Original Article

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Association Between Serum Uric Acid Level & Severity of Coronary Artery Disease Using GENSINI Score in Patients Undergoing Coronary Angiography

Satyam Leekha[1], Vinod Kumar Singh[2], Hare Krishna Sharma[3], Anubhav Lalit[4], Kajal[5], Aashima Walia[6]

[1]Postgraduate Student, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
Email: drsatyamleekha@gmail.com, ORCID ID: 0000-0002-9917-585X

[2]Professor & Head, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
Email: drvksingh.tmu@gmail.com, ORCID ID: 0000-0003-2480-1753

[3]Associate Professor, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
Email: harshshrm@yahoo.com, ORCID ID: 0000-0001-5263-4919

[4]Postgraduate Student, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
Email: anubhav_lalit@yahoo.com, ORCID ID: 0000-0002-3375-4197

[5]Postgraduate Student, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
Email: kajalmed2011@gmail.com, ORCID ID: 0000-0002-7971-7316

[6]Postgraduate Student, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
Email: anshu_walia@rediffmail.com, ORCID ID: 0000-0001-7387-6503

Abstract

Background: To assess the association of serum uric acid level and angiographic severity of coronary artery disease using GENSINI SCORE in patients undergoing coronary angiography. **Subjects and Methods:** All Patients presenting with symptoms related to CAD (Coronary Artery Disease) undergoing coronary angiography were included for the study. The GENSINI SCORE was used to evaluate the severity of atherosclerotic lesions on angiogram. **Results:** Out of 140 subjects; 41.43% and 58.57% of the subjects were having normal Uric acid and hyperuricemia which included 59.82% and 53.57% of the male and female respectively. Mean age among the subjects with normal Uric acid and hyperuricemia was 56.51±8.07 and 58.47±9.16 years respectively Hypertension and diabetes mellitus was found more among subjects with Hyperuricemia. Mean BMI (kg/m2) among the subjects with normal uric acid and hyperuricemia was 27.59±3.81 and 28.01±4.08 respectively. LDL-C (mmol/l) was comparatively more among subjects with hyper-uricemia. Single, double and triple vessel disease was revealed in 72, 47 and 21 subjects respectively. Hyperuricemia was reported among 37.5%, 76.60% and 90.48% of the subjects in single, double and triple vessel disease respectively. Out of 140 subjects; 1-14, 15-32 and >33 Gensini score was reported among 34.29%, 65% and 0.71% of the subjects respectively. **Conclusion:** There is a substantial link between serum uric acid levels and the existence and severity of CAD, as well as the Gensini score. High SUA levels are linked to a higher risk of cardiovascular disease.

Keywords: Uric Acid Level, Severity of Coronary Artery Disease.

Corresponding Author: Dr. Satyam Leekha, Postgraduate Student, Department of Medicine, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, Uttar Pradesh, India.
Email: drsatyamleekha@gmail.com

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Introduction

C.A.D. remains the world's leading cause of mortality. Age,[1] high cholesterol, diabetes, smoking, and hypertension are all known risk factors, yet they only account for a portion of mortality. As a result, it is critical to identify additional risk factors.[2] Because cardiovascular disorders, particularly C.A.D, are avoidable, early detection of the condition and associated risk factors is critical. Hyperuricemia has also been linked to ischemic heart disease (I.H.D.), male, advanced age, diabetes, hypertension, insulin resistance, hypertriglyceridemia, and metabolic syndrome.[3] Different studies have also shown that there is a strong link between S.U.A. levels and negative outcomes in I.H.D., particularly in individuals with heart failure.[4] nitric oxide (N.O) is involved in the control of vascular tone and shape.[5] The decrease in N.O generation and bioavailability is a key indicator of endothelial dysfunction.[6] U.A reduces N.O bioavailability in endothelial cells by a variety of methods, including inhibiting L-arginine absorption, promoting L-arginine degradation, and scavenging N.O

from U.A-generated oxidants or by U.A itself.[7] Furthermore, it is widely recognised that crystal uric acid can cause an inflammatory response,[8] and that soluble uric acid can cause vascular smooth muscle cell proliferation in vitro. As a result, U.A may be an endogenous risk factor in cardiovascular disease.[9] The Gensini Score (GS) is a widely used angiographic scoring framework for assessing the severity of C.A.D.[10] S.U.A measurement is a quick and inexpensive investigation that is available everywhere and does not place a strain on local residents' wallets.

Routine S.U.A level testing may offer prognostic advantages in terms of lowering global C.V.S risk & managing atherosclerosis. As a result, this research was carried out in order to link S.U.A & severity C.A.D using GENSINI-score in patients undergoing coronary angiography.

AIM

- To assess the association of serum uric acid level and angiographic severity of coronary artery disease using GENSINI SCORE in patients undergoing coronary angiography.

OBJECTIVE

- To determine serum uric acid levels in patients undergoing coronary angiography.
- To determine angiographic severity of coronary artery disease in patients.
- To grade the stenosis according to GENSINI Score.
- To correlate the GENSINI score with Serum Uric acid levels.

