RESEARCH ARTICLE **Open Access**

Gema Lingkungan Kesehatan
Vol. 24, No. 3 (2026), pp 482-485
e-ISSN 2407-8948 p-ISSN 16933761
doi: https://doi.org/10.36568/gelinkes.v24i3.461 *Journal Homepage: https://gelinkes.poltekkesdepkes-sby.ac.id/*

Association Between Menopausal Status and Serum Uric Acid Levels Among Women in Southeast Pontianak

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Serum uric acid levels are influenced by multiple factors, including hormonal status in women. Menopause, defined as the absence of menstruation for at least 12 consecutive months, is associated with decreased estrogen levels that may reduce renal uric acid excretion. However, local epidemiological data regarding uric acid profiles among menopausal women in Southeast Pontianak remain limited. This study aimed to analyze serum uric acid levels based on menopausal status among women in the working area of Puskesmas Kampung Bangka, Southeast Pontianak. A cross-sectional study was conducted using a purposive sampling technique. From a population of 230 women, 76 respondents met the inclusion criteria. Premenopausal women were defined as those with regular menstruation, while postmenopausal women were defined as those with amenorrhea ≥12 months based on interview data. Serum uric acid levels were measured using a spectrophotometric enzymatic colorimetric method and analyzed descriptively. The results showed that among 43 premenopausal women (56.6%), 97.7% had normal uric acid levels and 2.3% were below normal. Among 33 postmenopausal women, 75.8% had normal levels, 18.2% had elevated levels, and 6.0% were below normal. Elevated uric acid levels were more frequently observed in postmenopausal women compared to premenopausal women. In conclusion, although most respondents had normal serum uric acid levels, postmenopausal women showed a higher proportion of hyperuricemia, suggesting a potential influence of hormonal changes. This study provides important local evidence to support early metabolic risk screening among menopausal women in Southeast Pontianak.

Keywords: Hormonal changes, Menopause, Metabolic risk, Uric acid

INTRODUCTION

Menopause is a natural biological process characterized by the permanent cessation of menstruation due to decreased ovarian follicular activity and reduced estrogen production. The Indonesian Menopause Society (PERMINESIA) and the Ministry of Health indicate that premenopause typically occurs between the ages of 40–50 years, while menopause begins around 50–51 years (Dwi Susanti et al., 2019; Lumsden et al., 2025; Permana et al., 2023). International guidelines from the World Health Organization (WHO) and the North American Menopause Society (NAMS) define menopause as the absence of menstruation for at least 12 consecutive months, with an average onset of 50–52 years(Peacock K, Carlson K, 2023; WHO, 2024). The decline in estrogen during this transition affects multiple metabolic pathways, including uric acid regulation. Estrogen facilitates renal excretion of uric acid; therefore, its reduction may contribute to increased serum uric acid levels and elevated metabolic and cardiovascular risks.

The decline in estrogen during menopause has important metabolic consequences, including its role in regulating serum uric acid through renal excretion mechanisms. Reduced estrogen levels may impair uric acid clearance, leading to increased serum uric acid concentrations and a higher risk of hyperuricemia. In addition, metabolic changes such as increased adiposity and insulin resistance may further contribute to impaired uric acid metabolism (Cota E Souza et al., 2023; Lee, 2014; Ren et al., 2025). Other contributing factors include obesity, high-purine dietary intake, hypertension, diabetes, and genetic predisposition (Aydın et al., 2024; Singh et al., 2024; Y. Yang et al., 2022). Elevated uric acid levels are associated with gout, inflammation, and kidney dysfunction (Comberg & Schach, 2016; Du et al., 2023).

Globally, hyperuricemia affects a substantial proportion of the population, with increasing prevalence reported in many regions, including Indonesia. Previous reports indicate that the prevalence in Southeast Asia ranges from 13–25%, with approximately 15% reported nationally (Meiyetriani et al., 2018; Wulandari, 2018). This highlights the importance of early identification of metabolic risk, particularly among women undergoing menopausal transition.

