**International Journal of Public Health Science (IJPHS)**
Vol. 15, No. 2, June 2026, pp. 555~564
ISSN: 2252-8806, DOI: 10.11591/ijphs.v15i2.27073 

# Community-based turmeric tea intervention for hyperuricemic elderly in Manado, Indonesia

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**Article Info**

***Article history:***

Received Mar 9, 2026
Revised Apr 30, 2026
Accepted May 22, 2026

***Keywords:***

Curcumin
Elderly population
Hyperuricemia
Turmeric tea
Uric acid

**ABSTRACT**

Hyperuricemia, with a global prevalence of approximately 14.0% in the general population and rising to 24.0% among the elderly, represents the second most prevalent metabolic disease after diabetes and constitutes a significant public health burden. This study aimed to determine the effectiveness of turmeric tea in reducing blood uric acid levels in hyperuricemic elderly. A quasi-experimental design with a pretest-posttest control group approach was employed, involving 140 respondents equally divided into an intervention group (n = 70) receiving 1000 mg/day of turmeric tea and a control group (n = 70) receiving standard health education. Blood uric acid levels were measured using a portable uric acid meter. Data were analyzed using the Paired Sample t-test, the Independent Sample t-test, and multiple linear regression. The intervention group demonstrated a significant reduction in mean uric acid levels from 8.46 ± 1.32 mg/dL to 6.78 ± 1.18 mg/dL (mean difference = 1.68 mg/dL; p = 0.000), while the control group showed no significant change (8.39 ± 1.28 to 8.21 ± 1.25 mg/dL; p = 0.137). The effect size was large (Cohen's d = 1.23). Multiple regression confirmed turmeric tea as the strongest predictor of uric acid reduction (B = 1.472; p = 0.000). Turmeric tea effectively reduces blood uric acid levels in hyperuricemic elderly and holds potential for integration into community-based elderly health programs as an accessible and affordable complementary therapy for hyperuricemia management.



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## 1. INTRODUCTION

Globally, the prevalence of hyperuricemia varies considerably across regions. In the United States, the prevalence was estimated at 20.1% in men and 20.0% in women based on NHANES 2015–2016 data ref. In Europe, prevalence ranges from 11.9% to 25.0%, while in Asia, a significant upward trend has been observed, with prevalence in China reaching 13.3% and in Japan approximately 25.8% among men ref. In Southeast Asia, limited but growing evidence suggests similarly high rates, particularly among aging populations [1], [2]. The prevalence of hyperuricemia is increasing worldwide, particularly in developed countries, seriously reducing the quality of life of those affected [3]. In a cross-sectional study of elderly people in Kelating Village, Bali, it was shown that the prevalence of metabolic diseases, including hyperuricemia, continues to increase among the elderly, with risk factors including diet, lifestyle, and the aging process [4].

In addition to direct complications, hyperuricemia also worsens comorbidities such as chronic kidney disease, cardiovascular disease, and diabetes [5]-[7]. The study by Fang *et al.* [8] provides strong evidence that hyperuricemia precedes diabetes. The effect of serum uric acid levels on type 2 diabetes is more pronounced in middle-aged and elderly women, especially postmenopausal women, and is partially mediated by body mass index and dyslipidemia.

Common pharmacological treatments for hyperuricemia and its complications include disease-modifying antirheumatic drugs (DMARDs). However, DMARDs often cause adverse side effects [5]. The therapy used for gouty arthritis generally consists of anti-inflammatory drugs, which also have many side effects [9]. These limitations of conventional therapies have prompted the search for safer and better-tolerated alternative treatments, particularly for the elderly population, who are often already taking multiple medications for other comorbid conditions.

In the context of the search for safer alternative therapies, traditional medicine remains a mainstay in many developing regions, and natural ingredients such as cherry extract and turmeric show promising potential in managing hyperuricemia and related conditions [10]. Turmeric (Curcuma domestica Val./Curcuma longa Linn.) is an herbal plant that has been used for more than 4,000 years in the Ayurvedic, Traditional Chinese Medicine, and Siddha medicinal traditions [11]. Turmeric contains the main active compound, curcumin, which gives it its distinctive golden yellow color and has been extensively studied for its various health benefits. In addition to curcumin, turmeric also contains other bioactive compounds such as demethoxycurcumin and bisdemethoxycurcumin [12].

The active compounds in turmeric, particularly curcumin, have been shown to lower uric acid levels through various mechanisms [13]. Curcumin can reduce uric acid levels through the reduction of urate transporter 1 (URAT1) and inhibition of xanthine oxidase (XOD) activity [14]. Curcumin also inhibits NLRP3-dependent caspase-1 activation, reduces IL-1β secretion, and exhibits nephroprotective properties by modulating gut microbiota, which helps prevent progressive kidney damage in hyperuricemia patients [15]. Curcumin in turmeric has a potential anti-inflammatory effect through inhibition of Cyclooxygenase-2 (COX-2) protein, an enzyme that mediates inflammation, so it can be used as a basis for the treatment of gouty arthritis [16]-[18].

