INFLUENCE OF METABOLIC SYNDROME PROFILE ON CARDIOVASCULAR RISK

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(Abstract): Aim: The trial was conducted on patients with metabolic syndrome hospitalized between 01.01.2012-31.12.2012 at Cardiovascular Rehabilitation Clinic of the Rehabilitation Hospital Iasi. Material and methods: Patients included in the study were analyzed according to age and sex, criteria for the clinical definition of the metabolic syndrome, known cardiovascular diseases, diabetes mellitus type 2 or type 1. Results: Metabolic syndrome components analysis showed statistical differences between the sexes, in case of certain cardiovascular risk factors. The frequency of cardiovascular risk factors (obesity, hypertriglyceridemia, hypertension, glycemic profile modification) was higher among women, the only risk factor most common in males was the decrease of HDL cholesterol. The statistically significant difference occurs in hypertriglyceridemia (p = 0.001) and HDL-Cholesterol (p = 0.000). Patients included in the study were studied depending on the frequency of the main cardiovascular diseases, secondary to the metabolic syndrome: ischemic heart disease, stroke, peripheral arterial disease of the lower extremities. Conclusions: Association of impaired glucose tolerance/diabetes mellitus, arterial hypertension and hypertriglyceridemia recorded an additional risk of developing CIC or ischemic stroke, independent of sex. Keywords: OBESITY, HYPERTRIGLYCERIDEMIA, HYPERTENSION, CARDIOVASCULAR RISK.

The metabolic syndrome (MS) is a more and more debated research objective, as its clinical and biological components: obesity, insulin resistance, impaired glucose tolerance or diabetes, hypertension and dyslipidemia, gives individuals an increased cardiovascular risk (1). Current studies have shown that metabolic syndrome increases the risk of adverse cardiovascular events (2) accelerates the age-related changes in blood pressure, both in the carotid arteries and in large arteries, similar in both sexes (4).

MATERIAL AND METHODS
The trial was conducted on patients with metabolic syndrome hospitalized between 01.01.2012-31.12.2012 at Cardiovascular Rehabilitation Clinic of the Rehabilitation Hospital Iasi.

The inclusion criterion was the presence of increased cardiovascular risk, defined according to the European Society of Car-
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diology guidelines (5). Patients included in the study were analyzed according to:
- epidemiological data - age and sex;
- criteria for the clinical definition of metabolic syndrome (MS);
- known cardiovascular disease, diabetes mellitus type 2 or type 1.

Centralization of data was done in a nominal and numerical form. Statistical comparison of groups was performed according to the type of data, size of groups, the distribution of variables using Fisher’s exact test, Shapiro-Wilk test, Mann-Whitney U test and ANOVA. Statistical analysis was performed with SPSS Statistics 17.0 and Microsoft Office Excel 2007.

RESULTS AND DISCUSSION
1. Epidemiological data

We included 336 patients with a mean age of 62.7 years and age limits between 34 and 89 years. The analysis by sex targeted a total of 188 women (56%) and 148 men (44%) (fig. 1).

Fig. 1. Distribution of patients according to age, sex

2. Metabolic syndrome

Abdominal obesity

Abdominal obesity was present in 152 patients (45.2%), of whom 64 were men (42.1%) and 88 women (57.9%). By using Fisher’s exact test (Exact Sig. (2-sided)) we obtained a p=0.294 (at a significance level of 0.05), concluding that there is no statistical difference between the sexes in terms of the presence of abdominal obesity.

Hypertriglyceridemia

Hypertriglyceridemia was present in 284 patients (84.5%), of which 120 were men (42.2%) and 164 women (37.8%). In the working group the median triglyceride value was 129.5 mg / dl higher among women (141 mg / dl) than among men (122 mg / dl) (fig. 2).

The analysis of triglycerides values corresponding to the two sexes showed that the data distribution is not comparable (ANOVA p = 0.162). So, there was no significant difference between triglycerides value according to sex (fig. 3).
The presence of low HDL-C was found in 193 patients, of whom 97 were men (50.3%) and 96 women (49.7%). The statistical analysis showed a median of 40 mg/dl, with differences according to sex. Analysis of HDL-C values corresponding to the two sexes shows that the distribution of the data is comparable (ANOVA p = 0.032). Finally, there is a significant difference between triglycerides values according to sex (fig. 4, 5).
**Hypertension**

Hypertension was present in 292 patients (86%), of whom 148 were women (56%) and 144 men (44%). The blood pressure median in the study group was 140 mmHg, with a range between 100 mmHg and 200 mmHg, and differences between sexes (fig. 6). Analysis of BP corresponding to the two sexes showed that the data distribution is not comparable ($p = 0.865$). **Conclusion:** There is no significant difference between BP values according to sex (fig. 7).

