Original article

Prevalence of hyperuricemia and associated factors among individuals attending health examination at Quy Hoa Central Hospital of Leprosy-Dermatology

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Abstract

Background: Hyperuricemia is an important biomarker that supports the diagnosis of musculoskeletal diseases such as gout, kidney stones, renal damage, and cardiovascular complications, and it is associated with an increased risk of metabolic disorders. This study aimed to determine the prevalence of hyperuricemia and identify several associated factors among individuals attending health examination at Quy Hoa Central Hospital of Leprosy - Dermatology.

Materials and Methods: A cross-sectional descriptive study was conducted among 716 adults who attended health examination at Quy Hoa Central Hospital of Leprosy - Dermatology. Hyperuricemia was diagnosed according to the criteria issued by the Ministry of Health. Data were analyzed using SPSS version 20.0. Multivariable logistic regression analysis was used to identify factors associated with hyperuricemia.

Results: The prevalence of hyperuricemia was 31.3%. The mean serum uric acid concentration was 411.45 µmol/L in males and 261.31 µmol/L in females, with an overall mean of 363.53 µmol/L. Male sex, frequent consumption of organ meats, frequent seafood consumption, non-vegetarian diet, overweight/obesity, abdominal obesity, and elevated triglyceride levels were significantly associated with hyperuricemia.

Conclusion: The prevalence of hyperuricemia remains high. Therefore, effective strategies and appropriate interventions should be developed in accordance with the current context.

Keywords: *Serum uric acid, hyperuricemia, associated factors.*

1. INTRODUCTION

Hyperuricemia is a metabolic disorder that has been implicated in the development of numerous non-communicable diseases, including musculoskeletal disorders-most notably gout-as well as nephrolithiasis, renal impairment, chronic kidney disease, and cardiovascular complications. Moreover, elevated serum uric acid has been associated with an increased risk of obesity, metabolic syndrome, and type 2 diabetes mellitus … [1]. Notably, hyperuricemia has been recognised as an early metabolic abnormality that may precede the development of hypertriglyceridemia, diabetes mellitus, and hypertension. Therefore, it represents an important public health concern requiring timely detection and intervention [2, 3].

Over the past few decades, the global prevalence of hyperuricemia has increased considerably, largely attributable to population ageing and socioeconomic changes. In the United States, Chen-Xu et al. (2019) reported that the prevalence of hyperuricemia was 20.2% among men and 20.0% among women [4]. Similarly, a nationwide study conducted in Japan by Shirasawa et al. (2020) found prevalence rates of 21.4% in men and 11.0% in women [5]. In Vietnam, recent studies among adults undergoing routine health examinations have also demonstrated a high prevalence of hyperuricemia. Kieu Hong Nhung et al. documented a prevalence of 31.1% among 700 individuals attending health examination at Hanoi Medical University Hospital during 2020–2021 [6]. Likewise, Nguyen Thi Bich Ngoc et al. observed a prevalence of 34.5% among 235 adults undergoing health screening at the Ho Chi Minh University of Medicine and Pharmacy Hospital in 2023 [7]. Furthermore, a study conducted by Phan Thi Nho in Da Nang Hospital reported a prevalence of 35.2% [8].

In addition to genetic predisposition and family history, several modifiable lifestyle factors have been identified as important determinants of hyperuricemia. These include high dietary purine intake, alcohol consumption, intake of fructose-containing beverages, and insufficient physical activity [9]. Identifying factors associated with hyperuricemia is therefore essential for developing effective prevention strategies and community-

based management programs, particularly given its steadily increasing prevalence.

In Binh Dinh Province, epidemiological data on hyperuricemia remain limited. As a coastal province, seafood constitutes an important component of the local diet, which may contribute to higher dietary purine intake. Investigating the prevalence of hyperuricemia and its associated factors in this setting is therefore necessary to facilitate early detection and the implementation of appropriate preventive interventions, thereby helping reduce the future burden of metabolic and cardiovascular diseases. Accordingly, this study was conducted with the following objectives:

1. To determine the prevalence of hyperuricemia among adults attending routine health examination at Quy Hoa Central Hospital of Leprosy-Dermatology.

