	Abnormal

A normality test was performed using the Kolmogorov–Smirnov test because the sample size was greater than 50 respondents. The test results showed that both variables had a significance value of $p < 0.05$,

thus concluding that the data were not normally distributed. Therefore, the analysis of the relationship between the variables was performed using the Spearman correlation test.

Table 2. Relationship between Medication Compliance based on MMAS-8 and Disease Activity based on DAS-28

Variables	r (Spearman)	p-value	Information
MMAS-8 & DAS28-CRP	0.400	< 0.001	Positive, moderate (significant) correlation

Based on the Spearman correlation test between adherence level and Rheumatoid Arthritis disease activity, the correlation coefficient value was obtained as r = 0.400 with a significance value of p < 0.001. This indicates a statistically significant relationship with moderate correlation strength and a positive direction between the two variables. Thus, the better the patient's adherence level, the more controlled the disease activity tends to be.

Table 3. Relationship between Compliance and Disease Activity

Medication Compliance Based on MMAS-8	Degree of Disease Activity, n (%)				Total	P value	r
	Remission	Low	Currently	Tall			
Not obey	3 (4.34)	3 (4.34)	1 (1.44)	0 (0.0)	7 (10.14)	< 0.001	0.400
Currently	5 (7.24)	15(21.73)	10 (14.49)	3 (4.34)	33 (47.8)		
Obedient	2(2.89)	8 (11.59)	9 (13.04)	10 (14.49)	29(42.02)		
Total	**10 (14.49)**	**26(37.68)**	**20(28.98)**	**13(18.84)**	**69(100)**		

Based on Table 4, the level of medication adherence based on the MMAS-8 shows a varied distribution with the degree of disease activity based on the DAS28. In the non-adherent group, most patients were in low disease activity and remission, each with 3 patients (4.34%), while only 1 patient (1.44%) was in moderate activity, and none experienced high disease activity.In the moderate adherence group, the majority of patients, 15 (21.73%), had low disease activity. Ten (14.49%) had moderate disease activity, five (7.24%) were in remission, and three (4.34%) still had high disease activity.Meanwhile, in the adherence group, the distribution was more even. Eight people (11.59%) had low disease activity, nine people (13.04%) had moderate disease activity, and two people (2.89%) achieved remission. Interestingly, this group also included 10 patients with high disease activity (14.49%), which was the highest proportion compared to other adherence categories.Overall, of the 69 respondents, the majority were in low disease activity (37.68%), followed by moderate activity (28.98%), remission (14.49%), and high activity (18.84%). Statistical analysis showed a p-value < 0.001, indicating a significant relationship between medication adherence and disease activity. The correlation coefficient value of r = 0.400 indicates a moderately strong and positive relationship, meaning that higher adherence does not always lead to a decrease in disease activity; in this finding, some compliant patients still had high disease activity.

Discussion

1. Respondents' Age Characteristics

The majority of respondents in this study were under 50 years of age (50.0%). This finding aligns with recent literature showing that rheumatoid arthritis (RA) tends to appear in the productive age group, with an increased incidence between the ages of 40 and 60. RA is also an autoimmune disease that is more common in women, with a ratio of approximately 2–3 times that of men. Hormonal and reproductive factors, including early menopause, are known to play a significant role in increasing the risk and influencing disease activity (Ouyang et al., 2025). A large-scale prospective study by Ouyang et al. (2025) reported that early menopause was associated with higher RA disease activity, even after accounting for inflammatory factors as confounding variables. These findings suggest that hormonal changes may independently influence disease severity.Estrogen, as the primary female hormone, is known to play a crucial role in modulating the immune system. This hormone can exert both protective and pro-inflammatory effects, depending on a woman's physiological state and reproductive status. Recent research confirms that hormonal factors, particularly early menopause, are associated with higher disease activity. This strengthens the argument that estrogen plays a crucial role in immune system regulation in women with RA (Ouyang et al., 2025).

2. Respondent Gender Characteristics

Based on the research results, the majority of respondents were female, at 59 (85.5%), while 10 (14.5%) were male. This finding is consistent with epidemiological reports showing that rheumatoid arthritis (RA) is more common in women than in men. According to the Indonesian Rheumatology Association (2021) recommendations, women have approximately a 2–3 times higher risk of developing RA than men, with this difference decreasing with age.

3. Characteristics of Respondents' Education Level

The majority of respondents in this study had a secondary education level, namely high school/vocational school/high school, as many as 37 people (54%). Furthermore, 18 respondents (26%) had a bachelor's degree (S1), 9 respondents (13%) had a diploma 3 (D3), and 2 respondents (2.8%) had a master's degree (S2). In addition, 1 respondent each (1.4%) had an elementary school (SD), junior high school (SMP), and diploma 1 (D1) education. Lower education levels are potentially correlated with limited understanding of chronic health conditions and medication management, thus affecting adherence levels and therapy outcomes (Matcham et al., 2013).

4. Respondents' BMI Characteristics

The results of this study indicate that the highest proportion of body mass index (BMI) in respondents was in the obesity I category, namely 20 people (28.9%). Furthermore, 18 respondents (26%) had a normal BMI, 16 respondents (23.1%) were in the overweight category, 8 respondents (11.5%) were in the obesity II category, and 7 respondents (10.1%) were in the underweight category. If categorized further, the total number of overweight and obese respondents reached 44 people or 63.5%. This finding is in line with the report of Albiss et al. (2025) which stated that approximately 77.3% of rheumatoid arthritis patients were in the overweight or obese category. The consistency of these findings confirms that excess weight is a common problem in RA patients and needs to be a clinical concern (Albiss et al., 2025).

