Türk Geriatri Dergisi 2005; 8 (2): 57-60
Turkish Journal of Geriatrics

Güler BUĞDAYCI
Arife POLAT DÜZGÜN
Yüksel KOCA
Sevilay SEZER
Turan TURHAN

ARAŞTIRMA-RESEARCH

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

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

ÖZ

C-reaktif protein inflamasyonun en önemli belirtecidir. 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 seviyeleri karşılaştırıldı. Serum hsCRP düzeyleri kontrollerle kıyaslandığında grup II ve grup III'te önemli oranda yüksekti (p<0,001). Bulgularımız yaşlı kişilerde hsCRP düzeylerinin endotelyal disfonksiyonun şiddetiyle ilişkili olduğunu göstermektedir. İnflamasyonun, hipofibrinoliz ve insülin rezistansının biyolojik özelliklerini de yansıtan bazı biyomarkerların tersine, hsCRP ölçümü ucuzdur, standardize edilmiştir ve oldukça geniş kullanıma sahiptir. Ayrca kolesterol gibi dekadlar arası varyasyon göstermektedir.

Anahtar sözcükler: Yaşlılık, CRP, Metabolik sendrom

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

Geliş:24/01/2005 Kabul: 03/05/2005

Güler BUĞDAYCI, Ankara Numune Eğitim ve Araştırma Hastanesi, II.Biyokimya Laboratuvarı
Arife POLAT DÜZGÜN, Ankara Numune Eğitim ve Araştırma Hastanesi, III. Cerrahi Kliniği
Yüksel KOCA, Ankara Numune Eğitim ve Araştırma Hastanesi, II.Biyokimya Laboratuvarı
Sevilay SEZER, Ankara Numune Eğitim ve Araştırma Hastanesi, II.Biyokimya Laboratuvarı
Turan TURHAN, Ankara Numune Eğitim ve Araştırma Hastanesi, II.Biyokimya Laboratuvarı

İletişim: Dr.Güler Buğdaycı, Ankara Numune Eğitim ve Araştırma Hastanesi, Acil Laboratuvarı, Ankara
Tlf: 0312 3103030/4317 **GSM:** 0505 3900015 **e-mail:** gbugdayci@yahoo.com

INTRODUCTION

High-sensitivity C-reactive protein (hsCRP) represents a powerful cardiovascular risk predictor (1,2). C-reaktif 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 trombosis. 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 trombosis (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 charecteristics; abdominal obesity, elevated trigliserides, 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 atherotrombotic disease. Levels of hsCRP a marker of systemic inflammation and a mediator of atherothorombotic 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 Guideliness. The samples were obtained from antecubital vein using a 19 gauge sterile needle and blood was allowed to flow freely in to vacutainer tubes (no additives). Participants with 3 or more of following attributes are typically defined as having the metabolic syndrome: (1) triglyserides > 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, triglicerides, 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 prensented 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 caharecterisitics 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 pathophysology of age-related endotheial dysfunction.

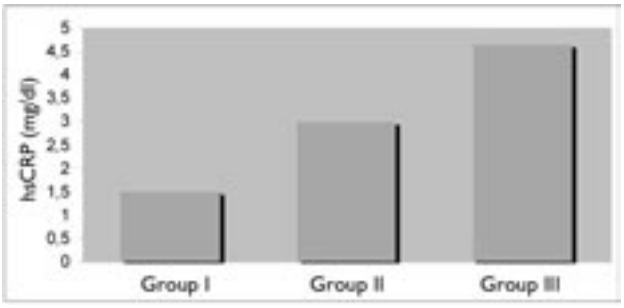

Figure 1- hsCRP levels in young subjects(I) and elderly subjects with(III) or without(II) Metabolic Syndrome

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 apperent for men (2). In our study, the mean CRP level was higher either health elderly subjects or elderly with metabolic sendrom (p<0,001). In previous reports, lower levels of albumin and higher levels of fibrinogen (both inflammation-sensitive protein, like CRP) have also been associated with increased risk of endothelial dysfunction (12). In our study, 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).

Frederikson et al. investigated association between diet, lifestyle, metabolic cardiovascular risk factors and plasma CRP levels. Their observation suggest that CRP levels are only marginally associated with individual dietary and lifestyle factors (low vitamin C intake, smoke, high fiber vitamin C intake, β carotene intake). Also they found increased with high body mass index (p=0,019), HDL-cholesterol (p=0,009) and low HDL cholesterol (p=0,01) (13).

Penninx et al. found elevated interleukin 6 (IL-6), tumor necrosing factor- alpha (TNF-α), hsCRP level in depressed mood in older persons. In old age, depressed mood is associated with high levels of inflammatory markers, suggesting that depressed mood is causing and/or caused by systemic inflammation (14).

