

FAKTOR-FAKTOR YANG BERHUBUNGAN DENGAN KADAR ASAM URAT PADA LANSIA DI PUSKESMAS BERSERI PANGKALAN KERINCI

FACTORS ASSOCIATED WITH URIC ACID LEVELS IN THE ELDERLY AT BERSERI PANGKALAN KERINCI HEALTH CENTER

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ABSTRAK

Latar Belakang: Kadar asam urat pada lansia dipengaruhi oleh berbagai faktor, termasuk indeks massa tubuh (IMT), pola makan, dan faktor genetik. Di wilayah kerja Puskesmas Berseri Pangkalan Kerinci terdapat 798 lansia dan 148 di antaranya menderita asam urat. Tujuan: Mengetahui faktor-faktor yang berhubungan dengan kadar asam urat pada lansia di Puskesmas Berseri Pangkalan Kerinci. Metode: Penelitian kuantitatif analitik observasional dengan desain cross-sectional dilaksanakan pada 15 November–10 Desember 2025. Populasi sebanyak 148 orang dan sampel 108 responden yang dipilih dengan purposive sampling. Data dikumpulkan menggunakan kuesioner dan pemeriksaan kadar asam urat, kemudian dianalisis menggunakan uji Chi-Square. Ethical clearance: nomor tidak tercantum dalam dokumen sumber. Hasil: Sebanyak 62 responden (57,4%) bukan obesitas, 76 (70,4%) memiliki pola makan rendah purin, 59 (54,6%) tidak memiliki riwayat genetik, dan 57 (52,8%) memiliki kadar asam urat normal. Terdapat hubungan IMT ($p=0,008$) dan pola makan ($p=0,007$) dengan kadar asam urat. Tidak terdapat hubungan genetik dengan kadar asam urat ($p=0,307$). Kesimpulan: IMT dan pola makan berhubungan dengan kadar asam urat pada lansia, sedangkan faktor genetik tidak menunjukkan hubungan yang signifikan. Temuan ini dapat menjadi dasar bagi pelayanan keperawatan di tingkat puskesmas untuk memperkuat edukasi pengendalian berat badan dan pola makan pada lansia. Pendekatan edukasi perlu menekankan pemilihan makanan, pengendalian berat badan, aktivitas fisik, dan pemantauan kadar asam urat secara berkala sesuai kebutuhan lansia.

Kata Kunci: BMI; Dietary Pattern; Elderly; Genetics; Uric Acid

ABSTRACT

Background: Uric acid levels in older adults are influenced by several factors, including body mass index (BMI), dietary patterns, and genetic factors. In the working area of Berseri Pangkalan Kerinci Health Center, 798 older adults were recorded and 148 had uric acid problems. Objective: To identify factors associated with uric acid levels among older adults at Berseri Pangkalan Kerinci Health Center. Methods: A quantitative analytic observational study with a cross-sectional design was conducted from November 15 to December 10, 2025. The population consisted of 148 people, and 108 respondents were selected using purposive sampling. Data were collected using questionnaires and uric acid measurements and analyzed using the Chi-Square test. Ethical clearance: the number was not stated in the source document. Results: Sixty-two respondents (57.4%) were non-obese, 76 (70.4%) had a low-purine diet, 59 (54.6%) had no genetic history, and 57 (52.8%) had normal uric acid levels. BMI ($p=0.008$) and dietary pattern ($p=0.007$) were significantly associated with uric acid levels, whereas genetics was not ($p=0.307$). Conclusion: BMI and dietary pattern were associated with uric acid levels among older adults, while genetic factors were not significantly associated. These findings may support nursing services at the primary care level in strengthening education on weight control and healthy dietary patterns among older adults. Education should emphasize food selection, weight management, physical activity, and periodic monitoring of uric acid levels according to older adults' needs.

Keywords: BMI; Dietary Pattern; Elderly; Genetics; Uric Acid

INTRODUCTION

Hyperuricemia is a metabolic condition characterized by an increased level of uric acid in the blood due to an imbalance between urate production and excretion. This condition may increase the risk of monosodium urate crystal formation in tissues, potentially leading to gout and joint disorders. In older adults, elevated uric acid levels require attention because the aging process may be accompanied by changes in renal function, metabolism, and an increased prevalence of comorbidities that affect uric acid regulation (Du et al., 2024; S. Wen et al., 2024).

