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The Correlation Between Pharmacological Rationality and Therapeutic Outcomes in Patients with Gout at RSI Siti Khadijah Palembang

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ABSTRACT

Gout is a kind of arthritis characterized by the presence of elevated amounts of uric acid in the bloodstream (hyperuricemia), leading to the accumulation of monosodium urate (MSU) crystals within the joints. The appropriate utilization of medications in individuals with gout can significantly impact the efficacy of treatment. The objective of this study is to establish a correlation between pharmacological rationality and therapeutic outcomes among gout patients at RSI Siti Khadijah Palembang from January 2020 to December 2022. The present work employs an observational analytic approach, utilizing cross-sectional and cohort study designs. The data were collected retrospectively by the utilization of the total sampling approach, encompassing a complete sample size of 32 patients. The utilization of rationality drugs yielded a 100% accuracy rate in terms of diagnosis, indication, patient selection for urate-lowering therapy, and 93.55% for analgesic anti-inflammatory treatment patient. The correct drug was administered in 100% of cases, while the appropriate dosage for urate-lowering therapy was achieved in 90.625% of instances and 100% for analgesic anti-inflammatory treatment. The route and timing of drug administration were both executed correctly in 100% of cases, and a high level of vigilance for potential side effects was maintained at 100% accuracy. The findings from Fisher's exact test demonstrated a statistically significant association between the effectiveness of urate-lowering medication and analgesic anti-inflammatory treatment in terms of obtaining normal uric acid levels ($p<0.05$) and reducing pain levels in individuals with gout ($p<0.05$). The judicious utilization of pharmaceutical substances is a viable approach for attaining desired therapeutic outcomes.

***Keywords*:** Gout; Pharmacological rationality; Therapeutic outcomes

INTRODUCTION

Gout is a degenerative condition characterized by the accumulation of monosodium urate (MSU) crystals inside the joints, kidneys, and other connective tissues due to prolonged hyperuricemia. Hyperuricemia is a medical disorder characterized by an elevation in the concentration of uric acid in the bloodstream beyond the established normal range.[1] The accumulation of uric acid leads to the manifestation of discomfort, distress, and inflammation inside the joints. In the absence of

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efficacious intervention, this particular ailment has the potential to progress into chronic gout, the manifestation of tophus, and may even precipitate significant renal dysfunction, with a decline in overall well-being.[2] According to a correlation between advancing age and the occurrence of gout. Specifically, the prevalence of gout tends to rise as individuals grow older. For instance, the average prevalence of gout among men aged 75 years and above is approximately 7%, while women aged 85 years and above exhibit an average prevalence of 3%. According to the World Health Organization (WHO), a significant proportion exceeding 50% of pharmaceuticals globally are prescribed, administered, and distributed in a manner that deviates from permissible standards. The escalating prevalence of gout contributes to an augmented likelihood of unreasonable medicine utilization. The study conducted by[3] at the Inpatient Installation of Deli Serdang Lubuk Pakam Hospital revealed a significant prevalence of drug misuse among patients with gout arthritis. Specifically, the right drug utilization rate was found to be 97.4%, while the accurate dosage administration rate was also 97.4%.

The improper utilization of pharmaceutical substances can have detrimental effects on patients about their clinical results.[4] Outcomes can serve as a method for evaluating health services, gauging patient adherence, and enhancing patients' quality of life.[5] The administration of the medicine in a sensible manner yields a result characterized by a decrease in reports of joint pain and inflammation, as well as a reduction in leg edema. The assessment of gout patients' clinical outcomes can also be conducted through the measurement of their uric acid levels.[6] In light of the aforementioned context, an investigation was undertaken to examine the correlation between pharmacological rationality and the therapeutic outcomes observed in patients with gout at RSI Siti Khadijah Palembang. The necessity of doing this research arises from the persistent issue of illogical medicine utilization among individuals diagnosed with gout. The implementation of a rational drug utilization strategy is imperative in order to get the desired therapeutic outcomes and enhance the overall quality of life for patients.

