

Biochemical consideration of HsCRP as a bond cursor to metabolic Syndrome

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Metabolic syndrome has generated a great deal of interest in recent years for researchers in India. The role of the acute phase protein Hs-CRP as a link marker to Metabolic Syndrome (MetS) in Indians is significant. Whose plasma concentration increases by 25% or more during inflammatory disorders. Studies have shown that elevated level of this protein can lead to an increased risk of hypertension and Cardiovascular Disease (CVD) as well as metabolic syndrome. The MetS is a clustering of components that reflect over nutrition, sedentary lifestyles and resultant excess adiposity. Metabolic Syndrome is posing a major public health challenge to the health systems in developed and developing countries. This study is an attempt to see the role of biochemical markers such as High Sensitive C reactive Protein (Hs-CRP) & Blood glucose in Metabolic Syndrome in study cases of Indian population. The 405 study subjects aged between 25-65 yrs from general population in Ghaziabad (U.P), India, were taken, who attended the hospital for general checkup. HsCRP, Lipid profile and Blood Glucose of subjects were evaluated. On application of ATP 3rd criteria on the screened subject patients, they are classified. Our study found that the number of subjects having MetS was 173 (42.71% of total). In the subgroup of metabolic syndrome with diabetes, the total number of subjects was 105 (25.92%) in which age wise distribution was 26 (6.41%) in 25-45 yrs and 79 (19.50%) in 45-65 yrs. In the second subgroup of metabolic syndrome without diabetes total number of subjects was 68 (16.79%) in which age wise distribution was 16 (3.95%) in 25-45 yrs and 52 (12.83%) in 45-65 yrs. The study proposes the inclusion of biochemical parameter HsCRP in the criteria for defining cases of metabolic syndrome, so that more metabolic syndrome cases can be picked up at earliest. This issue is especially pertinent for the Indian patient population in whom cardiovascular disease is becoming increasingly common in both sexes and in age group of 25-65 yrs. There should be emphasis on detection of metabolic syndrome and intensification of targeted preventive strategies. In this study; there is strong evidence that Hs-CRP should be included in the case definition criteria or diagnostic criteria of Metabolic Syndrome. The study proposes the inclusion of biochemical parameter Hs-CRP in the criteria for defining cases of metabolic syndrome in Indians. So that more cases of Metabolic Syndrome can be picked up at earliest.

Keywords: Metabolic Syndrome (MetS), High Sensitive C reactive Protein (Hs-CRP).

1. INTRODUCTION

Metabolic syndrome (MetS) refers to the consensus in an individual of numerous metabolic abnormalities associated with cardiovascular disease (CVD). When initially described by Reaven [1], greater weight was afforded to insulin resistance and lesser weight to central obesity. The definition recommended by the Adult Treatment Panel (ATP-III) of the National Cholesterol Education program (NCEP) [2]. MetS is a plausible precondition for type II diabetes and cardiovascular diseases. Metabolic syndrome is the name for a group of risk factors that raise your risk for heart disease and other health problems, such as hypertension, hyperglycemia, dyslipidaemia and obesity. This has been attributed to greater availability of food, urbanization and industrialization and reduced physical activity, resulting in increase adiposity. It is predicted that by 2030, 75% of the world's adults diabetic patients will be in developing countries and that 80 million of them will be in India [3]. Different organizations; WHO (1999), EGIR (1999), NCEP ATP III (2001), IDF (2006) [4] have included different parameter in their definition and names of metabolic syndrome but majority include Waist circumference, High Triglyceride level and Low high density lipoprotein, High blood pressure and Impaired glucose metabolism which are all independently associated with higher cardiovascular risk with or without history [5]. According to Third National Health and Nutrition Examination Survey (NHANES III) data, people who did not have MetS, had the lowest risk for cardiovascular disease (CVD) events, those with MetS had an intermediate level of risk, and those with diabetes had the highest level of risk [6]. The HsCRP is also gaining much attention in the field of cardiovascular disease and metabolic syndrome. Inflammatory marker CRP has been identified as one of the most significant risk factor for CVD, heart attack, as well as a metabolic syndrome [7].