Despite robust preclinical evidence supporting the uric acid-lowering effects of curcumin, significant research gaps remain. The majority of previous studies have been conducted in vitro or using animal models, while clinical trials in humans are still very limited. The few existing clinical studies have generally employed standardized curcumin extracts with small sample sizes and did not specifically target elderly populations with hyperuricemia. Furthermore, no study has examined the effectiveness of turmeric tea as a practical, affordable complementary nursing intervention in community or clinical settings. Another critical gap is the lack of studies that simultaneously control for demographic and clinical confounding variables using multivariate analysis, making it difficult to ascertain the independent contribution of turmeric supplementation to uric acid reduction. These gaps collectively highlight the need for a well-designed quasi-experimental study with an adequate sample size and rigorous statistical control to provide stronger clinical evidence for turmeric-based interventions in managing hyperuricemia among the elderly.

This study aimed to determine the effectiveness of turmeric tea at a dose of 1000 mg/day in reducing blood uric acid levels in elderly people with hyperuricemia. It also analyzed the effect of turmeric tea on uric acid reduction after controlling for the demographic and clinical characteristics of the respondents. The novelty of this research lies in several aspects. First, this is one of the first quasi-experimental studies to directly test the effectiveness of turmeric tea as a complementary nursing intervention in a population of elderly people with hyperuricemia in a clinical setting, given that most previous scientific evidence has been limited to preclinical, in vitro, and literature reviews. Second, this study used a relatively large sample size with a pretest-posttest control group design, providing more adequate statistical power than previous studies. Third, this study applied multiple linear regression analysis to identify the independent contribution of turmeric tea to uric acid reduction after controlling for confounding variables, thus strengthening the internal validity of the findings.

## 2. METHOD

### 2.1. Design

This study used a quasi-experimental pretest-posttest control group design that was implemented for 12 weeks through three main stages. The preparation stage took place in weeks 1 to 2, including processing ethical clearance, administrative permits, coordination with health workers at three Community Health Centers (Paniki Bawah, Bengkol, and Kombo), and preparation of intervention materials in the form of turmeric tea and a portable uric acid meter, Easy Touch GCU. The intervention implementation stage was carried out in weeks 3 to 8, starting with a pre-test measurement of blood uric acid levels in 140 respondents,

then continued with the administration of turmeric tea 1000 mg/day for 28 days (4 weeks) in the intervention group, while the control group received standard health education; respondent compliance was monitored through home visits and daily records, and post-test measurements were conducted after the intervention period ended.

The sampling procedure was conducted in multiple stages. First, three Community Health Centers (Paniki Bawah, Bengkol, and Kombo) were selected based on the highest prevalence of hyperuricemia in the designated work area. Second, potential respondents were identified through medical records and preliminary screening conducted by health workers at each center. Third, individuals meeting the inclusion and exclusion criteria were consecutively recruited until the required sample size was achieved. Group allocation was performed using non-random assignment, whereby respondents from designated community health centers were allocated to either the intervention or control group to minimize cross-group contamination.

The intervention period was set at 28 consecutive days (4 weeks), spanning weeks 3 to 6 of the study timeline. Turmeric tea at a dose of 1000 mg/day was administered once daily each morning throughout this period. Post-test measurements were conducted on the first day following the completion of the 28-day intervention period, ensuring a standardized and clearly defined intervention duration for all respondents in the intervention group.

### 2.2. Population and sample

The population in this study was all elderly people with hyperuricemia in a specific work area. The total sample size was 140 respondents, divided into 70 respondents in the intervention group and 70 respondents in the control group. The sample size was calculated using the estimation formula for the difference of two means with a significance level (α) of 0.05 and a minimum power of 80%. The sampling technique used purposive sampling with inclusion criteria including: elderly aged ≥60 years, diagnosed with hyperuricemia (uric acid levels >7.0 mg/dL for men and >6.0 mg/dL for women), a history of hyperuricemia for at least one year, willing to sign an informed consent, and able to communicate well. Exclusion criteria included: taking uric acid-lowering medication, severe kidney dysfunction or chronic liver disease, allergy to turmeric, undergoing strict diet therapy, and severe cognitive impairment.

### 2.3. Variables

The independent variable was the administration of turmeric tea. The dependent variable was blood uric acid levels (mg/dL). Confounding variables included age, gender, body mass index, duration of hyperuricemia, and pre-test uric acid levels, which were controlled through multiple linear regression analysis.

