ASSOCIATION BETWEEN METABOLIC SYNDROME AND RISK OF CARDIOVASCULAR DISEASE

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Abstract

The purpose of this study is to determine the association between the components used to define metabolic syndrome and cardiovascular risk using different criteria stratified by patient's predisposition to this disease.

Key words: metabolic syndrome, AHP, CVD, alcohol, nutrition.

INTRODUCTION

Cardiovascular diseases (CVD) are the most lethal diseases known to the Western world and as the standard of living continues to grow CVD will soon become the world's leading cause of mortality. This means more demanding challenges are being placed on scientific communities to research and develop new and more specific diagnostic approaches to unstable angina, acute myocardial infarction (AMI) and other life threatening cardiovascular pathologies. In this field, different cardiac markers**.**

As we know the term metabolic syndrome incorporates many metabolic alternations, associated especially with abdominal obesity. The abnormal features of the metabolic syndrome are: glucose intolerance, dyslipidaemia, hypertension and ovarian polytheistic cancer (in women's cases).

In order to be diagnosed with metabolic syndrome the patient must show at least two of the characteristics mentioned before (Adult Treatment Panel III; Bonow R.O., R.H. Eckel., 2003; Campia U., 2006).

Impaired glucose is a feature of metabolic syndrome, which means that the glucose level is high, after two hours from ingestion of 75g of glucose. The main role of impaired glucose in atherogenesis, remains unclear, still many statistics and studies show that high level of plasmatic glucose for a long period of time, can create alternations of the plasma of lipoproteins and proteins.

An example of such alterations can be found in the increasing concentration of glycosylated haemoglobin (DECODE Study Group, 2003; Defronzo R.A., E. Ferrannini, 2001; Després J.P., 2012).

Dyslipidaemia. The phenotype lipoprotein of the metabolic syndrome includes the moderate elevation of the triglycerides plasma and the level low level of HDL (1). The levels of the LDL cholesterol are not high in individuals who are affected by the metabolic syndrome, still LDL has abnormal physical – chemical proprieties.

Triglycerides and CVD risk. Epidemiological studies have proven a linear link between the levels of triglycerides and the risk for CVD (Campia U., 2006). Besides the importance of each risk factor, an important role is being played by insulin resistance, which seems to be a risk factor for the emergence of CVD, but for type 2 diabetes as well (Durrington P.N. et al., 2001; Eyre H. et al., 2004, Herbert R. et al., 2000).

Free fatty acids. The mechanism by which insulin resistance ca exert an atherogenic effect, can be trough triglycerides or free fatty acids (FFA). Herbert R. et al., 2000; Isomaa B. et al., 2001, Lakka H.M. et al., 2002).

The high concentrations of plasmatic FFA, are usual in type 2 diabetes cases. Insulin resistance in the fat, result in a flux of FFA, from the fat, to the liver, causing even insulin resistance in the liver and in the peripheral tissue. Free fatty acids block the oxidation of glucose and the distribution of glucose, but also cause atherogenic dyslipidaemia, because it leads to the generation of LDL particles in the liver, which lead to high level triglycerides and apolipoprotein B (ApoB) (Malik S. et al., 2004, Martin A., 2000; Mathieu P. et al., 2009, Murphy N.F. et al., 2006).

Metabolic syndrome is associated with arterial fibrillation. Its presence is more distinct, at patients that suffer of arterial fibrillation, than at patients who do not show signs of this affection, its presence is more common for women than men: 34,2 % and 7,7 for women, 19, 3 and 10, 9 for men (Pan U., A. Cerami A., 2001; Sajin R. et al., 2001; Sowers, J. R., E. D. Frohlich, 2004).

It is important to mention that the different combination of the most harmful components of the metabolic syndrome, can be useful for clinical practice (Steinmetz A. et al., 2001; Zicha J. et al., 2006).

MATERIAL AND METHODS

In this article, we review the prospective studies that investigate the association between MetS and CVD. Data has been provided from a series of studies by the Clinical Hospital for Emergencies Oradea, diagnosed using ATOIII criteria. Interest in exploring the association between MetS and CVD was sparked by a corssectional analysis.

