Association of Hyperuricemia with Coronary Artery Disease in Gulab Devi Chest Hospital

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Abstract

Background: Coronary artery disease is the most common and life threatening cardiac emergency presenting to a hospital. Having significant mortality and morbidity are on the rise in Pakistan. The objective of the study is to examine the association of elevated level of serum uric acid with ischemic heart disease among adult population, to guide planning for primary and secondary prevention of this disease in community.

Subjects and Methods: This cross-sectional study studied 110 consecutive patients from 20-80 years of age presenting with IHD (Myocardial infarction, unstable angina). All the subjects who were approached to participate in the study, gave their consent. Face-to-face interviews were conducted using a structured questionnaire followed by laboratory tests.

Results: Association of serum uric acid were lined up as gender, smoking, hypertension, diabetes mellitus, menopause, dyslipidemia, family history and obesity. In this study, out of 110 patients 35 (32%) were females and 74 (68%) were males. Minimum Age of patients in this study was 30 years and maximum age was 70 years This study revealed that chest pain was the most occurring symptom which was observed in 39 patients which are 35.45% of the total patients and the second most occurring symptom was Dyspnea which was observed in 32 patients which 29.09% of the total patients. The study reveals that the major risk factor observed in CAD patients is 'HTN' which was found in 81 patients which are 73.64% of the total patients. However, 'Smoking' and 'DM' are proximate in occurrence and were found in 59 (53.64%) and 56 (50.91%) patients respectively. The study revealed that hyperuricemia was more in males that was 34(22.67) than in females.

Conclusion: This study concluded that there was no significant association between hyperuricemia with ischemic heart disease.

Key Words: Ischemic heart disease, Serum Uric acid

Introduction:

Ischemic Heart Disease (IHD) is the other name of atherosclerotic heart disease or coronary artery disease (CAD) that causes heart attacks. (SHAFI et al.). Ischemic Heart Disease (IHD) is the most common, severe, chronic, life-threatening illness in the developed world. Atherosclerosis, a slowly progressive process is frequently associated with certain biochemical and physiological factors and life styles, called as coronary risk factors. A considerable increase in Ischemic Heart Disease is estimated worldwide, and Ischemic Heart Disease is likely to become

the leading cause of morbidity and mortality in Pakistan. The South Asian countries of Pakistan, India, Bangladesh, Sri Lanka and Nepal account for a quarter of the worlds' population but also contribute to the highest proportion of cardiovascular disease. (1)

In Pakistan CAD is the 2nd leading cause of death contributing to 11% of all deaths. However, IHD is the most common cause of death worldwide in both genders. According to WHO, 15 million of deaths every year in the world due to ischemic heart disease. (2) Ischemic heart disease in women is not the same as it is in men. Important gender differences exist in almost every aspect of this disease complex. IHD develops 10-20 years later in women compared to men. Incidence of IHD in men is several times of that in age adjusted pre-menopausal women. (3)

Some of the etiological factors like age, obesity, hypertension, diabetes mellitus, menopause, and family history have been convincingly demonstrated while others are still under investigation as is elevated serum uric acid levels. (4)

Uric acid (urate) is a product of the activity of xanthine oxidase, an enzyme increasingly concerned as a mechanistic contributor in oxidant stress and cardiovascular disease. Xanthine oxidase activity is augmented during ischemia and heart failure. (5) Hyperuricemia was knowable even in nineteenth century as an etiological mediator because of the high incidence of atherosclerosis. (6)

In the last few decades many prospective follow up studies of healthy subjects have shown a high prevalence of ischemic heart disease (Coronary artery disease) among the individuals having high serum uric acid levels than in those with normal serum uric acid levels. (7) Hyperuricemia is frequently present in patients with symptomatic heart failure, acute coronary syndromes, arterial hypertension, and atrial fibrillation and in patients with type2 diabetes mellitus. (8)

Current evidence suggests that serum uric acid could be a marker of oxidative damage. (9) Serum uric acid is also considered a useful biomarker for mortality and an indicator of a poor prognosis in high-risk patients with several cardiovascular diseases. (10) The First National Health and Nutrition Examination Survey (NHANES-1) revealed an independent association between high SUA and cardiovascular mortality. (11)

At least fifty years ago, unassumingly higher serum uric acid concentrations have been reported in patients with coronary heart disease (CHD). (4) Several large epidemiologic studies have identified an association between increased serum uric acid (SUA) and cardiovascular risk in the general population (12). The objective of the study was to determine the association of elevated uric acid level with ischemic heart disease at Gulab Devi Chest Hospital.

Materials and Methods:

Study Design: It was a cross sectional study.

