

THE VALUES OF C - REACTIVE PROTEIN FOR SOME EARLY-DIAGNOSED WITH MYOCARDIAL INFARCTION PATIENTS

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Abstract: C-reactive protein (CRP) is an indirect risk factor in the acute coronary syndromes [2,13,21]. Its high levels may reflect one of the following cases: an inflammation of the coronary arteries as a response to the infectious agents; the severeness of the inflammatory response within the atherosclerotic vessels; inflammation expansion associated with myocardial ischemia; inflammation expansion associated with myocardial necrosis. Therefore, CRP indicates the cardiac lesions specific to various coronary heart diseases. The prognostic value of CRP augmentation appears to be more important in the patients affected by myocardial lesions [21].

This present study is aimed to determine the CRP levels in female and male patients of different age groups, early diagnosed with myocardial infarction.

INTRODUCTION

Of all the inflammatory markers, the C - reactive protein (CRP) was the most thoroughly studied [17]. Produced by the liver in response to interleukin-6, CRP is an acute phase reactant that was primarily regarded as a 'passive' witness of vascular inflammation. The latest studies brought proofs to support the idea that in fact CRP plays an active role in atherogenesis. Therefore, CRP exerts a series of effects on the endothelial cells, in favour of the pro-inflammatory and pro-atherogenic phenotypes. For instance, CRP decreases the expression of endothelial nitric oxide – synthase (eNOS), and destabilises the mRNA for eNOS. As a result, basal and stimulated release of nitric oxide (NO) at the endothelial level decreases [23]. CRP stimulates the synthesis of endothelin-1 and interleukin-6, as well, increases the synthesis of adhesion molecules, therefore stimulates the adhesion of monocytes to the endothelium and their differentiation into macrophages [22]. It was recently proved that CRP plays an active role in the endothelial cells apoptosis; it inhibits the angiogenesis, significantly increases the expression of NF- κ B, a key transcriptional factor in the atherogenic process [3].

Many epidemiological studies effected both on healthy individuals, and also on patients affected by acute coronary heart disease have found the role of CRP as an independent predictor of adverse cardiovascular events [3,5,16,18,20].

It was as well ascertained that though apparently healthy women displayed a lower level LDL cholesterol (≤ 130 mg/dl), hsCRP continued to predict an approximately 3-time increase of cardiovascular risk in a population of apparently healthy women.

In addition to the coronary events, hsCRP is a predictor of cerebrovascular and peripheral vascular disease, and of sudden death, as well [17]. The relation between the metabolic syndrome (a sum of cardiovascular risk factors) and the increase of CRP level was proved, as well as the additional effect as a risk marker of all these elements in the predicament of coronary risk and the apparition of diabetes [6,7].

More recent research pointed out there exists a low correlation between the level of hsCRP and the expansion of atherosclerosis, as it is assessed by imagistic methods [11]. These type of studies imply that a high level of CRP reflects the composition, the morphology and the stability of atherosclerotic plaques, rather than their expansion into the arterial system. There is a lack of correlation between the CRP level and the expansion of atherosclerotic disease, quantified by the number of significant coronary lesions depicted by coronarography, and by carotid intima-media index, a fact mentioned in the studies of Romanian scientists [10].

Our present research study aims to compare the CRP value in female and male patients (belonging to different age groups, and characterised by the same diagnosis), and the early diagnose of acute myocardial infarction.

MATERIAL AND METHODS

The case study was effected on 86 patients suffering from acute myocardial infarction, hospitalised between 2008-2011, in the Cardiology Section from Bacău County Hospital; 42 of them are female patients, and 44 are male patients. Both the female subjects and the male ones were distributed into three age groups: 36-50 years, 51-65 years, and above 65 years. A control group comprising healthy people was formed for each of the three age groups.

C-reactive protein level from blood serum was determined using the Compact immuno – analyzer PATHFAST.

All the experimental data were statistically processed [24].

RESULTS AND DISCUSSIONS

C – reactive protein (CRP) represents an indirect risk factor to the coronary disease, and its high levels may reflect one of the following cases: an inflammation of the coronary arteries in response to some infectious agents; the severeness of the inflammatory response in the atherosclerotic blood vessels; inflammation spreading connected with myocardial ischemia; inflammation spreading connected with myocardial necrosis. CRP is therefore a specific indicator of heart lesions, associated with various coronary diseases. The decision intervals for cardiovascular risk assessment are established according to the recommendations of CDC (The Centers for Disease Control and Prevention)/AHA (American Heart Association):

< 1mg/L: mild risk;

1- 3 mg/L: moderate risk and

> 3 mg/L: high risk.

