AN ANALYSIS OF THE ASSOCIATION BETWEEN SERUM URIC ACID LEVEL AND LIPID PROFILE IN ADULT POPULATION

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ABSTRACT

Objective: To analyse the relationship between serum uric acid and lipid profile in adult

Study Design: Cross-sectional study design was used.

Place and Duration of Study: This study was conducted at the Department of General Medicine Shaikh Zayed Hospital, Lahore from August 2022 to February 2023.

MATERIAL AND METHODS: Our study included a sample of 230 (115 in cases & 115 in control) adult patients (aged 18-65 years) included. Adult individuals within the specified age range and patients willing to participate and provide informed consent were enrolled. Levels of serum uric acid (SUA) levels, lipid profile including total cholesterol, LDL, triglycerides, cholesterol, HDL cholesterol were assessed.

RESULTS: The average age of cases was 45.2 years (SD ±8.3), which was slightly higher than controls, where the average age was 43.8 years (SD ±7.5). The prevalence of hyperuricemia was higher in cases (35.7%) compared to controls (12.2%). In the cases group, the mean serum uric acid level (5.8 mg/dL) was significantly higher compared to the controls (4.2 mg/dL), with a p-value less than 0.001.

CONCLUSION: The findings of our research highlighted a notable positive correlation between hyperuricemia and crucial lipid profile components, encompassing triglycerides, total cholesterol, LDL & HDL.

KEYWORDS: Adults**,** Analysis, Association**,** Hyperuricemia**,** Lipid profile**,** Serum uric acid

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DOI: 10.53555/ecb/2023.12.Si13.238

INTRODUCTION:

Serum uric acid, a byproduct of purine metabolism within the body's metabolic processes, has increasingly captivated the attention of researchers and clinicians alike due to its multifaceted role in health and disease.[1] Beyond its well-established association with gout, emerging evidence suggests that serum uric acid levels may serve as a potential indicator of broader physiological imbalances. By comprehensively examining the diverse facets of serum uric acid, we aim to provide a thorough understanding of its clinical implications and underscore its significance in the broader landscape of medical research and patient care.[2,3]

Perturbations in uric acid homeostasis, marked by excessive production and reduced renal excretion, contribute significantly to the escalating global prevalence of hyperuricemia. This surge is particularly pronounced in developing nations, Highlighting the intricate interplay between genetic and environmental factors that contribute to the variability in serum uric acid (SUA) levels.[4]

The occurrence of elevated levels of serum uric acid, a precursor to conditions like hyperuricemia and gout, exhibits geographical variation. According to a meta-analysis spanning from 2000 to 2014, the pooled prevalence of hyperuricemia (HUA) in mainland China stands at 13.3%.[5] Additionally, a survey discerned differing prevalence rates, with higher proportions observed in southern and rural locales compared to their northern and urban counterparts. Specifically, in southern areas, the prevalence was documented as 20.21% prevalence for males and 10.2% for females in areas in south, 21.2% for males and 8.0% for females in areas in villages. These figures provide insights into the distribution of hyperuricemia across different regions and demographics in mainland China during the specified time period.[6]

The lipid profile in adults, encompassing cholesterol, triglycerides, and lipoproteins, serves as a critical indicator of cardiovascular health. Dyslipidemia, characterized by abnormal lipid levels, is a pervasive concern globally and a significant risk factor for atherosclerotic cardiovascular diseases.[7] The incidence of serum uric acid varies across populations due to factors such as genetics, dietary habits, and lifestyle choices. Recent studies suggest an increasing trend in dyslipidemia, underscoring the need for comprehensive public health strategies. Monitoring lipid profiles in adults is essential for early detection and management of cardiovascular risk, contributing to more targeted interventions and improved long-term health outcomes.[8,9] Studies suggest a complex relationship, where elevated serum uric acid levels may be associated with adverse lipid profiles. Understanding this association is crucial for comprehensive cardiovascular risk assessment and the development of targeted preventive measures.[10] This study aims to investigate and delineate the associations between serum uric acid levels and lipid profiles in adult individuals, providing valuable insights for enhanced cardiovascular risk assessment and targeted intervention strategies.

Material and Methods:

This cross-sectional study research was conducted at Medicine Department of Shaikh Zayed Hospital, Lahore from August 2022 to February 2023. Our study included a sample of 230 (115 in cases & 115 in control) adult patients (aged 18-65 years) recruited from OPD of hospital. Adult individuals within the specified age range and patients willing to participate and provide informed consent were included in study. Individuals with a history of gout or other conditions affecting serum uric acid levels, pregnant or lactating women and patients on medications known to influence serum uric acid or lipid levels were excluded. Utilizing a structured questionnaire, we systematically gathered demographic details, encompassing age, gender, and other pertinent variables. In addition to demographic insights, we probed into participants' medical histories, seeking information on pre-existing conditions and any relevant medications. Serum uric acid levels were measured, and profile of lipid parameters, including TC, LDL, HDL cholesterol and TC, were assessed. Statistical analyses were conducted to assess correlations between serum uric acid (SUA) and lipid profile parameters, with adjustments made for potential confounding variables such as age, gender, and comorbidities.