Ridker et al. found that median CRP levels for those with 0,1,2,3,4 or 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 charecteristic of the metabolic syndrome (15).

Schillinger et al. found hsCRP and glycated hemoglobin in patients with advanced atherosclerosis. Inflammation indicated by hsCRP and hyperglycemia, indicated by HbA1c, jointly contribute 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 cardivascular 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±2,4years) and young healthy subjects (n=20, 12 men, 25,5±1,3 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 warrented to determine the diagnostic value of hsCRP level.

REFERENCES:

1. Linton MF, Fazio S: A practical approach to risk assesment to prevent coronary artey disease and its complication. AM J Cardiol 2003;92;19i-26i.
2. Tracy RP, Lemaitre RN, Psaty BM, et al.: Relationship of C-reactive protein to risk of cardiovascular disease in the elderly: results from the Cardiovascular Health Study andthe Rural Health Promotion Project. Arteriscler Thromb Vasc Biol. 1997; 17:1121-27.
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

	Group I	Group II	Group III
Age (years)	25,5 (1,3)	69,5 (2,4)	70,4 (1,8)
Sex(M/F)	12/8	12/8	12/8
Diabetes (%)	0	20	65
Hypertension (%)	0	75	80
SBP, mmHg	107,7 (8,2)	132,3 (11,0)	144,7 (13,4)
(SD) DBP, mmHg	70,5 (4,2)		
Cholesterol, mg/dl	149,3 (20,3)	202,0 (21,1)	234,8 (24,5)
Total			
Triglycerides, mg/dl	71,1 (14,3)	95,9 (34,8)	193,3 (65,7)
HDL, mg/dl	52,6 (6,5)	46,4 (6,3)	39,1 (8,6)
hsCRP, mg/dl	1,48 (0,5)	2,9 (0,4)	4,6 (1,0)
Albumin, mg/dl	43,8 (3,8)	43,0 (2,2)	38,5 (11,9)
Fibrinogen, mg/dl	176,6 (17,7)	223,6 (56,9)	283,5 (0,5)

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).

4. Frohlic M, Imhof A, Berg C,et al: Association between C-reactive protein and features of the metabolic syndrome: a population based study. Diabetes Care.2000;23:1835-1839.
5. Shidama K, Miyazaki T, Daida H. Adiponectin and atherosclerotic disease. Clin Chim Acta.2004;344:1-12.
6. Expert Panel on Detection,Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive summary of the Third Report of the National Cholesterol EducatioProgram (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholsterol in Adults (Adult Treatment Panel III). JAMA. 2001;19:2486-2497.
7. Bassuk SS, Rifai N, Ridker PM.: High-sensitivity C-reactive protein; clinical importance.Curr Probl Cardiol 2004, Aug; 29(8):439-93.
8. Ridker PM: High-sensitivity C –reactive protein and cardiovascular risk: rationale for screening and primary prevention. Am J Cardiol.2003 21; 92(4B): 17K-22K.
9. Ridker PM, Hennekens CH, Buring JE : C-reactive protein and other markers of inflammation in the prediction of cardiovascular disease in women . N Eng J Med. 1997; 336:973-79.
10. Lindblad U, Langer RD,Wingard DL,Thomas RG, Barrett-Connor E: Metabolic Sydrome and ischemic heart disease in elderly men and women. Am J Epidemiol 2001; 153:481-89.
11. Isomaa B, Almgrem P, Tuomi T: Cardiovascular morbitiy and mortality associated with the metabolic syndrome. Diabetes Care 2001;24:683-89.
12. Ridker PM, Wilson PW, Grandy SM: Should C-reactive protein be added to metabolic syndrome and to assessment of global cardiovascular risk? Circulation 2004; 109 (23):2818-25.
13. Frederikson GN, Hedblad B, Nilsson JA, Alm R: Association between diet, lifestyle,metabolic cardiovacular risk factors and plasma CRP levels. Metabolism 2004; 53 (11); 1436-42.
14. Penninx BW, Kritchevsky SB, Yaffe K ,Newman AB, Simonsick EM,Rubin S et al.: Inflammatory markers and depressed mood in older persons; results from the health, aging and body composition study. Biol Psychiatry 2003 1; 54 (5): 566-72.
15. Ridker PM, Buring JE, Cook NR, Rifai N : C-reactive protein, The metabolic syndrome and risk of incident cardiovascular events. Circulation 2003; 107;391-97.
16. Schillinger M, Exner M, Amighi J, Mlekush W, Sabeti S, Rumpold H, Wagner O, Minar E: Joint effects of C-reactive protein and glycated hemoglobin in prediciting future cardiovascular events of patients with adnvanced atherosclerosis.Circulation 2003; 108:2323-28.