5. Characteristics of Respondents' Ethnic Groups

The distribution by ethnicity showed that the largest group of respondents were Batak, with 32 respondents (46.3%). The Javanese followed with 19 respondents (27.5%), followed by Nias and Chinese, each with 6 respondents (8.6%). The Mandailing ethnic group had 5 respondents (7.2%), while the Padang ethnic group had the smallest number, with 1 respondent (1.4%).The ethnic distribution in this study reflects the demographic composition of the area where the research was conducted, with the Batak ethnic group being the dominant ethnic group. These findings are not intended to compare rheumatoid arthritis (RA) susceptibility across ethnicities, but rather to reflect the characteristics of respondents in the study area.

The Relationship between Medication Compliance Based on MMAS-8 and the Degree of Disease Activity Based on DAS28 in Rheumatoid Arthritis Patients

The finding that patients who adhere to their medication still have a high degree of disease activity (DAS28) confirms that medication adherence is not the sole determinant of disease control in rheumatoid arthritis (RA). This is consistent with the literature demonstrating the complex relationships among biological, therapeutic, psychosocial, and comorbid factors.In Achmad et al.'s study, patient adherence to DMARDs was measured using the MMAS-8 (Morisky Medication Adherence Scale-8 item) questionnaire, while disease activity was assessed using the DAS28 (Disease Activity Score 28) in 88 Rheumatoid Arthritis patients. The results showed that the majority of respondents had a high level of adherence (72%), but only 21% of patients achieved remission, while the rest were still at a low-high (active) level of activity.Psychosocial factors also play a significant role in influencing disease activity in RA patients. A meta-analysis by Matcham F. et al. (2016) showed that anxiety and depression were significantly associated with higher DAS28 scores. A similar finding was found in a systematic review by Machin AJ et al. (2020), which confirmed that psychological distress increases the perception of pain and inflammation, potentially worsening disease activity even when patients are compliant with medication. Comorbidities such as obesity also play a role, as evidenced by Vidal C. et al. (2015), who found that RA patients with high BMI had worse disease activity than patients with normal BMI. Therefore, AR management must be carried out holistically, including therapy

adjustments, DMARD regimen optimization, psychological screening, and comprehensive comorbidity management.

Based on the Spearman correlation test between the level of adherence and rheumatoid arthritis disease activity, the correlation coefficient value was obtained r = 0.400 with a significance value of p < 0.001. This indicates a statistically significant relationship with moderate correlation strength and a positive direction between the two variables. This study found that the higher the level of medication adherence, the lower the disease activity as indicated by the DAS28 score. Conversely, the lower the level of adherence, the higher the disease activity experienced by patients.These results are in line with previous research that medication adherence is related to the degree of disease activity (DAS28) in rheumatoid arthritis patients by Li et al. (2017) through meta-analysis showing that adherent patients have a significantly lower DAS28 score than non-adherent patients (MD = –0.42; p = 0.03). In line with that, Hashimoto & Tanaka (2018) reported that in early phase RA patients (≤ 4.6 years), the rate of flares and DAS28-ESR increases were lower in the medication adherent group.[29]

A longitudinal study by Curtis et al. (2017) also showed that long-term adherence to a DMARD combination significantly reduced DAS28 within two years of treatment (β = –1.5; p < 0.0001).[32]Research by Çalışkan Uçkun et al. (2019) showed that more than half of rheumatoid arthritis patients were classified as non-adherent to treatment, with 51.5% of patients in the non-adherent group based on the MMAS-8 score. These non-adherent patients had higher DAS28-ESR scores, mean DAS28 scores, and HAQ and BDI scores than adherent patients, indicating more severe disease activity, functional limitations, and emotional symptoms in this group. Furthermore, regression analysis showed a significant correlation between the MMAS-8 and DAS28 scores (β = –0.51), indicating that higher adherence levels were associated with lower disease activity. This study also confirmed that low adherence is associated with higher disease activity, depression, and decreased cognitive abilities, so these factors need to be considered in efforts to improve therapy management in rheumatoid arthritis patients.[32]These findings support the results of the current study, which showed a moderate positive correlation (higher adherence, lower disease activity) between the MMAS-8 and the DAS28. Therefore, interventions to improve medication adherence, such as education, medication reminders, and regular monitoring, are crucial in the management of Rheumatoid Arthritis (RA) to suppress disease activity and the risk of flares.

IV. CONCLUSION

This study found a statistically significant positive relationship between medication adherence measured by the Morisky Medication Adherence Scale-8 (MMAS-8) and disease activity measured by the Disease Activity Score-28 (DAS28) in patients with rheumatoid arthritis (RA) at Royal Prima Hospital. The Spearman correlation coefficient of 0.400 with p < 0.001 indicates a moderate correlation, suggesting that higher adherence is associated with better control of disease activity. Despite some patients with high adherence still exhibiting active disease, the findings align with existing literature emphasizing that medication adherence is a crucial but not the sole factor influencing disease outcomes, highlighting the multifactorial nature of RA management. Psychosocial factors and comorbidities such as obesity also play significant roles in disease activity and patient quality of life (Li et al., 2017; Matcham et al., 2016; Vidal et al., 2015).

The study has limitations including reliance on self-reported adherence via MMAS-8, which may introduce recall and social desirability bias. Additionally, the cross-sectional design limits causal inference between adherence and disease activity. Other influential variables such as pain severity, fatigue, psychological status, and treatment side effects were not assessed, which limits comprehensive understanding of adherence determinants and disease control. Future research should adopt longitudinal designs and incorporate multidimensional assessments to better elucidate causal relationships and optimize individualized RA management strategies. Clinically, interventions to enhance medication adherence combined with assessment and management of psychosocial and comorbid factors are necessary to improve therapeutic outcomes and patient quality of life in RA populations.

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