Original Article

Association Between Serum Uric Acid and Lipid Profile in Adult Individuals

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ABSTRACT

Objective: The objective of this study to determine Association between Serum Uric Acid and Lipid Profile in Adult Individuals

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the Department of Biochemistry, Al Nafees Medical College Islamabad and Mohi-Ud-Din Islamic Medical College, Mirpur AJ&K from February 2021 to August 2022.

Materials and Methods: The research involved 300 adult participants, consisting of 150 males and 150 females, who were all in good health with no significant cardiovascular conditions. Prior to enrollment, informed consent was obtained from all participants, and the study protocol received approval from the internal Ethics Committee. Exclusion criteria encompassed individuals with myeloproliferative disorders, those undergoing cytotoxic drug therapy, pregnant or lactating women, individuals on diuretics, anti-hypertensive, or hypolipidemic medications, alcoholics, people with known cardiovascular, renal, or hepatic disorders, and those receiving anti-gout therapy. Blood samples were collected from both groups and underwent centrifugation at 3000 RPM for 10 minutes to obtain serum. Automatic chemical analyzers were used to analyze the serum samples, employing Merk kits for estimation. Additionally, biochemical tests were performed on female participants from both groups, including sugar levels, lipid profile, serum creatinine (Cr), blood urea nitrogen (BUN), and uric acid (UA). Statistical analysis was carried out using SPSS version 20 software.

Results: Significant differences were observed in the average levels of serum uric acid (SUA), triglycerides (TG), and high-density lipoprotein (HDL) between the male and female groups. According to the diagnostic criteria, the overall prevalence of hyperuricemia among the participants was 9.9%, with 8.9% in males and 10.7% in females. Male participants were more likely to have higher SUA levels compared to females

Conclusion: This study reveals a significant correlation between serum uric acid (SUA) levels and lipid profile in the adult population. It emphasizes the importance of early intervention to prevent hyperuricemia and dyslipidemia in order to reduce the occurrence of cardiovascular disease in adults

Key Words: Serum uric acid, Lipid Profile

INTRODUCTION

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Serum uric acid (SUA) is the final product in catabolism of purine.[1] Hyperuricemia, characterized high level of uric acid is a major contributing factor to its elevated levels [2, 3]. The prevalence of hyperuricemia is on the rise globally, with developing nations experiencing a particularly significant increase [4.] SUA levels are influenced by genetic environment.[5] Epidemiological studies have demonstrated a strong association between elevated serum uric acid levels and conditions[6–8]. Research has shown that individuals with coronary heart disease tend to have higher SUA concentrations compared to healthy individuals. Elevated SUA levels have also been linked cardiovascular diseases[9,10] it is believed that hyperuricemia may contribute to pro inflammatory endocrine imbalances in adipose tissue, thereby playing a role in dyslipidemia and the inflammatory processes underlying atherogenesis [11]

The determination of whether uric acid plays a causal role in the mentioned medical conditions or functions solely as a marker for individuals at higher risk, representing associations with other conventional risk factors such as blood lipids, metabolic syndrome, and diabetes, poses a multifaceted and challenging undertaking.[12,13] The relationship between uric acid and the risk factors for cardiovascular disease is influenced by various confounding factors, including diet, dyslipidemia, and obesity. Consequently, discerning the exact role of serum uric acid (SUA) in these diseases presents a formidable challenge. In summary, the involvement of SUA in hypertension, cardiovascular disease, and metabolic syndrome is a subject of ongoing debate and investigation within the academic community. Although elevated SUA levels are linked to these conditions, the precise nature of uric acid's role—whether it acts causally or merely serves as a marker for underlying risk factors—remains unclear. To gain a more profound understanding and identify potential therapeutic implications of hyperuricemia in these diseases, further research is imperative to elucidate the intricate mechanisms involved.

MATERIALS AND METHODS

This study was conducted at the Department of Biochemistry in Al Nafees Medical College, Islamabad, and Mohi-Ud-Din Islamic Medical College, Mirpur Aj&K. The research involved 300 adult participants, consisting of 150 males and 150 females, who were all in good health with no significant cardiovascular conditions. Prior to enrollment, informed consent was obtained from all participants, and the study protocol received approval from the internal Ethics Committee. Exclusion criteria encompassed individuals with myeloproliferative disorders, those undergoing cytotoxic drug therapy, pregnant or lactating women, individuals on diuretics, anti-hypertensive, or hypolipidemic medications, alcoholics, people with known cardiovascular, renal, or hepatic disorders, and those receiving anti-gout therapy. Blood samples were collected from both groups and underwent centrifugation at 3000 RPM for 10 minutes to obtain serum. Automatic chemical analyzers were used to analyze the serum samples, employing Merk kits for estimation. Additionally, biochemical tests were performed on female participants from both groups, including sugar levels, lipid profile, serum creatinine (Cr), blood urea nitrogen (BUN), and uric acid (UA). Statistical analysis was carried out using SPSS version 20 software.

