Prevalence of Cardiovascular Risk Factors among Healthy Subjects with or Without Metabolic Syndrome

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---ABSTRACT--
Metabolic syndrome (MetS) is defined by a constellation of interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of cardiovascular disease, type 2 diabetes mellitus, and all cause mortality. It is estimated that around a quarter of the world's adult population have MetS and they are twice as likely to die from and three times as likely to have a heart attack or stroke compared with people without the syndrome. Data from a total of 401 healthy individuals was analysed and there it was found the prevalence of MetS and there were evaluated the risk factors of CVD in people with MetS. The prevalence of MetS resulted 22%. It was found that in the group of people with MetS there was insulin resistance and a lower insulin sensitivity comparing to the group without MetS. There were studied the modifiable and the non-modifiable cardiovascular risk factors including : age, gender, BMI, HDL cholesterol, triglycerides, glycaemia, blood pressure. As a conclusion to this study was found that in the group of people with MetS, were present a significant number of CVD risk factors including modifiable and non-modifiable risk factors.

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I. BACKGROUND

Metabolic syndrome (MetS) is defined by a constellation of interconnected physiological, biochemical, clinical, and metabolic factors that directly increases the risk of cardiovascular disease, type 2 diabetes mellitus, and all cause mortality.

It can also be considered as a cluster of the most dangerous heart attack risk factors including diabetes and prediabetes, abdominal obesity, high cholesterol and high blood pressure. It is estimated that around a quarter of the world's adult population have MetS[1] and they are twice as likely to die from and three times as likely to have a heart attack or stroke compared with people without the syndrome.[2] In addition, people with MetS have a fivefold greater risk of developing type 2 diabetes.[3] The clustering of CVD risk factors that typifies the MetS is now considered to be the driving force for a CVD epidemic.

The majority of CVD is caused by risk factors that can be controlled, treated or modified, such as high blood pressure, cholesterol, overweight/obesity, tobacco use, lack of physical activity and diabetes. However, there are also some major CVD risk factors that cannot be controlled.

In terms of attributable deaths, the leading CVD risk factor is raised blood pressure (to which 13 per cent of global deaths is attributed), followed by tobacco use (9 per cent), raised blood glucose (6 per cent), physical inactivity (6 per cent) and overweight and obesity (5 per cent).[4]

Modifiable risk factors are the following ones : hypertension (high blood pressure), tobacco use, raised blood glucose (diabetes), physical inactivity, unhealthy diet, cholesterol/lipids, overweight and obesity.

Among non-modifiable risk factors are included age (CVD becomes increasingly common with advancing age), gender and family history.

II. METHOD OF STUDY

Data from a total of 401 healthy individuals was analysed and there it was found the prevalence of MetS according to IDF criteria.This study included 233 females and 168 males. The average age was 39 years old. We measured the blood pressure, glycaemia, arterial blood pressure, pulse, IL-6, TNF, cholesterol, triglycerides, HDL and LDL cholesterol,BMI, abdominal circumference. There was made a comparison between people who had MetS and those without this syndrome. There were evaluated the risk factors of CVD in people with MetS.

III. RESULTS

In our study the prevalence of MetS was 22% . Itwas found that in the group of people with MetS there was insulin resistance and a lower insulin sensitivity comparing to the group without MetS.

The first risk factor studied was age. As known it is a non-modifiable risk factor. CVD becomes increasingly common with advancing age. As a person gets older, the heart undergoes subtle physiologic changes, even in

the absence of disease.The heart muscle of the aged heart may relax less completely between beats, and as a result, the pumping chambers become stiffer and may work less efficiently.

 In the graphic below it is shown that among people with MetS the most important part of individuals (52%) were over 40 years old. The largest age group with this syndrome was the one with people 41-45 years old.
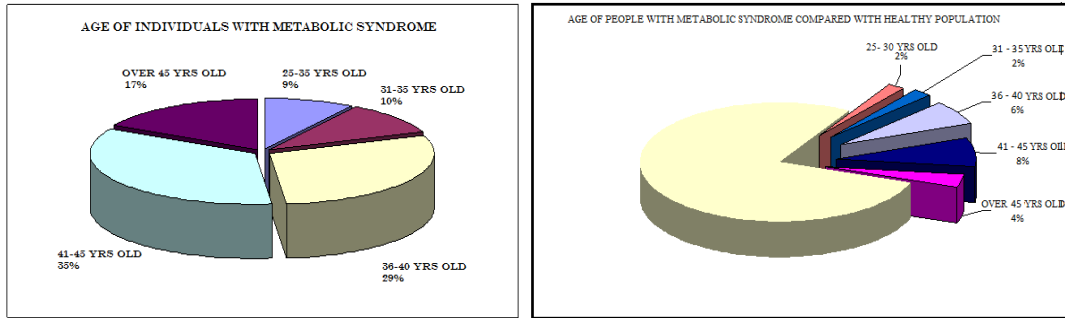
Graph 1. Age in individuals with MetS   **Graph.2.** Age of people with MetS compared with healthy population