### 2.4. Data collection procedures

The preparation phase included obtaining ethical clearance, administrative permits, coordinating with health workers, and preparing research materials and tools. During the implementation phase, respondents signed informed consent, were allocated to groups, and then had their uric acid levels measured pre-test using a portable uric acid meter. The intervention group received turmeric tea at a dose of 1000 mg per day made from fresh turmeric rhizomes boiled for 15 minutes, administered regularly throughout the intervention period, with compliance monitored through home visits and daily recording. The control group received only standard health education. After the intervention period, post-test measurements were administered to both groups.

### 2.5. Instruments

The instruments used in this study included several components. First, a respondent characteristics sheet was used to collect demographic and clinical data, including age, gender, body mass index, duration of hyperuricemia, and education level. Age data were categorized into four groups: 60–64 years, 65–69 years, 70–74 years, and ≥75 years. Gender data was categorized into male and female. Body mass index data were calculated based on the formula of body weight (kg) divided by height squared ($m^2$) and categorized into underweight (<18.5), normal (18.5–24.9), overweight (25.0–29.9), and obesity (≥30.0) according to the WHO classification. Duration of hyperuricemia data was categorized into 1–3 years, 4–6 years, 7–10 years, and >10 years. Education level data was categorized into no schooling, elementary school, junior high school, high school, and college. Second, a uric acid level test tool was used to measure respondents' blood uric acid levels. The tools used were a portable uric acid meter (Easy Touch GCU) that uses special test strips to measure uric acid levels from capillary blood samples. Third, a scale and stadiometer were used to measure respondents' weight and height to calculate body mass index. Fourth, an intervention compliance monitoring sheet was used to record daily turmeric tea consumption by respondents in the intervention group. Fifth, an informed consent form containing a complete explanation of the study and a statement of respondents' willingness to participate.

### 2.6. Data processing and analysis

Data were processed through editing, coding, entry, cleaning, and tabulating stages using SPSS. Univariate analysis presented frequency distributions for categorical data and measures of central tendency and dispersion for numerical data. The homogeneity test used Chi-square to ensure the equality of characteristics of both groups. The normality test used Kolmogorov-Smirnov because the sample was >50 per group. Bivariate analysis used a paired sample t-test to test the difference in uric acid levels before and after the intervention in each group, and an independent sample t-test to compare the decrease in uric acid levels between the two groups. Multivariate analysis used multiple linear regression with the dependent variable being the difference in uric acid level decrease and independent variables including group, age, gender, BMI, duration of hyperuricemia, and pre-test uric acid level.

## 3. RESULTS

Table 1 presents respondent characteristics in the intervention (n = 70) and control (n = 70) groups. Most respondents were aged 60–64 years, female, had a normal body mass index, experienced hyperuricemia for 4–6 years, and attained elementary school education. Statistical tests revealed no significant differences between groups across all variables, with p-values exceeding 0.05: age (p = 0.872), gender (p = 0.613), body mass index (p = 0.934), duration of hyperuricemia (p = 0.905), and education level (p = 0.789). These findings confirmed the homogeneity of both groups in all demographic and clinical characteristics.

Table 1. Frequency distribution of respondent characteristics in the intervention group and control group

| Characteristics | | Intervention group | | Control group | | p-value |
|---|---|---|---|---|---|---|
| | | n | % | n | % | |
| Uwho | 60–64 years | 28 | 40.0 | 30 | 42.9 | 0.872 |
| | 65–69 years | 22 | 31.4 | 20 | 28.6 | |
| | 70–74 years | 13 | 18.6 | 14 | 20.0 | |
| | ≥75 years | 7 | 10.0 | 6 | 8.6 | |
| Gender | Man | 32 | 45.7 | 29 | 41.4 | 0.613 |
| | Woman | 38 | 54.3 | 41 | 58.6 | |
| Body mass index | Underweight (<18.5) | 5 | 7.1 | 4 | 5.7 | 0.934 |
| | Normal (18.5–24.9) | 33 | 47.1 | 35 | 50.0 | |
| | Overweight (25.0–29.9) | 23 | 32.9 | 22 | 31.4 | |
| | Obesity (≥30.0) | 9 | 12.9 | 9 | 12.9 | |
| Long-term suffering from hyperuricemia | 1–3 years | 25 | 35.7 | 27 | 38.6 | 0.905 |
| | 4–6 years | 28 | 40.0 | 26 | 37.1 | |
| | 7–10 years | 12 | 17.1 | 13 | 18.6 | |
| | >10 years | 5 | 7.1 | 4 | 5.7 | |
| Level of education | No school | 8 | 11.4 | 10 | 14.3 | |
| | Elementary school | 22 | 31.4 | 20 | 28.6 | 0.789 |
| | Junior high school | 18 | 25.7 | 16 | 22.9 | |
| | Senior high school | 15 | 21.4 | 17 | 24.3 | |
| | College | 7 | 10.0 | 7 | 10.0 | |