2. To identify factors associated with hyperuricemia in the study population.

2. MATERIALS AND METHODS

2.1. Study participants

Inclusion criteria: Adults aged 18 - 60 years who attended the Department of Outpatient Services, Quy Hoa Central Hospital of Leprosy-Dermatology for routine health examination and agreed to participate in the study.

Exclusion criteria: Individuals with diseases causing secondary hyperuricemia (chronic kidney disease, hematological malignancies or cancers under active treatment….); those previously diagnosed with and treated for gout; those currently taking medications known to increase serum uric acid levels (diuretics, low-dose aspirin, pyrazinamide…); pregnant women; and individuals with mental health disorders or disabilities that prevented normal communication.

2.2. Study period and location

The study was conducted at the Department of Outpatient Services, Quy Hoa Central Hospital of Leprosy-Dermatology, from July to November 2024.

2.3. Study design

A cross-sectional study.

2.4. Sample size

The sample size was calculated using the formula for estimating a single population proportion:

$$n = Z^2_{1-\frac{\alpha}{2}} \frac{p(1-p)}{d^2}$$

n: Minimum required sample size for the study;

$Z_{1-\alpha/2} = 1.96$ ($\alpha = 0,05$): Z-score corresponding to a 95% confidence level, which is 1.96;

p: Estimated prevalence of hyperuricemia. Based on the study by Phan Thi Nho et al. (2020), the prevalence of hyperuricemia among adults undergoing routine health examinations at Da Nang Hospital was 35.2%; therefore, p was set at 0.352.

d: Desired absolute precision, set at d = 0.04.

Substituting these values into the formula, the minimum required sample size was calculated to be 548 participants. The actual sample size in our study was 716 individuals.

2.5. Sampling method

Participants were recruited using convenience sampling. All adults aged 18 – 60 years who attended routine health examinations at the Department of Outpatient Services, Quy Hoa Central Hospital of Leprosy-Dermatology, during the study period were invited to participate if they met the eligibility criteria.

2.6. Data collection instruments and variable measurements

2.6.1. Data collection instrument

Data were collected using a structured questionnaire developed specifically for this study. The questionnaire comprised sections on demographic and administrative information, anthropometric measurements, medical history, lifestyle behaviors, and laboratory test results.

2.6.2. Variable definitions

- Hyperuricemia: Hyperuricemia was defined as a serum uric acid concentration of ≥ 420 µmol/L in men and ≥ 360 µmol/L in women, according to Decision No. 361/QĐ-BYT issued by the Vietnamese Ministry of Health on January 25, 2014, on the diagnosis and treatment of musculoskeletal diseases [10].

- Body mass index (BMI): BMI was classified according to the World Health Organization (WHO) recommendations for the Asia-Pacific region [11].

BMI = [weight (kg)]/[height (m)]^2

+ Underweight: BMI < 18.5 kg/m²

+ Normal weight: BMI 18.5 - 22.9 kg/m²

+ Overweight: BMI 23.0 - 24.9 kg/m²

+ Obesity: BMI ≥ 25.0 kg/m²

- Abdominal obesity: Abdominal obesity was defined as a waist circumference of ≥ 90 cm in men and ≥ 80 cm in women [12].

- Hypertriglyceridemia: Hypertriglyceridemia was defined as a serum triglyceride concentration of ≥ 1.7 mmol/L (150 mg/dL) or current treatment with triglyceride-lowering medication [12].

- Elevated blood pressure: Elevated blood pressure was defined as systolic blood pressure ≥ 130 mmHg and/or diastolic blood pressure ≥ 85 mmHg, or a previous diagnosis of hypertension with ongoing or prior antihypertensive treatment [12].

- Elevated fasting blood glucose: Elevated fasting blood glucose was defined as a fasting plasma glucose

concentration of ≥ 5.6 mmol/L (100 mg/dL) or a previous diagnosis of type 2 diabetes mellitus [12].

- Coffee/tea consumption: Defined as consuming coffee or tea at least three times per week.

- High water intake: Defined as drinking at least 2 liters of water per day.

