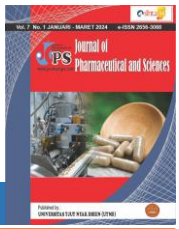
Journal of Pharmaceutical and Sciences
Electronic ISSN: 2656-3088 DOI: https://doi.org/10.36490/journal-jps.com
Homepage: https://journal-jps.com
ORIGINAL ARTICLE JPS. 2026, 9(1), 1004-1014



Profile of Compliance and Correlation of Allopurinol Administration with Changes in Uric Acid Levels Among Patients at Bandar Khalifah Health Center, Percut Sei Tuan

Profil Kepatuhan dan Hubungan Pemberian Allopurinol dengan Perubahan Kadar Asam Urat pada Pasien di Puskesmas Bandar Khalifah, Percut Sei Tuan

Salmah Handayani Lubis [a]*, Fenny Hasanah [a], Desy Natalia Siahaan [a], Eka Ayu Lestari [b]

[a] *Department of Pharmacology and Clinical ph#armacy, Faculty of Pharmacy and Health Sciences, Universitas Tjut Nyak Dhien, Medan, North Sumatra, Indonesia.*
[b] *Bachelor of Pharmacy Program, Faculty of Pharmacy and Health Sciences, Universitas Tjut Nyak Dhien, Medan, North Sumatra, Indonesia.*

Corresponding Authors: salmahhandayani@utnd.ac.id

Abstract

Background: Hyperuricemia is a metabolic disorder that may lead to gout arthritis and complications if not optimally managed. Allopurinol is the first-line therapy, but treatment success is strongly influenced by patient adherence and achievement of target uric acid levels. **Objective:** This study aimed to analyze the adherence profile and the correlation of allopurinol administration with changes in uric acid levels among patients at Bandar Khalifah Primary Health Center. **Methods:** A prospective descriptive observational design was conducted on 55 patients receiving allopurinol therapy from February to April 2025. Data were collected from medical records, laboratory results, and the Morisky Medication Adherence Scale-8 (MMAS-8) questionnaire. **Results:** Most patients (96%) experienced a reduction in uric acid levels, but the mean post-therapy level (6.46 mg/dL) remained above the target of <6 mg/dL. Mild adverse effects were reported in 14.5% of patients, while 85.5% had no complaints. High adherence was found in 54.5% of patients, moderate adherence in 30.9%, and low adherence in 14.6%. **Conclusion:** Allopurinol therapy demonstrated good clinical effectiveness and safety; however, dose optimization and regular monitoring are required, particularly in patients with low adherence or comorbidities, to achieve the recommended uric acid target.

***Keywords*: Uric acid, Allopurinol, Effectiveness, Safety, Adherence.**

Abstrak

Latar Belakang: Hiperurisemia merupakan gangguan metabolik yang dapat menyebabkan artritis gout dan komplikasi jika tidak ditangani optimal. Allopurinol adalah terapi lini pertama, namun keberhasilan pengobatan sangat dipengaruhi oleh kepatuhan pasien dan pencapaian target kadar asam urat. **Tujuan:** Penelitian ini bertujuan untuk menganalisis profil kepatuhan dan hubungan pemberian allopurinol terhadap perubahan kadar asam urat pada pasien di Puskesmas Bandar Khalifah. **Metode:** Desain observasional deskriptif prospektif dilakukan terhadap 55 pasien yang menjalani terapi allopurinol periode Februari–April 2025. Data dikumpulkan dari rekam medis, pemeriksaan laboratorium, dan kuesioner Morisky Medication Adherence Scale-8 (MMAS-8). **Hasil:** Sebagian besar pasien (96%) mengalami penurunan kadar asam urat, namun rerata pascaterapi (6,46 mg/dL) masih di atas target <6 mg/dL. Efek samping ringan dilaporkan pada 14,5% pasien, sedangkan 85,5% tidak mengalami keluhan. Tingkat kepatuhan tinggi tercatat pada 54,5% pasien, sedang 30,9%, dan rendah 14,6%. **Kesimpulan:** Terapi allopurinol menunjukkan efektivitas klinis dan keamanan yang baik, tetapi diperlukan optimalisasi dosis serta pemantauan rutin, terutama pada pasien dengan kepatuhan rendah atau komorbiditas, guna mencapai target kadar asam urat yang direkomendasikan.

Kata Kunci: Asam Urat, Allopurinol, Efektivitas, Keamanan, Kepatuhan.

https://doi.org/10.36490/journal-jps.com.v9i1.1068

Article History:
Received: 02/01/2026,
Revised: 27/03/2026
Accepted: 27/03/2026,
Available Online: 30/03/2026.