Subjects and Methods

Sample Size

- The study will have a minimum of 135 patients presenting with symptoms related to CAD who will be undergoing coronary angiography in TMMC&RC, Uttar Pradesh, India

Inclusion Criteria

- All patients with presenting symptoms related to CAD (Coronary Artery Disease) undergoing coronary angiography.

Exclusion Criteria

- Presence of Heart failure, Chronic Liver Disease, Chronic Kidney Disease, Haematological or Oncological disorders.
- Patients taking Alcohol, Drugs affecting serum UA levels (diuretics, ethambutol, pyrazinamide, salicylates, allopurinol, probenecid).
- Patients on antihyperuricemic therapy
- Previous Percutaneous Coronary Intervention/Stent Implantation/Previous Coronary Artery Bypass Grafting.

Procedure

Study Plan

- All Patients presenting with symptoms related to CAD (Coronary Artery Disease) undergoing coronary angiography were included for the study.
- Full clinical history was sought for cardiovascular risk factors, smoking habits, alcohol intake and ongoing medications affecting serum uric acid level.
- Blood samples were obtained after an overnight fasting and the serum uric acid (UA) and all coronary angiograms will be evaluated by an experienced cardiologist who will be blinded to laboratory results of the patients.
- The GENSINI SCORE was used to evaluate the severity of atherosclerotic lesions on angiogram.
- Patients with normal epicardial coronaries were designated as NON CAD (GENSINI SCORE=0) and those with minor, single or multi-vessel coronary artery disease were designated as CAD (GENSINI SCORE>1). CAD group was further subdivided into 3 groups:

GROUP A	Gensini score 1-14
GROUP B	Gensini score 15-32
GROUP C	Gensini score > 33

- The clinical data of these patients was consecutively, systematically and prospectively recorded in a database.

Results

Table 1: S.U.A. among the study subjects

Uric Acid	N	%
Normal Uric Acid	58	41.43
Hyperuricemia	82	58.57
Total	140	100

140 patients presenting with symptoms related to CAD who underwent coronary angiography in CATH Lab at TMMC&RC were included in the study. Out of 140 subjects; 41.43% and 58.57% of the subjects were having normal uric acid and hyperuricemia respectively [Table 1].

Table 2: Age according to uric acid level

Uric Acid	Age (in years)		p value
	Mean	SD	
Normal Uric Acid	56.51	8.07	0.47
Hyperuricemia	58.47	9.16	

Mean age among the subjects with normal uric acid and hyperuricemia was 56.51±8.07 and 58.47±9.16 years respectively with statistically insignificant difference [Table 2, Figure 1].

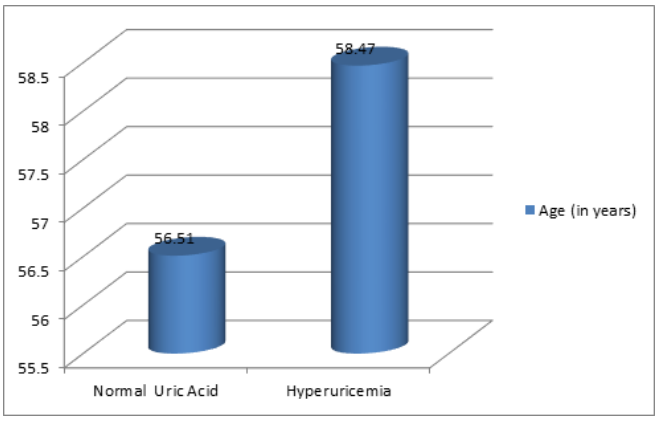

Figure 1: Age according to uric acid level

Table 3: Gender Distribution of study subjects according to uric acid level

Uric Acid	Male		Female		p value
	N	%	N	%	
Normal Uric Acid	45	40.18	13	46.43	0.56
Hyperuricemia	67	59.82	15	53.57	
Total	112	100	28	100	

Hyperuricemia was reported among 59.82% and 53.57% of the male and female respectively. When uric acid level was compared among male and female, no significant difference was found as p>0.05 [Table 3, Figure 2].

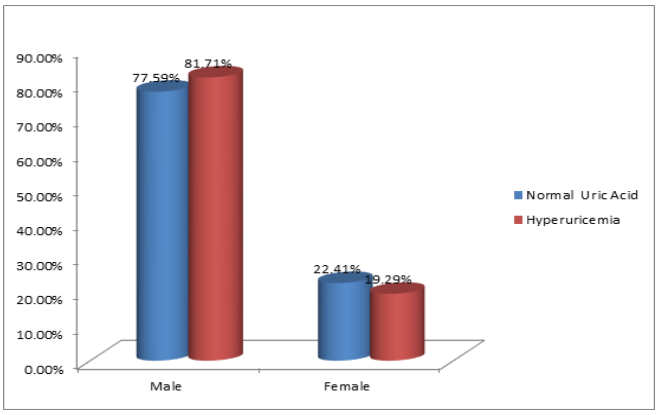

Figure 2: Gender Distribution of study subjects according to uric acid level

Table 4: Comparison of co-morbidities according to uric acid

Co-morbidities	Normal Uric Acid N=58		Hyperuricemia N=82		p value
	N	%	N	%	
Hypertension	36	62.07	66	80.49	0.016*
Diabetes mellitus	24	41.38	57	69.51	0.007*

*: significant

Hypertension and diabetes mellitus was found more among subjects with Hyperuricemia (80.49% and 69.51% respectively) as compared to subjects with normal uric acid level (62.07% and 41.38% respectively). When uric acid level was compared w.r.t. presence and absence of hypertension and diabetes mellitus, significant difference was found as p<0.05 [Table 4, Figure 3].

