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Nutrition and Health Insights

Literature Review

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# Relation between high purine intake and hiperurisemia in pre-elderly to late elderly ages

## *Hubungan asupan purin tinggi dengan hiperurisemia pada usia pra-lansia hingga lansia akhir*

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**Abstract**

The prevalence of joint disease in pre-elderly to late elderly ages is quite high (30.3%) and is generally caused by a high purine diet. The purpose of this scoping review is to discuss the relationship between a high purine diet and the incidence of hyperuricemia in the elderly. Methods: Researchers used the scoping review method using academic journals published from 2020 to 2024. The literature was searched using Google Scholar electronic database. Researchers used the following search terms: Asam urat OR Hiperurisemia AND lansia OR elderly AND makanan tinggi purin OR high purine intake AND observasional OR observasional crossectional case control. A total of 93 studies were identified and 9 studies were included in this review. Results: Based on nine journal articles, researchers obtained information regarding the relationship between high purine diet and the incidence of hyperuricemia in the elderly showing varied results in several regions of Indonesia. Most of the journal articles obtained stated that there was an association between a high purine diet and the incidence of hyperuricemia in the elderly. Conclusions: Elderly people who consume foods high in purines can increase uric acid levels in the body so it is necessary to adjust their diet, especially limiting foods that are high in purines.
**Keywords:** Hyperurisemia, high purin intake, elderly

**Abstrak**

Prevalensi penyakit sendi pada usia pra lansia hingga lansia akhir cukup tinggi (30,3%) dan umumnya disebabkan oleh pola makan tinggi purin. Tujuan dari kajian ini adalah untuk membahas hubungan antara pola makan tinggi purin dengan kejadian hiperurisemia pada lansia. Metode: Penulis menggunakan metode scoping review dengan menggunakan jurnal akademik yang diterbitkan dari tahun 2020 hingga 2024. Literatur ditelusuri menggunakan basis data elektronik Google Scholar. Penulis menggunakan istilah pencarian berikut: Asam urat ATAU Hiperurisemia DAN lansia ATAU lanjut usia DAN makanan tinggi purin ATAU asupan purin tinggi DAN observasional ATAU observasional crossectional case control, sebanyak 93 studi diidentifikasi dan 9 studi dimasukkan dalam tinjauan ini. Hasil: Berdasarkan 9 artikel jurnal, penulis memperoleh informasi mengenai hubungan antara pola makan tinggi purin dengan kejadian hiperurisemia pada lansia yang menunjukkan hasil yang bervariasi di beberapa daerah di Indonesia. Sebagian besar artikel jurnal yang diperoleh menyatakan bahwa terdapat hubungan antara pola makan tinggi purin dengan kejadian hiperurisemia pada lansia. Kesimpulan: Lansia yang banyak mengonsumsi makanan tinggi purin dapat meningkatkan kadar asam urat sehingga perlu pengaturan pola makan terutama membatasi makanan yang tinggi purin.
**Kata Kunci:** Hiperurisemia, asupan purin tinggi, lansia

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## Introduction



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One of the common health problems experienced by the elderly is elevated uric acid levels. Uric acid is a normal component found in the blood and urine. It is produced from the breakdown and metabolic waste of certain purine-containing foods or from purine nucleotides synthesized by the body. Uric acid is the end product of purine catabolism in the body. Catabolism is a metabolic process in which complex substrates are broken down into smaller molecules. Uric acid levels are closely related to both purine production and purine intake from the diet. Purines that have been catabolized in the body are ultimately converted into uric acid. Normal uric acid levels range from 3.4 to 7.0 mg/dL in men and 2.4 to 5.7 mg/dL in women.[1,2]

According to the World Health Organization (WHO) in 2022, the prevalence of hyperuricemia is approximately 30% in Europe and 27% in North America, with even higher prevalence observed in Southeast Asia and New Zealand. In 2022, the number of people affected by high uric acid levels reached 355 million globally, meaning 1 in 6 individuals worldwide is affected. In Indonesia, the highest prevalence of non-communicable diseases among adults and the elderly is joint disorders (30.3%), exceeding the prevalence of hypertension (29.8%), stroke (8.3%), asthma (3.5%), heart disease (3.2%), diabetes (1.1%), and tumors (4.3%). The prevalence of joint disorders in the age group 55–64 years is 45.0%, 65–74 years is 51.9%, and in those aged ≥75 years it reaches 54.8%. The most common joint diseases among the elderly include gout arthritis, osteoarthritis, and rheumatoid arthritis.[3,4]

Elevated uric acid levels can lead to the accumulation and crystallization of urate in the joint spaces, disrupting joint structures and causing inflammation and joint pain. Hyperuricemia is also a known risk factor for various cardiovascular diseases, including hypertension.[3] Health complications resulting from high uric acid levels include impaired kidney function, reduced range of motion, and pain during movement. Repeated gout attacks may cause permanent damage, leading to complications such as tophi, joint deformities, kidney disease, heart disease, cataracts, dry eyes, and uric acid crystal deposition in the lungs.

