IMPORTANCE OF HIGH-SENSITIVITY CRP IN ELDERLY SUBJECTS WITH AND WITHOUT METABOLIC SYNDROME

METABOLİK SENDROMU OLAN VE OLMAYAN YAŞLI BİREYLERDE HS-CRP'NİN ÖNEMİ

ABSTRACT

C-reactive protein is a prototypic marker of inflammation. The purpose of this study is to evaluate high sensitivity C-reactive protein (hsCRP) level in elderly subjects with and without metabolic syndrome. This study was performed to compare hsCRP levels between elderly healthy subjects (n=20, 12 men, 69,5±2,4 years, group II) and elderly with metabolic syndrome (n=20, 12 men, 70,4±1,8 years, group III) and young healthy subjects (n=20, 12 men, 25,5±1,3 years, group I). Serum hsCRP levels were significantly higher in group II and group III compared to controls (p<0,001). Our findings suggest that hsCRP level in elderly subjects may be related to the severity of endothelial dysfunction. In contrast to several biomarkers that also reflect biological aspects of inflammation, hypofibrinolysis, and insulin resistance, hsCRP measurement is inexpensive, standardized, widely available and has a decade-to-decade variation similar to that of cholesterol.

Key words: Elderly, CRP, Metabolic syndrome

ÖZ

C-reaktif protein inflamasyonun en önemli belirteci-dir. Bu çalışmanın amacı metabolik sendromu olan ve olmayan yaşlı bireylerde high sensitif C-reaktif proteinin (hsCRP) düzeylerini karşılaştırmaktır. Bu çalışmada genç sağlıklı bireyler (n=20, 12 erkek, 25,5±1,3 yaş, grup I), sağlıklı yaşlı bireyler (n=20, 12 erkek, 69,5±2,4 yaş, grup II) ve metabolik sendromu olan yaşlı bireylerin (n=20, 12 erkek, 70,4±1,8 yaş, grup III) hsCRP seviyelerini karşılaştırdı. Serum hsCRP düzeyleri kontrollerle kıyaslandığında grup II ve grup III te önemli oranda yük-sekti (p<0,001). Bulgularımız yaşlı kişilerde hsCRP düzeylerinin endotelyal disfonksiyonun şiddetiyle ilişkili olduğunu göstermektedir. İnflamasyonun, hipofibrinolo-"ziz ve insülin rezistansının biyolojik özelliklerini de yansitan bazı biyomarkerların tersine, hsCRP ölçüümü ucu-zdur, standardize edilmiş ve oldukça geniş kullanıma sahiptir. Ayrıca kolesterol gibi dekadlar arası varyasyon göstermektedir.

Anahtar sözcükler: Yaşlılık, CRP, Metabolik sendrom

Gülüş 24/01/2005 Kabul: 03/05/2005

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TÜRK GERİATRİ DERGİSİ 2005, CİLT: 8, SAYI: 2, SAYFA: 57
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INTRODUCTION

High-sensitivity C-reactive protein (hsCRP) represents a powerful cardiovascular risk predictor (1,2). C-reactive protein (CRP), a marker of inflammation, identifies a different high-risk group than the traditional parameters of the metabolic syndrome and provides additional information on the cardiovascular risk (3). Inflammation of arteries may be an important component of changes in plaque morphology, rupture, and thrombosis. In this setting, inflammation may or may not include immune activation but would certainly include the elaboration of proinflammatory cytokines. CRP taken up by monocytes may also increase production of tissue factor and the propensity for subsequent thrombosis (4,5).

In 2001, The National Cholesterol Education Program Adult Treatment Program (NCEP ATP III ) guidelines defined metabolic syndrome (6). The ATP III guideline also suggest a working definition of the metabolic syndrome that includes the presence of at least 3 of the following characteristics; abdominal obesity, elevated triglycerides, reduced levels of HDL cholesterol, high blood pressure, and high fasting glucose. However, all of these parameters are associated with elevated levels of hsCRP (5).

hsCRP levels of less than 1, 1 to 3, and greater than 3 mg/dl are associated with lower, moderate, and higher cardiovascular risk, prospectively (7,8). Inflammation is a major factor in atherosclerotic disease. Levels of hsCRP a marker of systemic inflammation and a mediator of atherosclerotic disease, have been shown to correlate with metabolic syndrome (9).

The present study was designed to evaluate hsCRP levels elderly subjects with and without metabolic syndrome.

METHODS

Participants and Protocol

The local ethics committee approved the study protocol; all participants gave written informed consent. Twenty young and twenty elderly healthy normotensive subjects and in addition 20 elderly subjects with metabolic syndrome were included in this study. Metabolic syndrome was defined according to ATP III Guidelines. The samples were obtained from antecubital vein using a 19 gauge sterile needle and blood was allowed to flow freely into vacutainer tubes (no additives). Participants with 3 or more of following attributes are typically defined as having the metabolic syndrome: (1) triglycerides > 150 mg/dl; (2) HDL-cholesterol < 50 mg/dl; (3) blood pressure > 135/85 mmHg; (4) obesity as defined by a waist circumference > 88 cm for women, > 105 cm for men; and (5) abnormal glucose metabolism as defined by a fasting glucose > 110 mg/dl (10,11). All participants were nonsmoking. Blood samples for measurements were taken without venous compression after at least 100 minutes of supine position.