RESULTS AND DISCUSSIONS

1. Cardiovascular risk depending on sex

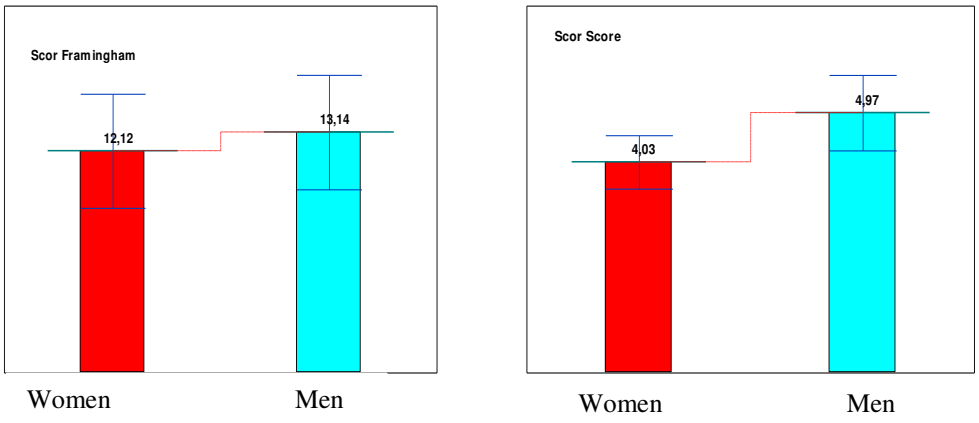
Table 1.

Framingham score and Score score variation on sex

Sex	Framingham	Score
Women	12,12±3,11	4,03±0,51
Men	13,14±3,12	4,97±0,72
Total	**12,61±3,08**	**4,52±0,64**

In out cohort study, the medium value of the Framingham score was of 12,61, which meets a moderate CVD risk, for women, but also for men, the score being insignificantly higher for men (13,14 vs 12,12) (p=0,782).

Even the Score score indicates a moderate risk in our cohort (4,52), insignificantly higher for men than for women (4,97 vs 4,03) (p=0,106).



Graphic no. 1. CVD risk depending on sex

2. CVD depending on age

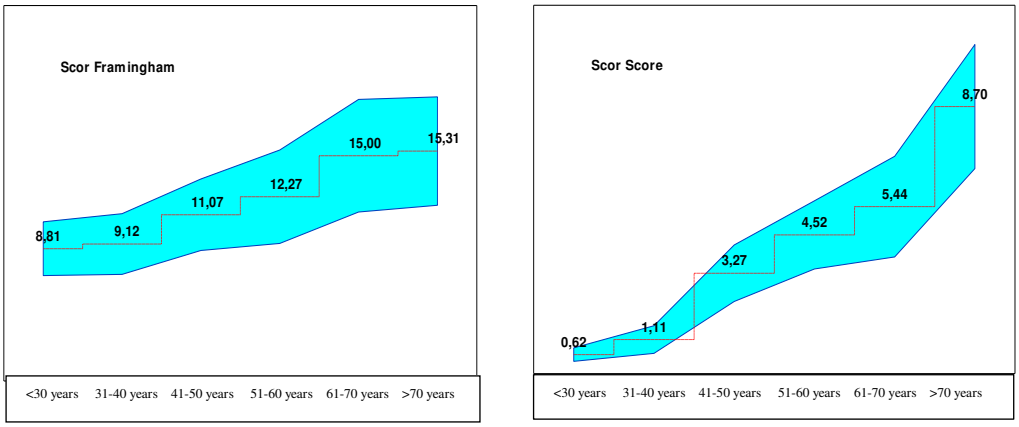
Table 2.

Framingham score and Score score depending on age

Age	Framingham	Score
<30 years	8,81±1,79	0,62±0,22
31-40 years	9,12±2,02	1,11±0,45
41-50 years	11,07±2,38	3,27±0,92
51-60 years	12,27±3,11	4,52±1,11
61-70 years	15,00±3,75	5,44±1,64

>70 years	15,31±3,61	8,70±2,02

From the analysis of the medium values of the Framingham score depending on age, we remark an elevation of it, if the age is higher. We can distinguish 3 groups of age <40 years where the score is almost 9 (9,01), between 41-60 years, where the score is almost 12 (11,73), and over 60 years, where the score is over 15 (15,10). In the case of the Score score, we have a reduced risk at ages under 30 years, moderate between 31-60 and high over 60 years.



Graphic no. 2. CVD depending on age

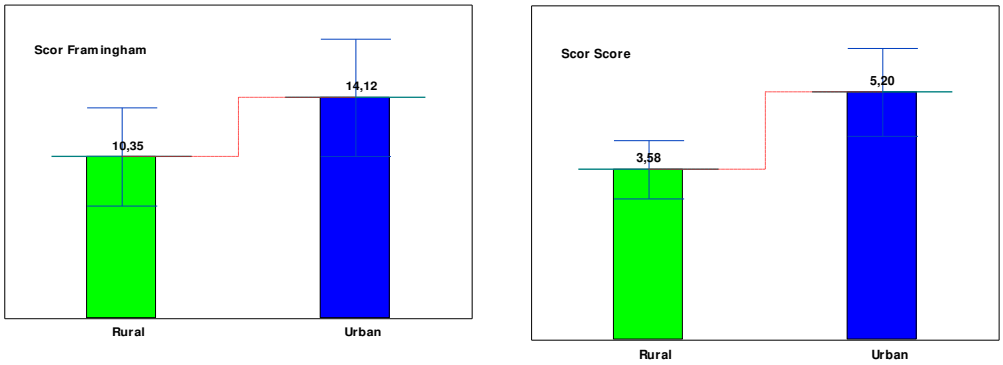
3. CVD risk depending on environmental factors

Table 3.

