Original Research Article

Hs-CRP as an important inflammatory risk marker of CAD in diabetes mellitus patients

Sangamesh[1],*

[1]Dept. of Biochemistry, Raichur Institute of Medical Sciences, Raichur, Karnataka, India

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ABSTRACT

Background: Elevation of hs-CRP is associated with increased risk of type 2 diabetes development in patients with all levels of metabolic syndrome. This study aimed to assess the hs-CRP among the patients with CAD in type 2 diabetes mellitus.

Materials and Methods: All the patients admitted under cardiology department of PMSSY Bangalore medical college were included in present case control study, conducted between November 2017 to May 2019. The patients with known history of diabetes mellitus for 5-10yrs of duration and willing to be part of study with age >40 were included in present study.

Results: Total 70 patients were included who fulfilled the inclusion criteria. Among them 35 were T2DM with CAD (Group A) and 35 were T2DM without CAD (Group B). Among them 40 were males and 30 were female patients. The mean age of patients was 57.2±9.4 in group A and 58.2±10.4 in group B patients, which was statistically not significantly different. There was a significant higher mean hs-CRP in patients of group A compared to group B patients.

Conclusion: Hs-CRP is a reliable marker for the atherosclerotic events, and there is a significant relation of coronary artery disease with the elevated hs-CRP in patients. We suggest that patients with diabetes mellitus should undergo a routine screening for hs-CRP levels to detect risk of CAD at early phase.

1. Introduction

The occurrence and prevalence of diabetes mellitus (DM) is rapidly growing worldwide due almost entirely to changes in non-insulin-dependent diabetes mellitus (Type 2). Type 2 DM constitutes more than 90% of all cases of diabetes.[1,2] Cardiovascular disorders are the leading cause of morbidity in patients with diabetes and ischaemic heart disease is the most frequent cause of death.[3] Excessive risk of cardiovascular disease (CVD) is two-to eight-fold higher in patients with diabetes relative to non-diabetic people with comparable age, sex and ethnicity.[4,5] In addition, among patients with coronary artery disease (CAD), diabetes is associated with an increased risk of developing acute coronary syndrome and an increased risk of death following

acute myocardial infarction.[6,7] The pathophysiological cause of type 2 DM is insulin resistance, a pro-inflammatory and hypercoagulable disorder that predisposes patients to develop CVD. Type 2 DM is associated with risk factors for atherosclerosis, including dyslipidemia, hypertension, inflammation, and impaired haemostasis.[8]

The American Heart Association recommended that patients at intermediate or high risk of coronary heart disease may benefit from measurement of hs-CRP. Elevation of hs-CRP is associated with increased risk of type 2 diabetes development in patients with all levels of metabolic syndrome.[9] This study aimed to assess the hs-CRP among the patients with CAD in type 2 diabetes mellitus.

* Corresponding author.
E-mail address: sangameshbajantri7@gmail.com (Sangamesh).

2. Materials and Methods

All the patients admitted under cardiology department of PMSSY Bangalore medical college were included in present case control study, conducted between November 2017 to May 2019. The patients with known history of diabetes mellitus for 5-10yrs of duration and willing to be part of study with age >40 were included in present study. The patients were grouped as Group A with diabetes mellitus patients having CAD as cases and group B patients were diabetes mellitus patients without CAD as controls. Diabetes was assessed by recording HbA1c and/or fasting blood sugar (FBS) levels in accordance to ADA criteria.[10] Already diagnosed cases of CAD with Type2 Diabetes from Cardiology was taken as cases (positive treadmill test in accordance with American Heart Association). Type 2 Diabetes patients diagnosed with no CAD was taken as controls by similar criteria.

5mL of fasting blood samples was collected from the cases and controls in EDTA and plain vacutainers. Samples allowed to clot for 2 hours at room temperature before centrifugation for 15 min at 1000×g at 2~8° C but for HbA1c without centrifugation and analyzed for Hs-CRP by Beckman auto analyzer with Latex enhanced immunoturbidimetric method, HbA1c by BioRad D-10 analyser utilizes principles of ion-exchange high-performance liquid chromatography (HPLC).

2.1. Statistical analysis

All the data was entered in excel sheet and analysed using SPSS v21 operating on windows. The data are represented as mean standard deviation, for data not normally distributed, median and inter-quartile range was mentioned. The mean difference between the normally distributed data was analysed using student t-test and the data not-normally distributed used the Mann-Whitney U Test. a p-value of <0.05 was considered statistically significant.