Hyperuricemia has a multifactorial etiology involving metabolic, behavioral, and genetic factors. Body mass index (BMI) is one of the indicators of nutritional status associated with metabolic conditions. Obesity may contribute to increased uric acid levels through insulin resistance, changes in purine metabolism, and impaired renal urate excretion. Therefore, weight management is a relevant approach to preventing increased uric acid levels, particularly among older adults (Du et al., 2024).

In addition to nutritional status, dietary patterns also play a role in regulating uric acid levels. Consumption of foods containing high amounts of purines may increase uric acid production through purine metabolism. However, the relationship between dietary patterns and hyperuricemia is not determined solely by one type of food, but also by overall dietary patterns and individual metabolic characteristics. The meta-analysis by Wen et al. (2024) demonstrated an association between dietary patterns and the risk of hyperuricemia, while Chi et al. (2024) identified several dietary factors associated with hyperuricemia and gout. These findings emphasize the importance of nutritional education approaches that consider overall dietary patterns. Genetic factors also contribute to variations in uric acid levels through mechanisms regulating urate transport in the kidneys and intestines. Variations in genes encoding urate transporters, including SLC2A9 and ABCG2, may affect the processes of uric acid reabsorption and excretion. Nevertheless, genetic predisposition does not always result in the manifestation of hyperuricemia because of its interaction with environmental factors, metabolic status, dietary patterns, and other health conditions (Leask et al., 2024; Du et al., 2024).

Based on data from Berseri Pangkalan Kerinci Health Center, there are 798 older adults, with 148 recorded as having uric acid problems. These data indicate that uric acid problems remain a concern in healthcare services for older adults. However, the available data do not specifically describe the factors associated with uric acid levels, particularly based on body mass index (BMI), consumption patterns of high-purine foods, and family history. Therefore, further investigation is needed to obtain an overview of the factors associated with uric acid levels among older adults in the working area of Berseri Pangkalan Kerinci Health Center.

Several previous studies have identified metabolic factors, dietary patterns, and genetic factors as aspects associated with uric acid levels. Nevertheless, research findings regarding genetic factors still show varied results. Furthermore, local empirical evidence analyzing the associations of BMI, consumption patterns of high-purine foods, and family history simultaneously with uric acid levels among older adults in primary healthcare facilities remains limited. Differences in population characteristics and risk factor patterns across regions may also result in variations in research findings. Therefore, this study was conducted to analyze the factors associated with uric acid levels among older adults at Berseri Pangkalan Kerinci Health Center, particularly BMI, consumption patterns of high-purine foods, and family history. The findings of this study are expected to serve as a consideration in developing promotive and preventive efforts to control uric acid levels among older adults.

METHODS

This study was a quantitative study using an observational analytical approach with a cross-sectional design. The study was conducted in the working area of the UPT Berseri Pangkalan Kerinci Health Center, Pelalawan Regency, in November–December 2025. The study population consisted of 148 older adults recorded as having uric acid problems based on healthcare service data from Berseri Pangkalan Kerinci Health Center. The study sample consisted of 108 respondents selected using a purposive sampling technique based on the inclusion and exclusion criteria established by the researcher. The independent variables in this study included body mass index, dietary patterns, and genetic history, while the dependent variable was uric acid levels. Data collection was conducted using questionnaires, anthropometric measurements, and uric acid examinations. BMI measurement was performed by measuring respondents' body weight and height, followed by calculating BMI using the formula of body weight in kilograms divided by the square of height in meters. The measurement results were categorized into obese and non-obese based on the classification thresholds used in the research protocol. Dietary patterns were assessed using a questionnaire regarding the consumption of purine-containing foods, which were then categorized into high-purine and low-purine dietary patterns. Genetic

history was obtained through interviews regarding the presence of a family history of uric acid problems and was categorized as present or absent. Uric acid levels were examined using a uric acid testing device and categorized as high or normal based on the threshold values established in the research protocol. Data were analyzed using univariate analysis to describe the distribution of respondent characteristics and research variables. Bivariate analysis was performed using the Chi-Square test to determine the associations between the independent and dependent variables. The magnitude of association was presented using the Prevalence Odds Ratio (POR) along with 95% confidence intervals. This study adhered to the principles of health research ethics under Ethical Approval Number: 265/STIKes-T.MHRT/KEP/XII/2025.