- Alcohol consumption: Classified according to the WHO STEPwise approach to Surveillance (STEPS) and the guidelines of the Vietnamese Ministry of Health [11]. The recommended maximum intake was defined as two standard drinks per day for men and one standard drink per day for women. Participants were categorized into two groups:

+ Exceeding the recommended limit

+ Within the recommended limit

- Consumption of red meat, seafood, and organ meats: Participants were classified into two groups [13, 14]:

+ Frequent consumption (≥ 3 times/week)

+ Infrequent consumption (< 3 times/week).

- Vegetarian diet: Defined as a lacto-ovo vegetarian pattern (excluding all meats, fish, processed meat products, mollusks, and crustaceans, but allowing eggs, dairy products, and honey) [15]. Participants were categorized as:

+ Periodic vegetarian eating (≥ 2 days/month): consuming a vegetarian diet at least two days per month.

+ < 2 vegetarian days/month: not meeting the above criterion.

- Physical activity: Classified according to WHO guidelines for noncommunicable disease prevention [11]. Participants were categorized as:

+ Physically active: Engaging in either moderate-intensity physical activity for ≥ 30 minutes per day on ≥ 5 days per week (≥ 150 minutes/week), or vigorous-intensity physical activity for ≥ 15 minutes per day on ≥ 5 days per week (≥ 75 minutes/week).

+ Physically inactive: Failing to meet either of the above criteria.

- Delayed bedtime: Defined as going to bed after 11:00 PM.

2.7. Data collection

Eligible participants were approached immediately after completing their routine health examination at the health examination clinic. In the reception area, trained investigators explained the study objectives and procedures. Individuals who met the eligibility criteria and provided written informed consent were subsequently enrolled in the study. Data collection was conducted in three sequential steps:

Step 1: Interview

Face-to-face interviews were conducted by physicians working at the health examination clinic to obtain information on sociodemographic characteristics, personal and family medical history, and lifestyle-related factors.

Step 2: Anthropometric measurements

Anthropometric measurements were performed by trained nurses following standardized measurement procedures.

Step 3: Blood sample collection

Each participant was assigned a unique identification number corresponding to the questionnaire code and was referred to the Department of Hematology and Blood Transfusion for venous blood sample collection. Laboratory analyses included serum uric acid, fasting plasma glucose, triglycerides, total cholesterol, and high-density lipoprotein cholesterol (HDL-C).

2.8. Statistical analysis

Data were entered and analyzed using SPSS version 20.0

+ Descriptive statistics were used to summarize the study data. Categorical variables were presented as frequencies and percentages, whereas continuous variables were expressed as means and standard deviations.

+ Inferential statistical analyses were performed to identify factors associated with hyperuricemia.

Initially, univariate analyses were conducted using the Chi-square test. Fisher's exact test was applied when the assumptions of the Chi-square test were not met because of small expected cell counts.

Variables with p-value ≤ 0.05 in the univariate analysis were entered into a multivariable logistic regression model. All selected independent variables were entered simultaneously (Enter method) to identify factors independently associated with hyperuricemia after adjusting for potential confounding variables. Statistical significance was set at $p < 0.05$.

2.9. Ethical approval

The study received ethical approval from the Biomedical Research Ethics Committee of the University of Medicine and Pharmacy, Hue University (Approval Number: H2024/204, dated May 23, 2024). All participants were informed of the study objectives and procedures prior to enrollment and provided written informed consent before participation. Participation was entirely voluntary, and participants were free to decline participation or withdraw from the study at any time without providing a reason.

3. RESULTS

3.1. General characteristics of study participants

Table 1. General characteristics of study participants (n = 716)

Characteristics		Frequency	Percentage
Age	≤ 30 years old	132	18.4
	31 to 40 years old	347	48.5
	41 to 50 years old	166	23.2
	51 to 60 years old	71	9.9
	Mean age ± SD	37.7 ± 8.2 (Min: 21, max: 60)	
Gender	Male	478	66.8
	Female	238	33.2
Occupation	Civil servants and public employees	237	33.1
	Farmers and manual laborers	63	8.8
	Self-employed/Traders	28	3.9
	Homemakers/Retired	16	2.2
	Company employees	321	44.9
	Others	51	7.1
Ethnicity	Kinh	716	100.0
Educational level	Primary to upper secondary education	211	29.5
	Vocational school, college, or university and above	505	70.5
Marital status	Single/Never married	88	12.3
	Married	624	87.1
	Separated/Divorced/Widowed	4	0.6
Place of residence	Urban	563	78.6
	Rural	153	21.4
Total		**716**	**100.0**