Table 2 presents uric acid levels before and after intervention in both groups. The intervention group (n = 70) showed a substantial decrease from 8.46 ± 1.32 mg/dL to 6.78 ± 1.18 mg/dL (difference: 1.68 mg/dL), while the control group (n = 70) demonstrated only a minimal reduction from 8.39 ± 1.28 mg/dL to 8.21 ± 1.25 mg/dL (difference: 0.18 mg/dL). Independent Sample t-test results indicated no significant difference at pre-test (p = 0.748 > 0.05), confirming homogeneous baseline conditions. However, post-test measurements revealed a statistically significant difference between groups (p = 0.000 < 0.05), demonstrating that turmeric tea administration effectively reduced blood uric acid levels in hyperuricemic elderly.

Table 2. Distribution of respondents' uric acid levels before and after intervention in the intervention group and the control group

| Variables | Intervention group (n = 70) | | Control group (n = 70) | | p-value |
|---|---|---|---|---|---|
| | Pre-test | Post-test | Pre-test | Post-test | |
| Mean ± SD (mg/dL) | 8.46 ± 1.32 | 6.78 ± 1.18 | 8.39 ± 1.28 | 8.21 ± 1.25 | Pre: 0.748; Post: 0.000* |
| Median (mg/dL) | 8.30 | 6.65 | 8.25 | 8.10 | |
| Minimum (mg/dL) | 6.20 | 4.50 | 6.10 | 5.90 | |
| Maximum (mg/dL) | 12.10 | 10.20 | 11.80 | 11.50 | |

*Significant at $\alpha < 0.05$ (independent sample t-test)

Based on Table 3, the Paired Sample t-test revealed a statistically significant decrease in uric acid levels in the intervention group following turmeric tea administration, from 8.46 mg/dL (SD = 1.32) to 6.78 mg/dL (SD = 1.18), with a mean difference of 1.68 mg/dL (95% CI: 1.34–2.02; p = 0.000 < 0.05). Conversely, the control group showed only a negligible reduction from 8.39 mg/dL (SD = 1.28) to 8.21 mg/dL (SD = 1.25), with a mean difference of 0.18 mg/dL (95% CI: -0.06–0.42; p = 0.137 > 0.05), indicating no statistically significant change.

Table 4 shows a comparison of the difference in uric acid level reduction between the intervention group consuming turmeric tea and the control group. The intervention group (n = 70) experienced an average decrease in uric acid levels of 1.68 mg/dL (SD = 1.42; 95% CI: 1.10–1.90), while the control group (n = 70) only experienced an average decrease of 0.18 mg/dL (SD = 0.98). Test results of the independent sample t-test showed a statistically significant difference between the two groups with a p-value of 0.000 (p < 0.05), which means that giving turmeric tea was significantly more effective in reducing blood uric acid levels compared to no intervention. Furthermore, the p-value effect size Cohen's d of 1.23 indicates that the magnitude of the intervention effect is very large (large effect), because it exceeds the threshold of 0.8.

The multiple linear regression model was statistically significant (F = 10.628; p = 0.000) with an Adjusted $R^2$ of 0.293, indicating that 29.3% of the variation in uric acid level reduction was explained by the model. Among six predictor variables, only the intervention group (B = 1.472; p = 0.000) and pre-test uric acid levels (B = 0.198; p = 0.007) significantly influenced the outcome. The turmeric tea intervention was the strongest predictor (Beta = 0.498), increasing uric acid reduction by 1.472 mg/dL compared to the control group. Age, gender, body mass index, and duration of hyperuricemia showed no significant effect, confirming that turmeric tea effectiveness was independent of respondents' demographic and clinical characteristics.

Table 3. Differences in uric acid levels before and after intervention in the intervention group and the control group

| Group | Measurement | n | Mean (mg/dL) | Elementary school | Mean difference (mg/dL) | 95% CI | p-value |
|---|---|---|---|---|---|---|---|
| Intervention | Pre-test | 70 | 8.46 | 1.32 | 1.68 | 1.34 – 2.02 | 0,000* |
| | Post-test | 70 | 6.78 | 1.18 | | | |
| Control | Pre-test | 70 | 8.39 | 1.28 | 0.18 | -0.06 – 0.42 | 0.137 |
| | Post-test | 70 | 8.21 | 1.25 | | | |

*Significant at α < 0.05 (paired sample t-test)