Previous studies have demonstrated higher serum uric acid levels in menopausal women compared to premenopausal women. For example. For example, Widyaningsih et al. (2021) eported that menopausal women had higher mean uric acid levels (6.2 mg/dL) compared to premenopausal women (4.8 mg/dL), suggesting a potential influence of hormonal decline on uric acid metabolism.

However, most existing studies are hospital-based or conducted in urban settings, and evidence at the primary healthcare or community level remains limited. In Southeast Pontianak, particularly in the working area of Puskesmas Kampung Bangka, data on serum uric acid levels based on menopausal status are still scarce. This lack of local evidence limits the development of targeted preventive strategies for metabolic disorders in this population. Therefore, this study aims to analyze serum uric acid levels among premenopausal and postmenopausal women in the working area of Puskesmas Kampung Bangka, Southeast Pontianak.

METHODS

This study employed a cross-sectional design to analyze serum uric acid levels among premenopausal and postmenopausal women in the working area of Puskesmas Kampung Bangka, Southeast Pontianak. The population consisted of 230 women recorded in the community health center database. A total of 76 respondents were selected using purposive sampling based on predefined inclusion criteria. Premenopausal women were operationally defined as women who still experienced regular menstruation, while postmenopausal women were defined as those who had experienced amenorrhea for at least 12 consecutive months, as determined through structured interviews. Inclusion criteria included women aged ≥40 years, willing to participate, and not currently taking medications that could affect uric acid levels, such as diuretics or uric acid-lowering agents. Purposive sampling was used to ensure that participants met specific menopausal status criteria relevant to the study objectives. This technique allowed the selection of subjects with clearly defined reproductive status; however, it may limit the generalizability of the findings to the broader population.

This study was conducted in accordance with ethical principles for human research and has received ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Pontianak (No. 142/KEPK-PK.PKP/IV/2025). All participants provided written informed consent prior to data collection. Blood samples were collected by trained laboratory personnel following standard venipuncture procedures. Serum uric acid levels were measured using a spectrophotometric enzymatic colorimetric method based on the uricase-peroxidase (Uricase-POD) principle. In this method, uric acid is oxidized by uricase to produce allantoin and hydrogen peroxide, and the resulting color intensity is proportional to the uric acid concentration. Absorbance was measured using a spectrophotometer at a wavelength of 520–540 nm. All laboratory examinations were performed using calibrated instruments and quality-controlled reagents at the health center laboratory. Data on age, menopausal status, and laboratory results were collected using standardized data collection sheets. Serum uric acid levels were classified as below normal, normal, or above normal based on standard reference values for women (2.6–6.0 mg/dL). Descriptive statistical analysis was performed to present the distribution of uric acid levels across premenopausal and postmenopausal groups. The results were expressed in frequencies and percentages to provide a clear overview of uric acid profiles in each group.

RESULT AND DISCUSSION

This study involved 76 female respondents consisting of premenopausal and postmenopausal women in the working area of Kampung Bangka Public Health Center, Southeast Pontianak. Serum uric acid levels were measured using an enzymatic colorimetric method and categorized as below normal, normal, or above normal

Table 1
Distribution Of Serum Uric Acid Levels Among Premenopausal And Menopausal Women

Uric Acid Category	Premenopause (n, %)	Menopause (n, %)	Total (n, %)
Below normal	1 (2.3)	2 (6.0)	3 (3.9)
Normal	42 (97.7)	25 (75.8)	67 (88.2)
Above normal	0 (0.0)	6 (18.2)	6 (7.9)
Total	43 (100)	33 (100)	76 (100)

The results show that the majority of premenopausal women (97.7%) had normal serum uric acid levels, with no cases of elevated levels observed in this group. In contrast, postmenopausal women exhibited a lower proportion of normal uric acid levels (75.8%) and a higher proportion of elevated levels (18.2%). This pattern indicates a tendency toward increased serum uric acid levels among postmenopausal women compared to premenopausal women. The observed difference in proportion suggests a potential influence of menopausal status on uric acid metabolism. In premenopausal women, normal uric acid levels may be maintained due to the protective effect of estrogen, which enhances renal urate excretion. Conversely, the higher proportion of elevated uric acid levels among postmenopausal women may be associated with decreased estrogen levels, leading to reduced uric acid clearance and increased retention in the circulation.