The mean age of the participants was 37.7 ± 8.2. Males accounted for approximately twice the proportion of females (66.8% and 33.2%, respectively). The predominant occupational groups were company employees (44.9%) and civil servants/public employees (33.1%). All participants (100%) belonged to the Kinh ethnic group. Participants with a vocational, college, or university education accounted for the largest proportion (70.5%). The majority of participants were married (87.1%) and resided in urban areas (78.6%).

3.2. Prevalence of Hyperuricemia among Adult Outpatients at Quy Hoa Central Hospital of Leprosy-Dermatology

Table 2. Distribution of hyperuricemia prevalence among study participants (n = 716)

Serum uric acid status	Frequency	Percentage
Hyperuricemia	224	31.3
Normal	492	68.7
Total	**716**	**100.0**

The prevalence of hyperuricemia among study participants was 31.3%.

Table 3. Mean serum uric acid concentrations among study participants (n = 716)

Serum uric acid concentration	Mean ± SD	Min – Max	Median
Male (n = 478)	411.45 ± 85.64	219 – 712	407.00
Female (n=238)	261.31 ± 56.74	28 – 439	264.00
Overall (n=716)	363.53 ± 102.84	28 – 712	353.00

The mean serum uric acid concentration was 411.45 µmol/L in males, 261.31 µmol/L in females and 363.53 µmol/L overall.

3.3. Factors Associated with Hyperuricemia Prevalence among Study Participants

Univariate analysis showed that gender ($p < 0.001$), educational level ($p = 0.008$), physical activity ($p = 0.048$), alcohol consumption ($p < 0.001$), water intake habits ($p = 0.004$), tea consumption ($p = 0.010$), coffee consumption ($p < 0.001$), organ meat consumption ($p < 0.001$), seafood consumption ($p < 0.001$), vegetarian diet ($p = 0.010$), delayed bedtime ($p = 0.007$), BMI category ($p < 0.001$), triglyceride level ($p < 0.001$), blood glucose level ($p < 0.001$), and blood pressure ($p < 0.001$) were significantly associated with hyperuricemia. After assessment of multicollinearity, no evidence of problematic multicollinearity was observed between BMI category and waist circumference (VIF < 5 and tolerance > 0.2). Therefore, all of the above variables were included in the multivariable logistic regression model.

Table 4. Multivariable logistic regression analysis of factors associated with hyperuricemia (n = 716)

Factor		OR	95% CI	p
Gender	Female	1		
	Male	7.83	3.72 – 16.47	**< 0.001**
Educational level	Primary to upper secondary education	1		
	Vocational college or higher	1.14	0.77 – 1.70	0.519
Physical activity	Physically inactive	1		
	Physically active	1.01	0.68 -1.49	0.967
Alcohol consumption	Within the recommended limit	1		
	Exceeding the recommended limit	1.07	0.61 – 1.88	0.819
Water intake habit	High intake	1		
	Low intake	1.26	0.81 – 1.95	0.303
Tea consumption	No	1		
	Yes	1.05	0.71 – 1.56	0.800
Coffee consumption	No	1		
	Yes	1.17	0.74 – 1.86	0.494
Consumption of organ meats	Infrequent consumption	1		
	Frequent consumption	3.35	1.30 – 8.63	**0.012**
Consumption of seafood	Infrequent consumption	1		
	Frequent consumption	1.56	1.04 – 2.35	**0.031**
Vegetarian diet	Periodic vegetarian eating (≥ 2 days/month)	1		
	< 2 vegetarian days/month	1.66	1.10 – 2.49	**0.016**
Delayed bedtime	No	1		
	Yes	0.951	0.64 – 1.41	0.802
BMI category	Underweight, normal weight	1		
	Overweight/Obesity	1.56	1.03 – 2.38	**0.038**