In general, elevated uric acid levels are largely attributed to dietary patterns. Some individuals who follow a plant-based diet may consume specific plant-derived foods (e.g., certain legumes like soy products, seaweed, and brassica vegetables) that also contain high purine content.[1]

Other contributing factors to hyperuricemia include overweight, age, physical activity, gender, medication use, and underlying medical history.[1] Elderly individuals are particularly susceptible to deficiency in the enzyme hypoxanthine-guanine phosphoribosyltransferase (HGPRT), which plays a role in converting purines into purine nucleotides. A deficiency in HGPRT leads to increased purine levels in the body, which may result in elevated uric acid concentrations.

Since high-purine dietary patterns are a major cause of hyperuricemia in the elderly, the purpose of this scoping review is to explore and discuss the relationship between high-purine diets and the incidence of hyperuricemia among older adults.

## Methods

### Study Design and Framework

Figure 1 presents the flow diagram based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR), illustrating the publication flow from the initial search through the final study selection.

This study design was used to identify the relationship between purine intake and the incidence of hyperuricemia in the elderly population. The primary focus of this research includes: What is the magnitude of the hyperuricemia problem in the elderly? What are the health impacts of elevated uric acid levels? Does a high-purine diet influence the incidence of hyperuricemia?

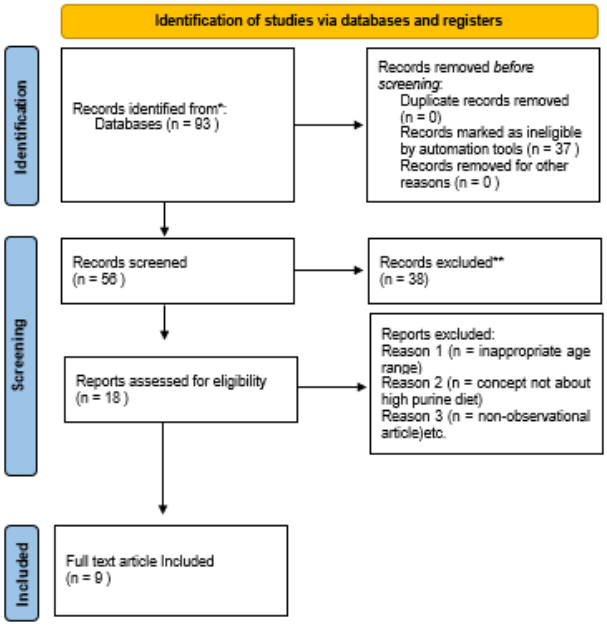


**Figure 1.** Flow Chart

### Identification of Relevant Studies

Academic journal articles were obtained through Google Scholar. All full-text accessible articles published between 2020 and 2024 in English and Indonesian were thoroughly searched. The review included observational study designs such as cross-sectional and case-control studies, focusing on elderly individuals experiencing hyperuricemia as a result of high-purine diets.

**Study Selection**

After a detailed review process, studies were selected based on the following inclusion criteria: 1) The study population included pre-elderly to late-elderly adults aged 45–80 years. 2) The study addressed the prevalence of hyperuricemia in the elderly. 3) It examined the relationship between purine intake and hyperuricemia in the elderly. 4) It identified risk factors associated with hyperuricemia. 5) It described the health impacts of elevated uric acid levels.

The primary search terms included: “Asam urat” OR “Hyperuricemia” AND “Lansia” OR “Elderly” AND “Makanan tinggi purin” OR “High purine intake” AND “Observational” OR “Observational cross-sectional” OR “Case control”. Key search terms: "asam urat", "lansia", "makanan tinggi purin", "observasional", "hiperurisemia", "elderly", "high purine intake", "observational", "cross-sectional", "case control".

**Data Charting**

After completing the initial database screening to identify entries relevant to the research topic, a more detailed filtering process was conducted. This involved applying specific inclusion criteria to select studies relevant to the research objective, while exclusion criteria were used to eliminate studies that did not meet the standards or were considered irrelevant. This two-step filtering ensured that only the most relevant and high-quality information was retained for further analysis.

