

# Clinical and Biochemical Study of *Hypoandrogenic Metabolic Syndrome* in the Cardiovascular Risk Content of Male Patients

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*The aim of this study was to determine the incidence of hypoandrogenic to male patients with S.Met., in the context of cardiovascular risk factors. It performed description of a correlation with diagnostic components of S.Met., and specifying an interrelated male hypogonadism with each of the major cardiovascular risk factors.*

*Keywords: hypoandrogenic, cardiovascular risk factors, hypogonadism*

The aim of this study was to determine the incidence of hypoandrogenic to male patients with S.Met., in the context of cardiovascular risk factors [1-3]. It performed description of a correlation with diagnostic components of S.Met., and specifying an interrelated male hypogonadism with each of the major cardiovascular risk factors [5, 6]. This study is intended to contribute to defining a new syndrome described in the literature, namely the *Hypoandrogen-Metabolic Syndrome* (HAM).

## Experimental part

### Materials and methods

In the aim of this study we selected a group of 92 male patients with S.Met. of the V<sup>th</sup> Medical Clinic Gerontology and Geriatrics, Railways University Hospital Iasi. These patients have made a clinic and paraclinic assessment to establish the diagnosis of hypogonadism. Patients who have associated S.Met. with hypoandrogenemia were included in the group of diagnosed with *Metabolic Syndrome-Hypoandrogen* (HAM). It was respected law nr. 46/2003 for the protection of persons with concerning the processing of personal data and the free movement thereof. It was respected the confidentiality of personal data and the fact that throughout the study person was not subjected to techniques or treatments that affect his quality of life.

### Criteria for inclusion in the study:

- Patients diagnosed with S. Met;
- consent informed of entering in the study.

### Exclusion criteria from the study:

- the refuse of patient;
- acute or chronic inflammatory affections which may influence the laboratory investigations.

### The diagnostic methods

Obesity was assessed by the following parameters:

- abdominal circumference determined with tailoring meter;
- the body mass index;

Blood pressure was measured with oscillometric tensiometer with automatic device, under the conditions of measurement after *European Guidelines for Hypertension*.

Laboratory examination included the following parameters:

- glycemia à jeun, complete lipid profile: total cholesterol, LDL - cholesterol, HDL-cholesterol, lipids, triglycerides,

fibrinogen, C reactive protein, glycosylated hemoglobin, urea, creatinine, urine analysis exam.

Positive diagnosis of hypoandrogenemia was placed on low testosterone values as knowing the normal values are: to males under 20 years: 28.8 - 1108ng/dL; men between 20-49 years normal values 245-1600ng/dL; men over 50 years, normal values 181-772ng/dL.

## Results and discussions

Previous studies have shown that age is an independent risk factor for the installation of hypogonadism to men. The overlap diagnostic criteria S.Met intensifie the risk and determine an increased incidence of hypoandrogenemia. In this study, we selected a group of 92 male patients diagnosed according to the protocol previously exposed with S.Met. At these patients venous blood was collected for the determination of serum testosterone level. Taking into account the criterion of age as a risk factor for the hypoandrogenemia, the 92 men were classified into two groups, namely:

-Lot I - adults between the ages of 40 and 64 years, which included 41 men with S.Met.;

-Lot II - elderly aged  $\geq 65$  years, which included 51 men with S.Met.;

Distribution of male patients hospitalized in the V<sup>th</sup> Gerontology-Geriatrics Medical Clinic, in January-May 2013 period, depending on the incidence of hypoandrogenemia.

In study we showed a 46.74% incidence of hypoandrogenism (43 patients), taking into account that in addition to the age criterion is added and the 4 diagnostic criteria of S.Met. (obesity, diabetes, hypertension and dyslipidemias) (fig 1).

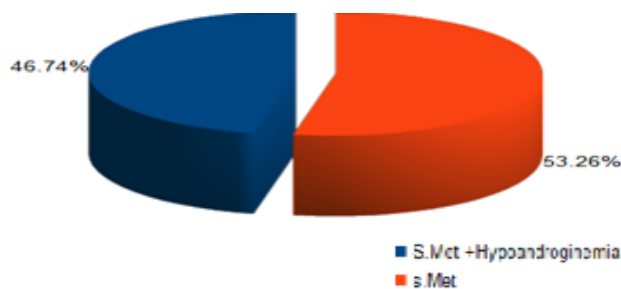


Fig. 1. Distribution of male patients S.Met hospitalized in the V<sup>th</sup> Gerontology-Geriatrics Medical Clinic in January to May 2013 period according to the incidence of hypoandrogenemia