QR access this Article

Introduction

Uric acid is severe joint pain accompanied by redness, swelling, and pain due to the buildup of uric acid crystals in the joints. This condition most commonly occurs in the big toe, but it can also affect other joints in the foot, such as the knee, and often the ankle. In people with gout, excess uric acid builds up and forms crystals in the joints. These uric acid crystals can trigger inflammation and cause pain and swelling around the feet [1].

Normal uric acid levels in men are 3.4–7.0 mg/dL, and in women are 2.4–6.0 mg/dL. Values above these limits are categorized as hyperuricemia and increase the risk of acute gout attacks. Clinical studies show that controlling uric acid levels within therapeutic limits can reduce the frequency of gout attacks, especially with serum uric acid levels below 6 mg/dL [2].

The World Health Organization (WHO) estimates the global prevalence of Uric acid to be around 2.6% to 47.2%, with variations depending on the characteristics of populations spread across the world. The WHO also reports that around 335 million people worldwide suffer from gout. In the United States, an estimated 13.6% of 100,000 people are affected by gout. In Indonesia, the prevalence of gout based on medical diagnosis in 2018 was recorded at 7.3%. Several provinces showed the highest prevalence rates compared to the national average, such as Aceh at 13.3%, Bengkulu at 12.1%, Bali at 10.5%, and Papua at 10.4%. Southeast Sulawesi Province has a prevalence of 5.6%, with North Buton Regency recording the highest rate in North Sulawesi Province at 12.62%, far higher than the national and provincial prevalence rates [3].

The management of uric acid involves lifestyle changes and the use of appropriate medications. The most commonly used medication to control uric acid levels in the blood is allopurinol. Evaluation of the use of this medication is very important to ensure that the treatment given is in accordance with clinical indications, effective in lowering uric acid levels, and minimizes possible side effects in patients with uric acid [4].

Initial treatment for uric acid symptoms includes analgesic-antipyretic medications, *nonsteroidal anti-inflammatory drugs* (NSAIDs), and corticosteroids. Patients with NSAID contraindications may be given oral corticosteroids such as methylprednisolone. First-line therapy for uric acid [5].

In general, the recommended treatment priorities are: treatment to address acute attacks, with the main goal of treatment being to reduce joint pain and inflammation. Commonly used medications include nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen, sodium diclofenac, potassium diclofenac, meloxicam, and mefenamic acid, which are effective in relieving pain and inflammation symptoms in a short period of time. In addition, paracetamol can be used as an additional analgesic to reduce pain. In cases of severe inflammation or if there is no response to NSAIDs, corticosteroids such as methylprednisolone can be used to help relieve inflammation more quickly. After the acute attack subsides, long-term treatment to lower uric acid levels in the blood becomes a priority. Medications such as allopurinol work by inhibiting uric acid production and preventing the formation of crystals in joint tissue. Regular use of this medication can help prevent recurrent attacks and long-term complications [6].

Method

This study was conducted at Puskesmas Bandar Khalifah, Percut Sei Tuan, Deli Serdang Regency from February to April 2025. The research employed a prospective descriptive observational design. The study

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

population included all patients receiving uric acid treatment at Puskesmas Bandar Khalifah. Sample selection was based on medical record data and questionnaire completion, resulting in 55 patients who met the inclusion criteria: diagnosed with hyperuricemia or gout, willing to complete the questionnaire, and patients with or without comorbidities. Exclusion criteria consisted of patients not diagnosed with gout, those who refused to complete the questionnaire, or individuals with mental disorders that could interfere with their ability to understand therapy instructions.

Data collection was carried out through patient medical records and the Morisky Medication Adherence Scale-8 (MMAS-8) questionnaire. The study variables included patient characteristics (age, sex, and education level), uric acid levels before and after therapy, clinical symptoms, comorbidities, drug side effects, and medication adherence levels.

Operational definitions included:

1. Successful reduction of uric acid level, defined as achieving a serum uric acid concentration of <6 mg/dL;
2. Pain severity, assessed using the Numeric Rating Scale (NRS) categorized as 0 = no pain, 1–3 = mild pain, 4–6 = moderate pain, and 7–10 = severe pain;
3. Medication adherence, determined according to MMAS-8 scoring guidelines (high adherence = score of 8; moderate adherence = scores 6–7; low adherence = scores <6).

Data analysis was performed descriptively to describe the distribution of patient characteristics, changes in uric acid levels, clinical symptoms, side effects, and compliance rates. The Paired t-test was used to compare uric acid levels before and after therapy, the Chi-Square test to analyze differences in compliance levels based on age and gender, the Spearman Correlation test to assess the relationship between diagnosis duration and success in achieving levels <6 mg/dL, and Logistic Regression Analysis to determine the factors most influential on medication compliance. Significance was set at $p < 0.05$.