METHODS

This research used an observational analytic approach, with a cross-sectional design to investigate the association between rational medicine usage and clinical outcome in gout patients. The investigation encompassed the entire population of medical records belonging to patients diagnosed with gout in the Inpatient Installation of RSI Siti Khadijah Palembang. Data analysis used univariate and bivariate analysis. Univariate data analysis related to the rationality of the use of gout drugs including right diagnosis, right indication, right drug, right dose, right patient, right route of administration, right duration of administration, and alert for side effects. Calculation of the percentage of accuracy of each criterion is stated in the following formula:

$$\%\text{Accuraccy}=\frac{the\ amount\ of\ data\ criteria\ is\ right}{the\ total\ amount\ of\ data\ obtained}\text{x}100\%$$

Bivariate analysis to see the rational relationship between the use of gout medication and clinical outcomes in the form of uric acid levels and decreased pain levels. The statistical test used is the chi-square test to see whether or not there is a relationship between the two variables. According to[7], the chi-square test can be used when the expected value is more than 5 or a maximum of 20% total cells. If it does not meet the requirements, the fisher's exact test formula is used. The value of $p<0,05$ was considered statistically significant.

RESULTS AND DISCUSSION

The findings of this study were the acquisition of a sample of 32 medical records of individuals diagnosed with gout who met the specified inclusion criteria.

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The data pertaining to the characteristics of patients with gout are displayed in Table 1.

Table 1. Patient characteristics with gout based on gender, age, comorbidity, and/or complications

Characteristics		Total	Percentage
Gender	Male	21	65.63 %
	Female	11	34.38 %
Age	46-55 years (early elderly)	9	28.13 %
	56-65 years (late elderly)	10	31.25 %
	>65 years (seniors)	13	40.63 %
Comorbidity and or complications	Comorbidity		
	Hypertension	7	12.28%
	Type 2 DM	5	8.77%
	Dehydration Low intake (DLI)	5	8.77%
	Congestive Heart Failure (CHF)	4	7.02%
	Hypertensive heart disease (HHD)	4	7.02%
	Hyperlipidemia /dyslipidemia	4	7.02%
	Chronic Kidney Disease (CKD)	3	5.26%
	DM Nephropathy	3	5.26%
	Anemia	2	3.51%
	Gastroesophageal Reflux Disease	2	3.51%
	Cholelithiasis	2	3.51%
	Urinary Tract Infection (UTI)	1	1.75%
	Acute Kidney Injury (AKI)	1	1.75%
	Meniere Disease	1	1.75%
	Pulmonary TB	1	1.75%
	Gastritis	1	1.75%
	Osteoporosis	1	1.75%
	Cushing Syndrome	1	1.75%
	Complications Gout Nephropathy	6	10.53%
	Staghorn	1	1.75%
	Obstructive Uropathy	1	1.75%
	Septic Arthritis	1	1.75%
Total		57	100%

The study findings revealed a higher proportion of male patients diagnosed with gout (65.63%) compared to female patients (34.38%). There exists a greater susceptibility among males to the development of gout in comparison to females. These phenomena can be explained by the absence of the hormone estrogen in the male body. The estrogen hormone facilitates the excretion of uric acid via urine, hence contributing to the low incidence of gout in women. Nevertheless, it is important to note that women who have undergone menopause will encounter a decline in estrogen levels. Consequently, postmenopausal women face a similar risk as men in terms of developing gout.[8] The senior population (>65 years) exhibited the highest prevalence of gout sufferers. Gout predominantly affects individuals in the older population, with a relatively low incidence among individuals under the age of 60. The average age of onset for gout is typically between 65 and 75 years, and its prevalence tends to increase with advancing age. From a health standpoint, it is seen that as individuals age, degenerative processes take place. These processes involve a decline in cellular function, particularly in the kidneys, which may impede the excretion of uric acid. Hypertension was identified as the most common comorbidity among gout patients, affecting seven people and accounting for roughly 12.28% of the entire sample group. The presence of hypertension can lead to the development of microvascular illness, resulting in tissue ischemia. This ischemic condition then triggers an increase in the synthesis of uric acid by the breakdown of ATP into adenine and xanthine. Gout nephropathy is a prevalent condition associated with gout arthritis, primarily characterized by the accumulation of uric acid crystals within the renal tubules, leading to a decline in renal function.[9]

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Table 2. The profile of medication usage among gout patients at RSI Siti Khadijah Palembang