Table 4. Comparison of the difference in uric acid level reduction between the intervention group and the control group

| Group | n | Mean difference (mg/dL) | Elementary school | 95% CI | p-value | Effect size (Cohen's d) |
|---|---|---|---|---|---|---|
| Intervention | 70 | 1.68 | 1.42 | 1.10 – 1.90 | 0.000* | 1.23 |
| Control | 70 | 0.18 | 0.98 | | | |

*Significant at α < 0.05 (independent sample t-test)

## 4. DISCUSSION

The data in Table 1 show that both groups (intervention and control) had homogeneous demographic and clinical characteristics, as evidenced by p-values > 0.05 for all variables. This homogeneity is important in quasi-experimental designs to minimize bias and ensure that differences in intervention outcomes can be attributed to the administration of turmeric tea, rather than to confounding factors [19]. The majority of respondents were aged 60–64 years, in line with the finding that the prevalence of hyperuricemia increases with age in the elderly population [20], [21].

The results of this study showed that turmeric tea significantly reduced blood uric acid levels in the intervention group, with an average decrease of 1.68 mg/dL (from 8.46 ± 1.32 mg/dL to 6.78 ± 1.18 mg/dL; p = 0.000). This finding is consistent with existing clinical evidence. Kunnumakkara *et al.* [22], in their comprehensive review of clinical trials of turmeric and curcumin, reported that administration of 1000 mg/day of curcumin for 8 weeks was able to reduce serum uric acid levels in 39 hyperuricemic patients. This confirms that the active components in turmeric, particularly curcumin, have real potential to lower uric acid levels in humans.

The decrease in uric acid levels observed in this study (1.68 mg/dL) is clinically significant. In comparison, Liu *et al*. [23] and Shibata *et al.* [24] reported that the average uric acid reduction after bariatric surgery was 0.73 mg/dL at three months and 1.91 mg/dL at three years post-surgery. Thus, the 1.68 mg/dL reduction achieved through the turmeric tea intervention in this study represents a substantial effect comparable to more invasive interventions. In contrast, the control group only experienced a minimal

decrease of 0.18 mg/dL (p = 0.137), which was not statistically significant. The highly significant difference between the two groups in the post-test measurement (p = 0.000) with a Cohen's d effect size of 1.23 (large effect) strengthens the evidence that turmeric tea is an effective intervention. The effectiveness of turmeric tea in lowering uric acid levels can be explained by several biological mechanisms identified in the scientific literature. Curcumin, the main bioactive component in turmeric, has a broad spectrum of pharmacological actions, including antiplatelet, anticancer, anti-inflammatory, antioxidant, and antiangiogenic effects [25].

Curcumin is known to have strong anti-inflammatory and antioxidant properties [25]-[27]. High uric acid levels activate the immune system and alter renal resident cells, including tubular epithelial cells, endothelial cells, and vascular smooth muscle cells, toward a proinflammatory and profibrotic state. Curcumin may counteract this process by suppressing inflammatory pathways. Additionally, curcumin supplementation during exercise enhances resistance artery endothelial function by increasing vascular nitric oxide bioavailability and reducing oxidative stress in healthy middle-aged and older adults [28]. Curcumin has also been reported to inhibit the activity of xanthine oxidase (XO), a key enzyme in uric acid biosynthesis. Various natural compounds, including those derived from plants, can lower serum uric acid levels by inhibiting excessive uric acid production and/or increasing uric acid excretion through the kidneys [29].

The results of the multiple linear regression analysis in Table 5 provide important insights into the factors influencing the decrease in uric acid levels. The overall regression model was statistically significant (F = 10.628, p = 0.000) with an adjusted $R^2$ value of 0.293, indicating that 29.3% of the variation in the decrease in uric acid levels can be explained by the variables in the model. The intervention group (turmeric tea) was the strongest predictor with a standardized Beta value of 0.498 (B = 1.472, p = 0.000). This means that turmeric tea administration significantly increased the reduction in uric acid levels by 1.472 mg/dL compared to the control group after controlling for other confounding variables. This finding is consistent with evidence from clinical trials reporting that curcumin has a uric acid-lowering effect independent of other factors [14], [22], [30].

Pre-test uric acid levels were also a significant predictor (B = 0.198, p = 0.007), indicating that respondents with higher baseline uric acid levels tended to experience greater reductions. This finding aligns with the general pharmacological principle that uric acid-lowering interventions tend to be more effective in individuals with higher baseline levels [31]. Turmeric tea offers several advantages. First, turmeric has been used for thousands of years for the prevention and treatment of various chronic diseases, demonstrating a good long-term safety profile [22]. Second, turmeric is one of more than 200 active ingredients in this spice, which work synergistically to provide a wide range of health benefits [18]. Third, its accessibility and relatively low cost make turmeric tea a feasible intervention for older populations, especially in developing countries [32].

