ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 08 | August - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"LEVELS OF LIPID PROFILE AND SERUM URIC ACID IN YOUNG PATIENTS NEWLY DIAGNOSED WITH CORONARY ARTERY DISEASE (CAD): A CASE-CONTROL STUDY"

General Medicine

Dr. Atul Sarkar Junior Resident, Department Of General Medicine, Baba Raghav Das Medical College, Gorakhpur, U.P., India.

Dr. Deepshikha* Professor, Department Of General Medicine, Baba Raghav Das Medical College, Gorakhpur, U.P., India. *Corresponding Author

Dr. Minakshi Awasthi Associate Professor, Department of General Medicine, Baba Raghav Das Medical College, Gorakhpur, U.P., India.

Dr. Harish Chandra Tiwari Associate Professor, Department Of SPM, Baba Raghav Das Medical College, Gorakhpur, U.P., India.

ABSTRACT

Background: Coronary artery disease (CAD) is increasingly affecting young adults, particularly in South Asia, where genetic predisposition and lifestyle factors contribute significantly. The role of serum uric acid and lipid profile alterations in early-onset CAD requires further evaluation. **Objectives:** To assess the association of serum uric acid and lipid profile parameters with CAD in young adults and explore their potential as early, cost-effective biochemical markers for risk assessment. **Methods:** A hospital-based case-control study was conducted on 50 newly diagnosed young CAD patients and 50 age- and sex-matched healthy controls. Serum uric acid, lipid profile, and other clinical parameters were analyzed and compared between groups. **Results:** Serum uric acid and lipid profile parameters, including total cholesterol, HDL, and VLDL, were significantly higher in CAD cases. Logistic regression identified total cholesterol and uric acid as independent predictors. **Conclusion:** Elevated serum uric acid and lipid abnormalities are significantly associated with young-onset CAD.

KEYWORDS

Coronary artery disease; Young adults; Serum uric acid; Lipid profile; Risk prediction.

INTRODUCTION

Coronary artery disease (CAD) is no longer confined to older adults; its rising prevalence among younger individuals, particularly those aged 20 to 45 years, has emerged as a significant global health concern. Recent estimates indicate that approximately 1.2% of individuals under 45 years worldwide are affected by CAD, with the burden reaching nearly 2% in South Asian countries, including India, where genetic, lifestyle, and dietary factors play a critical role[1,2].

Early-onset CAD in young adults poses unique diagnostic and therapeutic challenges. Unlike older individuals, they often lack classical risk factors such as longstanding hypertension, diabetes, or renal disease, leading to delayed recognition and management[3]. Simultaneously, the socioeconomic and psychological implications are profound, striking individuals in the prime of their professional and personal lives.

Emerging evidence highlights the role of systemic inflammation and metabolic dysfunction in the pathogenesis of premature atherosclerosis. Of particular interest is serum uric acid, historically regarded as an inert end-product of purine metabolism, now recognized for its involvement in endothelial dysfunction, oxidative stress, and promotion of vascular smooth muscle proliferation[4–8]. Parallel to this, dyslipidemia—characterized by elevated total cholesterol, LDL, triglycerides, and reduced HDL—remains a cornerstone in the development of CAD[9].

Several studies suggest a potential link between hyperuricemia and dyslipidemia, both contributing to early vascular injury and atherosclerosis, especially in young adults[10,11]. However, there is a paucity of focused studies assessing this interplay specifically in young Indian patients newly diagnosed with CAD, particularly those presenting with acute coronary syndromes (ACS). This study evaluated serum uric acid and lipid profiles in young adults with newly diagnosed CAD, aiming to identify simple, cost-effective biochemical markers for early risk assessment and prevention.

MATERIALS AND METHODS

A hospital-based case-control study was conducted over a period of one year in the Department of General Medicine at B.R.D. Medical College, Gorakhpur, Uttar Pradesh, India. The study included 50 newly diagnosed cases of coronary artery disease (CAD) presenting with acute coronary syndrome (ACS) and 50 age- and sex-matched healthy controls, making a total of 100 participants. Ethical clearance was obtained from the Institutional Human Ethics Committee of the college, and written informed consent was taken from all participants before inclusion.

The sample size was calculated based on a 2% estimated prevalence of CAD in young Indian adults, considering a 95% confidence level and a 5% margin of error. To improve the statistical validity, 50 participants were included in each group. The inclusion criteria for cases were adults aged 20 to 45 years with recent diagnoses of ACS, including STEMI, NSTEMI, or unstable angina, who were not on prior treatment for CAD. Controls were selected from healthy individuals within the same age range with no clinical history of CAD or ACS. Participants with known hepatic or renal disease, myeloproliferative disorders, those on lipid-lowering or anti-hyperuricemic medications, pregnant or lactating women, and those unwilling to participate were excluded.

