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# A pilot study: prevalence of pre-morbid metabolic syndrome in hypertensive people in general practice in Bydgoszcz using IDF and ATP III diagnostic criteria

## Badanie pilotażowe: częstość występowania przedchorobowego zespołu metabolicznego u osób z nadciśnieniem tętniczym w praktyce lekarza ogólnego w przemysłowym mieście według kryteriów diagnostycznych IDF i ATP III

### ABSTRACT

**Background.** The metabolic syndrome (MS), as a group of interconnected risk factors such as: central obesity, hypertension, elevated triglycerides (TG), low HDL-cholesterol and/or high blood glucose, is one of the most advantageous grounds for developing diabetes mellitus (DM) and/or cardiovascular diseases (CVD).

**Objectives.** 1. An analysis of the scale of the health problem MS in the patients of community health centers. 2. How often does pre-morbid vs. morbid metabolic syndrome occur in hypertensive patients according to IDF and ATP III diagnostic criteria in primary care?

**Material and methods.** The present study is based on cross-sectional data from 89 hypertensive people — patients' sample from medical clinic located in an industrial city area — who in the second half of 2014, underwent medical control and laboratory tests. The pre-morbid metabolic syndrome (pre-MetS) group was obtained from the participants with MS by excluding those patients with a previous diagnosis of CVD or DM.

**Results.** According to study design, 55.06% were pre-morbid and 44.94% were morbid. 76.40% of patients have MS, whereas 13.60% do not have, using IDF diagnostic criteria. ATP III diagnostic criteria revealed that 62.92% of people have MS, whereas 37.08% do not have.

**Conclusions.**

1. According to diagnostic criteria IDF 76.40% have metabolic syndrome, whereas using ATP III, 62.92% have MS.

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**2. Almost 4 out of 9 examined hypertensive patients have premorbid metabolic syndrome (pre-MetS), with the same statistical significance ( $p < 0.01$ ) according to IDF and ATP III.**

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**Key words:** premorbid metabolic syndrome, IDF, ATP III, hypertensive people, mass screening, family medicine, primary care, public health

### STRESZCZENIE

**Wstęp.** Zespół metaboliczny (MS), jako grupa niepowiązanych niezależnych czynników ryzyka, takich jak: występowanie otyłości brzusznej, nadciśnienia tętniczego, podniesionego stężenia trójglicerydów (TG) czy glukozy oraz obniżonego stężenia cholesterolu we frakcji HDL jest jednym z najlepszych podłoży do rozwinięcia w przyszłości pełnoobjawowej cukrzycy (DM) czy chorób naczyniowo-sercowych (CVD).

**Cel badania.** 1. Analiza częstości występowania zespołu metabolicznego u pacjentów z nadciśnieniem tętniczym z poradni ogólnej lekarza rodzinnego. 2. Ocena frekwencji przedchorobowego MS za pomocą kryteriów diagnostycznych IDF i ATP III.

**Materiał i metody.** Badanie zostało oparte na przekrojowej analizie danych 89 pacjentów z nadciśnieniem tętniczym — próbie z pacjentów przychodni rodzinnej położonej w mieście przemysłowym — którzy w drugiej połowie 2014 roku stawili się do lekarza ogólnego oraz mieli wykonane oznaczenia laboratoryjne. Tak zwany stan przedchorobowy został określony przez wykluczenie występowania u pacjenta DM i/lub CVD.

**Wyniki.** Zgodnie z przyjętą metodologią 55,06% osób było w stanie przedchorobowym, zaś u 44,94% wystąpiła DM i/lub CVD. Według IDF MS występował u 76,40%, zaś u 13,60% nie. Według ATP III MS miało 62,92% osób, a 37,08% nie miało.

**Wnioski.**

1. Użycie w badanej populacji kryteriów diagnostycznych IDF powoduje postawienie rozpoznania MS u 74,60% zaś wg ATP III u 62,92% osób.

2. Blisko co 4. na 9 zbadanych osób z nadciśnieniem tętniczym miała przedchorobowy zespół metaboliczny (pre-MetS), podobnie statystycznie często ( $p < 0,01$ ) stwierdzono to według klasyfikacji IDF czy też ATP III.

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**Słowa kluczowe:** przedchorobowy zespół metaboliczny, IDF, ATP III, nadciśnienie tętnicze, badanie przesiewowe, medycyna rodzinna, podstawowa opieka zdrowotna, zdrowie publiczne.

### BACKGROUND

Diabetes mellitus (DM) and cardiovascular diseases (CVD) are the most challenging diseases for the public health in the 20–21<sup>st</sup> century [1, 2]. The metabolic syndrome (MS), as a group of interconnected risk factors, such as: central obesity, hypertension, elevated triglycerides (TG), low HDL-cholesterol and/or high blood gluco-

se, is one of the best grounds for developing DM and/or CVD. People with SM exhibit a 5-fold increase in the risk of DM type 2 and a 2-fold increase in the risk of CVD [1, 2]. Nowadays, many investigators observe rapid increase in overweight and obesity, and so associated abnormalities in patients [3–5] based on general practice [6, 7]. For the health professional it is

important to put maximal prophylactic effort in these individuals, who have not been affected yet by DM and/or CVD — it is the best way to reduce high socioeconomic costs [8–10].