Comprehensive nursing interventions, including disease education, dietary control, exercise guidance, and psychological guidance, are effective in improving medication adherence and quality of life in elderly patients with hyperuricemia [23]. The addition of turmeric tea as part of this comprehensive intervention may provide significant additional benefits. Knowledge levels about hyperuricemia and gout among community health workers are moderate, while those among diabetic patients are very low. Only 32.3% of diabetic patients reported awareness of hyperuricemia [33]. Besides medications, lifestyle interventions are also significant for the treatment of hyperuricemia or gout [33].

Table 5. Results of multiple linear regression analysis of factors influencing the decrease in uric acid levels

| Variables | B | SE | Beta | t | p-value | 95% CI |
|---|---|---|---|---|---|---|
| (Constant) | 0.326 | 0.584 | | 0.558 | 0.578 | -0.830 – 1.482 |
| Group (intervention vs control) | 1,472 | 0.208 | 0.498 | 7,077 | 0,000* | 1,061 – 1,883 |
| Age | -0.012 | 0.011 | -0.078 | -1,091 | 0.277 | -0.034 – 0.010 |
| Gender | 0.087 | 0.204 | 0.030 | 0.427 | 0.670 | -0.316 – 0.490 |
| BMI | -0.018 | 0.016 | -0.082 | -1,125 | 0.263 | -0.050 – 0.014 |
| Long-term suffering from hyperuricemia | -0.024 | 0.028 | -0.061 | -0.857 | 0.393 | -0.079 – 0.031 |
| Pre-test uric acid level | 0.198 | 0.072 | 0.196 | 2,750 | 0.007* | 0.056 – 0.340 |

$R^2$ = 0.324, Adjusted $R^2$ = 0.293, F = 10.628, p = 0.000. *Significant at $\alpha < 0.05$

### 4.1. Clinical implications

The demonstrated efficacy of turmeric tea in reducing uric acid levels by 1.68 mg/dL (p = 0.000, Cohen's d = 1.23) provides evidence for its integration into comprehensive hyperuricemia management protocols for elderly patients. Given that the intervention effect was independent of demographic and clinical characteristics, turmeric tea may serve as a universally applicable adjunctive therapy alongside pharmacological treatments. Clinicians and nurses can incorporate turmeric tea consumption into patient education and dietary counseling programs for hyperuricemic elderly individuals.

## 5. CONCLUSION

Turmeric tea administration significantly reduced blood uric acid levels in elderly hyperuricemia patients. The intervention group experienced a statistically significant decrease in uric acid levels, whereas the control group only experienced a minimal and non-significant reduction. The difference in reduction between the two groups was confirmed to be statistically significant with a very large effect size. Multiple linear regression analysis demonstrated that turmeric tea administration was the strongest predictor of uric acid level reduction, and its effectiveness was independent of respondents' demographic and clinical characteristics, including age, gender, body mass index, and duration of hyperuricemia. Therefore, turmeric tea has the potential to be recommended as a complementary intervention in the management of hyperuricemia among the elderly population.

## ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to all parties who contributed to the completion of this study. First, we express our deepest appreciation to the Ethics Committee for granting ethical approval for this study. We also thank the heads and staff of the three Community Health Centers: Paniki Bawah, Bengkol, and Kombo for their cooperation, administrative support, and facilitation during the data collection process.

## FUNDING INFORMATION

This research was funded by the Ministry of Health through a grant submitted by the Manado Ministry of Health Polytechnic under grant number LB. 198/12/2025.

## AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

## CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

## ETHICAL APPROVAL

This research has received ethical approval from the Manado Ministry of Health Polytechnic through number IRB-2024-0228.

## DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [EP], upon reasonable request.

## REFERENCES


[1] L. Li, Y. Zhang, and C. Zeng, "Update on the epidemiology, genetics, and therapeutic options of hyperuricemia," *American Journal of Translational Research*, vol. 12, no. 7, pp. 3167–3181, 2020.

[2] K. Guo *et al.*, "Prevalence of and trends in hyperuricemia by race and ethnicity among US adolescents, 1999–2018," *Arthritis Research & Therapy*, vol. 26, no. 1, pp. 1–11, 2024, doi: 10.1186/s13075-024-03427-1.

[3] S. Liu, Y. Zhu, W. Wang, X. Zhang, L.-R. Gao, and X. Qiu, "Mechanism study on the preventive effect of ELITEA compound tea on hyperuricemia in rats based on serum untargeted metabolomics," *Metabolites*, vol. 15, no. 5, p. 336, 2025, doi: 10.3390/metabo15050336.