RESULTS

Table 1. Respondent Characteristics

Characteristics	Category	n	%
Sex	Male	66	61,1
	Female	42	38,9
Highest Educational	Elementary School	25	23,1
	Junior High School	39	36,1
	Senior High School	44	40,7
Occupation	Private Sector Employee	6	5,6
	Entrepreneur	20	18,5
	Farmer	31	28,7
	Unemployed	51	47,2

Source: Research Data 2025

Based on Table 1, the majority of respondents were male, accounting for 66 individuals (61,1%). The most common level of education was senior high school, with 44 respondents (40,7%), while the majority of respondents were unemployed, totaling 51 individuals (47,2%).

Table 2. Distribution of Study Variables

Variable	Category	n	%
BMI	Obese	46	42,6
	Non-obese	62	57,4
Dietary Pattern	High-purine	32	29,6
	Low-purine	76	70,4
Genetic Factors	Present	49	45,4
	Absent	59	54,6
Uric Acid Levels	Elevated	51	47,2
	Normal	57	52,8

Source: Research Data 2025

Based on Table 2, the majority of respondents were non-obese, totaling 62 individuals (57.4%), had a low-purine dietary pattern, totaling 76 individuals (70.4%), had no family history of hyperuricemia, totaling 59 individuals (54.6%), and had normal uric acid levels, totaling 57 individuals (52.8%).

Table 3. Association Between BMI and Uric Acid Levels

BMI	Elevated Uric Acid n (%)	Normal Uric Acid n (%)	Total	p-value	POR (95% CI)
Obese	29 (63,0)	17 (37,0)	46	0,008	3,102 (1,403–6,965)
Non-obese	22 (35,5)	40 (64,5)	62		
Total	51 (47,2)	57 (52,8)	108		

Source: Research Data 2025

Based on Table 3, there was a significant association between BMI and uric acid levels ($p=0,008$). Respondents with obesity had a higher proportion of elevated uric acid levels (63,0%) compared to those who were non-obese (35,5%). The POR of 3.102 (95% CI:1,403–6,965) indicates that obese respondents had higher odds of having elevated uric acid levels.

Table 4. Association Between Dietary Patterns and Uric Acid Levels

Dietary Pattern	Elevated Uric Acid n (%)	Normal Uric Acid n (%)	Total	p-value	POR (95% CI)
High-purine	22 (68,8)	10 (31,3)	32	0,007	3,566 (1,480–8,589)
Low-purine	29 (38,2)	47 (61,8)	76		
Total	51 (47,2)	57 (52,8)	108		

Source: Research Data 2025

Based on Table 4, there was an association between dietary patterns and uric acid levels ($p=0,007$). The proportion of elevated uric acid levels was higher among respondents with a high-purine diet (68,8%) than among those with a low-purine diet (38,2%). The POR of 3,566 (95% CI: 1,480–8,589) indicates a greater likelihood of elevated uric acid levels among respondents with a high-purine diet.

Table 5. Association Between Genetic Factors and Uric Acid Levels

Genetic Factors	Elevated Uric Acid n (%)	Normal Uric Acid n (%)	Total	p-value	POR (95% CI)
Present	20 (40,8)	29 (59,2)	49	0,307	0,623 (0,290–1,339)
Absent	31 (52,5)	28 (47,5)	59		
Total	51 (47,2)	57 (52,8)	108		

Source: Research Data 2025

Based on Table 5, there was no significant association between genetic factors and uric acid levels ($p=0,307$). Among respondents with a genetic history, 40,8% had elevated uric acid levels, while the proportion was 52,5% among those without a genetic history. The POR of 0,623 (95% CI: 0,290–1,339) indicates that the association was not statistically significant.

DISCUSSION

Association Between BMI and Uric Acid Levels

The results showed a significant association between body mass index (BMI) and uric acid levels among older adults at Berseri Health Center, Pangkalan Kerinci. Of the 108 respondents, 46 (42,6%) were classified as obese, while 62 (57,4%) were non-obese. In the obese group, 29 respondents (63,0%) had elevated uric acid levels, whereas in the non-obese group, 40 respondents (64,5%) had normal uric acid levels. The Chi-Square test yielded a p-value of 0,008, indicating a statistically significant association between BMI and uric acid levels. The POR of 3,102 (95% CI: 1,403–6,965) indicates that older adults with obesity had 3,102 times the odds of having elevated uric acid levels compared with non-obese older adults. This finding suggests that nutritional status based on BMI is one aspect that needs to be considered in controlling uric acid levels among older adults.