![Fig. 6. Distribution of blood pressure (BP) by sex](image)

**Glycemic profile**

In the study group there were 140 patients with decreased glucose tolerance and 84 patients with DM. The glycemia median in case of the study group was 109 mg/dl, varying between 80-336 mg/dl. The analysis of blood glucose values corresponding to the two sexes shows that the distribution of the data is comparable (ANOVA $p = 0.028$). The conclusion is that there is no significant difference between blood glucose levels by sex (fig. 8, 9).

3. **Metabolic syndrome profile**

The systematized analysis of the metabolic syndrome profile showed differences according to the sex of patients who were part of the study.

The risk factors studied had the following features:

- AHT was present in 292 patients (86.9%), with no statistical difference between sexes ($p = 0.055$), 148 women (56%) and 144 men (44%);
Fig. 9. Distribution of glycemia levels by sex

- hypertriglyceridemia was present in 284 patients (84.5%), with statistical difference between sexes (p = 0.001), 164 women (37.8%) and 120 men (37.8%);
- decrease in HDL-C was found in 193 patients (57.4%), with statistical difference between sexes (p = 0.001), 97 women (50.3%) and 96 men (49.7%);
- abdominal obesity was present in 152 patients (45.2%), with no statistical difference between sexes (p = 0.581), 88 women (57.9%) and 64 men (42.1%);
- change of glycemic profile was recorded in 224 patients (66.6%), without statistical difference between sexes (p = 0.206), 124 women (55.4%) and 100 men (44.6%).

Statistical analysis of Impaired glucose tolerance (IGT) / DM, AHT and increase of TG was present in 172 patients (51%), with no statistical difference between sexes (p = 0.206) in 92 women (53.5%) and 80 men (46.6%) (fig. 10).

Fig. 10 – Metabolic syndrome profile

4. Cardiovascular risk associated with metabolic syndrome

Patients included in the study were studied depending on the frequency of the main cardiovascular diseases, secondary to metabolic syndrome and of unfavorable
combination of cardiovascular risk factors included in the definition of metabolic syndrome.

**Ischemic heart disease**

Ischemic heart disease was present in 168 patients (50%), 68 women (40.5%) and 100 men (59.5%), with statistically significant differences between sexes (p = 0.000).

The statistical analysis of the presence of IHD in patients who have in association IGT / DM, AHT and increased TG showed a statistically significant difference compared to those without this association (p = 0.000, Exact Sig. 2-sided).

**Ischemic cerebral vascular accident (stroke)**

The statistical analysis of the presence of stroke has not showed a statistically significant difference between sexes (p = 0.575, Exact Sig. 2-sided), it was present in 32 patients (9.5%), of whom 16 women (50%) and 16 males (50%). The statistical analysis of this association IGT / DM, AHT and increased TG in patients with ischemic stroke revealed a statistically significant difference compared to those without this association.

**Peripheral artery occlusive disease (PAOD)**

Peripheral artery occlusive disease was present in 13 patients (3.9%), with statistical difference between sexes (p = 0.019, Exact Sig. 2-sided), in 2 females (15.4%) and 11 men (84.6%). The statistical analysis of this association IGT / DM, AHT and increased TG did not objectify a statistically significant difference (p = 0.251, Exact Sig. 2-sided).

The results of this study were consistent with the literature data in case of hypertriglyceridemia, the other components of MS recording larger differences (9). The effects of IGT / DM, AHT and hypertriglyceridemia association were consistent with literature data, statistically significant in case of IHD’s and ischemic stroke (4).

**CONCLUSIONS**

In the study group the metabolic syndrome profile showed statistical differences according to sex, in situations of HDL-C's decrease, being lower in male patients, and in case of hypertriglyceridemia, the triglycerides level was significantly higher in women.

In case IGT / DM, AHT and hypertriglyceridemia association we recorded an additional risk of development of IHD or ischemic stroke, independent of sex, requiring a multidisciplinary approach including lifestyle changes, pharmacological and surgical treatment (10).

**REFERENCES**


**CARDIOVASCULAR BENEFITS OF EXERCISE**

It is well established that regular exercise results in significant cardiovascular health benefits, including improvements in blood pressure, lipid profile, body mass and composition, as well as objective measures of functional capacity. Moreover, it has been extensively demonstrated that individuals engaging in regular, moderate exercise are at lower risk for mortality, enjoying an average life expectancy 7 years greater than their sedentary counterparts. Such health benefits are evident at relatively modest 'doses' of exercise, amounting to around 6–10 metabolic equivalents per week. Indeed, exercise prescription is among the most cost-effective therapies available for cardiovascular disease prevention, and is devoid of the side effects common to most pharmacological interventions. Incremental benefits in coronary heart disease risk reduction are manifest with increasing activity, such that those achieving around 42 metabolic equivalents per week appear to gain the greatest benefit. By way of example, this would equate to brisk jogging for around 5 h per week. That the beneficial effects of exercise continue to increment above and beyond this point has never been demonstrated.(Abbas Zaidi, Sanjay Sharma. Exercise and Heart Disease. *Future Cardiol.* 2013;9(1):119-136).