

## Prevalence of Metabolic Syndrome in an Adult Population from Târgu Jiu

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### Abstract

*Objective:* The prevalence of the metabolic syndrome is rapidly increasing worldwide and in Romania, leading to increased morbidity and mortality due to type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD). The purpose of this study was to assess the prevalence of the metabolic syndrome in an adult population from Târgu Jiu. *Material and Methods:* A total of 2200 persons randomly selected from primary care, aged 25 years or older, were included in this study. Clinical, anthropometric characteristics and laboratory investigation results were assessed, as well as smoking status. Metabolic syndrome was diagnosed according to International Diabetes Federation (IDF) criteria or National Cholesterol Education Program- Adult Treatment Panel III (NCEP-ATP III) criteria. *Results:* The prevalence of the metabolic syndrome diagnosed according to IDF criteria was 28.4% (625 persons). The prevalence was lower when metabolic syndrome was defined according to ATP III criteria (24%). The prevalence of the metabolic syndrome increased with age, from around 10% in persons aged between 30-39 years to 40% in those aged between 60-69 years. *Conclusions:* These results from a representative sample of the adult population from Târgu Jiu, show a high prevalence of metabolic syndrome. The large number individuals with the metabolic syndrome may have important implications for the health-care sector.

**Keywords:** Metabolic syndrome; Cardio-metabolic risk.

### Introduction

Metabolic syndrome (MetS) represents a combination of cardio-metabolic risk determinants, including central obesity, insulin resistance, glucose intolerance, dyslipidemia, hypertension, hyperinsulinemia, and microalbuminuria [1]. The prevalence of metabolic syndrome is rapidly increasing worldwide, largely as a consequence of the ongoing obesity epidemic. Data published by International Diabetes Federation (IDF) reported a prevalence of the metabolic syndrome in the general population ranging from 16% to 37%, according to the set of criteria used to define metabolic syndrome and of the population in which such data has been obtained [2]. Although different definitions of the metabolic syndrome have been developed by various consensus groups, epidemiological studies demonstrate that they all associate the metabolic syndrome with a high cardiometabolic risk [3]. Numerous studies have quantified the risk for type 2 diabetes and CVD associated with clinical definitions of the metabolic syndrome. A recent meta-analysis of the studies examining risk for incident diabetes showed that for those definitions published prior to the recent consensus statement, the metabolic syndrome conferred a relative risk of between 3.1 and 5.1 [4].

Despite this tremendous impact on the public health, a global evaluation for the prevalence of the metabolic syndrome in Romania is missing. The purpose of this study was to assess the prevalence of the metabolic syndrome in an adult population from Târgu Jiu.

## Material and Method

### *Study population and data collection*

A total of 2200 persons randomly selected from primary care, aged 25 years or older, were included in this study. Clinical, anthropometric characteristics and laboratory investigation results were assessed, as well as smoking status. The following data were collected from patients' files:

- Age
- Sex
- Smoking status
- Laboratory investigation: fasting plasma glucose, total cholesterol, HDL-cholesterol, triglycerides
- Weight, height, waist
- Systolic and diastolic blood pressure
- Personal history of arterial hypertension, coronary artery disease, cerebrovascular disease, peripheral artery disease, dyslipidemia, dysglycemia (type 2 diabetes mellitus, impaired fasting glucose or impaired glucose tolerance).

Type 2 diabetes was defined according to World Health Organisation criteria [5]. Body mass index (BMI) was calculated using the formula: weight (kg)/ height (m)<sup>2</sup>. Metabolic syndrome was diagnosed according to IDF (International Diabetes Federation) criteria [2] or NCEP-ATP III criteria [6].

The IDF criteria for the diagnosis of the metabolic syndrome are:

- Abdominal obesity (defined as waist circumference >94 cm in men and >80 cm in women) plus at least 2 of the following:
- Triglycerides  $\geq$  150 mg/dl or specific treatment
- HDL-cholesterol < 40 mg/dl in men and < 50 mg/dl in women or specific treatment for low HDL-cholesterol
- Systolic blood pressure  $\geq$  130 mmHg or diastolic blood pressure  $\geq$  80 mmHg or specific treatment
- Fasting plasma glucose  $\geq$  100mg/dl or impaired fasting glucose or impaired glucose tolerance or type 2 diabetes.

The NCEP ATP III criteria for the diagnosis of the metabolic syndrome are at least 3 from 5 of the following:

- Waist circumference > 102 cm in men and > 88 cm in women
- Hyperglycemia  $\geq$  100 mg/dl
- Systolic blood pressure  $\geq$  130 mmHg or diastolic blood pressure  $\geq$  85 mmHg or specific treatment
- Triglycerides  $\geq$  150 mg/dl or specific treatment
- HDL-cholesterol < 40 mg/dl in men, < 50 mg/dl in women or specific treatment for low HDL-cholesterol.