The association between obesity and uric acid levels can be explained by the interplay among adipose tissue, purine metabolism, insulin resistance, and uric acid excretion. Uric acid is the end product of purine metabolism in humans. Blood uric acid levels are influenced by the balance between its production and elimination, primarily through the kidneys. When uric acid production increases or its excretion is impaired, uric acid levels may rise (S. Wen et al., 2024). Du et al (2024) explained that hyperuricemia is associated with various metabolic factors and uric acid regulatory processes, including uric acid transport mechanisms in the kidneys. Thus, obesity may be associated with increased uric acid levels through several metabolic pathways, not merely as a result of increased physical body weight.

Physiologically, increased adipose tissue may be associated with impaired insulin sensitivity. Insulin resistance may affect uric acid regulation through changes in metabolic processes and renal excretion. These metabolic conditions may make it difficult for the body to maintain uric acid balance. Fu et al (2024) found an association between BMI and uric acid levels in adults, although this association was not always linear. This finding indicates that the relationship between body weight and uric acid levels may be influenced by Individual characteristics and other accompanying metabolic factors. Therefore, the significant association between obesity and uric acid levels among older adults in this study should be understood as an association within the population studied, rather than as evidence that obesity directly causes increased uric acid levels in every individual (Duan et al., 2023).

The findings of this study are also consistent with those of Han et al (2024) who analyzed the association between visceral fat accumulation and the risk of hyperuricemia among older adults. Their

study showed that visceral fat accumulation was associated with the risk of hyperuricemia in older adults. These results strengthen the understanding that body fat distribution and accumulation are important aspects of the relationship between obesity and uric acid levels. Han et al (2024) also emphasized that obesity cannot be assessed solely through BMI, because BMI represents the relationship between body weight and height but does not directly indicate body fat distribution. In the context of Debora's study, BMI remains a practical indicator that can be used in primary healthcare services, although waist circumference or other adiposity indicators may provide additional information when available.

The study by Liu et al (2024) on the association between adiposity indices and hyperuricemia among middle-aged and older adults also highlighted the importance of considering sex and age characteristics in the relationship between adiposity and uric acid levels. This is relevant to the present study because the respondents were older adults, who may have different metabolic conditions and body compositions compared with younger age groups. In older age, changes in body composition, decreased muscle mass, an increased proportion of body fat, and the possible presence of comorbidities may affect the interpretation of BMI (Prado et al., 2024). Therefore, the findings indicate that obesity based on BMI is associated with uric acid levels, but the assessment of older adults should still consider their overall clinical condition and metabolic status.

The POR of 3,102 indicates the odds ratio of elevated uric acid levels between the obese and non-obese groups. However, this value cannot be directly interpreted as obesity increasing the risk of the outcome by 3,102 times, because this study used a cross-sectional design and measured exposure and uric acid status at the same time. In addition, the 95% confidence interval of 1,403–6,965 does not include one, supporting the presence of a statistically significant association. Nevertheless, other factors may also be associated with uric acid levels, such as dietary patterns, physical activity, kidney function, medication use, and comorbidities. These factors need to be considered to avoid overinterpreting the association between BMI and uric acid levels.

Based on the data distribution, most respondents were non-obese, and most had normal uric acid levels, namely 57 respondents (52,8%). In the obese group, the proportion of respondents with elevated uric acid levels reached 63,0%, whereas in the non-obese group, the proportion with normal uric acid levels reached 64,5%. This difference in distribution indicates a tendency for elevated uric acid levels to be more frequently found among obese respondents. This pattern supports the statistical test results, which showed an association between BMI and uric acid levels.

In nursing services at the Health Center, these findings have implications for the assessment and health education of older adults. Weight and height measurements can be performed as part of routine examinations and subsequently used to determine BMI and identify older adults who require education regarding weight management. Education should not focus solely on weight reduction but also on maintaining nutritional status appropriate to the needs of older adults. Physical activity may be recommended according to each individual's abilities and health condition. This approach should be implemented gradually, taking into account the risk of falls, mobility limitations, comorbidities, and functional status of older adults. Thus, these findings support the importance of BMI monitoring as part of promotive and preventive efforts to control uric acid levels (Yurista et al., 2023).