**Participant Criteria**

Studies were included based on the following participant-related criteria: 1) Subjects were pre-elderly to elderly adults (ages 45–80). 2) Articles were published in English or Indonesian. 3) The articles were review-based and contained relevant data.

Studies were excluded if they: 1) Focused on populations outside the specified age range. 2) Were unrelated to high-purine dietary patterns. 3) Were not observational in design.

All journal articles that passed the screening process were included in the final scoping review analysis. Collating, Summarizing, and Reporting Results The findings were summarized by presenting the country of origin, study design, participant characteristics, and cases identified. Further analyses were conducted to examine hyperuricemia, purine intake, and the relationship between both variables in elderly individuals.

## Result and Discussion

During the initial search stage, the authors identified 93 potentially relevant titles. After a final screening process, nine journal articles were selected, as illustrated in Figure 1. This study summarizes the relationship between high-purine diets and the incidence of hyperuricemia in elderly individuals, as presented in Table 1. Based on these nine articles, the findings reveal that the association between purine-rich dietary patterns and hyperuricemia varies across different regions of Indonesia.

Below is a summary of several key studies: Mauliyana (2020) conducted a case-control study involving 82 elderly individuals, 41 of whom had hyperuricemia. Among them, 31 respondents were identified as having a high-risk purine intake. The results demonstrated that obesity, physical inactivity, and high-purine food intake were major risk factors.[7] Rudyana et al. (2023) reported contrasting findings in a cross-sectional study with 78 elderly participants, 48 of whom exhibited elevated uric acid levels. This study, conducted at Padasuka Public Health Center, did not find a statistically significant relationship between dietary patterns or physical activity and uric acid levels.[8]

Maimuna et al. (2024) examined 86 elderly individuals in Kendek and Bone Baru Villages, identifying a significant correlation between high-purine diets and uric acid levels. Among the 41 participants with elevated uric acid, 34 were found to consume high-purine diets.[6] Ramli et al. (2020) also discovered a significant association between high-purine food consumption and uric acid levels among 44 elderly respondents at Malili Public Health Center. Fifteen participants with high-purine dietary patterns exhibited abnormal uric acid levels.[1] In Cianjur, Nurmala et al. investigated 45 elderly individuals and found a statistically significant relationship between high-purine diets and increased uric acid levels ($p = 0.005$).[2] Junaidin et al. studied 60 elderly individuals at Toili II Public Health Center, reporting a strong correlation between the consumption of purine-rich foods and the occurrence of hyperuricemia.[9]

Hariyono et al. evaluated 88 elderly participants and found a significant impact of high-purine diets on uric acid levels.[7] Saputra et al. conducted research involving 42 gout patients and concluded that both dietary patterns and physical activity significantly influenced the development of hyperuricemia.[34] Panggalissani assessed 73 elderly participants, with 42 showing elevated uric acid levels and 31 having normal levels. Influencing factors identified included age, sex, food intake, and physical activity.[5]

Overall, most of the reviewed studies confirmed a positive relationship between high-purine dietary patterns and hyperuricemia in elderly individuals. However, one study also highlighted the role of other contributing factors, such as physical activity and medical history, in influencing uric acid levels.

**Table 1.** Overview of research on high purine intake and hyperuricemia in the elderly

| No. | Author(s) | Year | Title | Design | Sample Size | Key Findings |
|---|---|---|---|---|---|---|
| 1 | Ramli et al. | 2020 | Relationship Between Purine-Rich Food Consumption and Uric Acid Levels in the Elderly | Cross-sectional | 44 elderly | Significant relationship between high-purine food intake and uric acid levels. |
| 2 | Nurmala et al. | 2020 | Relationship Between High-Purine Food Consumption and Uric Acid Levels in the Elderly in Cianjur | Cross-sectional | 45 elderly | Significant relationship; p = 0.005. |
| 3 | Maimuna et al. | 2024 | Relationship Between High-Purine Diet and Uric Acid Levels in the Elderly | Cross-sectional | 86 elderly | 41 with high uric acid; 34 followed high-purine diet. |
| 4 | Rudyana et al. | 2023 | Relationship of Diet and Physical Activity with Uric Acid Levels in the Elderly | Cross-sectional | 78 elderly | No significant relationship found. |
| 5 | Panggalissani | 2020 | Factors Affecting Uric Acid Levels in the Elderly at Malalayang Health Center | Cross-sectional | 73 elderly | 42 with high uric acid; factors: age, sex, diet, physical activity. |
| 6 | Saputra et al. | 2021 | Relationship Between Diet and Physical Activity with Hyperuricemia in Gout Patients | Cross-sectional | 42 patients | Diet and physical activity affect hyperuricemia occurrence. |
| 7 | Mauliyana | 2020 | Risk Factors for Hyperuricemia in the Elderly in Palembang | Case-control | 82 elderly | Obesity, inactivity, and high-purine diet are major risk factors. |
| 8 | Hariyono et al. | 2020 | Effect of High-Purine Diet on Uric Acid Levels in the Elderly | Cross-sectional | 88 elderly | Significant effect of high-purine diet on uric acid levels. |
| 9 | Junaidin et al. | 2021 | Relationship Between Types of High-Purine Foods and Uric Acid in the Elderly | Cross-sectional | 60 elderly | Strong relationship between purine-rich foods and uric acid levels. |