Results and Discussion

All respondents who met the inclusion criteria (n = 55) were willing to participate in this study without coercion or refusal. The demographic and clinical characteristics of the respondents are presented in Table 1. Most respondents were male (56%), while 44% were female. The age distribution showed that most respondents were in the 56–65 age group (40%), followed by the >66 age group (27%) and the 46–55 age group (24%), while the youngest age groups were 30–35 years (2%) and 36–45 years (7%). Based on educational level, most respondents had a high school education (84%), while 13% had a junior high school education and only 3% had a college education.

In terms of clinical conditions, 9 patients (16.4%) had comorbidities, consisting of 8 patients (14.5%) with hypertension and 1 patient (1.8%) with renal failure, while the majority of the others had no comorbidities (83.6%). These findings are important because the demographic and clinical characteristics of patients can affect medication adherence, treatment effectiveness, and the risk of side effects that may occur during treatment. To clarify the distribution of respondents, these characteristics are presented in Table 1.

The results of research on uric acid symptoms and complaints from Table 2 show that of the total 55 uric acid patients at Bandar Khalifah Public Health Center, Percut Sei Tuan, Deli Serdang Regency, most patients experienced pain and swelling in the knee and foot joints, with a percentage of 87%, while the other 13% of patients experienced pain in the hand joints. This indicates that the knee and foot joints are the most common sites for uric acid crystal accumulation, which causes joint inflammation.

This finding is consistent with the most common clinical characteristics of gout, in which peripheral joints such as the *metatarsophalangeal* joints (big toes), knees, and ankles are the main sites of gout attacks. This is due to the lower temperature in the distal parts of the body, which facilitates the deposition of monosodium urate (MSU) crystals. Pain in the knees and feet is often a manifestation of gout, accompanied by signs of inflammation such as redness, swelling, and joint pain. This condition greatly interferes with the functional activities of patients, especially in the elderly who already have limited mobility [7].

Meanwhile, pain in the hands can also be a manifestation, although it is less common. This can be found in patients with chronic gout or tophaceous gout, where urate crystal deposits have spread to multiple joints due to poor uric acid control, causing the spread of urate crystals.

Based on the results presented in Table 3 above, the pattern of gout therapy among patients at the Bandar Khalifah Primary Health Center shows that all patients received Allopurinol 100 mg as the main urate-

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

lowering medication. The treatment regimens consisted of various combinations of allopurinol with analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), or corticosteroids, adjusted to the degree of pain, level of inflammation, and each patient's clinical needs.The most frequently used combination was Allopurinol + Paracetamol + Methylprednisolone (23.6%), indicating corticosteroid use in patients with more severe inflammation or acute gout attacks. Corticosteroids are typically prescribed when NSAIDs cannot be used, such as in patients with gastrointestinal disorders or certain comorbidities.

Table 1 Demographic and Clinical Characteristics of Respondents (n = 55)

Characteristics	Number (N)	Percentage (%)
Gender		
Female	24	44
Male	31	56
Age (years)		
30-35	1	2
36-45	4	7
46-55	13	24
56-65	22	40
>66	15	27
Education		
Junior high school	7	13
Senior high school	46	84
College	2	3
Comorbidities		
Hypertension	8	14,5
Kidney failure	1	1,8
No comorbidities	46	83,6

Table 2 Symptoms and complaints of uric acid

Symptoms and complaints	Number (N)	Percentage (%)
Pain in the joints of the hands	7	3
Swelling/pain in the joints of the knees and feet	48	87
Total	55	100

Table 3 Patterns of uric acid medication use

Type of medication	Patients	%
Allopurinol 100 mg + Paracetamol + Methylprednisolone	13	23,6
Allopurinol 100 mg + Paracetamol	6	10,9
Allopurinol 100 mg + Mefenamic Acid	9	16,3
Allopurinol 100 mg + Potassium Diclofenac	6	10,9
Allopurinol 100 mg + Paracetamol + Mefenamic Acid	7	12,7
Allopurinol 100 mg + Meloxicam	3	5,5
Allopurinol 100 mg + Sodium Diclofenac	5	9,1
Allopurinol 100 mg + Paracetamol + Potassium Diclofenac	6	10,9

Combinations such as Allopurinol + Paracetamol (10.9%) and Allopurinol + Mefenamic Acid (16.3%) were commonly administered to patients with mild to moderate pain. Paracetamol was selected for its favorable safety profile, while mefenamic acid provided additional anti-inflammatory effects for joint pain. Within the NSAID category, several therapeutic variations were used, including Allopurinol + Potassium Diclofenac (10.9%), Allopurinol + Meloxicam (5.5%), and Allopurinol + Sodium Diclofenac (9.1%). The choice of NSAID reflected patient response, drug tolerance, and the presence of comorbidities such as hypertension or renal impairment.

