

Correlation between inflammatory marker (hs-CRP) and metabolic syndrome

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Abstract

Background: The metabolic syndrome is defined by the clustering of risk factors that predisposes people to diabetes and cardiovascular disease (CVD). MetS has been linked to high sensitivity C-reactive protein (hs-CRP). In apparently healthy men and women, hs-CRP is highly predictive of eventual risk of cardiovascular events and diabetes.

Aim of the Work: This study aimed to correlation between inflammatory marker (hs-CRP) and metabolic syndrome.

Subjects and Methods: The research was carried out at the Index Medical College and Research Center in Indore, in the Department of Biochemistry. A total of 120 people with metabolic syndrome and 120 healthy controls were included in the study. A blood sample was taken from the antecubital vein and centrifuged to obtain serum, which was then evaluated for hs-CRP levels quantitatively.

Result and conclusion: Significant increases in hs-CRP levels were found in patients with MetS and type II diabetes in the current investigation. As a result, in patients with metabolic syndrome, hs-CRP could be employed as a proxy marker of chronic inflammation.

Keywords: Metabolic syndrome, hs-CRP

Introduction

The metabolic syndrome is defined by the clustering of risk factors that predisposes people to diabetes and cardiovascular disease (CVD) ^{1, 2}. Glucose intolerance, obesity, high blood pressure, and dyslipidemia are the key features of the syndrome. As a significant modifiable factor of cardiovascular disease and type-2 diabetes, it is increasingly garnering the attention of international research organizations and scientific organisations³⁻⁵.

The plurimetabolic syndrome, the X syndrome, the X plus syndrome, the X metabolic syndrome, the cardiovascular metabolic syndrome, the insulin-resistance – dyslipidemia syndrome, the atherogenic metabolic syndrome, the syndrome of atherogenic factors agglomeration, and the deadly quartet have all been given to the metabolic syndrome over time. The MetS abbreviation has recently been used to replace the term Metabolic Syndrome. The World Health Organization (WHO), the International Diabetes Federation (IDF), and other international agencies agreed on the term "metabolic syndrome" as the best way to describe this nosologic entity.

Because of the many points of view on the variables required for the diagnosis, estimating the metabolic syndrome is complicated. It's not about a single disease, but rather a cluster of symptoms that can arise suddenly or gradually in the same person, as a result of combining hereditary and environmental factors (lifestyle) with insulin resistance, which is regarded the primary pathogenic component.

Alternative clinical criteria for identifying Metabolic Syndrome were developed in 2001 by NCEP ATP III (National Cholesterol Education Programme, Adult Treatment Panel III). The presence of insulin resistance is not required by the ATP III criterion⁶.

According to the modified NCEP ATP III definition of the metabolic syndrome, at least three of the following parameters are present⁷:

- Waist circumference ≥ 90 cm for Asian men
 ≥ 80 cm for Asian women
- Fasting triglycerides ≥ 150 mg/dl (≥ 1.7 mmol/l) or drug treatment for elevated triglycerides
- HDL cholesterol < 40 mg/dl (1.03 mmol/l) in men
 < 50 mg/dl (1.30 mmol/l) in women or drug treatment for reduced HDL cholesterol
- Blood pressure $\geq 130/85$ mmHg or drug treatment for elevated blood pressure
- Fasting glucose ≥ 100 mg/dl (≥ 5.6 mmol/l) or drug treatment for elevated glucose

MetS has been linked to high sensitivity C-reactive protein (hs-CRP). In apparently healthy men and women, hs-CRP is highly predictive of eventual risk of cardiovascular events and diabetes⁸. There is evidence that can help identify people who are at high risk for diabetes and cardiovascular disease in the future⁹. MetS is associated with elevated blood uric acid levels, and there appears to be a relationship between MetS and

serum uric acid¹⁰. Hyperuricemia is linked to the onset of hypertension, obesity, and type 2 diabetes.

C-reactive protein (CRP), the most well-studied IF biomarker, is a reliable predictor of future cardiovascular events, and high CRP levels have also been linked to the development of type II diabetes, a major CVD risk factor. Several epidemiological studies have found that plasma hsCRP levels are a strong predictor of ischaemic cardiovascular events in patients with stable angina, that they appear to correlate with softer plaques that are more likely to rupture, and that they may even predict cardiovascular events in otherwise healthy people¹¹. It could thus be beneficial in identifying patients with a moderate risk of cardiovascular disease who could benefit from aggressive cardiovascular preventative therapy. Furthermore, hsCRP levels are linked to systolic blood pressure, pulse pressure, and incident HTN¹². As independent indicators of cardiovascular risk, CRP and high blood pressure in combination offer substantial predictive value for cardiovascular outcomes.

This study aimed to correlation between inflammatory marker (hs-CRP) and metabolic syndrome

Material and Methods

The research was carried out at the Index Medical College and Research Center in Indore, in the Department of Biochemistry. A total of 120 people with metabolic syndrome and 120 healthy controls were included in the study. Prior to the collection of blood samples, a Performa containing a questionnaire was filled out as a baseline record (Performa contained). During the research, all ethical precautions were taken. A blood sample was taken from the antecubital vein and centrifuged to obtain serum, which was then evaluated for hs-CRP levels quantitatively.