Hs-CRP is used mainly as a marker of inflammation such as ageing, late pregnancy, viral and bacterial infection burns. Apart from liver failure; there are few known factors that interfere with CRP production. These value can prove useful in determine disease progress or the effectiveness of treatment [8]. The Centre for Diabetes control and Prevention and American Heart Association recently noted that screening of CRP levels may be appropriate among persons at intermediate risk for CVD and metabolic syndrome [9]. The screening of CRP levels in persons with metabolic syndrome, many of whom are at intermediate risk; identification of those with elevated CRP levels may help identify a higher-risk subset of person with metabolic syndrome [10]. The Hs-CRP is significantly increased in obese children, adult and adolescents with metabolic syndrome. A possible interaction is found between Hs-CRP and the levels of triglycerides and HDL- cholesterol, suggesting its utility as a metabolic risk marker. Hs-CRP seems to be an excellent marker in order to distinguish the presence of metabolic syndrome among obese children and adolescents and could be a useful tool for the early detection of cardiovascular disease among this population. Inflammatory marker should be used in addition to assessment of increased cardiac risk in un-controlled diabetes and metabolic syndrome [10].

2. MATERIALS AND METHODS

2.1. ATP 3rd criteria for Metabolic Syndrome

The presence of three or more of the following risk factor, (1) Abdominal obesity (2) Elevated Triglycerides (3) High density lipoprotein (HDL) cholesterol (4) Hypertension or anti hypertensive medication use and (5) Impaired fasting glucose is termed as Metabolic Syndrome.

Three or more than three positive of the above five factors = Metabolic Syndrome

Less than three positive of the above five factors = No Metabolic Syndrome

2.2. Study subject

The 405 patients aged between 25-65 yrs from general population in Ghaziabad, India, were taken, who attended the hospital for general checkup, as study subjects for this study. In these 405 subjects age-wise distribution is 108 (26.66% of total) in 25-45 yrs age group and 297 (73.33% of total) in 46-65 yrs age group. All subjects after various tests divided into three groups as:

(i) Control group: Only those subjects were selected for inclusion in the control group that does not fulfill adult treatment panel 3rd criteria for Metabolic Syndrome.

(ii) Metabolic syndrome with Diabetes group: Only those subjects were selected for inclusion in this group that fulfills adult treatment panel 3rd criteria for Metabolic Syndrome and they should have Diabetes. This group is further mentioned as 'Diabetic group'.

(iii) Metabolic Syndrome with No Diabetes group: Only those subjects were selected for inclusion in this group that fulfills adult treatment panel 3rd criteria for Metabolic Syndrome but they should not have Diabetes. This group is further mentioned as 'Non-Diabetic group'.

Fasting blood samples has also be taken from all the subjects for the estimation of Hs-CRP, Lipid profile and fasting blood glucose. All parameters have estimated by the reagent Randox international laboratory Ltd. and run the samples on fully auto chemistry analyzer Olympus AU480 in the laboratory. We applied internal and external quality control measures in the laboratory.

2.3. Statistical analysis

The statistical analysis was carried out using ANOVA (One-way) by SPSS (Ver.19) Inc., Chicago, Illinois, USA.