3. Result

Total 70 patients were included who fulfilled the inclusion criteria. Among them 35 were T2DM with CAD (Group A) and 35 were T2DM without CAD (Group B). Among them 40 were males and 30 were female patients. The mean age of patients was 57.2±9.4 in group A and 58.2±10.4 in group B patients, which was statistically not significantly different. History of smoking was present in 9 of the patients, and 6 patients had history of alcohol consumption. ECG and Treadmill test was found positive among the 35 patients included in Group A. Statistically significant high levels of the hs-CRP was seen in diabetes patients with CAD compared to DM patients without CAD.(Table 1)

There is a significant higher median of the hs-CRP among the diabetic patients with CAD compared to diabetic

Table 1: Mean age of the patients in two groups.

	Group A Mean ± SD	Group B Mean ± SD	p-value
Age in Years	57.2 ± 9.47	58.2 ± 10.47	.69

P-value<.05 statistically significant. Group A: DM with CAD; Group B: DM without CAD.

Table 2: Showing the median value of hs-CRP and Cyclophilin A in both groups using Mann-Whitney U Test

Mann-Whitney U Test	Group A (DM with CAD) Median (Minimum – maximum)	Group B (DM without CAD) Median (Minimum – maximum)	p-value
Hs-CRP (mg/dL)	2.73 (1.01-17.31)	0.98 (0.2-7.87)	.001

P<.05 statistically significant; <.001 statistically highly significant.

patients without CAD. (Table 2)

Among the lipid profile results, the total cholesterol and LDL-cholesterol showed a significant mean difference in two groups. (Table 3)

4. Discussion

The prevalence, incidence and mortality of all forms of CVD are higher among the patients with diabetes mellitus.[4,5] The measurement of hs-CRP as a important inflammatory markers will predict independently about the future vascular events, which improves the global classification of risk irrespective of the LDL-C levels in the person.[11,12] In a carotid artery risk for atherosclerosis study (ICARAS), indicated hs-CRP was elevated with the nature of systemic progressive atherosclerosis disease and suggested that patients with enhanced inflammation are generally at high risk for progression of atherosclerosis.[13] Hs-CRP was used as one the early marker to detect the underlying subclinical inflammation occurring in the patients. It is a established markers for prediction of the atherosclerosis and the complications related to diabetes mellitus and the atherosclerosis in the patient with diabetes and without. The CAD patients have been documented with high hs-CRP concentration than the patients without. CRP belongs to pentraxin protein family and is synthesized in hepatocytes and some extra-hepatic tissue such as vascular smooth muscle, atherosclerotic plaques and intracardial tissue. Indeed, as vascular inflammatory changes are hardly evaluated using cardiac imaging methods, the role of inflammation biomarkers testing in peripheral blood is increasing with the hs-CRP being the most profoundly studied biomarker in CAD and CVD's. It remains stable in sample over long periods of time and can be tested quite simply, rapidly and inexpensively.[14] Hs-CRP levels among the Group-1 patients [2.73 (1.01 - 17.31)] was significantly

Table 3: Mean difference in Lipid profile among Group A (DM with CAD) and Group B (DM without CAD)

	Group A (DM with CAD)		Group B (DM without CAD)		
	Mean	Standard Deviation	Mean	Standard Deviation	p-value
Total Cholesterol in mg/dL	164.51	60.10	218.06	53.71	.001
High Density Lipoprotein in mg/dL	47.11	54.48	43.53	12.37	.710
Very low density lipoprotein in mg/dL	40.38	25.21	41.12	22.26	.897
Low density lipoprotein in mg/dL	84.57	35.47	133.82	38.50	.001
Triglycerides in mg/dL	192.70	119.21	198.06	107.28	.843
Urea in mg/dL	31.73	13.18	29.88	15.56	.590
Creatinine in mg/dL	1.12	.88	.88	.42	.143

P<.05 statistically significant; <.001 statistically highly significant.

higher than group-2 patients [0.98 (0.2 - 7.87)] (p-value <.001). Similar findings was present in recent studies. [15,16]

5. Conclusion

Hs-CRP is a reliable marker for the atherosclerotic events, and there is a significant relation of coronary artery disease with the elevated hs-CRP in patients. The high hs-CRP levels were positively correlated with multivessel disease in diabetic CAD. We suggest that patients with diabetes mellitus should undergo a routine screening for hs-CRP levels to detect risk of CAD at early phase.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Author biography

Sangamesh, Senior Resident Doctor