Additionally, three-drug combinations such as Allopurinol + Paracetamol + Mefenamic Acid (12.7%) and Allopurinol + Paracetamol + Potassium Diclofenac (10.9%) indicated that some patients required multimodal therapy to control pain and inflammation. Such regimens are common among patients with

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

recurrent gout attacks or more dominant inflammatory symptoms. Overall, the medication patterns in this study illustrate an individualized, layered therapeutic approach in which allopurinol, as the primary urate-lowering agent, is combined with various analgesics and anti-inflammatory drugs tailored to the patient's condition. Presenting the data in terms of specific drug combinations provides a more accurate and clinically relevant description than categorizing them by drug classes alone.

Allopurinol is a xanthine oxidase inhibitor that reduces uric acid production by blocking the active site of the xanthine oxidase enzyme, thereby decreasing the conversion of hypoxanthine and xanthine into uric acid. In this study, the 100 mg/day dosage was considered adequate and safe, especially for elderly patients, and may be adjusted according to renal function based on creatinine clearance. NSAIDs were used to control inflammation, pain, and joint swelling during gout attacks. Their side effects include gastrointestinal disturbances (nausea, epigastric pain, diarrhea, constipation, peptic ulcers) and cardiovascular risks (hypertension, myocardial infarction). Examples include mefenamic acid, ibuprofen, potassium/sodium diclofenac, and meloxicam. Corticosteroids are synthetic steroid-based agents that suppress the production of pro-inflammatory substances and act as immunosuppressants to reduce inflammation [8].

Allopurinol is an antipyretic drug from the xanthine oxidase (XO) inhibitor class that works by inhibiting the active center of the xanthine oxidase enzyme, thereby reducing the formation of uric acid from hypoxanthine and xanthine. In this study, a dose of 100 mg/day was considered sufficient and safe, especially in the elderly, and could be adjusted in patients with renal impairment based on creatinine clearance. NSAIDs are used to control inflammation, pain, and joint swelling during gout attacks. Side effects include gastrointestinal disorders (nausea, heartburn, diarrhea, constipation, stomach ulcers) and cardiovascular disorders (hypertension, myocardial infarction). Examples of drugs: mefenamic acid, ibuprofen, potassium/sodium diclofenac, meloxicam. Corticosteroids are synthetic steroid hormone-based drugs that suppress the production of proinflammatory substances and can act as immunosuppressants, reducing the activity of the immune system to reduce inflammation [8]

Table 4 Reduction in Uric Acid Levels

Category Reduction in Uric Acid Levels	Number of Patients	Presentase (%)
Experienced a reduction	53	96
No decrease	2	4
Total Number	55	100

Based on Table 4, it is known that of the 55 patients who underwent therapy, 53 patients (96%) experienced a decrease in uric acid levels, and 2 patients (4%) did not experience a decrease in uric acid levels. This shows that the majority of patients (96%) experienced a decrease in uric acid levels after therapy.

Table 5 Paired Sample Test Results for Uric Acid Levels Before and After Therapy (n = 55)

Mean Before	Mean After	Mean Difference	SD of Difference	t-value	df	Sig. (2tailed)	Cohen´s d
8,0818mg/dL	6,4655mg/dL	1,6164mg/dL	0,7107	16,867	54	<0,001	2,274

The results of the paired sample test show that the average uric acid level in the patients' blood decreased from 8.08 mg/dL before therapy to 6.46 mg/dL, with a difference of 1.62 mg/dL. This decrease was statistically significant with a t-value of 16.867 and $p<0.001$. In addition, the effect size of the therapy, as indicated by Cohen's d = 2.27, was in the very large category, showing that the treatment was effective in lowering uric acid levels both clinically and statistically.This effectiveness is influenced by the appropriate use of medication, namely Allopurinol as a xanthine oxidase inhibitor, as well as NSAIDs or corticosteroids to treat acute inflammation.

The study findings indicate that although 96% of patients experienced a reduction in uric acid levels, the post-therapy mean value of 6.46 mg/dL did not reach the clinical target of <6 mg/dL recommended to prevent gout progression and recurrence. Recent literature explains that a fixed allopurinol dose of 100 mg/day is often insufficient to lower serum uric acid to the target range, thus requiring dose titration based on renal function and the patient's laboratory response (Zhu et al., 2018). This condition helps explain why some patients in this study did not achieve the therapeutic target despite showing significant numerical improvement.

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

The majority of patients (81.8%) experienced a reduction in joint pain after therapy, 3.6% reported no pain at all, and only 14.5% still complained of pain. This indicates that the therapy was effective in relieving uric acid symptoms.