3. RESULT AND DISCUSSION

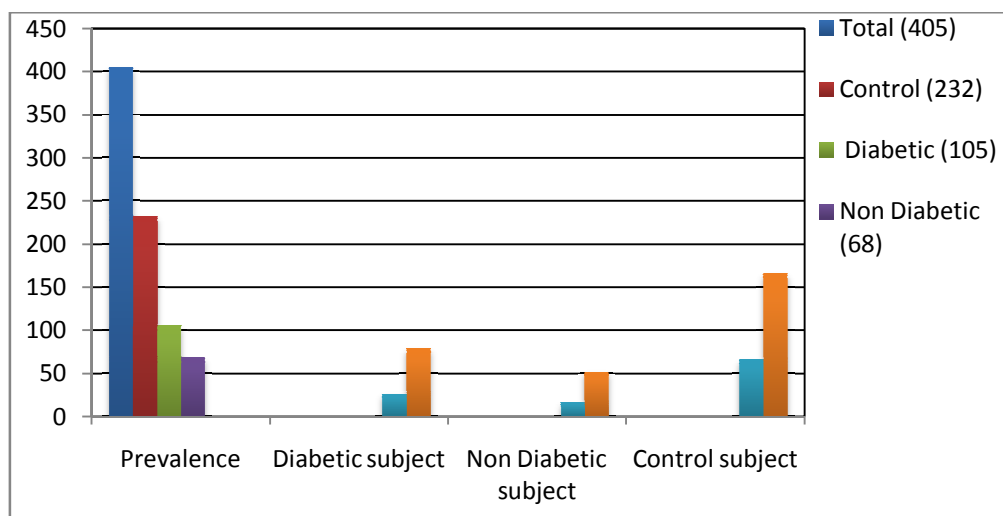


Fig. 1: Total prevalence and age wise distribution (Control, Diabetic, and Non Diabetic group of study subjects).

The prevalence of metabolic syndrome in our study of general population of city Ghaziabad, India is based upon 405 subjects. In these subjects 232 were found in control group, 105 were found in Diabetic group and rest 68 were found in Non- Diabetic group as shown in Figure 1.

In the diabetic group, the number of subjects was 105 (25.92% of total) with age-wise distribution as 26 (6.41% of total) in 25-45 yrs age group and 79 (19.50% of total) in 45-65 yrs age group. In the non-diabetic group, the number of subjects was 68 (16.79% of total) with age-wise distribution as 16 (3.95% of total) in 25-45 yrs age group and 52 (12.83% of total) in 45-65 yrs age group. In control group the number of subjects was 232 (57.29% of total) with age-wise distribution as 66 (16.30% of total) in 25-45 yrs age group and 166 (40.99% of total) in 45-65 yrs age group as shown in Figure 1. It is comparable to 18-48% in previous studies conducted in the resident Indian population [11,12].

Percentage wise biochemical value in control, diabetic and non diabetic group are summarized in Figure 2 and Table 1, which indicate that an elevated Hs-CRP level could be suggested as a subsidiary marker for MetS and partially reflects dyslipidaemia as a component of MetS.