Drug Class	Medicine Name	Total	Percentage
Uric acid lowering therapy			
Xanthine Oxidase Inhibitors	Allopurinol	32	34%
Analgesic and Anti-inflammatory Therapy			
Colchicine	Colchicine	12	12.8%
Nonsteroidal Anti-inflammatory	Etoricoxib	7	7.45%
	Diclofenac Sodium	2	2.13%
	Meloxicam	2	2,13%
	Piroxicam	1	1.06%
	Mefenamic acid	1	1.06%
	Ketorolac	8	8.51%
	Ketoprofen	1	1.06%
Corticosteroids	Methylprednisolone	12	12.8%
	Dexamethasone	1	1.06%
Non-opioid Analgesics	Paracetamol	12	12.8%
Opioid Analgesics	Tramadol	3	3.19%
Total		**94**	**100%**

The treatment regimen for individuals with gout encompasses two categories of medications: those aimed at halting the acute inflammatory response and those targeting uric acid levels. The drug utilization patterns are presented in Table 2.

Allopurinol is commonly used as the initial pharmacological intervention for reducing uric acid levels, primarily achieved by the inhibition of xanthine oxidase enzymes.[2] Colchicine effectively mitigates pain and inflammation associated with gout, while maintaining the metabolic and secretory functions of the veins unaltered. Colchicine effectively binds to tubulins within leukocytes, thereby impeding their polymerization into microtubules. Consequently, this process leads to the suppression of leukocyte movement and phagocytosis.[10]

Nonsteroidal anti-inflammatory drugs (NSAIDs) are administered for the purpose of alleviating pain. The primary determinant of treatment success lies not in the selection of NSAIDs, but rather in the promptness of their administration. Nonsteroidal anti-inflammatory drugs (NSAIDs) are a class of medications that exert their therapeutic effects by inhibiting the enzyme cyclooxygenase (COX), hence suppressing inflammation. NSAIDs have been found to be efficacious in alleviating pain at modest dosages and mitigating inflammation, thereby affording relief to individuals afflicted with chronic joint conditions.[11] Methylprednisolone and dexamethasone are synthetic glucocorticoids that exhibit potent anti-inflammatory properties. Corticosteroids exert their anti-inflammatory effects by inhibiting several elements of the inflammatory cascade, hence mitigating manifestations such as edema, erythema, and nociception.[12] Paracetamol functions as a prostaglandin production inhibitor, hence exhibiting the ability to alleviate minor discomfort. The administration of tramadol, either alone or in combination with paracetamol, demonstrates a modest analgesic effect in individuals suffering from arthritis when compared to the use of a placebo. Tramadol is administered in cases where alternative analgesics fail to elicit a satisfactory therapeutic effect. Tramadol may be prescribed to those with renal impairment who are contraindicated for nonsteroidal anti-inflammatory drugs (NSAIDs).[12]

The rationality of drug use yielded the following outcomes: accurate diagnosis was achieved in 100% of cases, accurate

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indication for treatment was achieved in 100% of cases, patients received accurate treatment for acidity reduction in 100% of cases, and analgesic and anti-inflammatory therapy was administered with an accuracy rate of 93.55%. Furthermore, the prescribed medications were accurate in 100% of cases, the precise dosage for acid reduction therapy was achieved in 90.625% of cases, and the treatment of analgesics and anti-inflammatory drugs was accurate in 100% of cases. The administration route was correctly determined in 100% of cases, the correct duration of treatment was observed in 100% of cases, and precautions regarding side effects were taken in 100% of cases (Figure 2).

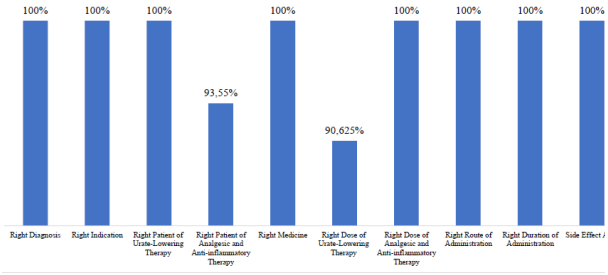

Figure 2. The rational use of urate-lowering therapy and analgesic and anti-inflammatory therapy in gout patients at RSI Siti Khadijah Palembang