These findings are consistent with previous studies reporting higher uric acid levels in postmenopausal women (Chou et al., 2024; Deji-Oloruntoba et al., 2025; Hak & Choi, 2008; Ioannou & Boyko, 2013; Li et al., 2025; Terkeltaub et al., 2006). However, this study contributes additional evidence from a primary healthcare setting in Southeast Pontianak, which remains underrepresented in the literature compared to hospital-based studies. From a local context, lifestyle factors such as dietary patterns, particularly the consumption of purine-rich foods, as well as levels of physical activity, may influence serum uric acid levels among women in this area. Although these variables were not directly measured in this study, they are important considerations in interpreting the findings, especially in community-based populations.

In addition to hormonal changes, metabolic factors such as obesity and insulin resistance are known to contribute to increased uric acid levels by impairing renal excretion (Budhiraja et al., 2004; Ndrepepa, 2025; Tian et al., 2025; T. Yang et al., 2025). The higher proportion of elevated uric acid levels observed in postmenopausal women in this study may reflect the combined effects of hormonal and metabolic changes. This study has several limitations. First, important confounding factors such as dietary intake, body mass index (BMI), physical activity, and metabolic status were not assessed. Second, the use of purposive sampling limits the generalizability of the findings. In addition, no inferential statistical analysis was performed, so the observed differences should be interpreted as descriptive trends rather than statistically significant associations. From a public health perspective, the higher proportion of elevated uric acid levels among postmenopausal women highlights the importance of early screening and preventive interventions in this group. Health promotion strategies focusing on diet modification, physical activity, and routine metabolic monitoring should be strengthened, particularly at the primary healthcare level.

CONCLUSIONS

This study demonstrates a clear difference in serum uric acid profiles between premenopausal and menopausal women. Premenopausal women predominantly exhibited normal serum uric acid levels, whereas menopausal women showed a higher tendency toward elevated levels. These findings highlight the influence of menopausal status on uric acid metabolism, primarily related to hormonal changes and associated metabolic alterations. From an environmental and public health perspective, the increased prevalence of elevated serum uric acid levels among menopausal women may contribute to a higher risk of metabolic and cardiovascular disorders, potentially increasing the burden on healthcare systems. The results underscore the importance of early screening and preventive strategies, including lifestyle modification and metabolic risk management, particularly for women entering the menopausal transition. Overall, this study contributes to environmental health by providing evidence that menopausal status should be considered in community-based health monitoring and prevention programs aimed at reducing the risk of non-communicable diseases associated with hyperuricemia.

SUGGESTION

From a public health perspective, the higher proportion of elevated serum uric acid levels observed among postmenopausal women in this study indicates a potential increase in metabolic risk within this group. In the local context of Southeast Pontianak, lifestyle factors such as dietary patterns, particularly the consumption of purine-rich foods, and levels of physical activity may contribute to this condition. Therefore, community-based screening of serum uric acid levels is important, especially for women entering the menopausal transition, to support early detection and prevention of hyperuricemia-related complications at the primary healthcare level. However, this study has several limitations that should be considered when interpreting the findings. Important confounding factors such as dietary intake, body mass index (BMI), physical activity, and metabolic conditions (e.g., hypertension and diabetes) were not measured or analyzed. These factors may influence serum uric acid levels and potentially affect the observed differences between groups. In addition, the use of purposive sampling may limit the generalizability of the results to the broader population. Despite these limitations, this study provides initial community-based evidence regarding serum uric acid profiles among premenopausal and postmenopausal women in Southeast Pontianak. Future studies are recommended to include a wider range of variables and employ analytical or longitudinal designs to better understand the relationship between menopausal transition and changes in serum uric acid levels.

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