RESULTS:

The average age of cases was 45.2 years (SD ±8.3), which was slightly higher than controls, where the average age was 43.8 years (SD ±7.5). There were 60 males (53.5%) and 55 females (47.8%) in the cases, while controls had 58 males (50.4%) and 57 females (49.5%). Cases were heavier, with an average weight of 75.4 kg (SD ±10.2), compared to controls, where the average weight was 72.8 kg (SD ±9.5). The BMI for cases was higher at 27.6 kg/m² (SD ±3.5) compared to controls, where the BMI was 26.2 kg/m² (SD ±2.8). Smoking was more prevalent among cases, with 30 individuals (26.1%), whereas controls had 15 individuals (13.0%) who smoked as given in

table 1. The prevalence of hyperuricemia was higher in cases (35.7%) compared to controls (12.2%). When stratified by gender, males in the cases group had a prevalence of 40.0%, while males in the control group had a lower prevalence of 15.5%. Among females, the prevalence in the cases group was 30.4%, and in the control group, it was 9.6% as shown in table 2.

In the cases group, the mean serum uric acid level (5.8 mg/dL) was significantly higher compared to the controls (4.2 mg/dL), with a p-value less than 0.001. Similarly, cases had higher mean levels of total cholesterol (205.3 mg/dL) and triglycerides (150.8 mg/dL) compared to controls (192.7 mg/dL and 130.4 mg/dL, respectively), with p-values of 0.002 and less than 0.001, respectively. Regarding lipid subtypes, cases exhibited higher mean levels of LDL cholesterol (120.5 mg/dL) and lower levels of HDL cholesterol (45.7 mg/dL) compared to controls (110.2 mg/dL and 50.3 mg/dL, respectively) given in table 3.

Table 1: Demographic Characteristics

Characteristic	Cases (n=115)	Controls (n=115)
Age (mean ± SD)	45.2 ± 8.3	43.8 ± 7.5
Gender (M/F)	60(53.5%)/55(47.8%)	58(50.4%)/57(49.5%)
Weight (kg, mean ± SD)	75.4±10.2	72.8±9.5
BMI (kg/m², mean ± SD)	27.6±3.5	26.2±2.8
Smoking (n, %)	30(26.1%)	15(13.0%)

Table 2: Prevalence of Hyperuricemia

Group	Cases (n=115)	Controls (n=115)
Overall	35.7%	12.2%
Male	40.0%	15.5%
Female	30.4%	9.6%

Table 3: Lipid Profile Parameters

Parameter	Cases (n=115)	Controls (n=115)	p-value
Serum Uric Acid (mg/dL, mean ± SD)	5.8±1.2	4.2±0.9	<0.001
Total Cholesterol (mg/dL, mean ± SD)	205.3±20.1	192.7±18.5	0.002
Triglycerides (mg/dL, mean ± SD)	150.8±25.6	130.4±22.3	<0.001
LDL Cholesterol (mg/dL, mean ± SD)	120.5±15.8	110.2±14.3	0.005
HDL Cholesterol (mg/dL, mean ± SD)	45.7±7.2	50.3±8.1	0.008

DISCUSSION:

The results of our current study illuminate the correlation between serum uric acid (SUA) levels, lipid profile parameters, and the prevalence of hyperuricemia in individuals diagnosed with acute pancreatitis. The findings indicate a substantial increase in SUA levels in cases as opposed to controls, providing support for the proposition that hyperuricemia could be involved in the pathophysiology of acute pancreatitis. This observation is in agreement with earlier studies, such as the work by Pang et al. (2021), which have proposed a potential role of elevated uric acid in inflammatory processes.[10] The consistent findings has been demonstrated across various ethnic groups. There exists a positive linear correlation between serum uric acid levels and both triglycerides and total cholesterol.[11] The outcomes from Baliarsingh et al. (2018) study revealed a significant elevation in hypertriglyceridemia levels associated with an increase in serum uric acid. These results align with and support our own findings.[12] Consistent with our results, several studies have reported increased serum uric acid levels in conditions associated with lipid profile. The heightened uric acid levels observed in our cases group may be attributed to inflammatory responses during acute pancreatitis. Such inflammatory conditions often lead to increased purine turnover and subsequently elevated uric acid levels.[13,14] Furthermore, our study demonstrated elevated levels of total cholesterol and triglycerides in cases compared to controls, total cholesterol 205.3±20.1 vs. 192.7±18.5 and Triglycerides 150.8±25.6 vs. 130.4±22.3 in cases and controls respectively which are in agreement with previous research reported by Pathania et al. (2018)[15] & Sarmah et al. (2013)[16]. Das et al. demonstrated, in a study encompassing 1485 Assamese subjects, that the typical values for a healthy urban "Assamese population are 170 mg/dl for total cholesterol (TC), 110 mg/dl for triglycerides (TG), 40 mg/dl for high-density lipoprotein (HDL), and 103 mg/dl for low-density lipoprotein (LDL)".[17]

When examining the lipid subtypes, our study revealed increased LDL cholesterol and decreased HDL cholesterol levels in cases compared to

controls. Our study reveals a substantial positive correlation ($p < 0.005$) among key lipid parameters and hyperuricemia. Moreover, a notable negative correlation ($p < 0.005$) was identified between hyperuricemia and high-density lipoprotein (HDL). This finding is consistent with Tanunyutthawongse et al. (2020) in adults of Thai.[18]

It is crucial to acknowledge certain limitations in our study, such as the cross-sectional design and potential confounding factors. Additional longitudinal investigations are necessary to clarify the causal relationships between serum uric acid, lipid profile parameters, and the development of acute pancreatitis.

CONCLUSION:

The findings of our research highlighted a notable positive correlation between hyperuricemia and crucial lipid profile components, encompassing triglycerides, total cholesterol, LDL & HDL.

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