Table 6 Distribution of Pain Symptoms After Therapy

Pain Symptoms	Number of Patients	Presentase (%)
Pain Reduced (Scale 2–3	45	81,8
Still in Pain (Scale 4–6)	8	14,5
No Pain (Scale 0)	2	3,6
Total	55	100

Table 7 Therapy Effectiveness Based on Reduction of Uric Acid Levels and Clinical Symptoms

Therapy Effectiveness	Number of Patients	Percentage (%)
Effective	45	81,8
Not Effective	10	18,2
Total	55	100

Out of 55 patients, 45 patients (81.8%) demonstrated an effective therapeutic response. Patients were categorized as effective because they achieved a reduction in uric acid levels to the normal range and reported improvement in joint pain and swelling. The assessment of effectiveness was not solely based on laboratory findings but also on patients' subjective complaints, in line with the Indonesian Rheumatology Association Guidelines (2020), which emphasize that effective therapy encompasses both clinical and laboratory improvement. The high effectiveness rate may be influenced by appropriate allopurinol dosing, patient adherence, and the implementation of a low-purine diet [9].

Meanwhile, 10 patients (18.2%) did not achieve an optimal response. This could be due to non-adherence to medication, inappropriate dosing, individual metabolic variability, or drug interactions related to comorbidities, such as the use of antihypertensives or diuretics, which can interfere with uric acid excretion. This condition highlights the importance of regular monitoring, dose adjustments, and patient education to maximize therapy effectiveness [9].

In this study, therapeutic effectiveness was assessed not only by laboratory parameters but also by patients' subjective complaints, particularly joint pain and swelling. This combined approach of uric acid reduction and clinical improvement is consistent with the management guidelines for hyperuricemia and gout established by the Indonesian Rheumatology Association 2020 [10].

The group of patients who did not achieve therapeutic effectiveness (18.2%) requires particular attention. When compared with Table 1 and Table 9, a portion of these patients had comorbidities especially hypertension and a disease duration of more than five years. These two factors are frequently associated in the literature with difficulty achieving urate targets due to chronic inflammation and changes in renal function that affect drug metabolism. In addition, poor adherence in some patients may also contribute to therapeutic failure [8].

To improve therapeutic effectiveness in patients who have not reached the target, dose optimization strategies are needed. Recent guidelines recommend gradual titration of allopurinol based on serum uric acid levels and renal function, rather than administering a fixed 100 mg dose to all patients. This treat-to-target approach has been shown to improve treatment success and reduce the frequency of recurrent gout attacks [11].

Table 8 Adverse Effects

Type of Adverse Effect	Number of Patients	Percentage (%)
Dizziness	5	9
Allergic Reaction	2	4
Diarrhea	1	2
Patients with no adverse effects	47	85
Total	55	100

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

Based on Table 7, out of a total of 55 patients, 8 patients (15%) experienced adverse effects, with the most common complaint being dizziness in 5 patients (9%), followed by allergic reactions in 2 patients (4%), and diarrhea in 1 patient (2%). The majority of patients (85%) reported no complaints, indicating that allopurinol therapy is relatively safe.

Dizziness was the most frequent adverse effect observed in this study. According to the Indonesian Guidelines for the Management of Gout and Hyperuricemia [11]. allopurinol is known to cause mild side effects in the central nervous system, such as headache and dizziness. In addition, concomitant medications, such as diuretics in hypertensive patients, may increase the risk of these symptoms. Therefore, although the reported adverse effects were generally mild, periodic monitoring remains essential, especially in patients with comorbidities or those receiving combination therapy, to ensure treatment safety and minimize the risk of complications [12].

Table 9 Medication Adherence

Adherence Level	Number of Patients	Percentage (%)
Low	8	14,6
Moderate	17	30,9
High	30	54,5

Based on Table 8, the results of the study on 55 gout patients at Bandar Khalifah Public Health Center, Percut Sei Tuan, Deli Serdang Regency, assessed using the MMAS-8 instrument, showed that 30 patients (54.5%) had high adherence, 17 patients (30.9%) had moderate adherence, and 8 patients (14.6%) had low adherence. The findings indicate that more than half of the patients were classified as adherent to therapy; however, approximately 45.5% of patients still experienced adherence issues, falling into the moderate and low categories. Non-adherence commonly occurred because patients felt their symptoms had improved or were concerned about possible side effects.

High adherence among the majority of patients is a positive finding, as it correlates with successful uric acid therapy. Factors contributing to high adherence include older age, greater awareness of the importance of maintaining health, strong motivation to recover, and the relatively mild side effects of allopurinol, which made patients feel comfortable taking the medication regularly. Conversely, patients with moderate and low adherence (45.5%) often faced barriers, such as the habit of discontinuing medication once symptoms improved, concerns about side effects, or uncontrolled purine-rich dietary habits. This finding is consistent with[8], who reported that poor adherence is often due to inadequate patient education, poor dietary control, and the belief that medication is only needed during gout flares. Therefore, interventions such as continuous education, nutritional counseling, and routine monitoring by healthcare professionals are crucial to improving adherence, particularly in patients with moderate and low adherence.