### *Statistical Analysis*

SPSS-PC 13.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Results were reported as means and standard deviation for continuous variables and % for dichotomial data. T-test and  $\chi^2$  test were used to compare data. A p-value of less than 0.05 was considered statistically significant.

## Results

The current analysis is limited to 2200 persons, 56% women and 44% men. Clinical characteristics of research participants are summarized in table 1. The mean age of these patients was 49.6 years (range 25 to 80) and 53.9% were 30 years of age or older. Mean age was similar both in men and women (49.4 vs. 49.8 years,  $p=0.79$ ). Prevalence of type 2 diabetes was 6% (132 persons), and 4% (88 persons) of the study group presented impaired fasting glucose or impaired glucose tolerance. According to BMI, 19.5% had obesity ( $BMI \geq 30 \text{ kg/m}^2$ ) and 28.2% had overweight ( $BMI = 25\text{-}29.99 \text{ kg/m}^2$ ).

**Table 1.** Clinical characteristics of research participants

Parameter	Value
Age (years)	49.6±10.40
% Women	56
Personal history of diabetes (%)	6.0
Personal history of IGT or IFG (%)	4.0
Overweight (%)	28.2
Obesity (%)	19.5

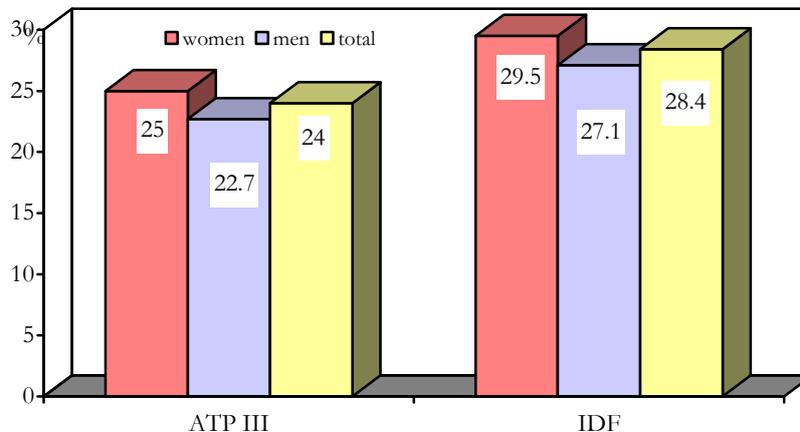
IGT – impaired glucose tolerance;

IFG - impaired fasting glucose;

BMI – body mass index;

Data is shown as mean ± SD for continuous variables and % for dichotomic variables

Prevalence of metabolic syndrome diagnosed according to IDF criteria was 28.4% (625 persons). The prevalence was lower when metabolic syndrome was defined according to ATP III criteria (Figure 1). Even the prevalence was slightly higher in women (29.5%) compared to men (27.1%), the difference was not statistically significant ( $p=0.17$ ).