Measurement and Calculations

Glucose, triglycerides, HDL-cholesterol, albumin levels were measured with original kits using Abbott-Aeroset autoanalyzer (Chicago,IL,USA). Fibrinogen levels were measured with Sigma kits using AMAX-200 (Sigma Co,St Louis,USA). CRP levels were determined by immunoturbidimetric methods in the Aeroset (Abbott-USA) Autoanalyser. Ultra CRP (hsCRP) reagents were purchased from Sentinel Diagnostic (Sentinel-Italy-Catalog No: 11 508). The results are presented as mg/dl (measuring range 0,005-16 mg/dl). We were measured hsCRP with Abbott-Aeroset autoanalyzer (Chicago,IL,USA).

Statistical analysis

The SPSS package was used for statistical analysis. Comparison groups was done by using ANOVA after normality of data distribution was confirmed with the Kolmogorov-Smirnov Test. The zero hypothesis was rejected at a probability level of 0.001. All results were expressed as mean ± standart deviation (SD).

RESULTS

The clinical and biochemical caharecteristics of elderly subjects and their age-matched controls were summarized in Table 1. Serum hsCRP levels were higher in group II and group III compared to controls (p<0,001). Serum hsCRP levels were shown in Figure I.

Serum albumin levels were not differed among groups (p>0,05). Serum fibrinogen levels of group III were higher than group I and group II levels ( p<0,001). Serum hsCRP levels were shown in Figure I.

DISCUSSION

The results of the present study shown markedly increased serum hsCRP in all elderly subjects. These prospective data suggest that measurement of CRP adds clinically important prognostic information to the elderly subjects with or without metabolic sendrom. Our aim was to assess in its role the pathophysiology of age-related endothelial dysfunction.
Tacy et al. found that CRP was associated with incident events in the elderly, especially with subclinical disease at baseline. They performed a similar study in the Rural Health Promotion Project, in which mean values of CRP were higher for female case subjects than for female control subjects, but no differences were apparent for men (2). They also found that median CRP levels for those with 0,1,2,3,4 and 5 characteristics of metabolic syndrome were 0.68, 1.09, 1.93, 3.01, 3.88 and 5.75 mg/L, respectively. Over the 8-year follow-up, cardiovascular event-free survival rates based on CRP levels above or below 3.0 mg/L were similar to survival rates based on having 3 are more characteristic of the metabolic syndrome (15).

Schilling et al. found hsCRP and glycated hemoglobin in patients with advanced atherosclerosis. Inflammation indicated by hsCRP and hyperglycemia, indicated by HbA1c, is linked to the cardiovascular risk of patients with advanced atherosclerosis. Patients with both hsCRP and HbA1c in the upper quartiles (> 0.44 mg/dl and > 6.2%, respectively) are at particularly high risk for poor cardiovascular outcome (16).

This study was performed to compare concentrations of hscrp between elderly subjects with (n=20, 12 men, 70.4±1.8 years) and without metabolic syndrome (n=20, 12 men, 69.5±2.4 years ) and young healthy subjects (n=20, 12 men, 25.5±2.2 years). Serum hs-CRP concentration were significantly higher (p<0.001) in elderly than in young healthy subjects. Our findings suggest that hsCRP level in elderly subjects may be related to the severity of endothelial dysfunction. Given the consistency of prognostic data for hsCRP and the practicality of its use in outpatient clinical criterion for metabolic syndrome. Further prospective studies are warranted to determine the diagnostic value of hsCRP level.

REFERENCES:
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3. Scott CL. Diagnosis, prevention, and intervention for the metabolic syndrome:Am J Cardiol 2003; 92: 35i-42i

### Table 1: Baseline characteristics of the groups

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>25.5 (1.3)</td>
<td>69.5 (2.4)</td>
<td>70.4 (1.8)</td>
</tr>
<tr>
<td>Sex(M/F)</td>
<td>12/8</td>
<td>12/8</td>
<td>12/8</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>0</td>
<td>20</td>
<td>65</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>0</td>
<td>75</td>
<td>80</td>
</tr>
<tr>
<td>SBP, mmHg</td>
<td>107.7 (8.2)</td>
<td>132.3 (11.0)</td>
<td>144.7 (13.4)</td>
</tr>
<tr>
<td>(SD) DBP, mmHg</td>
<td>70.5 (4.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholesterol, mg/dl</td>
<td>149.3 (20.3)</td>
<td>202.0 (21.1)</td>
<td>234.8 (24.5)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triglycerides, mg/dl</td>
<td>71.1 (14.3)</td>
<td>95.9 (34.8)</td>
<td>193.3 (65.7)</td>
</tr>
<tr>
<td>HDL, mg/dl</td>
<td>52.6 (6.5)</td>
<td>46.4 (6.3)</td>
<td>39.1 (8.6)</td>
</tr>
<tr>
<td>hsCRP, mg/dl</td>
<td>1.48 (0.5)</td>
<td>2.9 (0.4)</td>
<td>4.6 (1.0)</td>
</tr>
<tr>
<td>Albumin, mg/dl</td>
<td>43.8 (3.8)</td>
<td>43.0 (2.2)</td>
<td>38.5 (11.9)</td>
</tr>
<tr>
<td>Fibrinogen, mg/dl</td>
<td>176.6 (17.7)</td>
<td>223.6 (56.9)</td>
<td>283.5 (0.5)</td>
</tr>
</tbody>
</table>

Group I: young healthy subjects; Group II elderly healthy subjects; Group III elderly with metabolic syndrome
SBP, indicates systolic blood pressure; DBP, diastolic blood pressure
All values shown as mean (SD).

TURKISH JOURNAL OF GERIATRICS 2005, VOLUME: 8, NUMBER: 2, PAGE: 60