In graphic 2 it is shown the age of people with MetS compared with the healthy population. It is shown that the ages over 40 years old with MetS are 12% of all individuals included in the study where the prevalence of MetS is 22%.

The second risk factor studied was gender. It is known that a man is at greater risk of heart disease than a pre-menopausal woman. Once past the menopause, a woman's risk is similar to a man's. Risk of stroke, however, is similar for men and women.

Tab.1

	Individuals	In %	MetS
Male	168	45%	39.7
Female	233	55%	48.5
Total	401	100%	88.2

Tab.2

	Individuals	In %	MetS
Male	233	53%	55.1
Female	233	47%	48.5
Total	466	100%	103.6

If we see Tab.1 it seems that there are more females compared to males that have MetS. In order to make a balanced calculation, we artificially increased the number of males by keeping unchanged the percentage of individuals with MetS towards total and by keeping unchanged the percentage of male individuals with MetS towards male total. For this reason the below calculation was made "(artificially increased male individuals*MetS individuals)/actual number of MetS individuals" or "(233*39.7)/168=55.1". After this, we realised that 53% of MetS individuals were male and 47% were female.

Other risk factors that were studied, were the modifiable ones. BMI was calculated in all individuals with or without MetS. It was found that people with MetS were overweight 49% (BMI 25-30 kg/m^2) and 39% were obese (BMI over 30 kg/m^2). Individuals with normal BMI were only 15%.
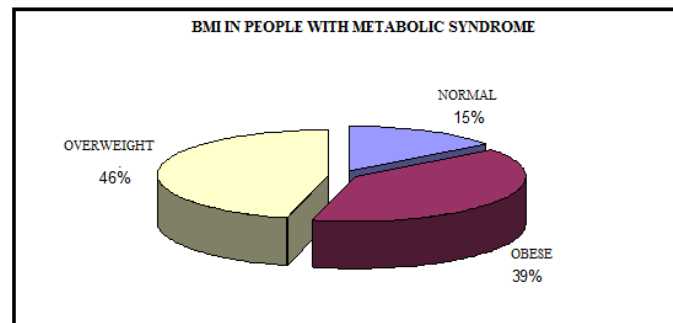
Graph.3. BMI in people with MetS

Individuals who were included in the category of MetS had all a high triglyceride level, low HDL levels, impaired fasting glucose level and high blood pressure. All these elements are crucial CVD risk factors.

Below it is a graphic which shows the impact that each of the elements like glycaemia, high blood pressure, triglycerides, HDL cholesterol and waist circumference has on people with MetS.

Each element impact on people with MetS

Glycaemia 15%
High blood pressure 12%
Waist circumference 29%
Triglycerides 17%
HDL 27%
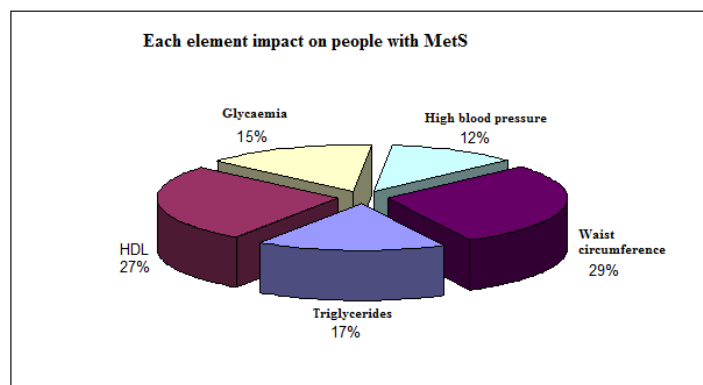
IV. CONCLUSIONS

As a conclusion to this study was found that in the group of people with MetS, were present a significant number of CVD risk factors including modifiable and non-modifiable risk factors.

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