Study Settings: The data was collected from Gulab Devi Hospital Lahore

Sample Size: The study included 110 patients with ischemic heart disease.

Duration of study: The study was completed in 6 months.

Sampling Technique: Non-probability (purposive) sampling was employed.

Inclusion Criteria: Patients with 20-80 years of age with IHD, Unstable angina,

STEMI and NSTEMI and Myocardial Infarction with at least two major risk factors.
Patients who are Trop-T positive.
Patients having their ECG investigations (STEMI or NSTEMI) done.
Patients who had their ECHO findings done.

Exclusion Criteria: Any foreigner patient, any patient having other comorbid pathology, any patient who was not diagnosed properly by clinical evaluation, patients with valvular heart disease, patients with chronic liver and kidney diseases, type1 diabetes, stroke and pulmonary disease, patients having thiazide diuretics, patients taking uricosuria drugs

Methodology: After obtaining approval from committee, diagnosed cases of coronary artery disease fulfilling the inclusion criteria, were taken from cardiac wards of Gulab Devi Chest Hospital, Lahore. After taking written informed consent, all Pakistani patients with ages 20 to 80 years, including male and female, with their demographic information (name, age, gender) were included in the study based on non-probability sampling technique. Foreigner patients and those brought in dead to emergency were excluded. Clinical diagnosis of CAD was established based on ST-segment elevation and non-ST elevation on ECG. In addition to collecting basic demographic details; patients were asked about the presence of chronic hypertension and diabetes mellitus and information was also obtained regarding smoking history and history of ischemic heart disease in first degree relatives. Ever smoking was defined as smoking at least 100 cigarettes during lifetime. Old age females were asked about menopause. Patients were considered hypertensive if already on antihypertensive therapy or re-noted to have blood pressure of more than 140/90mmHg on two or more occasions. The patients were taken as diabetic if already taking treatment for diabetes or fasting blood sugar>126mg/dl or random blood sugar >200mg/dl. Hyperuricemia is usually defined as a serum urate concentration >6.8 mg/dl which is the limit of urate solubility in serum. Serum uric acid, lipid profile and fasting blood glucose were estimated in all study population. Samples for blood glucose, TGs and HDL Cholesterol, SUA, ESR serum creatinine were taken after an overnight fast and were immediately sent to laboratory where they were centrifuged at 4C for 15 minutes. The waist circumference was taken to the nearest standing horizontal circumference between the lower border of the c12th rib and the highest point of the iliac crest on the mid-axillary line at the end of normal expiration detect central obesity. All the data were collected in a pre-designed questionnaire. Patients were disposed of according to existing hospital regulations. There was no follow up.

Statistical analysis: The data was analysed by using Statistical Package for Social Sciences (SPSS) version 16.0. The qualitative data were presented in the form of graph and tables along with percentage. The bar charts, pie charts and the cross tabulation was also used for the qualitative data. Age and gender represented by using
Histogram and tabulations respectively and the association of hyperuricemia with Coronary Artery Disease and its risk factors are represented through Histogram and tabulation. The Chi square test is applied to find association between diabetes and

coronary artery disease and we considered ≤ 0.05 level of significance.

Operational Definition:

Hyperuricemia is a metabolic consequence. Hyperuricemia is the increase in urate concentration >420μmol/ L (7.0 mg/dl) in blood. Elevated SUA should be considered as one of the multiple injurious stimuli to the arterial vessel wall which may contribute to endothelial dysfunction and arterial – capillary vessel wall remodelling through oxidative – redox stress.

Coronary artery disease is the most common, severe, chronic, life-threatening illness in the developed world. Atherosclerosis, a slowly progressive process is frequently associated with certain biochemical and physiological factors and life styles, called as coronary risk factors.

Severity of CAD:

Mild: When there is ≥50% stenosis in one artery.

Moderate: When there is ≥50% in two arteries.

Severe: When there is more ≥50% in more than two arteries.

Results:

In this study, out of 110 patients, 35 (32%) were females and 74 (68%) were males. Mean age of studied individuals was 58.17±11.58.

This study revealed that chest pain was the most occurring symptom which was observed in 39 patients which are 35.45% of the total patients and the second most occurring symptom was dyspnoea which was observed in 32 patients which 29.09% of the total patients. (***Table*** 2)

The study revealed that the major risk factor observed in CAD patients is 'HTN' which was found in 81 patients which are 73.64% of the total patients. However, 'Smoking' and 'DM' are proximate in occurrence and were found in 59 (53.64%) and 56 (50.91%) patients respectively. (Table 3)

Descriptive statistics of vessel diseases in CAD patients is described in table 4. Maximum uric acid recorded was 21.1 and the minimum was 0.2. The mean of uric acid (mg/dl) was 6.996±3.1781. The maximum value was 67 and the minimum value was 23. The mean ejection fraction was 47.05±10.07. (Figure 1 & Table 5)

Study of frequency of artery diseases revealed that at most, 91 patients exhibited LAD which are 82.13% of the total patients. The second most occurring disease is LMS which was found in 49 patients which are 44.55% of the total patients. (Table 6).

