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Assessment of total cholesterol and uric acid level among postmenopausal women attending Chitwan Medical College Teaching Hospital

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Abstract

Introduction: This study aims to evaluate serum uric acid and total cholesterol concentrations among postmenopausal women.

Method: A cross-sectional study was conducted over a five-month period, from Aug to Dec 2023, at Chitwan Medical College and Teaching Hospital (CMCTH), Bharatpur, Nepal. Ethical approval was obtained. A non-probability consecutive sampling technique was employed. Postmenopausal women were included, except those with known comorbidities (chronic kidney disease, cardiovascular disorders, or on medication for lipid-lowering or uric acid-altering therapy). Demographic and biochemical variables (age, serum total cholesterol, and serum uric acid levels) were gathered from lab records. Normality of continuous variables were checked. Descriptive and inferential statistics were applied, including Spearman's rank correlation and Pearson's chi-square test, with significance set at 5%.

Result: Among the 165 postmenopausal women, the median age was 59 years, total cholesterol was 188 mg/dL, and uric acid was 5.20 mg/dL. Spearman correlation analysis revealed statistically significant positive correlations between age and uric acid ($r=0.210$, $p=0.007$) and between total cholesterol and uric acid ($r=0.696$, $p<0.001$).

Conclusion: The study highlights elevated levels of uric acid and total cholesterol in postmenopausal women, with both markers showing positive associations with advancing age.

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Introduction

Postmenopausal women experience physiological changes due to diminished ovarian function and hormonal imbalances. This significantly impacts their overall health and susceptibility to cardiovascular diseases (CVDs).[1,2] Among the various biomarkers associated with CVD risk, total cholesterol and uric acid have drawn considerable attention. Total cholesterol is an atherosclerotic risk factor and predictor of CVD morbidity and mortality.[3,4] Similarly, elevated uric acid (a terminal product of purine metabolism) is a marker related to hypertension, metabolic syndrome, and insulin resistance.[5,6]

The patient base of Chitwan Medical College Teaching Hospital is diverse, including postmenopausal women. There is limited data about the lipid and uric acid profiles of this population. To better understand the cardiovascular risk profile of postmenopausal women attending this institution, we conducted this study to determine the total cholesterol and uric acid levels among postmenopausal women. The data could help identify high-risk individuals for CVD and guide the prevention and intervention plans.

Method

A hospital-based cross-sectional study was conducted over five months from Aug to Dec 2023, at Chitwan Medical College and Teaching Hospital (CMCTH), Bharatpur, Nepal. The study aimed to assess the levels of total cholesterol and uric acid among postmenopausal women by analysing laboratory reports obtained from the hospital's clinical biochemistry department.

The sample size for the study was calculated using Cochran's formula, $n=Z^2\sigma^2/d2^{15}$, where Z-score corresponds to a 95% confidence interval (1.96), σ is the standard deviation, and d is the allowable margin of error. The σ for serum total cholesterol levels in postmenopausal women was taken as 44.1 mg/dL.[7] With a margin of error of 7 mg/dL, the minimum required sample size was calculated to be 153 participants.

A non-probability consecutive sampling technique was employed to include eligible participants who met the inclusion criteria during the study period. The inclusion criteria consisted of postmenopausal women (≥50 years), while those with known comorbidities like chronic kidney disease, diagnosed cardiovascular disorders, or those undergoing lipid-lowering or uric acid-altering therapy were excluded. A self-designed structured proforma was used to record relevant demographic and biochemical variables, including age, serum total cholesterol, and serum uric acid levels. The data were prospectively extracted from laboratory records and manually verified for completeness and accuracy before being entered into Microsoft Excel 2010. The cleaned data were imported into IBM SPSS v20. The Shapiro-Wilk test was applied to assess the normality of continuous variables, expressed as mean±SD or median and interquartile range (IQR). To explore associations and correlations between age, uric acid levels, and total cholesterol, the Spearman rank correlation test was used for continuous variables, and the Pearson chi-square test for categorical. A $p<0.05$ was considered statistically significant.

The study received ethical approval from the Institutional Review Committee of Chitwan Medical College (Approval Reference Number: CMC-IRC/079/080-222), and all ethical guidelines regarding the use of patient data for research purposes were strictly adhered to, ensuring confidentiality and anonymity.

Result

There was a total of 165 postmenopausal women's data available for analysis. The data demonstrated notable skewness (Shapiro-Wilk test) for age, total cholesterol, and uric acid measurements. The cohort's median age was 59 years (range 50-97), median total cholesterol 188 mg/dL (range 95-319), median uric acid 5.20 mg/dL (range 2.2-8.3), Table 1.