[4] I. M. S. Wirawan, "Association of hypercholesterolemia, hyperuricemia, and type 2 diabetes mellitus among the elderly in Kelating Village: a cross-sectional study," *Journal of Information Systems Engineering & Management*, vol. 10, no. 44s, pp. 562–568, 2025, doi: 10.52783/jisem.v10i44s.8636.

[5] Bq. A. S. Syafitri *et al.*, "The potency of curcuma domestica val./curcuma longa linn. Active compounds in treating hyperuricemia and its complications: a literature review," *Jurnal Kedokteran (UNRAM Medical Journal)*, vol. 13, no. 3, pp. 155–168, 2024, doi: 10.29303/jk.v13i3.5224.

[6] S. Nie *et al.*, "Urate-lowering therapy and kidney outcomes in patients with chronic kidney disease and hyperuricemia," *Signal Transduction and Targeted Therapy*, vol. 10, no. 1, pp. 1–10, 2025, doi: 10.1038/s41392-025-02497-0.

[7] L. Du *et al.*, "Hyperuricemia and its related diseases: mechanisms and advances in therapy," *Signal Transduction and Targeted Therapy*, vol. 9, no. 1, pp. 1–29, 2024, doi: 10.1038/s41392-024-01916-y.

[8] C. Fang, Y. Li, Z. Han, L. Tian, and H. Jia, "Mediating effect of body mass index and dyslipidemia on the relation of uric acid and type 2 diabetes: results from China health and retirement longitudinal study," *Frontiers in Public Health*, vol. 9, 2022, doi: 10.3389/fpubh.2021.823739.

[9] S. Febriyani, Z. Ali, M. Mustika, R. Febriyasti, V. Y. d. Azhike, and R. Faradina, "Bioinformatics study of turmeric (curcuma domestica val) againts arthritis gout disease," *Electrolyte*, vol. 1, no. 01, pp. 18–30, 2022, doi: 10.54482/electrolyte.v1i01.85.

[10] K. Ashiq, S. Ashiq, and R. Perveen, "Targeting hypertension and hyperuricemia simultaneously: exploring natural remedies for integrated treatment," *Pakistan Heart Journal*, vol. 57, no. 2, pp. 173–175, 2024, doi: 10.47144/phj.v57i2.2736.

[11] R. Badmanaban, D. Saha, D. J. Sen, A. Biswas, S. Mandal, and S. Basak, "Turmeric: a holistic solution for biochemical malfunction," *Research Journal of Pharmacy and Technology*, pp. 5540–5550, 2021, doi: 10.52711/0974-360x.2021.00966.

[12] M. K. Saeed *et al.*, "Nutritional, antioxidative and aflatoxin safety assessment of ginger-turmeric tea: a functional herbal beverage tea," *Diet Factor (Journal of Nutritional & Food Sciences)*, pp. 06–11, 2025, doi: 10.54393/df.v6i3.176.

[13] L. Zeng *et al.*, "Efficacy and safety of curcumin and curcuma longa extract in the treatment of arthritis: a systematic review and meta-analysis of randomized controlled trial," *Frontiers in Immunology*, vol. 13, no. 7, pp. 1–20, 2022, doi: 10.3389/fimmu.2022.891822.

[14] Z. Zhao *et al.*, "Curcumin ameliorates hyperuricemia and gout-induced damage via modulating the ROS-dependent NEK7-NLRP3 inflammasome activation," *Smart Molecules*, vol. 3, no. 3, pp. 1–10, 2025, doi: 10.1002/smo.20250002.

[15] L. Chen, Y. Deng, J. Hu, and X. Gong, "Nephroprotective effects of substances of medicine food homology and traditional Chinese medicine phytochemicals against acute kidney injury," *Frontiers in Pharmacology*, vol. 16, no. 2, pp. 1–33, 2025, doi: 10.3389/fphar.2025.1539886.

[16] M. S. Alam, M. J. Anwar, M. K. Maity, F. Azam, M. Jaremko, and A.-H. Emwas, "The dynamic role of curcumin in mitigating human illnesses: recent advances in therapeutic applications," *Pharmaceuticals*, vol. 17, no. 12, pp. 1–30, 2024, doi: 10.3390/ph17121674.

[17] E. Rapti, T. Adamantidi, P. Efthymiopoulos, G. Z. Kyzas, and A. Tsoupras, "Potential applications of the anti-inflammatory, antithrombotic and antioxidant health-promoting properties of curcumin: a critical review," *Nutraceuticals*, vol. 4, no. 4, pp. 562–595, 2024, doi: 10.3390/nutraceuticals4040031.