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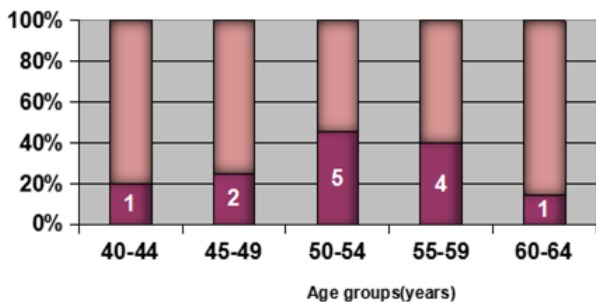


Fig 2. The distribution of male patients with S.Met hospitalized in the Vth Medical Clinic Gerontology and Geriatrics in January to May 2013 period according to hypo-androgenemia incidence and age groups to Lot II-elderly

Studying incidence of hypoandrogenemia for those 41 men with S.Met., under the age of 65 years have revealed that 13 of them (31.71%) showed low levels of serum testosterone levels, the remaining 68.29% of patients with S.Met. presenting normal values. The study by age group showed a higher percentage of patients with S.Met. in the age group 50-54 years (38.46%).

Distribution of male patients with S.Met hospitalized in the Vth Gerontology and Geriatrics Medical Clinic in January to May 2013 period according to age groups and hypoandrogenemia incidence and age groups to Lot I-adults.

Studying incidence of hypoandrogenemia to S.Met.51 elderly men with of / and over 65 years I have highlighted that 33 of them (64.71%) had low levels of serum testosterone levels, the rest of the 35.29% of patients with S.Met. presenting normal values.

The study by age group showed a higher percentage of patients in the age group 75-79 years (48.48%) (fig 2).

Analysis of statistical indicators on the hypoandrogenemia incidence associated S.Met. depending on the age reveals a higher percentage of it patients of / and over 65 years, with statistically significant differences ( $\chi^2=8.62$ ;  $df=1$ ;  $p=0.003$ ) (table1).

By study groups, depending on the presence of hypogonadism are found the following issues:

-at patients from Lot I- adults, the average age to which hypogonadism evidenced was significantly increased compared with patients to which this affection has not been associated with S.Met. (57.25 vs 46.25 years), ( $t=6.42$ ;  $df=39$ ;  $p<0.001$ );

-at patients from Lot II - elderly, the average age it has been highlighted hypogonadism has been over 80 years, significantly higher compared to patients age who did not associate hypogonadism S.Met., (74.9 years), ( $t=2.03$ ;  $df=99$ ;  $p=0.026$ ).

#### Average values of age based on the presence of hypogonadism

S.Met. to men represent a sum of cardiovascular risk factors to which may be associated hpyoandrogenemia, thus defining a new entity, more complex, called

Grups	N	Mean	Std. Deviation	Std.Errors	$\chi^2$	Df	P
Group I Adults	41	427	5.71	1.39	8.03	0.85	0.003
Group II Elderly	51	358	5.26	1.27	8.62	1	

**Table 1**  
STATISTICAL INDICATORS REGARDING DISTRIBUTION OF MALE PATIENTS WITH S.MET HOSPITALIZED IN THE VTH MEDICAL CLINIC GERONTOLOGY AND GERIATRICS IN JANUARY-MAY 2013 PERIOD ACCORDING TO HYPOANDROGENEMIA INCIDENCE TO THE TWO GROUPS STUDIED (PARAMETER, AGE)

**Hypoandrogen-Metabolic Syndrome (HAM).** Men with S.Met. have an increased cardiovascular risk presenting this fund an increased risk of acute coronary events. Sometimes it can be said that hypoandrogenemia can cause progressive installation of a S.Met., which in the vicious circle aggravates hipoandrogenemia, in other cases S.Met. is the only initiator of installing a secondary hypogonadism [5, 7]. Contrary, hypoandrogenemia it can often precede obesity of adult men with progressive decrease in muscle and adipose tissue development (body fat) and percentage of visceral adipose tissue. These have the repercussions, installation insulin resistance, type 2 diabetes and finally S.Met.

In this context we intend to study the incidence of hypoandrogenemia in the correlation with three minimum criteria for diagnosis of S.Met.