One of the first investigators was Eskil Kylin, who in 1923 joined occurrences of hypertension, hyperglycemia and hyperurikemia [11]. Jacob Węgięko, another Polish investigator, observed associations between DM with hypertension and ischemic heart diseases and introduced the term “associated diabetes mellitus” [12]. In 1981 Hanefeld was the first who used the term „metabolic syndrome” and described its etiology, characteristics and complications [13]. In 1988 World Health Organization (WHO) introduced this term to medical practice [14]. Since then, several modifications in definition and principles of medical practice have been added [1, 2, 8].

### ■ Objectives

1. The analysis of the scale of the health problem of MS in the hypertensive patients from community health centers.
2. How often does premorbid and morbid metabolic syndrome occur in hypertensive people according to IDF and ATP III diagnostic criteria in primary care?

## MATERIAL AND METHODS

### ■ Study design

The present study is based on cross-sectional data and sample from 89 patients from health centre located in industrial city area. In the second half of 2014, sample group of hypertensive people underwent medical control and laboratory tests. The methodology of anthropometric measurements (including height, weight, abdominal obesity and waist circumferences (WC)) was similar to the one previously described [15].

### ■ Biochemical variables

Venous blood samples were taken after a 12 hour overnight fast from the antecubital

vein using suitable vacutainers according to norm ISO 6710 and underwent standard medical analysis (concentrations of LDL cholesterol, triglycerides and glucose) in certified laboratory “Vitalabo” in Bydgoszcz [16].

### ■ Classification of metabolic syndrome

Using IDF and ATP III diagnostic criteria estimate the presence of MS. Characteristics included in the IDF MS are as follows [17]:

- abdominal obesity ( $\geq 80$  cm in females and  $\geq 94$  cm in males);
- fasting plasma glucose  $> 100$  mg/dL;
- triglycerides  $\geq 150$  mg/dL, or specific treatment for this lipid abnormality;
- HDL cholesterol  $< 50$  mg/dL in females and  $< 40$  mg/dL in males;
- treatment for previously diagnosed hypertension or blood pressure  $\geq 130/85$  mm Hg.

A diagnosis of MS according to IDF was made when central obesity plus, at least, two out of the four above mentioned criteria were met [17].

Characteristics included in the ATP III MS are as follows [18]:

- abdominal obesity ( $> 88$  cm in females and  $> 102$  cm in males);
- fasting glucose  $\geq 100$  mg/dL;
- triglycerides  $\geq 150$  mg/dL;
- HDL cholesterol  $< 50$  mg/dL in females and  $< 40$  mg/dL in males;
- blood pressure  $\geq 130/85$  mm Hg.

A diagnosis of MS according to ATP III was made when, at least, three out of the five above-listed characteristics were present [18].

### ■ Classification of premorbid metabolic syndrome

The premorbid metabolic syndrome (pre-MetS) group was obtained from the participants with MS by excluding those people with a previous diagnosis of CVD or DM [19].

### ■ Statistical analysis

Statistical analysis is based on the primary measurement done by mathematical cal-

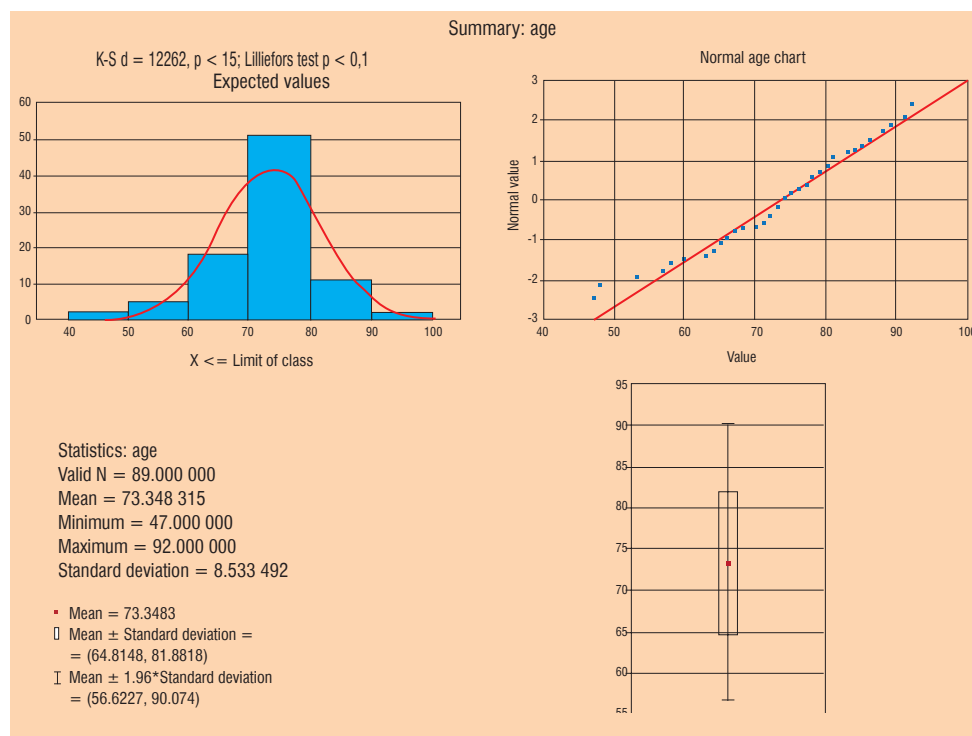
culations. Significance was accepted at  $p < 0.05$ . Four tables and one figure below show the results of the analysis. Statistical analysis was carried out using Statistica Software StatSoft [20] under license from the Faculty of Pharmacy, Department of Biophysics CM UMK in Bydgoszcz.