Table 10 Duration of Uric Acid Diagnosis

Duration of Diagnosis	Number Of Patient	Percentage (%)
< 1 Year	2	3,6
1-5 Years	20	36,4
>5 Years	3	60,0

Based on the table above, most patients (60%) had been diagnosed with uric acid disease for more than five years, indicating long-term exposure to elevated uric acid levels. A total of 36.4% were in the intermediate duration group (1–5 years), while only 3.6% had recently initiated therapy (<1 year). Among the total sample, 1 patient had kidney disease and 8 patients had hypertension. This is important, as uric acid therapy, particularly the use of allopurinol and analgesics, must be tailored to kidney function and blood pressure status.

Longer disease duration (>5 years) suggests potential risks of treatment fatigue, which may reduce adherence to therapy. In patients with impaired kidney function, such as chronic kidney disease (CKD), allopurinol — the main uric acid-lowering agent — should be administered at a lower dose with gradual titration to avoid toxicity or hypersensitivity reactions. Furthermore, the use of nonsteroidal anti-inflammatory drugs (NSAIDs) for acute gout attacks should be restricted in patients with hypertension or

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

CKD, as NSAIDs can worsen blood pressure and kidney function. As an alternative, colchicine or corticosteroids are often recommended [13].

Table 11 Association Between Age and Medication Adherence Level (Chi-Square Test)

Age	High adherence	Moderate adherence	Low adherence	Total
30-45	3	2	0	5
46-55	8	4	1	13
56-65	15	5	2	22
>66	4	6	5	15
Total	30	17	8	55

Based on the results of the Chi-Square analysis in Table 10, there was no significant association between age groups and the level of medication adherence among gout patients ($\chi^2 = 6.89$; $p = 0.249$). A p-value greater than 0.05 indicates that the distribution of adherence levels high, moderate, and low is relatively similar across different age categories.

This finding is consistent with previous studies suggesting that demographic factors such as age are not always associated with treatment adherence in chronic diseases. According to [8], adherence is more strongly influenced by behavioral and psychological factors, including patients' beliefs about the benefits of therapy, satisfaction with healthcare services, and the level of education received, rather than biological age.

Table 12 Association Between Gender and Medication Adherence Level (Chi-Square Test)

Gender	High adherence	Moderate adherence	Low adherence	Total
Male	17	9	5	31
Female	13	8	3	24
Total	30	17	8	55

The analysis showed that there was no significant difference in medication adherence between male and female patients. A p-value greater than 0.05 indicates that the distribution of adherence levels in both groups is relatively similar, suggesting that gender is not a determining factor for whether a patient is adherent. This finding aligns with previous reports stating that adherence in chronic disease patients is more strongly influenced by psychological factors and the perceived benefits of therapy rather than biological characteristics such as gender.

Although men and women may have physiological differences, in the context of long-term treatment such as hyperuricemia, adherence behavior is more greatly shaped by disease understanding, family support, and medication routines. Other studies have also indicated that differences in adherence between genders are generally not significant in chronic conditions, unless influenced by specific social factors (Wulandari & Putra, 2020). Therefore, the results of this study are consistent with existing literature, confirming that gender is not a primary predictor of adherence. Consequently, efforts to improve adherence should focus on patient education, side-effect management, and continuous support [14].

Table 13 Spearman Correlation Between Duration of Diagnosis and Success in Achieving Target Uric Acid Levels (n = 55)

Variable	r	p	Interpretasi
Duration of diagnosis vs. Treatment success	0,211	0,123	Tidak signifikan

The correlation test results showed that the duration of gout diagnosis was not significantly associated with the success of achieving uric acid levels <6 mg/dL. This indicates that patients who have had the disease for a longer period are not automatically better or worse in responding to therapy. These findings are consistent with national guidelines, which emphasize that treatment success is more strongly influenced by appropriate dosing, regular evaluation, and renal function rather than the length of illness [12].

In some cases, patients with a longer disease duration may indeed find it more difficult to reach target levels due to joint changes or renal impairment; however, this does not apply to all individuals. Therapeutic response largely depends on the accuracy of urate-lowering dose titration and adherence to a low-purine diet.

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

Other studies have similarly concluded that duration of diagnosis is not a primary determinant of treatment outcomes [13].

Conversely, newly diagnosed patients also do not always achieve target levels if they are not adherent or fail to follow medication instructions properly. Factors such as correct allopurinol dosing, regular monitoring of uric acid levels, and consistent medication intake play a more dominant role in determining treatment success [3].