Framingham Score and Score score depending on environment

Area of origin	Framingham	Score
Rural	10,35±3,13	3,58±0,61
Urban	14,12±3,74	5,20±0,92

Framingham score and Score score were significantly higher in the urban environment than the rural one (12,12 vs 10,35, respectively 5,20 vs 3,58) (p=0, 0047, respectively p=0, 003).



Graphic no. 3. CVD risk depending on the environment

4. CVD depending on life style

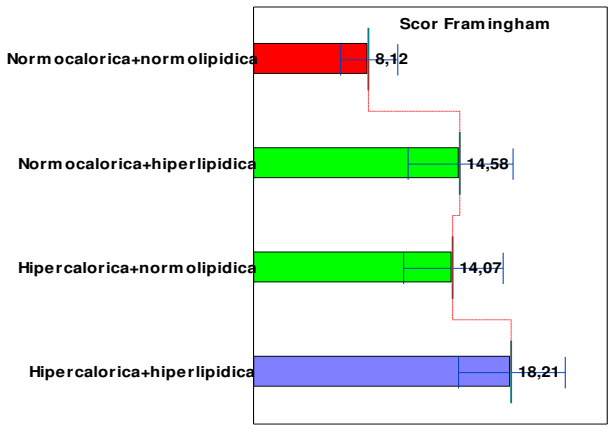
Nutrition

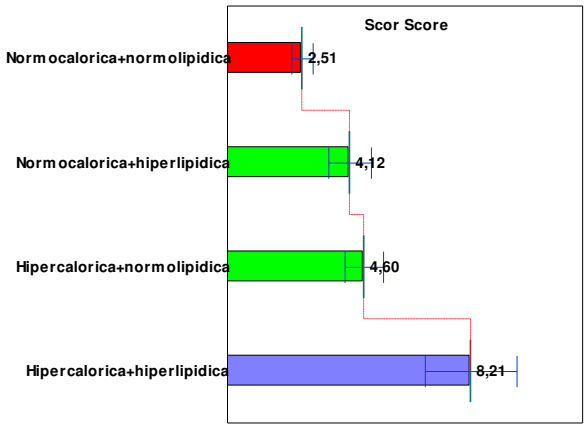
Table 4.

Framingham score and Score score depending on nutrition

Type of diet	Framingham	Score
Normocaloric+normolipidic	8,12±2,02	2,51±0,36
Normocaloric+hiperlipidic	14,58±3,71	4,12±0,72
Hipercaloric+normolipidic	14,07±3,52	4,60±0,65
Hipercaloric+hiperlipidic	18,21±3,77	8,21±1,55

The results obtained from the analysis of the Framingham score and the Score score indicates the fact that nutrition has an essential role regarding CVD. Thus, for patients with balanced nutrition (normocaloric and normolipidic), the CVD risk was lower, respectively moderate (8, 12 respectively 2, 51), significantly lower than for the patients with excessive nutrition from a caloric/or lipid point of view (16, 87, respectively 5, 98) (p=0,031, respectively p< 0,001).





Graphic no.4. CVD depending on nutrition

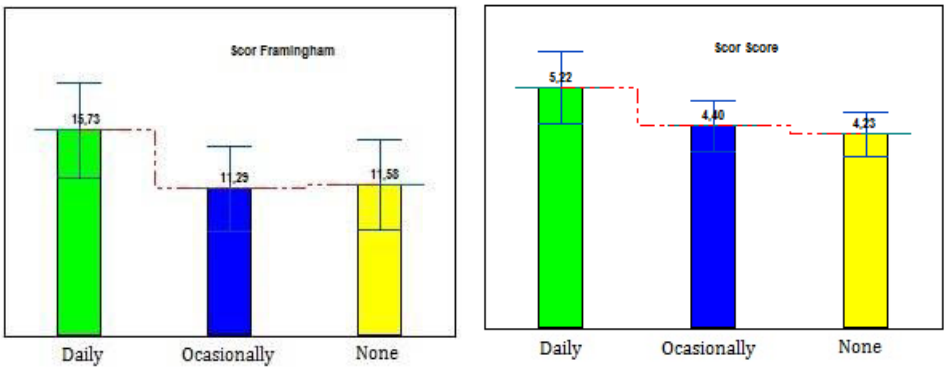
5. Alcohol intake

Table 5.