Waist circumference	Normal	1		
	Abdominal obesity	1.69	1.06 – 2.69	**0.026**
Triglycerides	Normal	1		
	Elevated	2.72	1.80 – 4.09	**< 0.001**
Blood glucose	Normal	1		
	Elevated	1.08	0.71 – 1.63	0.721
Blood pressure	Normal	1		
	Elevated	1.18	0.77 – 1.82	0.449

CI: Confidence interval; OR: Odds ratio

Results from the multivariable logistic regression model indicated that gender, organ meat consumption, seafood consumption, non-vegetarian diet, BMI category, waist circumference, and serum triglycerides were significantly associated with hyperuricemia ($p < 0.05$). No statistically significant associations were found between hyperuricemia and educational level, physical activity, alcohol consumption, water intake habit, tea consumption, coffee consumption, delayed bedtime, blood glucose level or blood pressure $p > 0.05$.

4. DISCUSSION

4.1. Prevalence of hyperuricemia among adults attending health examination at Quy Hoa Central Hospital of Leprosy-Dermatology

The prevalence of hyperuricemia observed in this study was within the range reported in several recent Vietnamese studies conducted among adults undergoing health examinations. Similar estimates were reported by Kieu Hong Nhung et al. (31.1%) [6], Phan Thi Nho et al. (35.2%) [8], Hoang Thi Minh et al. (32.0%) [16], and Nguyen Thi Bich Ngoc et al. (34.5%) [7]. The consistency across these studies suggests that hyperuricemia is a relatively common metabolic abnormality among adults in Vietnam, particularly in populations undergoing routine health assessment. Nevertheless, the prevalence should be interpreted in relation to differences in study populations, age structures, health status, diagnostic thresholds, and study settings.

A higher prevalence was reported by Le Ngoc Thi My et al. among adults younger than 40 years at the Ho Chi Minh University of Medicine and Pharmacy Hospital (41.1%) [17]. In contrast, Nguyen Thi Thu Lieu reported a lower prevalence of 23.3% among staff members of Hanoi Medical University in 2015 [18]. These variations may partly reflect differences in demographic characteristics, occupational profiles, dietary patterns, and metabolic risk profiles between study populations. Therefore, although differences between studies may suggest changes in the epidemiology of hyperuricemia over time, direct temporal comparisons should be made cautiously when the underlying populations and methodologies are not equivalent.

The clinical relevance of hyperuricemia extends beyond its established relationship with gout. Increasing evidence has linked elevated serum uric acid concentrations with metabolic syndrome and cardiovascular and renal disorders. Pugliese et al. reported that serum uric acid concentrations exceeding sex-specific thresholds lower than conventional gout-related thresholds were independently associated with cardiovascular mortality among patients with metabolic syndrome, even after adjustment for conventional cardiovascular risk factors [19]. This evidence highlights the importance of identifying elevated uric acid concentrations during routine health examinations, particularly in individuals with coexisting metabolic risk factors.

From a public health perspective, the findings support the potential value of integrating assessment of serum uric acid with broader cardiometabolic risk screening. Interventions targeting modifiable behaviours, including dietary patterns, body weight, and other lifestyle factors, may be particularly relevant for individuals identified as having elevated serum uric acid concentrations.

4.2. Factors associated with hyperuricemia

Gender: Our findings (Table 4) indicate a significant association between gender and hyperuricemia ($p < 0.001$). This finding is consistent with those of previous Vietnamese studies. Kieu Hong Nhung reported a significantly higher prevalence of hyperuricemia among men than women (46.5%, 7.3%, $p < 0.05$) [6]. Similarly, Phan Thi Nho reported a significant gender difference in the prevalence of hyperuricemia ($p < 0.05$), with men having 3.96-fold higher odds of hyperuricemia than women (95% CI: 2.58 – 6.09) [8].