Table 14 Logistic Regression Analysis of Factors Affecting Medication Adherence

Variable	OR	p	Description
Age	1.12	0.418	Not significant
Gender	1.28	0.376	Not significant
Education	0.94	0.553	Not significant
Duration of diagnosis	1.09	0.327	Not significant
Comorbidities	2.41	0.043	Significant (most dominant)

The regression analysis showed that comorbidities were the most dominant factor influencing medication adherence. Patients with hypertension, kidney disease, or other comorbid conditions tended to take more medications, which increased the risk of treatment fatigue and reduced consistency in taking uric-acid–lowering therapy. This pattern aligns with previous findings showing that polypharmacy has a major impact on adherence among individuals with chronic illnesses [13].

A higher number of medications can also increase concerns about side effects, leading some patients to discontinue certain drugs without consulting healthcare professionals. This is consistent with Indonesian literature stating that comorbidities are one of the major barriers to therapeutic adherence [8]

Other variables such as age, education, and gender did not show a significant influence. This reinforces the idea that adherence is more strongly affected by clinical conditions and treatment burden rather than demographic characteristics. Therefore, educational interventions and regular monitoring are essential, especially for patients with comorbidities, to prevent non-adherence [10].

Limitations of the Study

This study has several limitations that should be considered when interpreting the findings. First, the descriptive observational design does not allow the researchers to establish a causal relationship between allopurinol therapy and changes in uric acid levels. This design only describes the observed conditions, and causal associations require further analytical or experimental research [15].

Second, the data relied on medical records and patient reports, including adherence measurement using the MMAS-8 instrument. Self-reported measures are prone to biases such as recall bias and social desirability bias, which may result in adherence levels being reported higher than they actually are [15].

Third, this study did not assess other factors that may influence therapeutic effectiveness, such as renal function, body mass index, or dietary patterns factors known in the literature to contribute significantly to uric acid control [16]. This limitation may lead to a less comprehensive interpretation of clinical outcomes.

Fourth, the sample size of 55 patients is relatively small, so generalizing the findings to a broader population must be done cautiously. Future research with a larger sample size and inclusion of more clinical variables is recommended to strengthen these findings [17].

Practical Implications

The practical implications of this study emphasize the importance of implementing comprehensive and sustainable management strategies for patients receiving allopurinol therapy. Regular clinical monitoring is essential to evaluate therapeutic outcomes and to adjust allopurinol dosage according to serum uric acid levels and renal function status. In clinical practice, a dose-titration strategy should be prioritized because a fixed dose of 100 mg may not be adequate to achieve optimal therapeutic targets in all patients. Furthermore, structured and continuous patient education programs are necessary to enhance long-term medication adherence and improve dietary management, particularly among patients with a disease duration exceeding five years. Patients presenting with comorbid conditions also require closer and more intensive monitoring, as they are more likely to experience suboptimal therapeutic responses. In addition, strengthening follow-up systems through interventions such as medication reminders and scheduled visit notifications may further support patient adherence and improve the overall effectiveness of therapy

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

Conclusion

This study demonstrates that the administration of allopurinol in primary healthcare practice at the Bandar Khalifah Health Center provides notable clinical improvement for most gout patients. A total of 96% of patients experienced a reduction in serum uric acid levels after therapy; however, the mean post-treatment value (6.46 mg/dL) remained slightly above the recommended clinical target (<6 mg/dL). This indicates that although the therapy produced a positive response, some patients still require further dose adjustments to achieve the desired therapeutic target. The safety profile of allopurinol therapy in this study was generally favorable, as reflected by the low incidence of mild adverse effects (14.5%), while the majority of patients (85.5%) reported no complaints. Patient adherence also showed encouraging results, with more than half of the respondents classified as having high adherence based on the MMAS-8 assessment. Nevertheless, the presence of patients with moderate and low adherence indicates remaining barriers in long-term medication use that may hinder optimal therapeutic outcomes. Overall, this study reinforces that allopurinol therapy demonstrates good effectiveness and safety and is supported by a relatively adequate level of patient adherence. However, treatment optimization remains necessary, particularly for patients with comorbid conditions, those who have not yet achieved target uric acid levels, or those with low adherence. Enhancing long-term adherence and implementing more targeted dose-adjustment strategies are expected to improve therapeutic success in the future.

Acknowledgments

The author would like to express sincere gratitude to the Head of the Deli Serdang District Health Office, the Head of Bandar Khalifah Public Health Center, Percut Sei Tuan, Deli Serdang Regency, for granting permission to conduct this research, as well as to colleagues who have provided valuable assistance in the completion of this study.

Referance

[1] kemenkes, "pengerian penyakit asam urat, resiko penyakit asam urat," *https://www.alodokter.com/rematik-asam-urat*, 2022. http://yankes.kemenkes.go.id.