Discussion:

Coronary artery disease(CHD) is a chronic process that begins during adolescence and slowly progresses throughout life, characterized by atherosclerosis in the coronary arteries. The present study consists of 110 patients in which there were 35(32%)males and 74(68%)were females. The mean age of patients was 58.17±11,588, and the maximum and minimum age limit was 70 to 30 respectively.

BMI ranges of patients were 59(58.64%) in the range of normal, 30 (27.27%) in the range of overweight, and 7 (6,36%) in the range of obese. (table 1)

Table 3 described the frequency of various variables that affect CAD. There were 81(73.64%) hypertensive, 56 (50.91%) diabetes mellitus, 59 (53.64%) smoker, and 39 (39.45%) had positive family history, while 29(26.36%) were non-hypertensive, 54

(49.09%) non-diabetic, 51 (46.36%) non-smoker, and 71 (64.55%) had no positive family history.

Fasting glucose level in CAD patients was 147.35±78.774. The maximum and minimum values were 412mg/dl and 66mg/dl respectively.

Another research described fat diabetes (diabetes gras) in 1880. Though more studies are needed, the evidence that fructose-induced hyperuricemia may have a contributory role is gaining ground (13)

Some studies reported that there is a positive association between elevated serum uric acid levels and diabetes. (14)

Whereas some other study reported no positive association between serum uric acid and diabetes mellitus. (15)

Also, some studies reported that serum uric acid is inversely associated with diabetes mellitus.(16)

The exact reason for why previous studies found a positive relation between uric acid and diabetes is not clear.

The mean triglyceride level was 137.90±40.753. The maximum and minimum recorded values were 303mg/dl and 42mg/dl. Another study revealed that Higher serum LDL cholesterol, triglycerides, total cholesterol, and ratio of triglycerides to HDL cholesterol levels were positively correlated with higher serum uric acid levels, whereas serum HDL cholesterol levels are inversely correlated (17).

Figure 1 described the ejection fraction in CAD patients. That was 47.05±1010.070. The maximum and minimum value was 67% and 23%.

Table 6 described the uric acid levels CAD patients. That was 8.996±3.1781. The table has shown the maximum and minimum readings of Uric acid were 21.1mg/dl and 0.2mg/dl respectively.

Another study suggested that serum uric acid level in the highest quartile (above 35.9 mmol/L) was very significant in prediction of coronary calcification examined by Agatston score index in comparison with the lowest quartile in preserved left ventricular systolic function. (10) Another study by Geremy G.et al suggested that that serum uric acid levels are unlikely to be a major determinant of CHD.(18) Another study revealed that Numerous coronary arteries with plaques determined were 36.5% (1 vessel), 33.3% (2 vessels), and 20.2% (3 and more vessels) described the frequency of vessel disease in hyperuricemia patients (18)

Out of of 110 patients in which there were 35 (32%) males and 74 (68%) were females with the mean age was 58.17±11,588, and the maximum and minimum age limit was 70 to 30 respectively and the BMI ranges of patients were 59(58.64%) in the range of normal, 30 (27.27%) in the range of overweight, and 7 (6,36%) in the range of obese. In this study There were 42 (8.18%) patients who had SVD, 42 (38.16%) patients had DVD, and 17 (15.45%) patients had TVD respectively.

Conclusion:

No association is found, and further studies should be made to find the association between hyperuricemia and coronary artery disease with a large sample size.

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cardiovascular mortality. Journal of Internal Medicine. 1982;212(S668):49-59.

Table 1. Descriptive Statistics of BMI in study

BMI (kg/m2)	Frequency	Percentage
Normal	59	53.64%
Under weight	14	12.73%
Over weight	30	27.27%
Obese	7	6.36%

Table 2. Sign & Symptoms frequency in studied CAD patients

Signs/ Symptoms	Yes	No
Chest pain	39 (35.45%)	71 (64.55%)
Dyspnea	32 (29.09%)	78 (70.91%)
Nausea	6 (5.45%)	104 (94.55%)
Cold peripheries	26 (23.64%)	84 (76.36%)
Pain in shoulder/ neck/ jaw	28 (25.45%)	82 (74.55%)