The higher prevalence of hyperuricemia among

men has been consistently reported in the literature and may be explained by both biological and behavioural factors. Oestrogen enhances renal urate excretion, thereby contributing to lower serum uric acid concentrations in premenopausal women, whereas men generally exhibit higher serum uric acid levels because they do not benefit from this uricosuric effect. Furthermore, men are more likely to adopt lifestyle behaviours associated with elevated serum uric acid concentrations, including higher consumption of alcohol and purine-rich foods.

Dietary habits: Dietary habits play an important role in the development of hyperuricemia. Frequent consumption of purine-rich foods, particularly animal-derived products such as organ meats, red meat, and seafood, increases dietary purine intake and consequently elevates serum uric acid concentrations. Previous studies have shown that high seafood consumption is associated with an approximately 50% increase in the risk of gout, whereas diets rich in meat may increase gout risk by approximately 40%. The association between dietary habits and hyperuricemia has long been recognised and consistently demonstrated in both domestic and international studies.

Our findings (Table 4) indicate significant associations between hyperuricemia and frequent seafood consumption, frequent consumption of organ meats, and non-adherence to a vegetarian diet ($p = 0.031$, $p = 0.012$, and $p = 0.016$, respectively). These findings are consistent with those reported by Kieu Hong Nhung, who found that individuals who frequently consumed seafood or organ meats had significantly higher serum uric acid levels than those who consumed these foods less frequently ($p = 0.04$ and $p = 0.004$, respectively) [6]. Likewise, Phan Thi Nho reported that individuals who frequently consumed seafood had 1.75-fold higher odds of hyperuricemia (95% CI: 1.20 – 2.56) than those who rarely or never consumed seafood. The same study also reported a significantly higher prevalence of hyperuricemia among participants who frequently consumed organ meats than among those who did not ($p < 0.05$) [8]. Similarly, Nguyen Thi Thu Lieu found that frequent consumption of red meat increased the risk of hyperuricemia by approximately 7.5-fold [18].

Overall, accumulating evidence suggests that several dietary factors, including purine-rich foods (such as seafood, organ meats, and red meat), beer, and sugar-sweetened beverages, contribute to elevated serum uric acid concentrations. Purines are metabolised into uric acid, and excessive dietary purine intake may therefore increase the risk of hyperuricemia in susceptible individuals. Nevertheless, accurately estimating dietary purine intake remains challenging because the purine content of foods varies considerably according to food type and preparation methods. Previous studies have demonstrated a strong positive association between the consumption of purine-rich foods and the prevalence of hyperuricemia. In particular, seafood intake has been positively associated with hyperuricemia, whereas soybean consumption has shown an inverse association. Furthermore, animal- and plant-derived protein sources appear to have different effects on serum uric acid concentrations, and limiting the intake of animal-derived protein may help reduce serum uric acid levels.

Overweight and obesity: Obesity is a well-established risk factor for numerous non-communicable diseases, including hyperuricemia. In recent years, growing attention has been directed toward the association between obesity and hyperuricemia because both conditions are closely linked to metabolic syndrome, cardiovascular disease, and other adverse health outcomes, imposing a substantial public health and economic burden. Our findings (Table 4) indicate a significant association between overweight/obesity and hyperuricemia ($p = 0.038$). These findings are consistent with those reported by Phan Thi Nho, who observed that the prevalence of hyperuricemia increased progressively across BMI, from 15.0% among underweight individuals and 23.0% among those with normal weight to 46.8% among overweight individuals and 54.3% among those with obesity, with statistically significant differences between groups ($p < 0.05$) [8]. Similarly, Kieu Hong Nhung reported that overweight or obese individuals had 2.6-fold higher odds of hyperuricemia than those with normal body weight (95% CI: 1.8 – 3.6 [6]. Furthermore, Suwit Klongthalay et al. reported a significant positive correlation between serum uric acid concentration and body mass index (BMI) ($r = 0.316$, $p < 0.001$) [20]. The association between obesity and hyperuricemia may be explained by several underlying mechanisms. Excess adiposity promotes insulin resistance, which impairs renal urate excretion and consequently increases serum uric acid concentrations. Obesity is also associated with increased purine turnover and chronic low-grade inflammation, both of which may further enhance uric acid production.