[2] G. Ruoff, N. L. Edwards, G. Ruoff, and N. L. Edwards, "Overview of Serum Uric Acid Treatment Targets in Gout : Why Less Than 6 mg / dL ?," *Postgrad. Med.*, vol. 128, no. 7, pp. 706–715, 2016, doi: 10.1080/00325481.2016.1221732.

[3] Irma, Y. Ellen, L. O. Liaumin Azim, and K. Kamrin, "Faktor Genetik dan Konsumsi Purin sebagai Prediktor Asam Urat Pada Masyarakat Pesisir," *Wind. Heal. J. Kesehatan.*, vol. 6, no. VoL 6 No 3 (Juli 2023), p. 3, 2023. http://jurnal.fkmumi.ac.id/index.php/woh/article/view/woh6304.

[4] A. Gunawan, D., Setiawan, "pengaruh obat asam urat pada pasien lansia di rs x: sebuah studi evaluasi," *J. Farm. Indones.*, vol. 12, no. 2, pp. 67–75, 2018.

[5] P. Dellia, N. Mambu, N. Godiman, and M. Walean, "Evaluasi rasionalitas penggunaan obat pada pasien arthritis gout di instalasi rawat inap Rumah Sakit Advent Manado periode Januari – Juni 2020," *Pharm. Res. J.*, vol. 1, no. 1, pp. 18–26, 2024.

[6] Kemenkes RI, *pengelolahan penyakit asam urat*. Jakarta, 2020.

[7] G. Ragab, M. Elshahaly, and T. Bardin, "Gout: An old disease in new perspective – A review," *J. Adv. Res.*, vol. 8, no. 5, pp. 495–511, 2017. https://doi.org/10.1016/j.jare.2017.04.008.

[8] S. N. Manurung, H. Kuncoro, and J. Junaidin, "Evaluasi Penggunaan Obat pada Pasien Artritis Gout di Instalasi Rawat Jalan Rumah Sakit Pupuk Kaltim Bontang Periode 2022," *Proceeding Mulawarman Pharm. Conf.*, vol. 18, pp. 171–176, 2023, https://doi.org/10.25026/mpc.v18i1.722.

[9] G. Hikmatyar and T. Larasati, "Penatalaksanaan Komprehensif Arthritis Gout dan Osteoarthritis pada Buruh Usia Lanjut Comprehensive Management of Arthritis Gout and Osteoarthritis in Old Age Workers," *J. medula unila*, vol. 7, no. Vol 7, No 3 (2017), p. 29 halaman, 2018.

[10] Perhimpunan Reumatologi Indonesia, *Rekomendasi Pedoman Diagnosis dan Pengelolaan Gout*. 2020. https://reumatologi.or.id/wp-content/uploads/2020/10/Rekomendasi GOUT.

[11] R. Mildawati, B. Prasetyo Nugroho, F. Prasetyawan, A. Kristjono, and Y. Saristiana, "Edukasi Swamedikasi Penggunaan Obat Asam Urat Pada Pemeriksaan Kesehatan Berkala," *J. LENTERA*, vol. 4,

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com

no. 2, pp. 141–151, 2024, doi: 10.57267/lentera.v4i2.369.

[12] Kementerian Kesehatan Republik Indonesia. (2023). *Formularium Nasional*. Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07/MENKES/2197/2023. Diakses dari: https://farmalkes.kemkes.go.id/unduh/kepmenkes-2197-2023/.

[13] H. Alatas, "Penatalaksanaan Hiperurisemia Pada Penyakit Ginjal Kronik (CKD)," *Herb-Medicine J.*, vol. 4, no. 1, p. 1, 2021, doi: 10.30595/hmj.v4i1.5805.

[14] J. A. Alshahrani *et al.*, "Gouty Arthritis Across Ages: Understanding Disease Patterns and Predictors," *Cureus*, vol. 16, no. 4, 2024. https://doi.org/10.7759/cureus.58873.

[15] R. F. Abdillah, *Allopurinol pada Pasien Gout Artritis di Puskes*. 2022.

[16] J. C. J. Spragg *et al.*, "Optimizing adherence to allopurinol for gout: patients' perspectives," *Br. J. Clin. Pharmacol.*, vol. 89, no. 7, pp. 1978–1991, 2023, doi: 10.1111/bcp.15657.

[17] V. Agustira, D. Simbolon, and K. Kusdalinah, "Hubungan Kadar Asam Urat Dengan Tekanan Darah Pada Civitas Akademik Poltekkes Kemenkes Bengkulu," *Qual. J. Kesehat.*, vol. 17, no. 2, pp. 86–95, 2023, doi: 10.36082/qjk.v17i2.1288.

Electronic ISSN : 2656-3088
Homepage: https://www.journal-jps.com