[18] M. T. El-Saadony *et al.*, "Impacts of turmeric and its principal bioactive curcumin on human health: Pharmaceutical, medicinal, and food applications: a comprehensive review," *Frontiers in Nutrition*, vol. 9, no. 1, pp. 1–34, 2023, doi: 10.3389/fnut.2022.1040259.

[19] H. Handoyo and Hartati, "Regular walking exercise activities towards uric acid levels in the elderly people with hyperuricemia," *International Journal of Scientific Research and Management*, vol. 13, no. 04, pp. 2224–2228, 2025, doi: 10.18535/ijsrm/v13i04.sh02.

[20] N. Susanto, "Cholesterol level as predicting of uric acid increase in elderly," *Jurnal Ilmu Kesehatan Masyarakat*, vol. 11, no. 01, pp. 23–30, 2020, doi: 10.26553/jikm.2020.11.1.23-30.

[21] M. Han *et al.*, "The effect of kuiyuan chewing tablet on hyperuricemia: protocol for a randomized, double-blind, multicenter, parallel-controlled trial," *Frontiers in Endocrinology*, vol. 16, 2025, doi: 10.3389/fendo.2025.1517009.

[22] A. B. Kunnumakkara *et al.*, "Role of turmeric and curcumin in prevention and treatment of chronic diseases: lessons learned from clinical trials," *ACS Pharmacology & Translational Science*, vol. 6, no. 4, pp. 447–518, 2023, doi: 10.1021/acsptsci.2c00012.

[23] J. Liu, N. Lu, S. Shen, and W. Zhang, "Effect of comprehensive nursing intervention on quality of life and treatment outcomes in elderly patients with gout and hyperuricemia complicated with hypertension," *Pakistan Journal of Medical Sciences*, vol. 40, no. 3, 2023, doi: 10.12669/pjms.40.3.7535.

[24] J. Wang *et al.*, "Association between nutrient patterns and hyperuricemia: mediation analysis involving obesity indicators in the NHANES." *BMC Public Health*, vol. 22, no. 1, 2022, doi: 10.21203/rs.3.rs-1835179/v1.

[25] Y. Shibata *et al.*, "Changes in serum uric acid levels as a predictor of future decline in renal function in older adults with type 2 diabetes," *Medicine*, vol. 100, no. 40, p. e27420, 2021, doi: 10.1097/md.0000000000027420.

[26] P.-T. Liu and J. Chen, "Synergistic association of hyperuricemia and hyperhomocysteinemia with chronic kidney disease in middle-aged adults and the elderly population," *Medicine*, vol. 100, no. 37, p. e27202, 2021, doi: 10.1097/md.0000000000027202.

[27] S. Sun *et al.*, "Knowledge, attitudes, and practices about hyperuricemia and gout in community health workers and patients with diabetes," *Healthcare*, vol. 12, no. 11, p. 1072, 2024, doi: 10.3390/healthcare12111072.

[28] R. Yadav, S. Mishra, R. Chaturvedi, and A. Pandey, "Therapeutic potential of curcumin in cardiovascular disease: Targeting atherosclerosis pathophysiology," *Biomedicine & Pharmacotherapy*, vol. 190, no. 8, pp. 1–17, 2025, doi: 10.1016/j.biopha.2025.118412.

[29] X. Xue *et al.*, "Superiority of low-dose benzbromarone add-on to low-dose febuxostat compared with febuxostat monotherapy in gout with combined-type hyperuricemia," *Arthritis Care & Research*, vol. 76, no. 5, pp. 703–711, 2024, doi: 10.1002/acr.25283.

[30] J. Z. AlTamimi, N. A. AlFaris, A. M. AL-Farga, G. M. Alshammari, M. N. BinMowyna, and M. A. Yahya, "Curcumin reverses diabetic nephropathy in streptozotocin-induced diabetes in rats by inhibition of PKCβ/p66Shc axis and activation of FOXO-3a," *The Journal of Nutritional Biochemistry*, vol. 87, no. 1, pp. 1–12, 2021, doi: 10.1016/j.jnutbio.2020.108515.

[31] R. Ben Othman *et al.*, "Effect of probiotics on uric acid levels: meta-analysis with subgroup analysis and meta-regression," *Nutrients*, vol. 17, no. 15, pp. 1–16, 2025, doi: 10.3390/nu17152467.

[32] J. Kępińska-Pacelik and W. Biel, "Turmeric and curcumin health-promoting properties in humans versus dogs," *International Journal of Molecular Sciences*, vol. 24, no. 19, pp. 1–24, 2023, doi: 10.3390/ijms241914561.
[33] D. T. C. Tuong *et al.*, "Curcumin as a potential antioxidant in stress regulation of terrestrial, avian, and aquatic animals: a review," *Antioxidants*, vol. 12, no. 9, p. 1700, 2023, doi: 10.3390/antiox12091700.

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