Association Between Dietary Patterns and Uric Acid Levels

The results showed a significant association between dietary patterns and uric acid levels among older adults at Berseri Health Center, Pangkalan Kerinci. Of the 108 respondents, 32 (29,6%) had a high-purine dietary pattern, while 76 (70,4%) had a low-purine dietary pattern. Among respondents with a high-purine dietary pattern, 22 (68,8%) had elevated uric acid levels. Conversely, among respondents with a low-purine dietary pattern, 47 (61,8%) had normal uric acid levels. The Chi-Square test yielded a p-value of 0,007, indicating a statistically significant association between dietary patterns and uric acid levels. The POR of 3,566 (95% CI: 1,480–8,589) indicates that respondents with a high-purine dietary pattern had 3,566 times the odds of having elevated uric acid levels compared with those with a low-purine dietary pattern.

This association can be explained by the role of purines as one of the substances involved in uric acid formation. Purines derived from food undergo metabolism in the body and produce uric acid as an end product. Therefore, excessive consumption of foods high in purines may contribute to increased uric acid levels, particularly when accompanied by other conditions that interfere with uric acid excretion. Nevertheless, uric acid levels are not determined solely by purine intake but are also influenced by the body's metabolism, kidney function, genetic factors, and individual health conditions. Thus, dietary patterns are a modifiable factor, but not the only determinant of uric acid levels.

These findings are supported by the meta-analysis conducted by Wen et al (2024), which examined the association between dietary patterns and the risk of hyperuricemia. The study included 13 studies involving a total of 163.192 participants. The results showed that plant-based dietary patterns were associated with a reduced risk of hyperuricemia, whereas animal-based dietary patterns and diets high in sugary foods were associated with an increased risk of hyperuricemia. These findings indicate that the association between dietary patterns and uric acid levels should be considered comprehensively rather than based on a single type of food. A dietary pattern dominated by plant-based foods and providing balanced nutrition may be part of an approach to preventing hyperuricemia.

The study by Cheng et al (2023) also showed that plant-based dietary patterns were associated with lower uric acid levels and a lower risk of hyperuricemia, whereas animal-based dietary patterns were associated with an increased risk of hyperuricemia. The meta-analysis combined findings from 41 studies involving a total of 359.317 participants. These results support the role of overall dietary consumption patterns in regulating uric acid levels. However, these findings do not mean that all plant-based foods should be avoided or that all animal-based foods should be prohibited. Nutritional education should still consider food types, amounts and frequency of consumption, nutritional requirements, and the health conditions of older adults.

In addition to overall dietary patterns, Chi et al (2024), through a systematic review and meta-analysis, reported that the consumption of red meat, seafood, alcohol, and fructose was positively associated with hyperuricemia and gout. Conversely, vegetable consumption showed an inverse association with the risk of hyperuricemia in the analyses conducted (Mao et al., 2023). These findings reinforce the importance of regulating dietary consumption among individuals with elevated uric acid levels or risk factors for hyperuricemia. In the context of this study, the high-purine dietary category showed a significant association with uric acid levels. However, the findings cannot be used to conclude that a particular type of food caused increased uric acid levels among respondents, because the variable analyzed was the overall dietary pattern category.

Among older adults, dietary regulation needs to consider changes in nutritional requirements and health conditions accompanying the aging process (Volkert et al., 2024). Older adults may have comorbidities, limitations in selecting or preparing food, and long-established eating habits (Caso & Vecchio, 2022). Therefore, education regarding foods high in purines should be delivered communicatively and tailored to each individual's dietary habits. Healthcare professionals need to explain that controlling uric acid levels cannot be achieved merely by avoiding certain types of food, but also requires attention to dietary balance and adequate nutritional intake (Sautner et al., 2023). This is important to prevent dietary restrictions from causing older adults to have insufficient intake of essential nutrients.

The study distribution showed that most respondents were classified as having a low-purine dietary pattern. This may provide an overview of respondents' dietary behaviors, but it cannot be confirmed as the sole reason why most respondents had normal uric acid levels. Among respondents with a high-purine dietary pattern, the proportion with elevated uric acid levels reached 68,8%, whereas among those with a low-purine dietary pattern, the proportion with normal uric acid levels reached 61,8%. This difference supports the statistical analysis indicating an association between dietary patterns and uric acid levels. However, some respondents with low-purine dietary patterns still had elevated uric acid levels. This indicates that uric acid levels may also be influenced by other factors, including kidney function, the use of certain medications, comorbidities, and metabolic factors.