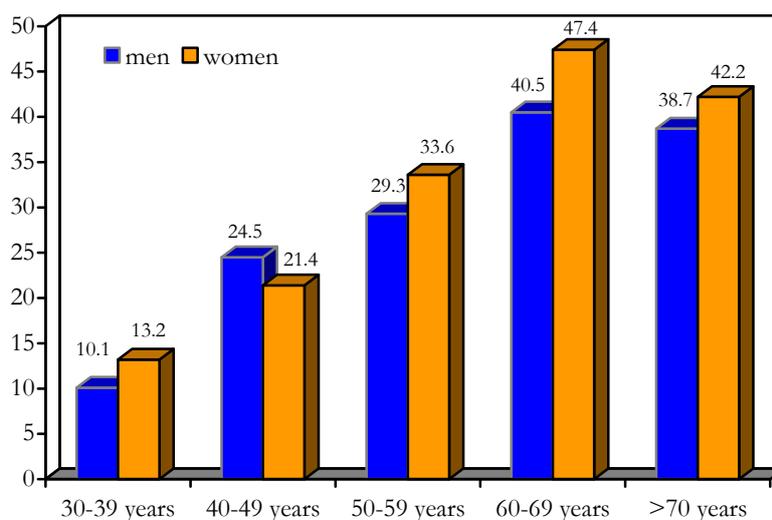


**Figure 1.** Prevalence of the metabolic syndrome

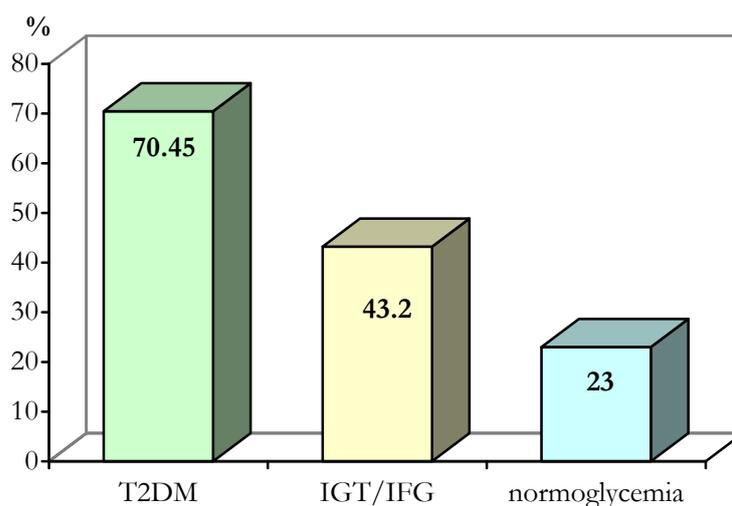
Prevalence of the metabolic syndrome increased with age, from around 10% in persons aged 30-39 years to 40% in group aged 60-69 years ( $p<0.001$ ). As observed in figure 2, similar results were obtained when data was separately analysed in men and women.

Metabolic syndrome was diagnosed according to IDF criteria

As shown in figure 3, prevalence of metabolic syndrome was significantly higher in patients with type 2 diabetes (70.45%), compared with patients with IFG/IGT (43.2%) and with persons with normoglycemia (23.0%),  $p<0.001$ .



**Figure 2.** Prevalence of metabolic syndrome stratified by age group



**Figure 3.** Prevalence of metabolic syndrome in persons with type 2 diabetes, impaired fasting glucose or impaired glucose tolerance and in persons with normoglycemia

## Discussion

The increase in the prevalence of obesity and the metabolic syndrome since the middle of the twentieth century is threatening to prevent achievement of the millennium development goals, with the increasing global burden of non-communicable diseases being described as the new agenda for global public health [7]. Clinical definitions of the metabolic syndrome, while therefore obviously important, have frequently been criticized for being sub-optimal in their ability to predict the development of type 2 diabetes and CVD [8]. As has previously been published, even though the metabolic syndrome was not designed as a tool that optimally predicts absolute risk of future cardiovascular disease and type 2 diabetes, it certainly does identify a population at high future risk of both conditions [9].

Rapid demographic, nutritional, and economic changes are occurring in Romania. The life expectancy and the percentage of elderly population have increased. Most importantly, globalization of diets and consumption of nontraditional fast foods have occurred at a rapid pace in urban areas [10].

In this context, more information regarding the prevalence of obesity and metabolic syndrome in our country are necessary in order to establish the specific prevention programs for the cardiovascular diseases and type 2 diabetes.

Another report from Cluj County showed a higher prevalence of the metabolic syndrome (45.7%), with a significantly higher prevalence in women compared with men: 57.8% in women versus 28.8% in men,  $p < 0.0001$  [11]. A study performed also in Cluj Napoca, but in patients with acute coronary syndrome demonstrated that the prevalence of metabolic syndrome was 47.26%, as assessed by criteria of the NCEP-ATP III [12]. In another research paper Matei and colleagues studied all patients admitted to 1176 patients in 15 cardiology departments [13]. They found that the prevalence of MetS according to the NCEP ATP-III and the IDF criteria was 40.6% (38.3% in men and 42.3% in women) and 44.2% (43.1% in men and 45.3% in women), respectively [13]. Data from other Balkan countries, in particular the ATTICA Study, showed that the prevalence of the MetS was 17.9% according to the NCEP definition and 48.9% according to the IDF definition, while the prevalence was higher in men than in women according to both definitions ( $p < 0.001$  for gender differences) [14].

The discrepancies between our results and those previously described could be explained by the different dietary patterns in different regions of our country as well as by the different populations included in these studies.

Our data regarding the prevalence of the metabolic syndrome in different categories of glucose tolerance are similar with those from NHANES III showing that there is a stepwise increase in prevalence of metabolic syndrome with worsening glucose tolerance from 26% in those with normal fasting glucose rising to 86% in those with diabetes [15].

## **Conclusions**

These results from a representative sample of the adult population from Târgu Jiu, show a high prevalence of metabolic syndrome, especially in persons aged more than 60 years and in those with type 2 diabetes. The large number individuals with the metabolic syndrome may have important implications for the health-care sector, in order to establish specific prevention policies and programs for the prevention of cardiovascular diseases and type 2 diabetes in persons diagnosed with metabolic syndrome.

## **Ethical Issues**

This research is in accordance with all ethical standards.

## **Conflict of Interest**

The author declares that they have no conflict of interest.

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