Table 3. Frequency of risk factors in studied CAD patients

Risk Factors	Yes	No
Smoking	59 (53.64%)	51 (46.36%)
HTN	81 (73.64%)	29 (26.36%)
DM	56 (50.91%)	54 (49.09%)
Positive family history	39 (35.45%)	71 (64.55%)

Table 4. Descriptive Statistics of vessel diseases in studied CAD patients

Vessel disease	Frequency	Percentage
Normal	9	8.18%
SVD	42	38.16%
DVD	42	38.16%
TVD	17	15.45%

Table 5. Frequencies of arterial diseases in studied CAD patients

Frequency of disease in artery	Yes	No
LAD	91 (82.13%)	19 (17.27%)
RCA	31 (28.18%)	79 (71.82%)
PDA	08 (7.27%)	102 (92.73%)
OM	08 (7.27%)	102 (92.73%)
Diagonal artery	13 (11.82%)	97 (88.18%)
LMS	49 (44.55%)	61 (55.45%)
Ramus intermedius	07 (6.36%)	103 (93.64%)

Table 6. Descriptive statistics of hyperuricemia in CAD patients

		Coronary Artery Disease				Total
		Normal	SVD	DV	3VD	
Hyperuricemia	**Yes**	2	25	22	5	**54**
	No	7	17	20	12	**56**
Total		**9**	**42**	**42**	**17**	**110**

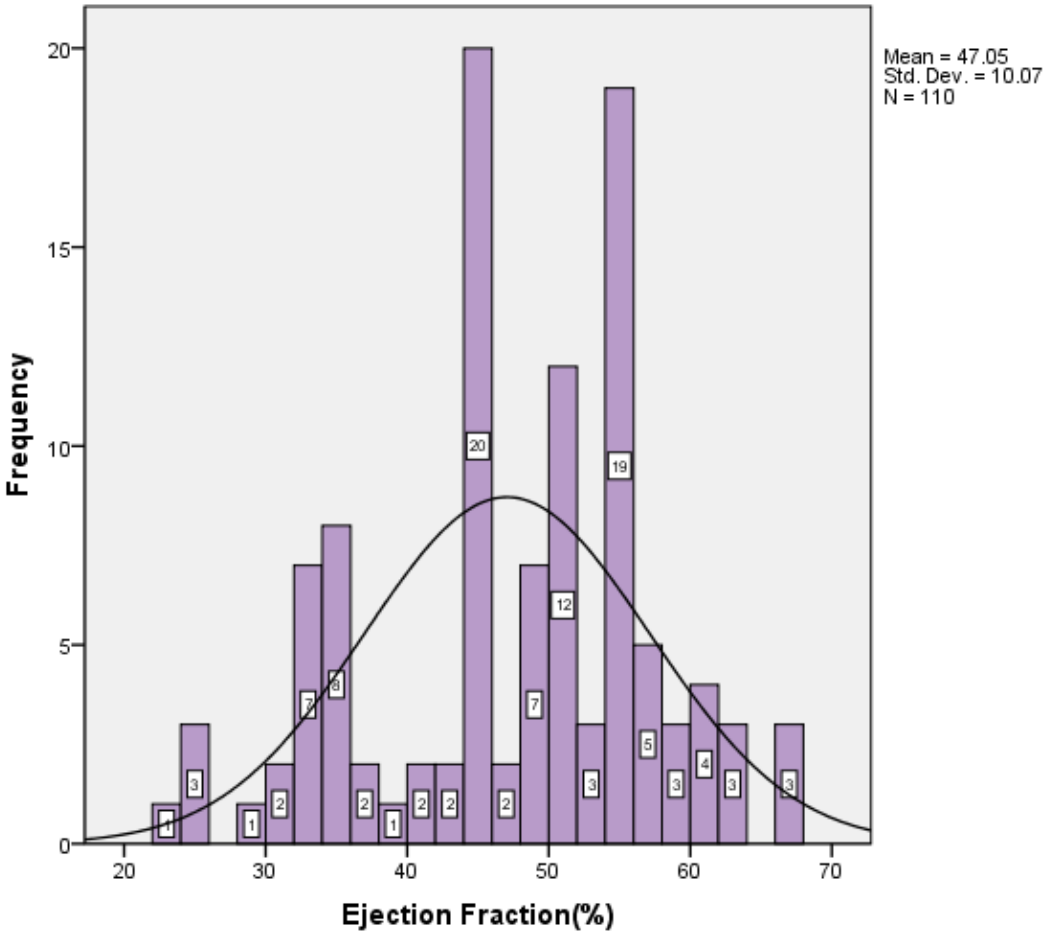

Figure 1. Ejection Fraction in CAD patients