The discussion of previous research sources identified several foods that should be limited, such as organ meats, duck, and belinjo. However, dietary education should not be delivered as a general prohibition without considering the type, amount, and frequency of consumption. A more appropriate educational approach is to help older adults identify sources of purines, understand appropriate portion sizes, and choose alternative foods that still meet their nutritional requirements. This is consistent with the findings of Wen et al (2024) and Cheng et al (2023), which emphasize the importance of overall dietary patterns in relation to uric acid levels.

The implications of these findings for nursing services include the need to strengthen practical nutritional counseling that can be easily implemented by older adults and their families. Nurses can assess dietary habits, identify the consumption of foods that may be high in purines, and provide food-selection recommendations according to individual health conditions. Family involvement is also important because family members often play a role in preparing food and determining older adults' daily menus. Counseling needs to be provided repeatedly so that older adults not only understand the information but are also able to apply it in their daily lives. Thus, these findings can serve as a basis for Health Centers to integrate dietary education into healthcare services for older adults.

Association Between Family History and Uric Acid Levels

Unlike BMI and dietary patterns, the results showed that family history was not significantly associated with uric acid levels among older adults at Berseri Health Center, Pangkalan Kerinci. A total of 49 respondents (45,4%) had a family history of uric acid problems, while 59 respondents (54,6%) did not have such a history. Among respondents with a family history, 20 (40,8%) had elevated uric acid levels and 29 (59,2%) had normal uric acid levels. Meanwhile, among respondents without a family history, 31 (52,5%) had elevated uric acid levels and 28 (47,5%) had normal uric acid levels. The Chi-Square test yielded a p-value of 0,307, indicating no statistically significant association between family history and uric acid levels. The POR of 0,623 (95% CI: 0,290–1,339) also indicates that the observed association was not statistically significant because the confidence interval included one.

These non-significant findings need to be interpreted cautiously. The absence of a statistically significant association in this study does not mean that hereditary factors have no role in regulating uric acid levels. Genetic factors may influence purine metabolism and uric acid transport through the kidneys. Leask et al (2024) explained that genetic studies have identified variations in several gene loci associated with urate levels and gout, including genes related to uric acid transporters. These findings indicate that genetic factors have a biological basis in the regulation of uric acid levels. However, molecular genetic studies cannot be directly equated with the assessment of family history through questionnaires.

Du et al (2024) also explained that the regulation of uric acid levels involves processes of production, transport, and excretion that are influenced by various biological mechanisms. Genetic factors are one component of these mechanisms, but an individual's uric acid levels may still be influenced by environmental factors and health conditions. Thus, family history may provide information regarding a possible familial predisposition, but it does not always directly reflect uric acid metabolism in each family member.

The distinction between molecular genetic testing and family history is important when interpreting the findings of this study. The family history variable represents information known by respondents regarding family members who have experienced uric acid problems (Kim et al., 2023). This information may be influenced by respondents' knowledge, the accuracy of their recollection of family medical history, and whether family members have undergone uric acid testing. In contrast, molecular genetic testing identifies specific gene variations associated with uric acid metabolism or transport. Therefore, the findings of this study are more appropriately interpreted as showing no significant association between respondents' reported family history and uric acid levels, rather than as evidence that genetic factors have no biological role.

Descriptively, the proportion of elevated uric acid levels among respondents without a family history was higher than that among respondents with a family history, namely 52,5% compared with

40,8%. Nevertheless, this difference was not statistically significant. This pattern may have been influenced by the distribution of other factors in the two groups, such as dietary patterns, BMI, physical activity, kidney function, comorbidities, or medication use. Because this study could not establish the temporal sequence between exposure factors and uric acid levels, these findings cannot be used to conclude that the absence of a family history increases uric acid levels. They only indicate that, based on the study data, an association between the two variables was not statistically established.

The findings of this study also need to be compared cautiously with previous research. The study by Sitanggang et al (2023), cited in the research sources, showed no association between genetic history and the occurrence of uric acid problems among the community of Manado Tua Island. This similarity in findings may indicate that family history does not always show a significant association in every population. However, because complete bibliographic information for that study is not available in the provided manuscript, the reference needs to be verified before being included in the reference list, particularly regarding its publication year, title, journal name, and DOI. To address the reviewer's comments, the discussion of genetic factors should prioritize recent and verifiable references, such as Leask et al (2024) and Du et al (2024), while maintaining a distinction between molecular genetic evidence and the family history variable used in this study.