Framingham score and Score score depending on alcohol intake

Frequency of alcohol intake	Framingham	Score
Daily	15,73±3,64	5,22±0,78
Occasionally	11,29±3,22	4,40±0,56
None	11,58±3,46	4,23±0,48

For patients that have daily alcohol intake the Framingham score was significantly higher than for those who drink occasionally or never (p=0,034). The Score score was insignificantly higher for patients that drink daily in contrast to those who drink occasionally (p=0,090), and lower in significance than those who never drink alcohol (p=0,045).



Graphic no.5. CVD depending on alcohol intake

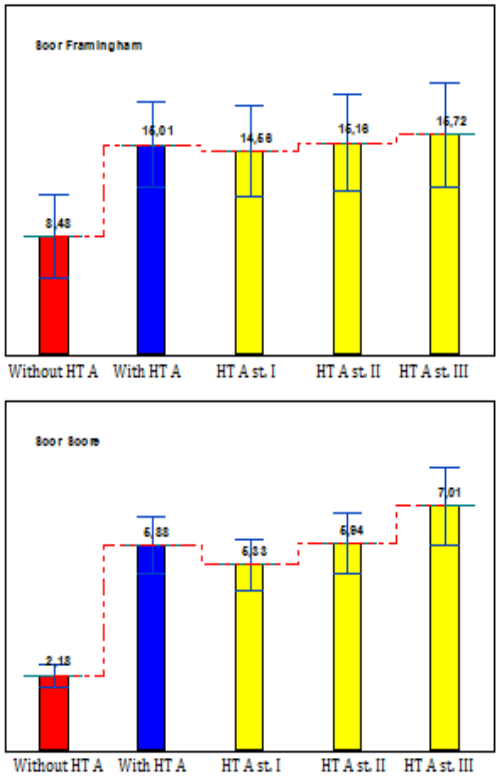
6. CVD risk depending on associated pathology
6.1. Arterial hypertension

Table 6.

Framingham score and Score score depending on AHP

	Framingham	**Score**
Without AHP	8,48±2,99	2,18±0,33
With AHP	15,01±3,06	5,88±0,81
HTA st.I	14,56±3,21	5,33±0,72
HTA st.II	15,16±3,46	5,94±0,84
HTA st.III	15,72±3,71	7,01±1,11

Framingham CVD risk for non-hypertensive patients was low (8,48), while for hypertensive patients it was moderate (15,01), the difference was significant (p<0,001). CVD Score score for non-hypertensive patients was moderate (2,18), while for hypertensive patients it was high (5,88), the difference being significant (p< 0,001).



Graphic no.6. CVD depending on AHP

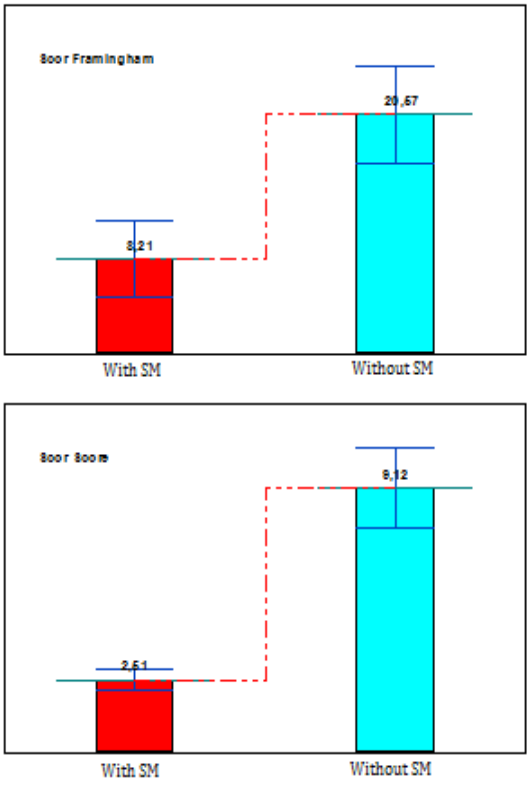
7. CVD risk for patients affected by Metabolic Syndorme

Table 7.

Framingham score and Score score depending on metabolic syndrome

	Framingham	**Score**
Without MetS	8,21±3,32	2,51±0,38
With MetS	20,57±4,12	9,12±1,41

For patients with metabolic syndrome CVD risk is high, Framingham score being 2,5 folds higher than patients not suffering of metabolic syndrome (<0,001).



Graphic no. 7. CVD risk depending on metabolic syndrome

CONCLUSIONS

A series of studies have examined the relation between MetS and CVD risk factors mentioned above.

In this study the patients that have participated have had in their family members that have been affected by the factors that we discussed earlier.

In this study a number of 2.508 men have participated. Almost 34% of the participants have fulfilled the criteria for being liable for metabolic syndrome.

The recommendations in this cases would be to mention to the patients that they adjust their life style, which include dietary modifications and physical activity, as first line treatment for individuals with MetS.

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