After obtaining detailed medical history and performing a comprehensive physical examination, including measurement of body mass index (BMI) and vitals, all participants underwent a 12-lead electrocardiogram. Fasting blood samples were collected under aseptic conditions to assess serum uric acid, lipid profile (total cholesterol, triglycerides, HDL, LDL, VLDL), and other biochemical parameters. Lifestyle habits such as smoking, alcohol use, physical activity, and dietary patterns were recorded using a structured questionnaire. All laboratory investigations were performed using standardized kits and equipment with quality control measures. Statistical analysis was conducted using SPSS version 25, with significance set at $p < 0.05$.

RESULTS

Table 1: Distribution Of Subjects By Age And Gender

Category	Sub-Category	Case		Control		Significance	
		No.	%	No.	%	chi sq	p-value
Age (Years)	30 - 35 years	12	24.0%	16	32.0%	3.30	0.192
	35 - 40 years	11	22.0%	16	32.0%		
	40 - 45 years	27	54.0%	18	36.0%		
Gender	Male	38	76.0%	29	58.0%	3.66	0.056
	Female	12	24.0%	21	42.0%		

The mean serum uric acid level was significantly higher in cases (6.65 ± 2.04 mg/dL) than in controls (5.17 ± 1.36 mg/dL), with a t-value of 4.29 and $p < 0.001$, indicating a strong association between elevated uric acid levels and CAD in young adults.

Table 2: Comparison of Lipid Parameters between Case & Control Groups

Lipid Parameter	Case Mean ± SD	Control Mean ± SD	t-value	p-value
Total Cholesterol (T.C)	182.85 ± 48.49	154.50 ± 45.46	3.03	0.003
Triglycerides (TG)	185.73 ± 97.80	162.36 ± 101.31	1.18	0.241
High-Density Lipoprotein (HDL)	50.29 ± 12.68	42.92 ± 9.68	3.28	0.001
Low-Density Lipoprotein (LDL)	117.15 ± 40.29	102.31 ± 46.86	1.71	0.091
Very Low-Density Lipoprotein (VLDL)	35.71 ± 16.64	28.02 ± 15.99	2.37	0.020

Table 3: Comparison of Lipid and Other Parameters among ACS Types

Parameter	AWMI Mean ± SD	NSTEMI Mean ± SD	IWMI Mean ± SD	F-value	p-value
Trop-I (ng/mL)	13.42 ± 16.51	10.05 ± 16.03	16.17 ± 18.34	0.34	0.711
Total Cholesterol (T.C) (mg/dL)	177.45 ± 49.44	182.44 ± 47.74	217.50 ± 43.59	1.18	0.316
Triglycerides (TG) (mg/dL)	158.40 ± 75.89	196.99 ± 101.46	285.00 ± 140.33	3.46	0.039
High-Density Lipoprotein (HDL) (mg/dL)	49.40 ± 10.43	51.97 ± 15.60	46.05 ± 2.88	0.47	0.626
Low-Density Lipoprotein (LDL) (mg/dL)	112.31 ± 33.12	117.40 ± 46.80	144.73 ± 37.16	1.12	0.336
Very Low-Density Lipoprotein (VLDL) (mg/dL)	32.13 ± 15.25	36.98 ± 17.59	50.00 ± 13.14	2.20	0.122
Serum Uric Acid (mg/dL)	6.22 ± 1.80	6.70 ± 2.17	8.95 ± 1.07	3.40	0.042

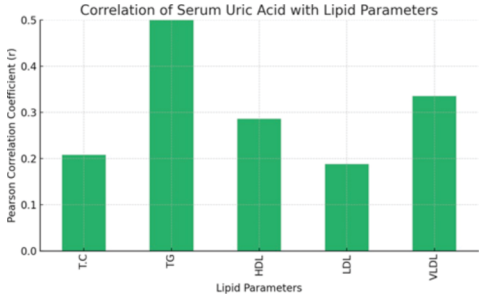

Figure 1: Correlation of Serum Uric Acid with Lipid Parameters

Table 4: Logistic Regression Analysis Showing Relationship of CAD with Independent Predictors

Predictor	B	S.E.	p-value	Exp(B) / OR	95% CI for Exp(B)
Smoking	22.55	8753.71	0.998	Large	0.00 – Large
Alcohol	19.56	7957.86	0.998	Large	0.00 – Large
Physical Activity			0.010		
Sedentary	2.22	1.38	0.107	9.23	0.62 – 138.14
Light	0.14	1.26	0.913	1.15	0.10 – 13.61
Moderate	-2.13	1.69	0.210	0.12	0.00 – 3.31
Active/Vigorous	Ref.			Reference	
Total Cholesterol (T.C)	0.02	0.01	0.007	1.02	1.01 – 1.04
Triglycerides (TG)	-0.01	0.00	0.099	0.99	0.99 – 1.00
Serum Uric Acid	0.64	0.21	0.002	1.90	1.26 – 2.87
Constant	-6.86	2.05	0.001	0.00	