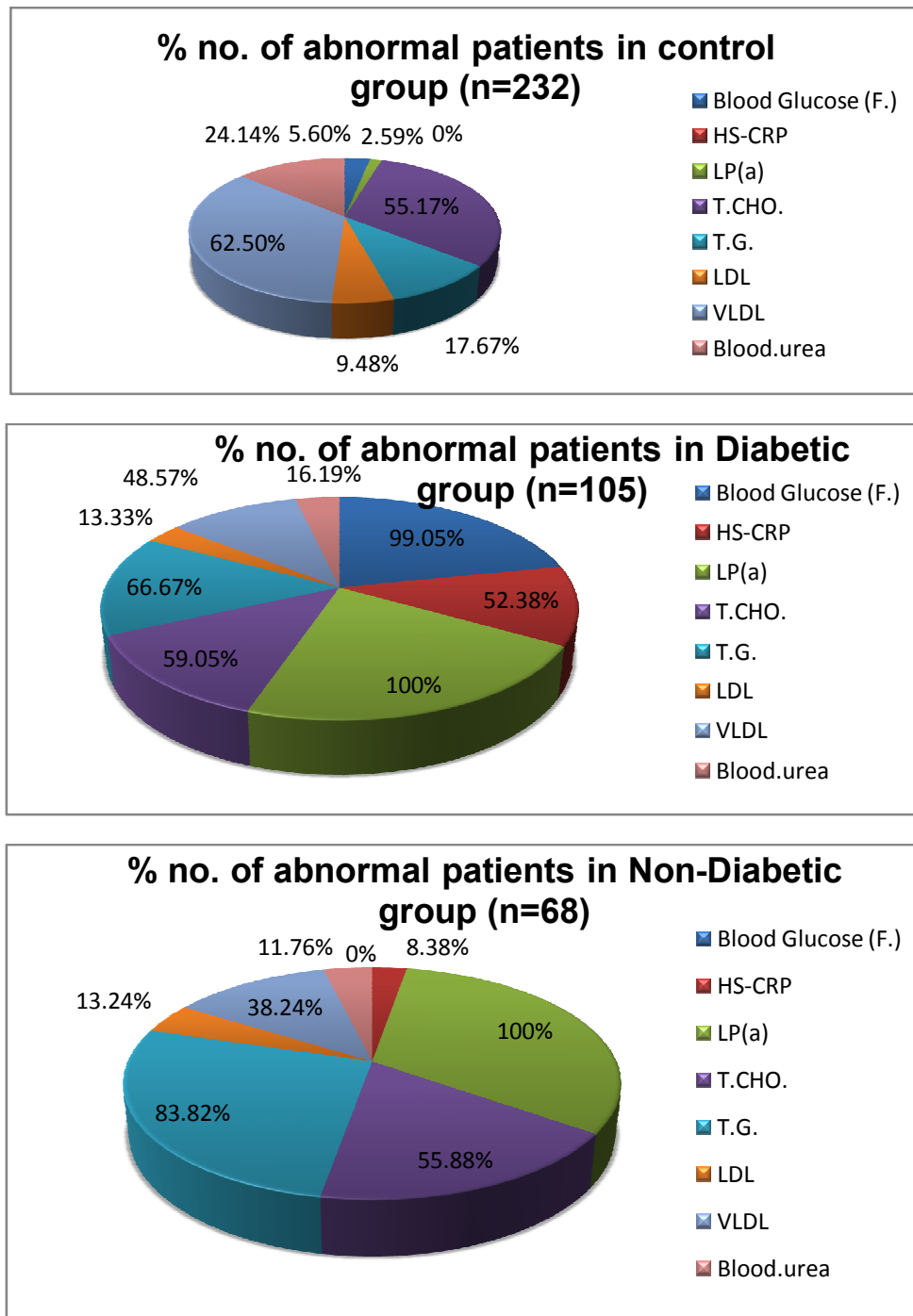


Fig. 2: Percentage of biochemical parameters in Control, Diabetic & Non Diabetic groups.

Table 1: Percentage wise comparison of biochemical value in control, diabetic and non diabetic group.

S. No.	Biochemical Parameter	Control Group (%)	Diabetic Group (%)	Non Diabetic Group (%)
1.	Blood Sugar (Fasting)	5.60%	99.04%	0.0%
2.	Hs-CRP	0.0%	52.38%	83.82%
3.	T.CHO.	55.17%	59.04%	55.88%
4.	TG	17.60%	66.66%	83.82%
5.	LDL	9.40%	13.33%	13.23%
6.	HDL-C	Male-12.10%	Male-18.46%	Male-12.12%
		Female-6.67%	Female-17.50%	Female-28.57%
7.	VLDL	62.50%	48.57%	38.23%

Mean level of Hs-CRP in Control, Diabetic and Non Diabetic group is presented in Figure 3(a) and 3(b) for age group 25-45 and 46-65 years respectively.