RESULTS

Significant differences were observed in the average levels of serum uric acid (SUA), triglycerides (TG), and high-density lipoprotein (HDL) between the male and female groups. According to the diagnostic criteria, the overall prevalence of hyperuricemia among the participants was 9.9%, with 10.7% in males and 8.9% in females. Male participants were more likely to have higher SUA levels compared to females.

When adjusting for age and sex, it was found that the mean levels of serum uric acid, TG, total cholesterol (TC), and low-density lipoprotein (LDL) increased progressively across the quartiles of SUA. Conversely, the mean level of HDL decreased progressively across the SUA quartiles.

Table No.1: Participant characteristics

	Test adult (n=300) Male and Female	Control (n=300) Male , Female
Age (years)	41.53 ± 10.58	40.56 ± 10.48
Education Basic Secondary University	B-48%, S-26% , U-26%	B-52 % , S-25% U-123%
Body weight (Kg)	70.3 + 11.6	72.1 + 11.4
BMI (kg/m2)	25.4 + 2.6	25.3 + 2.7

B: Basic , S: Secondary , U:University

Table No. 2: Prevalence of hyperuricemia among the participants

Participants	Pentangle
Serum Uric Acid %	
Male	10.7%
Female	8.9%
Over all	9.9%

Table No. 3: Biochemical profile with hyperuricemia in test group of adult

Test (n=300) With High serum Uric Acid	Control (n=300) With normal Serum Uric acid
Fasting Blood Glucose(mg/dl)	
97.8 ± 3.3	99.3 ± 3.4
Total Cholesterol (mg/dl)	
244.5 ± 11.9	112.6 ± 32.4\3
LDL (mg\dl)	
128.7 ± 19.4	123.5± 17.3
HDL (mg\dl)	
42.71± 8.5	56.3 ± 8.4
Triglycerides (mg\dl)	
198.3 ± 31.5	132.3 ± 32.4

DISCUSSION

The objective of this study was to investigate the potential association between hyperuricemia (elevated uric acid levels) in individuals without known cardiovascular disease (CVD) and abnormal lipid levels.

The aim was to determine whether identifying and treating hyperuricemic individuals could potentially prevent the development of CVD. This study is believed to be the first to report a strong association between uric acid levels and lipid profile.

These findings align with previous research that has identified overlapping pathogenic mechanisms between hyperuricemia and dyslipidemia [14]

Cardiovascular disease (CVD) is influenced by a combination of modifiable and non-modifiable risk factors. Atherogenic dyslipidemia, characterized by elevated triglyceride (TG) and low-density lipoprotein (LDL) cholesterol levels, along with reduced high-density lipoprotein (HDL) cholesterol levels, represents a modifiable risk factor in humans[15].

Extensive epidemiological studies have established a direct correlation between atherogenic dyslipidemia and cardiovascular risk[16]. Similarly, several studies have demonstrated a link between hyperuricemia and CVD (References.[17] This study investigates the relationship between hyperuricemia and lipid profile in individuals without known CVD. Notably, the results indicate a positive association between uric acid levels and the TG to HDL cholesterol ratio, a recognized marker of insulin resistance, which is consistent with prior research.[18]

Furthermore, previous investigations have highlighted the impact of hyperuricemia on adipocytes, leading to increased monocyte chemoattractant protein and decreased adiponectin production, contributing to insulin resistance and inflammation[19,20]. These findings suggest a complex interplay between uric acid and lipid levels that is not yet fully understood.

Considering the results of this study, it supports the notion proposed by previous research, suggesting that uric acid may amplify various pathophysiological mechanisms associated with cardiovascular disease risk and may synergistically interact with other lipid components, thereby increasing the risk of CVD .

In summary, this study aimed to examine the association between hyperuricemia and lipid profile in individuals without known CVD. The results demonstrated a significant link between elevated uric acid levels and abnormal lipid levels, supporting the hypothesis that addressing hyperuricemia could potentially help prevent the development of cardiovascular disease. These findings align with previous research that has identified similar associations and emphasize the complex interplay between uric acid and lipids in relation to cardiovascular risk. Further investigation is needed to fully elucidate the underlying mechanisms involved in this relationship.

CONCLUSION

This study reveals a significant correlation between serum uric acid (SUA) levels and lipid profile in the adult population. It emphasizes the importance of early intervention to prevent hyperuricemia and dyslipidemia in order to reduce the occurrence of cardiovascular disease in adults. To enhance our understanding of this association, future research should consider additional factors such as hypertension, diabetes, and lifestyle factors. These investigations will provide a more comprehensive insight into the observed relationship.

Author's Contribution:

Concept & Design of Study:	Roomisa Anis
Drafting:	Ayesha Shafqat, Rashad Mahmood
Data Analysis:	Saeed Ahmed, Wajahat Ullah Khan, Rana Tauqir Ullah Khan
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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