Dependent: CAD

Table 5: Correlations between LIPID and Other Parameters

Parameter	Trop-I		T.C		TG		HDL		LDL		VLDL		S.Uric acid	
	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value
Trop- I	1													
T.C	-.111	.480	1											
TG	.129	.409	.443	<0.001	1									
HDL	-.076	.628	.416	<0.001	.323	.001	1							
LDL	-.083	.597	.821	<0.001	.317	.001	.259	.009	1					
VLDL	-.049	.755	.479	<0.001	.840	<0.001	.367	<0.001	.289	.003	1			
S.Uric acid	.125	.426	.175	.080	.354	<0.001	.305	.002	.128	.285	.004	1		

Table 6: ROC Analysis to Establish Serum Uric Acid as the Diagnostic Marker of CAD

Parameter	Value	95% CI
AUROC	0.729	0.63 – 0.83
Optimum Cut-off	SUA > 5.95 mg/dL	-
Sensitivity (%)	54.9	45.1 – 64.7
Specificity (%)	86.0	79.2 – 92.8

DISCUSSION

The present study evaluated the increasing burden of coronary artery disease (CAD) among young adults, with a majority (54%) of cases occurring between 40 and 45 years, consistent with reports of early-onset CAD in South Asians (Aggarwal et al., 2016; Rehman et al., 2023)[12,13]. Male predominance was evident, with 76% of cases being male, aligning with global studies showing higher CAD rates in young men (Mumcu & Gitmez, 2023; Yang et al., 2021)[14,15]. Although family history was not significantly associated with CAD in this cohort, other studies consistently report its role as a key risk factor (Iyengar et al., 2017; Otaki et al., 2013)[16,17].

Comorbidities such as diabetes (24%) and hypertension (10%) were prevalent among CAD cases, with dyslipidemia and higher body mass index (BMI) also significantly associated with CAD. Elevated BMI among cases (23.01 ± 1.49 kg/m²) is in line with studies emphasizing obesity as a modifiable risk factor for early CAD (Foroughi et al., 2014; Choi et al., 2018)[18,19].

Anterior wall myocardial infarction (AWMI) was the most common acute coronary syndrome (ACS) presentation, followed by NSTEMI and IWMI, consistent with global trends where AWMI is frequently seen among young CAD patients (Tungsubutra et al., 2007; Deora et al., 2016)[20,21].

Biochemically, serum uric acid (SUA) was significantly higher in CAD cases (6.65 ± 2.04 mg/dL) than controls, supporting evidence of SUA as a potential independent risk factor for CAD (Lv et al., 2019; Dai et al., 2015)[22,23]. Lipid profile abnormalities, notably elevated total cholesterol, HDL, and VLDL levels, were observed, though LDL and triglycerides did not differ significantly. Notably, SUA levels and lipid parameters showed moderate positive correlations, reinforcing the interplay between dyslipidemia and hyperuricemia in CAD pathogenesis. Logistic regression identified total cholesterol and SUA as independent predictors of CAD. Furthermore, ROC analysis revealed SUA had fair diagnostic accuracy (AUC = 0.729), with high specificity (86%), highlighting its potential as a simple, cost-effective biomarker for risk stratification in young adults with suspected CAD.

Limitations: The limitations of the study include a relatively small, single-center sample size, lack of long-term follow-up, and exclusion of other inflammatory markers or genetic factors that may influence CAD risk.

Strengths: The strengths of the study include its case-control design, inclusion of only newly diagnosed young CAD patients, and simultaneous evaluation of both serum uric acid and lipid profiles using standardized laboratory methods.

CONCLUSION

We concluded that elevated serum uric acid and altered lipid profiles are significantly associated with early-onset CAD in young adults, highlighting their potential role as cost-effective biochemical markers for early risk assessment and prevention.

Conflict Of Interest: None.
Funding: None.
Ethical Approval: Obtained.
Consent: Written consent secured.