This study highlights the relationship between high-purine dietary patterns and the incidence of hyperuricemia in the elderly. Purines are compounds that, when broken down in the body, produce uric acid. In individuals whose kidneys are unable to efficiently excrete uric acid, urate crystals may accumulate in the joints, leading to inflammation.[9] Excessive purine consumption triggers crystal buildup, causing inflammation, endothelial dysfunction, and renin-angiotensin system activation, all of which contribute to hypertension.[3] Uric acid is a metabolic byproduct of purine metabolism and is commonly found in foods such as meat, organ meats, legumes, and seafood. Elevated uric acid levels, known as hyperuricemia, can lead to the deposition of urate crystals in joints, causing inflammatory arthritis or gout. Consumption of high-purine foods, including red meat, organ meats, and seafood, is a major contributor to increased uric acid levels.[2]

Hyperuricemia occurs due to excessive accumulation of uric acid in the body, which may result from increased production, decreased renal excretion, or excessive intake of purine-rich foods. This condition leads to acute joint inflammation, commonly known as gout arthritis, and can eventually cause chronic joint damage and renal dysfunction.[9] Factors influencing uric acid levels include age, sex, physical activity, high-purine food intake, and medical history. Individuals who consume high-purine foods are more likely to experience elevated uric acid levels. In addition, a history of diseases such as hypertension and gout, particularly among elderly individuals taking medications that affect uric acid excretion, further contributes to hyperuricemia.[5]

In the study by Junaidin et al., an unhealthy diet characterized by the consumption of purine-rich foods—such as anchovies, legumes, and water spinach—was shown to increase uric acid levels. Conversely, respondents who followed healthier dietary habits and avoided purine-rich foods were less likely to experience elevated uric acid.[9] This is consistent with the findings of Andi Mauliyana (2020), who reported that consuming high-purine vegetables such as cassava leaves, spinach, water spinach, legumes, and seafood contributes to increased uric acid levels.[7]

Physical activity also plays an important role in regulating uric acid levels. Participants with low levels of physical activity were more likely to have high uric acid levels due to reduced renal excretion. In contrast, those who engaged in moderate or vigorous activity tended to maintain normal uric acid levels. Physical activity enhances uric acid excretion by increasing lactate production, which facilitates uric acid clearance. A sedentary lifestyle, therefore, raises the risk of hyperuricemia, while regular exercise combined with a healthy diet can help reduce uric acid levels and prevent joint pain caused by crystal accumulation.[6]

Elderly individuals are more susceptible to hyperuricemia due to declining kidney function with age, often compounded by poor dietary control.[9] Those who adhere to healthy eating habits are more likely to maintain normal uric acid levels. However, excessive physical exertion may increase lactate production, which paradoxically may impair uric acid excretion.[4] Even when elderly individuals maintain a healthy diet, age-related decline in organ function can make it more difficult to regulate purine metabolism.[1] Elderly individuals who excessively consume purine-rich foods are at high risk of developing elevated uric acid levels, which may lead to gout attacks. Therefore, adopting a low-purine diet, along with structured dietary management and a healthy lifestyle, is strongly recommended to prevent hyperuricemia in older adults.[2]

In conclusion, implementing a healthy eating pattern that limits high-purine foods can effectively help prevent and reduce the risk of hyperuricemia in the elderly.[9]

## Conclusion

Overall, the majority of studies demonstrate a significant relationship between high-purine dietary patterns and the incidence of hyperuricemia in the elderly. Several studies also highlight the role of physical activity and other contributing factors. Therefore, appropriate dietary choices among older adults are essential for the prevention and management of hyperuricemia.

This review also addresses the association between physical activity and uric acid levels in elderly individuals. Based on the findings, the promotion of healthy eating behaviors should be prioritized as a public health strategy to reduce the risk of hyperuricemia in aging populations.

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## Authors' Contributions

The authors contributed to the research process, including planning, data collection, data analysis, and manuscript writing.

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