Abdominal obesity: Abdominal obesity, an indicator of central adiposity, reflects the accumulation of visceral fat, which plays a pivotal

role in metabolic dysfunction. Visceral adipose tissue contributes to insulin resistance, resulting in reduced renal urate excretion and subsequent elevation of serum uric acid concentrations. Furthermore, abdominal obesity may increase endogenous uric acid production through enhanced purine turnover.

In the present study, abdominal obesity was independently associated with hyperuricemia. This finding is consistent with those of previous Vietnamese studies. Kieu Hong Nhung reported a moderate positive correlation between waist circumference and serum uric acid concentration ($0.3 < r < 0.5$, $p < 0.001$) [6]. Likewise, Phan Thi Nho found that hyperuricemia was significantly more prevalent among individuals with elevated waist circumference than among those with normal waist circumference (56.3%; 29.9%, $p < 0.05$) [8]. These findings further support the role of abdominal obesity in the pathogenesis of hyperuricemia and suggest that waist circumference may serve as a simple and practical anthropometric indicator for identifying individuals at increased cardiometabolic risk.

Hypertriglyceridemia: The association between hypertriglyceridemia and hyperuricemia observed in this study is consistent with evidence indicating that elevated uric acid frequently coexists with an adverse metabolic profile. Phan Thi Nho reported that the prevalence of hyperuricemia was significantly higher among individuals with hypertriglyceridemia than among those with normal triglyceride levels (50.7% vs. 26.4%, $p < 0.05$), whereas no significant association was observed between HDL-C and hyperuricemia ($p > 0.05$) [8]. Similarly, Suwit Klongthalay et al. found a significant positive correlation between serum uric acid concentration and triglyceride levels ($r = 0.358$, $p < 0.001$) [20]. In the present study, alcohol consumption, hyperglycaemia, hypertension, and insufficient physical activity were not significantly associated with hyperuricemia. Nevertheless, previous studies have consistently reported significant associations between these factors and hyperuricemia. The absence of statistically significant associations in our study may be attributable to differences in sample characteristics, study design, sample size, or the methods used to assess lifestyle behaviours and metabolic risk factors. Furthermore, residual confounding cannot be excluded. Therefore, despite the absence of statistically significant associations in the present study, these factors remain clinically important and should continue to be monitored and addressed in routine clinical practice and public health programmes, given their well-established roles in the development of hyperuricemia and other cardiometabolic disorders.

Limitations: Several limitations of this study should be acknowledged. First, the use of convenience sampling may have introduced selection bias and limited the generalizability of the findings. Second, dietary assessment focused primarily on the frequency of consumption of red meat, seafood, and organ meats, whereas other purine-rich foods, particularly plant-based sources such as asparagus, bamboo shoots, and sprouts, were not comprehensively assessed. Third, the study did not comprehensively assess other potential factors that may influence serum uric acid levels, such as renal function, concomitant medications, fructose intake and sugar-sweetened beverage consumption, total energy intake, and total dietary purine intake. Furthermore, the classification of delayed bedtime, coffee/tea consumption, and high water intake was based on researcher-defined criteria, which may have been subjective and non-standardized. Finally, dietary variables were assessed only in terms of consumption frequency, without quantifying portion sizes or estimating total dietary purine intake, which may have resulted in residual measurement error. Future studies should employ more comprehensive dietary assessment methods to better characterize lifestyle-related risk factors for hyperuricemia.

5. CONCLUSIONS

The prevalence of hyperuricemia among adults attending routine health examination was 31.3%. The mean serum uric acid concentration was 411.45 µmol/L in men, 261.31 µmol/L in women, and 363.53 µmol/L overall. Male sex, frequent consumption of organ meats and seafood, adherence to a non-vegetarian diet, overweight/obesity, abdominal obesity, and hypertriglyceridemia were independently associated with hyperuricemia. These findings underscore the need for comprehensive health promotion strategies targeting modifiable lifestyle-related risk factors. Public health interventions should emphasise dietary counselling, weight management, and early screening for metabolic abnormalities, particularly among individuals at increased risk of hyperuricemia.

Conflict of interest statement: The authors declare that there is no conflict of interest regarding the research, authorship, and publication of this article.

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