This study revealed that 18 (41.9%) patients out of 43 patients diagnosed with S.Met. and hypoandrogenemia had three diagnostic criteria namely obesity + diabetes + hypertension remaining patients, 58.1% presenting other diagnostic criteria (fig. 8)

The distribution of male patients with S.Met and hypoandrogenemia hospitalized in the Vth Gerontology and Geriatrics Medical Clinic in January to May 2013 period according to the interrelation obesity + diabetes + hypertension

This study revealed that 11 (25.6%) patients out of 43 patients diagnosed with S.Met. and hypoandrogenemia had three diagnostic criteria namely hypertension + obesity + dyslipidemia, 74.4% remaining patients presenting other diagnostic criteria.

Distribution of male patients with S.Met and hypoandrogenemia hospitalized in the V of Medical Gerontology

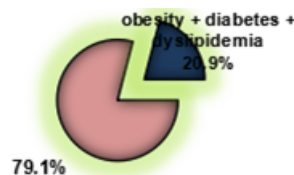


Fig. 3. Distribution of male patients with S.Met. and hypoandrogenemia hospitalized in the Vth Medical Gerontology and Geriatrics in the period January to May 2013 according to the interrelation obesity + diabetic + dyslipidemia

and Geriatric in the period January to May 2013 according to the interrelation HTA+ obesity + dyslipidemia

This study revealed that 9 (20.9%) patients out of 43 patients diagnosed with S.Met. and hypoandrogenemia had three diagnostic criteria namely obesity + diabetes + dyslipidemia, the remaining 79.1% of patients presenting other diagnostic criteria (fig. 3).

Our study showed that 5 (11.6%) patients out of 43 patients diagnosed with S.Met. and hypoandrogenemia had three diagnostic criteria namely hypertension + diabetes + dyslipidemia, the remaining 88.7% of patients presenting other diagnostic criteria (fig 4).

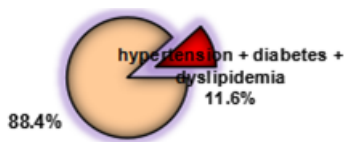


Fig. 4. Distribution of male patients with S.Met. and hypoandrogenemia hospitalized in the Vth Medical Gerontology and Geriatrics in the period January to May 2013 according to the interrelation hypertension + diabetes + dyslipidemia

In the studied cases, most often hypoandrogenemia it has been associated with S.Met., placed on diagnostic criteria, obesity + diabetes + hypertension (41.9%) and less frequently diagnosed with S.Met., placed on criteria diabetic + dyslipidemia + hypertension (11.6%), with percentage differences statistically significant ( $\chi^2=11.01$ ;  $df=3$ ;  $p=0.012$ ).

Distribution of male patients with S.Met and hypoandrogenemia hospitalized in the Vth Medical Gerontology and Geriatrics in January to May 2013 period according to the interrelation with cardiovascular risk factors

In the Hypoandrogen-Metabolic Syndrome, cardiovascular risk factors are described confounding with diagnostic criteria of S.Met. taking into account the importance of individual, I studied their incidence in correlation with hypogonadism [9, 5].

Studying the correlation between hypoandrogenism and obesity as a cardiovascular risk factor in the S.Met I showed that from total of 43 patients diagnosed with hypogonadism, 38 patients (88.4%) had obesity (the rest of the patients presenting diagnostic version of S.Met. HTA + DZ + Dyslipidemia) (fig.5).

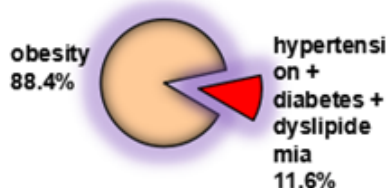


Fig. 5. Distribution of male patients with S.Met. and hypoandrogenemia hospitalized in the the Vth Medical Clinic Geriatrics-Gerontology in the period January to May 2013 according to the interrelation with obesity

Studying the correlation between hypoandrogenism and hypertension as a diagnostic criterion independent of S.Met and as independent cardiovascular risk factor have revealed that from total of 43 patients diagnosed with hypogonadism, 34 patients (79.17%) had hypertension, (the rest of patients had diagnostic version of S.Met., obesity + DM + Dyslipidemia) (fig.6).

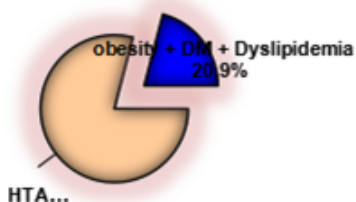


Fig. 6. Distribution of male patients S.Met. and hypoandrogenemia hospitalized in the Vth Medical Clinic Gerontology and Geriatrics in the period January to May 2013 according to the interrelation with hypertension

Studying the correlation between hypoandrogenism and diabetes, as a independent criterion for diagnosis of S.Met. and as independent cardiovascular risk factor have revealed that of the total 43 patients diagnosed with hypo-

gonadism, 32 patients (74.4%) had diabetes (remaining patients had diagnostic version of S.Met., Obesity + HTA + Dyslipidemia) (fig. 7).