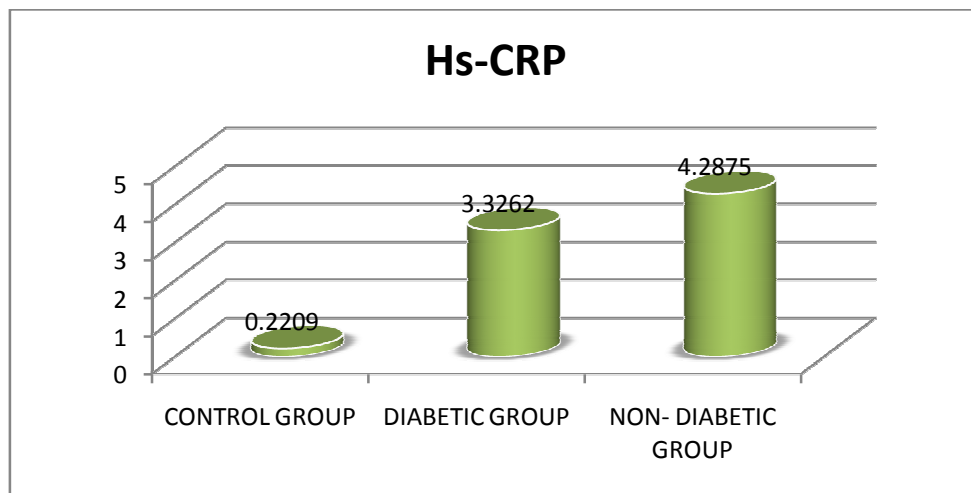


Fig. 3(a): Mean Chart of Hs-CRP for age group 25 to 45 years for various groups.

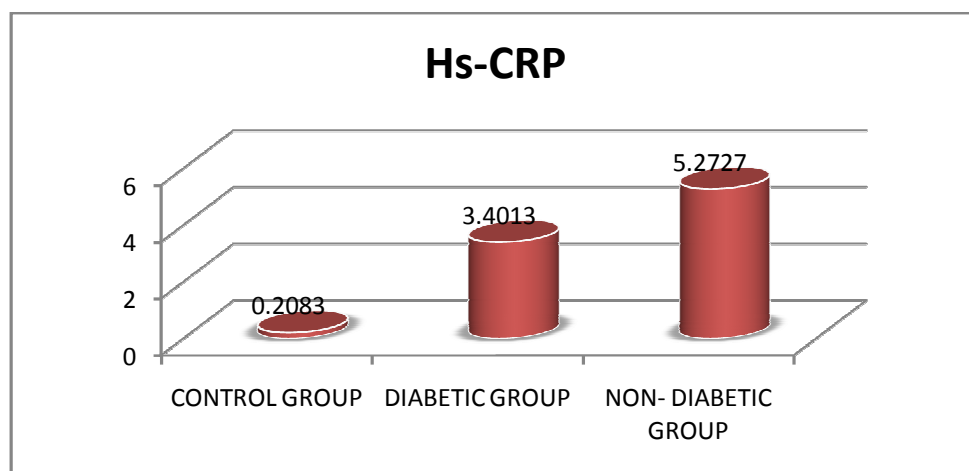


Fig. 3(b): Mean Chart of Hs-CRP for age group 46 to 65 years for various groups.

Hs-CRP is raised in more than 2/3rd (83%) patients of the metabolic syndrome in non diabetic group and about half (52%) of the patients of the metabolic syndrome in diabetic group. Prior studies suggested that elevated Hs-CRP levels may also be predictive of development of the metabolic syndrome [13]. Prior studies suggested that Hs-CRP as a clinical criterion for metabolic syndrome and as part of a modified cardiovascular risk score useful for global risk assessment in both men and women. While Hs-CRP is a strong independent predictor of risk of future MI, stroke, peripheral arterial disease and vascular death, the validity of Hs-CRP as a risk marker needs to be assessed in all populations. Our observation is Serum C-reactive protein (CRP) is significantly related to features of the metabolic syndrome [14].

4. CONCLUSION

The study proposes the inclusion of biochemical parameter Hs-CRP in the criteria for defining cases of metabolic syndrome in Indians. So that more metabolic syndrome can be picked up at earliest. This issue is especially pertinent for the Indian patient population in whom cardiovascular disease is appropriate all the time more ordinary in both sexes and in age group of 25-65 yrs. There should be continued health care emphasis on recognition of metabolic syndrome and intensification of targeted preventive strategies. We strongly recommend that large prospective studies are needed to establish link between the biochemical parameter of Hs-CRP with metabolic syndrome.

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