The analysis yielded a percentage accuracy of 93.55% in relation to patients who had analgesic and anti-inflammatory medication. Inaccuracies were observed in four patients. The drug administered to the patient is highly efficacious, although it may not be the most risk-free option available. The presence of errors was observed in two individuals diagnosed with gout and concomitant Hypertensive Heart Disease (HHD) who were administered etoricoxib. Additional abnormalities were observed in individuals with gout who also had a concurrent medical condition known as Congestive Heart Failure (CHF) and were on treatment with a nonsteroidal anti-inflammatory drug (NSAID) called ketorolac. It is recommended to refrain from or terminate the utilization of nonsteroidal anti-inflammatory drugs (NSAIDs) in individuals diagnosed with heart failure. Patients with Chronic Kidney Disease (CKD) are also advised against the use of Ketorolac. The utilization of alternative pharmaceuticals that are not contraindicated is recommended as a means to address the issue of inappropriate treatment of patients, hence preventing the exacerbation of their condition.[13] The analysis yielded a percentage accuracy of 90.625% in the decrease of uric acid with dosage treatment. The study observed dosing errors in three patients. This is due to the administration of a dosage of allopurinol that is beyond the recommended threshold for individuals with renal impairment who are suffering from gout. Table 3 presents the statistical analysis results pertaining to the reasonableness of employing acidity reduction medication for the purpose of managing uric acid levels in individuals diagnosed with gout.

Table 3. Analysis correlation between the rationality of urate-lowering therapy on uric acid levels of gout patients at RSI Siti Khadijah Palembang

Rationality	Uric Acid Levels		*p**
	Achieved	Not achieved	
Rational	25	3	0.015
Irrational	1	3	
Total	**26**	**6**	

The table presented above illustrates that a total of 26 patients successfully achieved the desired uric acid level, whereas 6 patients failed to get the target normal uric acid level. The statistical analysis yielded a p-value of 0.015 ($p<0.05$), indicating a significant association between the rationality of acidity reduction drug utilization in patients with gout and the clinical outcome of reduced acidity levels. The calculated odds ratio is 25, with a 95% confidence interval ranging from 1,932 to 323,553. This indicates that a rational acid reduction therapy is much more effective in reducing acidity compared to an irrational therapy, with a magnitude of 25 times. The findings of this study align with the research conducted by[14], which shown that

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patients who received rational therapy achieved clinical outcomes of 88.89% and 97.78%. Furthermore, a significant association was observed between the rationality of treatment and the clinical results.

Table 4 displays the statistical analysis findings pertaining to the reasonableness of employing analgesic and anti-inflammatory medicines in managing pain levels among individuals diagnosed with gout.

Table 4. Analysis correlation between the rationality of analgesic and anti-inflammatory therapy on the pain level of gout patients at RSI Siti Khadijah Palembang

Rationality	Pain Level		*p**
	No Pain	Mild Pain	
Rational	27	1	0.035
Irrational	2	2	
Total	**29**	**3**	

The table presented above displays the distribution of pain scales across patients. It indicates that a total of 29 patients reported a pain scale of 0, indicating the absence of pain, while 3 patients reported a pain scale of 2, indicating mild pain. The study yielded a p-value of 0.035 ($p<0.05$), indicating a statistically significant association between the rationality of analgesic and anti-inflammatory therapy usage and the level of pain experienced by individuals with gout. The odds ratio of 27 is derived from the Confidence Interval (95%) of 1.646 – 442.833. This indicates that rational analgesics and anti-inflammation therapy are significantly more successful, with a 27-fold increase, in alleviating pain in patients with Gout compared to irrational alternatives. The findings presented here align with the study conducted by[15] which establishes a relationship between the rationality of pain medication usage and the severity of pain reported by patients. Specifically, the majority (69.8%) of individuals diagnosed with osteoarthritis received pain medication in a rational manner. Furthermore, 67.4% of these patients reported experiencing moderate pain, while 16.6% reported mild pain.

CONCLUSION

The proper use of pharmacological medicines has the ability to effectively lower both uric acid levels and pain severity in patients diagnosed with gout.

Conflict of Interest

The authors declare no conflict of interest.

Authors' Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

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