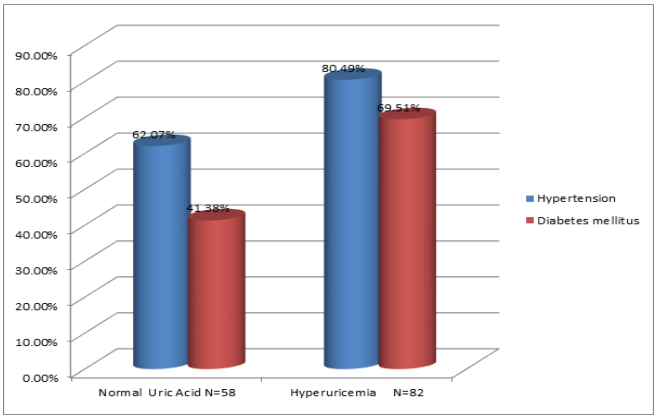

Figure 3: Comparison of co-morbidities according to uric acid.

Table 5: BMI (kg/m^2) according to uric acid level

Uric Acid	BMI (kg/m^2)		p value
	Mean	SD	
Normal Uric Acid	27.29	3.81	0.17
Hyperuricemia	28.01	4.08	

Mean BMI (kg/m2) among the subjects with normal uric acid and hyperuricemia was 27.59±3.81 and 28.01±4.08 respectively with statistically insignificant difference [Table 5].

Discussion

The present study was conducted in C.A.T.H Lab at T.M.M.C&R.C among 140 patients presenting with symptoms related to C.A.D who underwent coronary angiography in C.A.T.H Lab at TMMC&RC. Out of 140 subjects; 41.43% and 58.57% of the subjects were having normal Uric Acid and hyper-uricemia respectively. Mustafa Duran et al,[11] in their study revealed hyperuricemia among 94 (38.2%) patients, which is approximately similar to our study. Mean age among the subjects with normal URIC ACID and hyper-uricemia was 56.51±8.07 and 58.47±9.16 years respectively with statistically insignificant difference. Yang et al,[12] in their study reported the mean age of patients with and without hyper-uricemia was 74.33 and 71.04 years, respectively. Hyperuricemia was reported among 59.82% and 53.57% of the male and female respectively. Hypertension and diabetes mellitus was found more among subjects with Hyperuricemia (80.49% and 69.51% respectively) as compared to subjects with normal uric acid level (62.07% and 41.38% respectively) with statistically significant difference as p<0.05. Puig JG et al,[13] too found that increased S. URIC ACID levels have been observed in diabetics and hypertensive subjects. Mean BMI (kg/m2) among the subjects with normal uric acid and hyperuricemia was 27.59±3.81 and 28.01±4.08 respectively with statistically insignificant difference. As indicated by Jisa George et al,[14] there was no measurably huge contrast (p=0.65) in the distinction in the mean S.URIC ACID of patients with ordinary B.M.I and those with a B.M.I > 25.Mean Cholesterol (mmol/l) and HDL-C (mmol/l) was comparable among the subjects with and without normal URIC ACID as p>0.05.LDL-C (mmol/l) was comparatively

more among subjects with hyper-uricemia as compared to subjects having normal uric acid level with statistically significant difference as p<0.05. Desai et al, have additionally shown a direct and free relationship between serum uric acid levels and the T.G/H.D.L-Cholesterol proportion.[15] Single, double and triple vessel disease was revealed in 72, 47 and 21 subjects respectively. Hyperuricemia was reported among 37.5%, 76.60% and 90.48% of the subjects in single, double and triple vessel disease respectively. This finding is like our review. Qureshi et al,[13] in their review revealed that mean Gensini-score in normouricemic bunch was 22.15 ± 21.52 and hyper-uricemic bunch was 35.69 ± 26.80. Direct relationship between S. URIC ACID and Gensini-score was likewise observed to be measurably critical utilizing 2-followed Spearman connection which is like our review. Out of 140 subjects; 1-14, 15-32 and >33 Gensini score was reported among 34.29%, 65% and 0.71% of the subjects respectively. This finding is like our review. In our study significant association was found between URIC ACID and Gensini score (r=0.30, p value=<0.01).

Conclusion

Finally, there is a substantial link between serum uric acid levels and the existence and severity of CAD, as well as the Gensini score. This could explain why high SUA levels are linked to a higher risk of cardiovascular disease. SUA levels beyond a certain threshold may serve as surrogate marker for the severity of coronary artery disease. In addition to evaluating traditional risk variables in everyday clinical practice, uric acid level assessment may provide considerable predictive benefits in terms of overall cardiovascular risk and patient treatment.

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