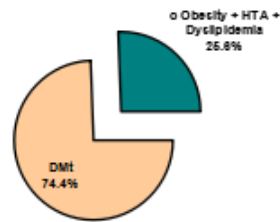


Fig. 7. Distribution of male patients with S.Met. and hypoandrogenemia hospitalized in the Vth Medical Clinic Gerontology and Geriatrics in the period January to May 2013 according to the interrelation with diabetes

Studying the correlation between hypoandrogenism and dyslipidemia as an independent diagnostic criterion S.Met and as independent cardiovascular risk factor have revealed that of the total 43 patients diagnosed with hypogonadism, 25 patients (58.1%) had dyslipidemia, the remaining patients had diagnostic version of S.Met. obesity + diabetes + hypertension (fig. 8).

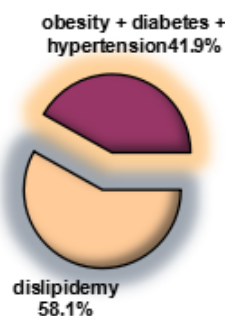


Fig.8. Distribution of male patients with S.Met. and hypoandrogenemia hospitalized in the Vth Medical Clinic Gerontology and Geriatrics in the period January to May 2013 according to the interrelation with dyslipidemia

In conclusion, within the S.Met the most common disease that is accompanied by hypoandrogenemia is obesity, followed by hypertension, diabetes and then dyslipidemia (79.17% vs 88.4% vs 74.4% vs 58.1%).

Hypogonadism can join the male patients diagnosed with S.Met. creating a new entity defined *Metabolic Syndrome-Hypoandrogen (HAM)*, with implications in the increasing cardiovascular risk and incidence of coronary heart disease. Dyslipidemia associated with insulin resistance, defined by increasing LDL cholesterol and decrease HDL cholesterol, creates a predisposition to a prothrombotic status, which in turn accentuates the risk of hypertension and coronary heart disease [11]. A prospective study conducted over a 11 year period showed a S.Met development and a type 2 diabetes in patients with low serum testosterone levels. Also, an analysis undertaken in the Massachusetts Male Aging Study states that androgen deficiency is a predictor and a risk factor for developing S.Met in the next 15 years. Treatment with testosterone in men with hypogonadism can reduce visceral adipose tissue and waist circumference. There are also studies showing that testosterone therapy in men reduce triglyceride uptake by adipocytes through inhibition of lipoprotein lipase [10]. Testosterone therapy in men with hypoandrogenism can normalize dyslipidemia can help maintain hemodynamic balance with stabilization to normal blood pressure and simultaneously decreases the risk of coronary heart disease. Such is shaping diagnosis of HAM benefit for both the treatment of hypogonadism, and components of S.Met. In these conditions, early treatment of hypogonadism to men could prevent the risk of S.Met. and simultaneously would increase quality of life.

## Conclusions

Hypoandrogenemia may be associated to men with S.Met. creating a specific entity called *Metabolic Syndrome-Hypoandrogen (HAM)*.

The decrease of serum testosterone level may be at the origin of developing obesity and further S.Met causing together an increase in cardiovascular risk and the risk of coronary heart disease.

Study the correlation between hypoandrogenism of male patients and components diagnosis of S.Met. revealed that the association obesity + diabetes + hypertension shows the highest incidence, compared to other associations, hypertension + obesity + dyslipidemia, diabetes + obesity + dyslipidemia, and hypertension + diabetes + dyslipidemia (41.9% vs. 25.6% vs. 20.9% vs. 11.6%) suggesting that these disorders involve the highest risk of cardiovascular disease. It is mentioned statistically significant differences between associations with the most frequent incidence, and associations with the lowest incidence ( $\chi^2=11.01$ ;  $df=3$ ;  $p=0.012$ ).

The independent study of cardiovascular risk factors to men with S.Met and hypoandrogenemia, highlights that obesity as a disease, it comes first, followed by hypertension, diabetes and dyslipidemia (88.4% vs. 79.1% vs. 74.4% vs. 58.1%), with statistically significant differences between the first and last incidence.

Defining a new entity namely *Hypoandrogen-metabolic Syndrome* (HAM) involves a new vision and a multidisciplinary collaboration with the aim of establishing a preventive treatment with testosterone, along with control cardiovascular risk factors, lifestyle changes and appropriate medical treatment.

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