The majority of participants had normal biochemical values; 73.9% (122 women) had total cholesterol levels within the normal range,

while 26.1% (43 women) had values outside the normal range. Similarly, for uric acid, 73.3% (121 women) were within the normal range, whereas 26.7% (44 women) had abnormal levels, Figure 1.

Of the 165 participants, 74(44.84%) were in the 50-59 years' age group, while 91(55.15%) were 60 years or older. The proportion of participants with abnormal total cholesterol levels was significantly higher in the ≥60 years' age group compared to the 50-59 years' age group (31.9% vs. 18.9%, p=0.050). Similarly, the proportion of participants with abnormal uric acid levels was also significantly higher in the ≥60 years' age group compared to the 50-59 years' age group (33.0% vs. 18.9%, p=0.042), Table 2.

There was a significant positive correlation between age and uric acid (r=0.210, p=0.007), indicating that as age increases, uric acid levels also tend to increase. Additionally, there was a significant positive correlation between total cholesterol and uric acid (r=0.696, p<0.001), suggesting that as total cholesterol levels increase, uric acid levels also tend to increase. The correlation between age and total cholesterol was not significant (r=0.167, p=0.032), Table 3.

Table 1. Descriptive analysis on quantitative parameters among postmenopausal women attending, n=165

Parameters	Median (Q1-Q3)	Min-Max	Normality test#
Age	59(53-68)	50-97	Skewed
Total cholesterol	188(148-221)	95-319	Skewed
Uric acid	5.20(4.0-6.1)	2.2-8.3	Skewed

Normality test was done through the Shapiro-Wilk test at 5% level of significance

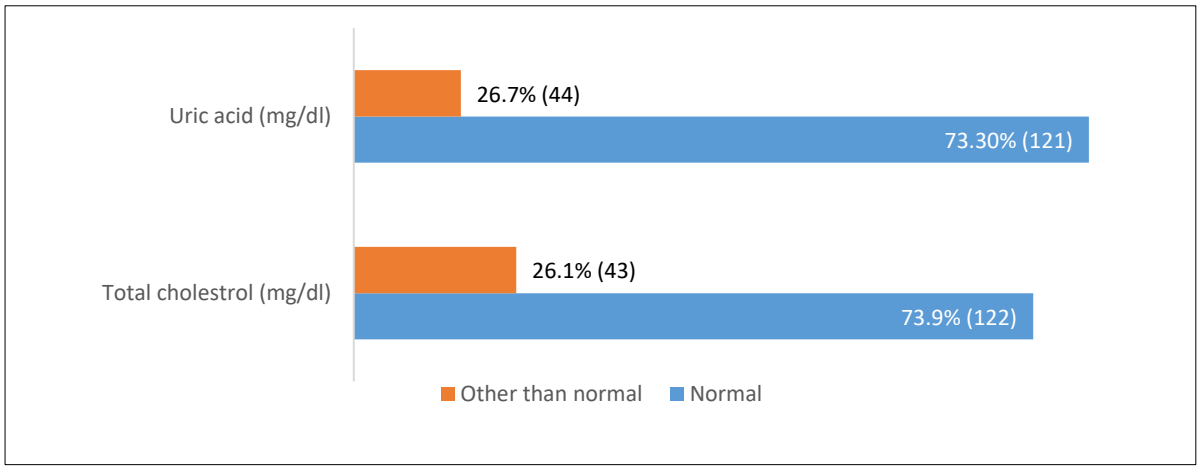

Figure1. Percentage of postmenopausal women with normal and abnormal lipid levels, n=165

Table 2. Patients' levels of uric acid and cholesterol according to age group, n=165

Variables	n(%)	Other than normal (%)	
		Total cholesterol	Uric acid
Age group			
50-59 years	74(44.84)	14(18.9)	14(18.9)
≥60 years	91(55.15)	29(31.9)	30(33.0)
p-value		0.050*	0.042*

*Denotes significant association (Pearson chi-square test at 5% level of significance)

Table 3. Degree of linear relationship between quantitative parameters, n=165

Variables	Correlation	p-value
Age vs total cholesterol	0.167	0.032*
Age vs uric acid	0.210	0.007*
Total cholesterol vs uric acid	0.696	<0.001*

*Denotes significant correlation (by applying Spearman correlation coefficient at 5% level of significance)

Discussion

The present hospital-based cross-sectional study assessed the levels of total cholesterol and uric acid among postmenopausal women attending Chitwan Medical College Teaching Hospital (CMC-TH), Nepal demonstrates high prevalence of abnormal cholesterol and uric acid levels, with statistically significant correlations between age and uric acid, and between total cholesterol and uric acid levels. These findings provide valuable insights into the biochemical changes experienced by postmenopausal women and implications for cardiovascular risk.