REFERENCES

1. Sinha N, Krishna V, Reddy KS. Newer perspectives of coronary artery disease in young. World J Cardiol. 2016;8(12):728–734.
2. Mohan V, Deepa R, Rani SS, Premalatha G. Prevalence of coronary artery disease and its relationship to lipids in a selected population in South India: The Chennai Urban Population Study (CUPS No. 5). J Am Coll Cardiol. 2001;38(3):682–687.
3. Enas EA, Senthilkumar A. Coronary artery disease in Asian Indians: An update and review. Internet J Cardiol. 2001;1(2).
4. Libby P. Inflammation in atherosclerosis. Nature. 2002;420(6917):868–874.
5. Feig DI, Kang DH, Johnson RJ. Uric acid and cardiovascular risk. N Engl J Med. 2008;359(17):1811–1821.
6. Johnson RJ, Nakagawa T, Jalal D, et al. Uric acid and chronic kidney disease: Which is chasing which? Nephrol Dial Transplant. 2013;28(9):2221–2228.
7. Khosla UM, Zharikov S, Finch JL, et al. Hyperuricemia induces endothelial dysfunction. Kidney Int. 2005;67(5):1739–1742.
8. Sautin YY, Nakagawa T, Zharikov S, Johnson RJ. Adverse effects of the classic antioxidant uric acid in adipocytes: NADPH oxidase-mediated oxidative/nitrosative stress. Am J Physiol Cell Physiol. 2007;293(2):C584– C596.
9. Gordon DJ, Rifkind BM. High-density lipoprotein—the clinical implications of recent studies. N Engl J Med. 1989;321(19):1311–1316.
10. Peng TC, Wang CC, Kao TW, et al. Relationship between hyperuricemia and lipid profiles in US adults. Biomed Res Int. 2015;2015:127596.
11. Zhao G, Huang L, Song M, et al. Baseline serum uric acid levels are associated with all-cause mortality in patients with coronary artery disease: A systematic review and meta-analysis. Int J Cardiol. 2017;228:1105–1110.
12. Aggarwal A, Srivastava S, Velmurugan M. Newer perspectives of coronary artery disease in young. World J Cardiol. 2016;8(12):728–34
13. Rehman M ur, Ahmed I, Alam F, Sadiq MW, Mustafa A, Hussain Z, Mukhtar MS, Jafar MA. Pattern of Coronary Artery Disease in Young Patients with Acute Coronary Syndrome. JHRR [Internet]. 2023 Dec. 31 [cited 2025 May 8];3(2):1068-72.
14. Mumcu A, Gitmez M. The association of coronary artery disease with age, gender and affected coronary segments. Med Sci Int Med J. 2023;12(4):1024.
15. Yang H-X, Zuo H, Jia S, Li X, Zhao X, Zhang D, et al. Gender differences in risk factors and characteristics of young patients hospitalized for first acute coronary syndrome. Natl Med J China. 2021;101(19):1403–9
16. Iyengar SS, Gupta R, Ravi S, Thangam S, Alexander T, Manjunath CN, et al. Premature coronary artery disease in India: coronary artery disease in the young (CADY) registry. Indian Heart J. 2017;69(2):211–6.
17. Otaki Y, Gransar H, Cheng VY, Dey D, LaBounty TM, Lin FY, et al. Gender differences in the prevalence, severity, and composition of coronary artery disease in the young: a study of 1635 individuals undergoing coronary CT angiography from the prospective, multinational confirm registry. Eur J Echocardiogr. 2015;16(5):490–9.
18. Foroughi M, Abbaszadehahranjani S, Ebrahimian M, Saieedi M, Safi M, Abtahian Z. Coronary artery disease in Iranian young adults, similarities and differences. Open J Epidemiol. 2014;4(1):19–24
19. Choi S, Kim K, Kim SM, Lee G, Lee G, Jeong SM, et al. Association of Obesity or Weight Change With Coronary Heart Disease Among Young Adults in South Korea. JAMA Intern Med. 2018;178(8):1060–8
20. Tungsubutra W, Tresukosol D, Buddhari W, Boonsom W, Sanguanwang S, Srichaiveth B, et al. Acute coronary syndrome in young adults: the Thai ACS Registry. J Med Assoc Thai. 2007;81–90.
21. Deora S, Kumar T, Ramalingam R, Manjunath CN. Demographic and angiographic profile in premature cases of acute coronary syndrome: analysis of 820 young patients from South India. Cardiovasc Diagn Ther. 2016;6(3):193–8.
22. Lv S, Liu W, Zhou Y, Liu Y, Shi D, Zhao Y, et al. Hyperuricemia and severity of coronary artery disease: An observational study in adults 35 years of age and younger with acute coronary syndrome. Cardiol J. 2019;26(3):275–82.
23. Dai X, Wei L, Ma L, Chen H, Zhang Z, Ji Z, et al. Serum uric acid and its relationship with cardiovascular risk profile in Chinese patients with earlyonset coronary artery disease. Clin Rheumatol. 2015;34(9):1605–11.