The ANOVA test was used to compare the mean (SD) blood hs-CRP level of the test group (metabolic syndrome) to that of the control group. Significant was defined as a p value of less than 0.05.

Results

Statistical analyzes projected that the hS-CRP level was significantly increased in the DM & MetS group when compared with control groups, while no changes observed between MetS and DM group.

This was observed that the average (Mean ± SD) hs-CRP concentration that was found in the control group

was 1.47 ± 0.24 , in the MetS group, it was 3.90 ± 0.24 and in the DM group, it was 3.92 ± 0.26 . The hs-CRP level was found significantly higher in comparison to that in the (healthy subjects) control group, with a p value of < 0.001 . MetS group & DM group not showed any significant changes of hs-CRP. However, one way anova of variance indicated that these differences in mean hs-CRP among three groups were highly significant ($p < 0.001$).

Table 1: Comparison of hs-CRP in control, metabolic syndrome and diabetes mellitus patients

PARAMETER (mg/L)	CONTROL (MEAN ± SD)	MetS (MEAN ± SD)	DM (MEAN ± SD)	P-VALUE
hs-CRP	1.47 ± 0.24	3.90 ± 0.24	3.92 ± 0.26	< 0.001

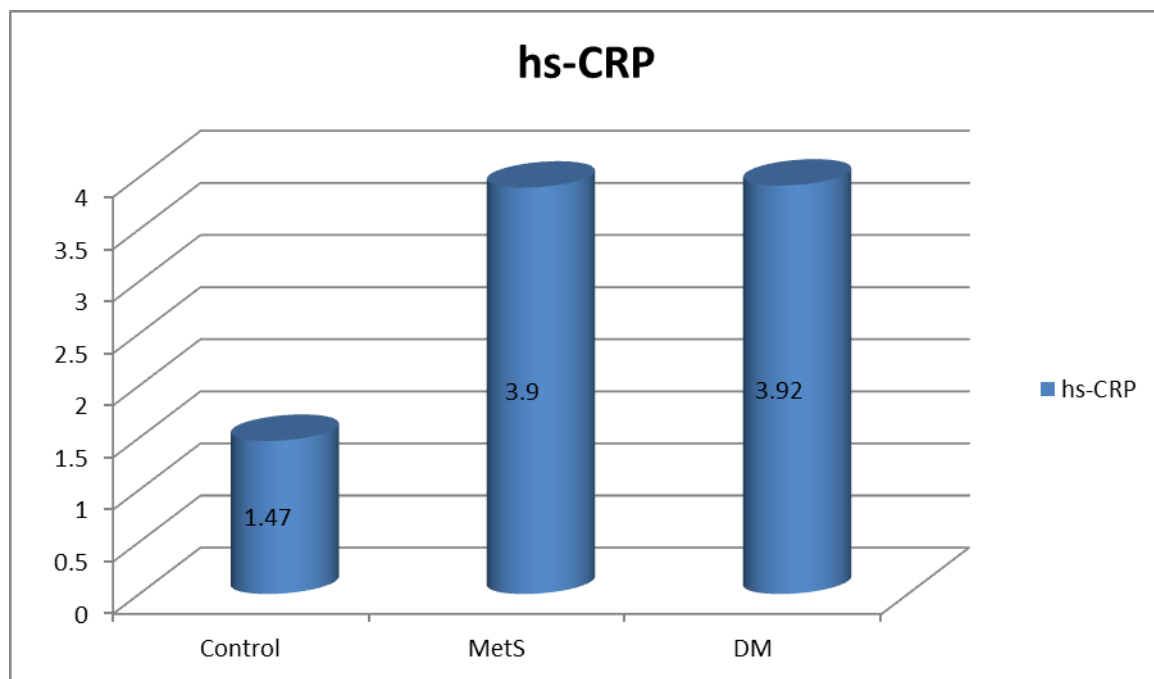


Figure 1: Comparison of hsCRP in control, metabolic syndrome and diabetes mellitus patients in the form of bar diagram.

Discussion

The hs-CRP level was found significantly higher in comparison to that in the (healthy subjects) control group, with a p value of < 0.001 . MetS group & DM group not showed any significant changes of hs-CRP.

The chemical C - reactive protein (CRP) is created by the liver in response to IF. A high level of CRP in the blood is a sign of any condition that produces IF, despite the fact that CRP is a generic test that can be elevated in any inflammatory condition. These findings

were concordant with the results of the studies, which were previously done by Arulanantham et al., (2016)¹³ and Devaraj et al., (2009)¹⁴ investigated that the patients with high hsCRP should be primarily targeted with life style modification at an early age, treatment with low dose aspirin, and lipid lowering medications before it culminates in overt CVD and suggest that measurement of CRP adds clinically important prognostic information to the metabolic syndrome.

Conclusion

Significant increases in hs-CRP levels were found in patients with MetS and type II diabetes in the current investigation. As a result, in patients with metabolic syndrome, hs-CRP could be employed as a proxy marker of chronic inflammation.

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