These findings align with previous studies that have reported increased cardiovascular risk in postmenopausal women due to hormonal changes and other factors.[8,9] Menopause is a critical phase in a woman's life associated with a decline in estrogen levels, which in turn affects lipid metabolism, renal function, and cardiovascular physiology.[1,2] In Nepal, where cardiovascular diseases (CVDs) are emerging as a leading cause of mortality among women, especially in older age groups, understanding such biomarker patterns in postmenopausal women is essential for early risk stratification and intervention.

Our results show that the median total cholesterol level among postmenopausal women was 188 mg/dL, with approximately 26% of participants having abnormal cholesterol values. This aligns with findings from a study conducted at a tertiary hospital in Chitwan, where postmenopausal women exhibited increased cholesterol levels and lipid abnormalities.7 Elevated total cholesterol is a well-established risk factor for atherosclerotic cardiovascular disease (ASCVD)[3], and the 2018 ACC/AHA guideline emphasizes the importance of managing cholesterol to reduce ASCVD risk.[4]

Likewise, the study found a median uric acid level of 5.20 mg/dL, with over 28% of women showing elevated levels. The significant positive correlation between uric acid and age (r=0.210, p=0.007) supports prior observations that aging may impair renal uric acid clearance and increase purine metabolism, leading to hyperuricemia.[10,11] Uric acid, although traditionally associated with gout, is increasingly recognized as a contributor to endothelial dysfunction, oxidative stress, and metabolic disorders.[5,6,12] In Nepal, where dietary patterns rich in purines and limited access to geriatric care are common, hyperuricemia could be an underdiagnosed but significant risk factor among older women.[15,16]

Furthermore, the study identified a strong correlation between total cholesterol and uric acid levels (r=0.696, p<0.001), implying that these biomarkers may share common metabolic pathways or be influenced by overlapping risk factors such as insulin resistance and systemic inflammation.[12-13] Several studies have indicated that both hypercholesterolemia and hyperuricemia may exacerbate the progression of atherosclerosis, especially in individuals with reduced estrogenic protection, as is the case in postmenopausal women.[4,5]

Interestingly, our findings show a statistically significant difference in biochemical parameters between the two age groups, 50–59 and ≥60 years. Women over 60 had higher proportions of abnormal total cholesterol (31.9%) and uric acid levels (33.0%) compared to their younger counterparts. This reflects a progressive metabolic deterioration with age,

potentially exacerbated by poor health-seeking behaviour and low physical activity, particularly among Nepalese women. Cultural norms in Nepal often prioritize caregiving and household responsibilities, which may delay personal health screening and management.[17,18]

Although Nepal lacks extensive population-based data on biochemical markers in postmenopausal women, small-scale studies and regional comparisons suggest similar trends.[7] The absence of routine screening programs for lipid and uric acid levels among older women remains a gap in Nepal's non-communicable disease control strategies. While national surveys like NDHS or STEPS collect useful data on hypertension, blood glucose, and BMI, parameters like serum cholesterol and uric acid are generally overlooked.[19,20]

From a public health perspective, these findings underscore the need to integrate menopause-specific screenings into healthcare services. Preventive cardiology services, community-based education, and cholesterol and uric acid screening for women aged 50 years and above could reduce long-term CVD risk in Nepal. Moreover, clinicians should consider biochemical monitoring of postmenopausal women, especially those with risk factors such as obesity, sedentary lifestyle, or family history of CVD.

The cross-sectional design, non-random sampling, and lack of data on other pertinent lifestyle factors are the study's limitations, which may limit generalizability. Still, they also add significantly to the evidence that cardiovascular risk assessment in postmenopausal Nepalese women is both urgent and under-addressed, especially among postmenopausal women.

Conclusion

A significant number of postmenopausal women at Chitwan Medical College Teaching Hospital had abnormal uric acid and cholesterol levels. Age-related increases in uric acid were strongly correlated with these indicators. This population may be more susceptible to cardiovascular and renal disorders. An important next approach includes additional research incorporating metabolic screening with a menopause focus into medical procedures.

Author contribution

Concept design: PR; Literature search: AD, AP, DB; Data collection: PR; Data analysis: PR, SK; Draft manuscript: PR, FM, BR; Final manuscript and accountability: All

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Conflict of interest

None

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Supplementary material

Data and supplementary material that support the findings of this study are available from the corresponding author upon reasonable request.

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