The data provided by the tests we have run show that the C – reactive protein (CRP) displays different values for the female or male patients belonging to the three age groups. The values of C – reactive protein of the female patients for the group ages: 36-50 years, 51-65 years, and over 65 years are presented in table I; the values of CRP in female patients belonging to the respective three control groups are displayed by table II.

Table I
CRP levels for the experimental group (female patients)

REFERENCE VALUES		AGE GROUP		
		36-50 YEARS	51-65 YEARS	>65 YEARS
< 1mg/L: mild risk 1- 3 mg/L: moderate risk > 3 mg/L: high risk	n	3	13	26
	X	10.59	4.15	7.48
	± ES	0.15	0.26	0.49
	t	11.96	4.07	7.02
	p	p < 0.001	p < 0.001	p < 0.001

Table II
C – reactive protein levels in different age groups from the control lot (female patients)

REFERENCE VALUES		AGE GROUP		
		36-50 YEARS	51-65 YEARS	>65 YEARS
< 1mg/L: mild risk 1- 3 mg/L: moderate risk > 3 mg/L: high risk	n	3	6	9
	X	3.53	2.6	2.56
	± ES	0.58	0.30	0.50

The analysis of our results lead to the conclusion that the average values indicate a CRP level of 10.59 mg/L in female patients aged 36 to 50 years, that is more than three times higher than the

reference ranges; this fact proves that the patients displayed a high risk of coronary heart disease. The above – mentioned CRP level has a major statistical significance ($p < 0.001$). The female patients belonging to the age group 51 to 65 years old displayed a CRP level of 4.15 mg/L, slightly exceeding the upper reference range; this fact implies a moderate risk of coronary heart disease. The CRP level for the female patients older than 65 years was 7.48 mg/L, which is 1.8 times higher than the value for the patients of the age group 36 to 50 years, and 2.5 times higher than the upper reference range (3 mg/L). Therefore, there is a considerable risk of manifesting the coronary disease for the female patients belonging to the third age group ($p < 0.001$). Of all the above – mentioned data, it was ascertained that the patients belonging to the 36 – 50 years age group are the most vulnerable to the coronary disease.

The CRP levels in male patients belonging to the three age groups are presented in table III. The CRP levels in healthy men within the control groups are displayed by table IV. As it was shown by these research results, the patients aged 36 to 50 years old, and the ones over 65 years displayed a very similar level of CRP: 5.79 mg/L, and 5.08 mg/L, respectively. These two values are almost twice than the upper reference limit. The explanation is that the patients belonging to the three age groups display a milder risk of coronary disease. Nevertheless, the patients aged 51 to 65 years showed a very high CRP level: 8.81 mg/L ($p < 0.001$), which indicates an extremely high risk of coronary heart disease.

Table III
CRP levels within the experimental group (male patients)

REFERENCE VALUES		AGE GROUP		
		36-50 YEARS	51-65 YEARS	>65 YEARS
< 1mg/L: mild risk 1- 3 mg/L: moderate risk > 3 mg/L: high risk	n	8	17	19
	X	5.79	8.81	5.08
	± ES	0.81	1.80	0.41
	t	2.63	10.58	5.25
	p	0.02 < p < 0.05	p < 0.001	p < 0.001

Table IV
C – reactive protein levels in different age groups from the control lot (male patients)

REFERENCE VALUES		AGE GROUP		
		36-50 YEARS	51-65 YEARS	>65 YEARS
< 1mg/L: mild risk	n	3	6	9
1- 3 mg/L: moderate risk	X	3.60	2.88	2.19
> 3 mg/L: high risk	± ES	0.20	0.38	0.39

By comparing the values for the CRP levels in female and in male patients, it was ascertained that the female patients from the first, and from the third age group, as well, displayed a higher CRP level than the male patients within the same age groups. Regarding the persons aged 51 to 65 years, the value of CRP represents half of the one depicted in the male patients. Considering the upper limit for the reference ranges, one may state that the women of the first and of the last age groups, and the men aged 51 to 65 years old displayed a high risk of coronary disease. We consider, therefore, that the CRP levels vary both with the patients' sex, and with the age group.

CONCLUSIONS

The research we conducted led to the following conclusions:

The concentration of C – reactive protein varies with the female and the male patients belonging to different age groups. The female sex displays an increased average level of CRP for the 36 to 50 years age group, a decrease in the category 51 to 65 years, and a subsequent increase in the patients over 65 years old. The male sex displayed the highest augmentation of average CRP levels only for the age group 51 to 65 years;

C – reactive protein level is sex – related, with a higher value in female sex;

The levels of CRP vary with the age groups, as well;

The female patients display a much higher risk of coronary heart disease.

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