In nursing services, family history can still be used as part of the assessment of risk factors among older adults. Nurses can ask about a history of uric acid problems in parents or siblings, but this information should not be used as the sole basis for determining uric acid status. The assessment needs to be complemented by uric acid testing, nutritional status evaluation, dietary habits, medical history, and medication use. This approach enables healthcare services to provide a more comprehensive assessment. Thus, although this study found no significant association between family history and uric acid levels, this information may still be useful as part of health assessments for older adults.

Synthesis of Research Findings and Nursing Implications

Overall, the results showed that BMI and dietary patterns were significantly associated with uric acid levels, whereas family history did not show a statistically significant association. These findings indicate that modifiable factors, particularly body weight status and dietary patterns, need attention in efforts to control uric acid levels among older adults. Nevertheless, these findings do not mean that family history or other factors are unimportant. Uric acid levels are influenced by multiple factors; therefore, healthcare approaches need to be comprehensive.

The association between BMI and uric acid levels in this study is consistent with recent research evidence demonstrating a relationship between adiposity and hyperuricemia among adults and older adults. Han et al (2024), in a study involving older adults, reported an association between visceral fat accumulation and the risk of hyperuricemia, while Fu et al (2024) found an association between BMI and uric acid levels. Both studies support the importance of nutritional status monitoring in healthcare services for older adults. However, because BMI does not directly describe body fat distribution, other anthropometric measurements may be considered to complement the assessment when facilities and resources permit.

Meanwhile, the association between dietary patterns and uric acid levels is supported by recent meta-analyses showing that dietary consumption patterns are related to uric acid levels and the risk of hyperuricemia. Wen et al (2024), Cheng et al (2023), and Chi et al (2024) provide evidence that overall dietary patterns, including the consumption of animal-based foods, plant-based foods, and certain types of food, are associated with uric acid levels. These findings reinforce the importance of nutritional education that focuses not only on restricting high-purine foods but also on establishing balanced dietary patterns.

From a community nursing perspective, the findings of this study can be used to strengthen promotive and preventive activities at Berseri Health Center, Pangkalan Kerinci. These activities may include regular BMI monitoring, food-selection education, counseling on dietary habits, recommendations for physical activity according to individual capabilities, and uric acid testing based on clinical indications and healthcare needs. Education should use simple language and examples of

foods commonly consumed by older adults. Families should also be involved so that behavioral changes are not solely the responsibility of older adults but are supported by the household environment.

The findings also indicate that health education needs to be provided individually according to the factors identified in each older adult. Older adults with obesity based on BMI may receive counseling on safe and gradual weight management. Those with high-purine dietary patterns may receive education on food selection, portion sizes, and frequency of consumption. Meanwhile, older adults with a family history should still receive information about the importance of uric acid testing and monitoring, although this study did not find a statistical association between family history and uric acid levels. This individualized approach may help healthcare professionals avoid providing general education that does not adequately address the needs of each older adult.

Nevertheless, this study has limitations that need to be considered when interpreting the findings. First, the cross-sectional design only describes associations between variables at a single point in time and therefore cannot establish cause-and-effect relationships. Second, family history based on respondents' reports is not equivalent to molecular genetic testing. Third, the associations between BMI and dietary patterns and uric acid levels may be influenced by other factors not analyzed in this study, such as kidney function, physical activity, comorbidities, and the use of certain medications. Fourth, the classification of dietary patterns into high- and low-purine categories needs to be understood in accordance with the instrument used, because the results do not directly represent the amount of purine intake in specific units. These limitations need to be considered when generalizing the findings to a broader population of older adults.

Considering these findings and limitations, this study provides an overview indicating that BMI and dietary patterns are associated with uric acid levels among older adults at Berseri Health Center, Pangkalan Kerinci. These findings can serve as a basis for developing health education programs for older adults that emphasize nutritional status monitoring and dietary improvement. Future studies may consider longitudinal designs, larger sample sizes, and measurements of other factors such as kidney function, physical activity, comorbidities, and medication use. To examine hereditary factors in greater depth, future studies may also distinguish between family history reported by respondents and molecular genetic testing. Thus, understanding of the factors associated with uric acid levels among older adults can be developed more comprehensively.

CONCLUSION

BMI and dietary patterns were associated with uric acid levels among older adults at Berseri Pangkalan Kerinci Health Center, whereas genetic factors showed no significant association. Most respondents were non-obese, followed a low-purine diet, had no family history of genetic factors, and had normal uric acid levels.

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