## RESULTS

89 people participated in the study. The vast majority are 70–80 years old patients (mean 73.34 years  $\pm$  8.53 SD, max. 92 & min. 47) (Fig. 1).

Gender: 47 (52.81%) women and 42 men. The mean age of women (72.19 years  $\pm$  7.64 SD) and men (74.64 years  $\pm$  8.53 SD) was comparable ( $p < 0.177$ ).

In a pilot study in general practice 49 (550.06%) included hypertensive patients were premorbid in comparison to 40 (44.94%) patients previously diagnosed with CVD or DM (Table 1). In examined groups of people 5 patients (5.62%) fulfilled 1 diagnostic criteria for metabolic syndrome according to IDF, 16 (17.98%) 2 diagnostic criteria, 37 (41.57%) 3 diagnostic criteria, 22 (24.72%) 4 diagnostic



**Figure 1.** Age (mean, SD, min., max.), patients included in the study. Graphic estimation for expected and standard results

**Table 1**

Detailed comparison of the number (and percentage) of fulfilled diagnostic criteria of metabolic syndrome according to IDF with premorbid and morbid status

	Number (and percentage) of fulfilled diagnostic criteria according to IDF					
	1	2	3	4	5	All in all
Premorbid	1 (2.04%)	5 (10.20%)	21 (42.86%)	15 (30.61%)	7 (14.29%)	49 (55.06%)
Morbid	4 (10.00%)	11 (27.50%)	16 (40.00%)	7 (17.50%)	2 (5.00%)	40 (44.94%)
All things considered	5 (5.62%)	16 (17.98%)	37 (41.57%)	22 (24.72%)	9 (10.11%)	89 (100.00%)

criteria and 9 (10.11%) complete 5 diagnostic criteria (Table 1).

Using IDF as a diagnostic criteria for 76.40% (68 patients) have metabolic syndrome and 13.60% (21 people) not. Significantly ( $p < 0.01$ ) premorbid IDF metabolic syndrome occurs in examined group of people from general practice (Table 2).

**Table 2**

**The importance of diagnosis of IDF metabolic syndrome according to premorbid and morbid status**

IDF	Metabolic syndrome		p
	No	Yes	
Premorbid	6 (12.24%)	43 (87.76%)	< 0.01
Morbid	15 (37.50%)	25 (62.50%)	

In tested population 8 (8.99%) of patients fulfilled 1 diagnostic criteria for metabolic syndrome according to ATP III, 25 (28.09%) — 2,28 (31.46%) — 3,19 (21.35%) — 4 and 9 (10.11%) fulfilled 5 diagnostic criteria (Table 3).

62.92% (56 people) using ATP III as a diagnostic criteria were diagnosed with metabolic syndrome and 37.08% (33 people)

were not. Indicate ( $p < 0,01$ ) premorbid ATP III metabolic syndrome shows in examined population from general practice (Table 4).

**Table 4**

**The importance of diagnosis ATP III metabolic syndrome according to premorbid and morbid status**

ATP III	Metabolic syndrome		p
	No	Yes	
Premorbid	12 (24.49%)	37 (75.51%)	< 0.01
Morbid	21 (51.25%)	19 (47.75%)	

In the same statistical significance ( $p < 0.01$ ) premorbid metabolic syndrome occurs according to IDF and ATP III diagnostic criteria.

## CONCLUSIONS

1. According to IDF 76.40% of patients have MS, whereas according to ATP III, MS have 62.92% of patients.
2. Almost 4 out of 9 examined hypertensive patients have pre-MetS, with the same statistical significance ( $p < 0.01$ ) according to IDF and ATP III.

**Table 3**

**Detailed comparison of number (and percentage) of fulfilled diagnostic criteria for metabolic syndrome according to ATP III with premorbid and morbid status**

	Number (and percentage) of fulfilled diagnostic criteria according to ATP III					
	1	2	3	4	5	All in all
Premorbid	2 (4.08%)	10 (20.41%)	17 (34.69%)	13 (26.53%)	7 (14.29%)	49 (55.06%)
Morbid	6 (15.00%)	15 (37.50%)	11 (27.50%)	6 (15.00%)	2 (5.00%)	40 (44.94%)
All things considered	8 (8.99%)	25 (28.09%)	28 (31.46%)	19 (21.35%)	9 (10.11%)	89 (100.00%)

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