Metabolic syndrome in male population of the Warmia and Masuria region in Poland

Zespół metaboliczny wśród mężczyzn z województwa warmińsko-mazurskiego w Polsce

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Abstract

Background. The objective of the study was to evaluate the prevalence of metabolic syndrome (MS) in male population of the Warmia and Masuria region in Poland according to IDF 2005 recommendations.

Material and methods. 631 men, aged 19–82 years (mean 47 ± 14) were examined between Dec 2014 and Dec 2016. Standardized questionnaire was completed by the subjects. Anthropometric measurements were performed. Blood pressure was measured. Blood tests (serum fasting glucose, lipidogram) were performed in 398 men (age: 48 ± 13years). Following age groups were identified: < 30YOA, 30–47YOA, 48–64YOA, ≥ 65YOA. Two groups of 398 men were defined: MS+ who fulfilled MS criteria, MS- who did not fulfill MS criteria.

Results. MS was diagnosed in 45.7% of 398 men. There was a significant age-related increase in its prevalence: < 30years of age (YOA) 9.5%, 30–47YOA 38.1%, 48–64YOA 53.2%, ≥ 65YOA 65.8%. Prevalence of components of MS in study group (n = 398) was: waist circumference (≥ 94 cm) in 254 (63.8%); high triglycerides (≥ 150 mg/dl or hypertriglyceridemia treatment) in 146 (36.7%); low HDL (< 40 mg/dl or dyslipidemia treatment) in 83 (20.9%); fasting glucose (≥ 100 mg/dl or diabetes treatment) in 173 (43.5%); elevated blood pressure (SBP ≥ 130 mmHg or DBP ≥ 85 mmHg or treatment of hypertension) in 313 (78.6%).

Conclusions. The prevalence of MS in male population of Warmia and Masuria was 45.7% with significant increase in age. The study confirms the necessity of early prevention of MS in that region of Poland.

Key words: metabolic syndrome, prevalence, male population

Streszczenie

Wstęp. Celem pracy była ocena częstości występowania zespołu metabolicznego (MS) według zaleceń IDF 2005 wśród mężczyzn w województwie warmińsko-mazurskim.

Materiał i metody. Zbadano 631 mężczyzn w wieku 19–82 lat. Dane zebrano między XII 2014 r. a XII 2016 r. Każdy z badanych wypełnił standaryzowany kwestionariusz. Dokonano pomiarów antropometrycznych. Zmierzono ciśnienie tętnicze. W surowicy 398 mężczyzn (wiek: 48 ± 13) zbadano poziom glukozy i lipidogram. Analizy przeprowadzono dla czterech grup wiekowych: < 30, 30–47, 48–64, ≥ 65 lat. Wyodrębniono grupy: MS+ badani spełniali kryteria MS oraz MS- badani nie spełniali tych kryteriów.

Wyniki. MS rozpoznano u 45,7% badanych. Zaobserwowano istotny wzrost częstości występowania MS w grupach wiekowych: < 30 lat 9,5%, 30–47 lat 38,1%, 48–64 lat 53,2%, ≥ 65 lat 65,8%. Częstość występowania kryteriów

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MS (n = 398) wyniosła: obwód talii (≥ 94 cm) u 254 badanych (63,8%); stężenie triglicerydów (≥ 150 mg/dl lub leczenie hipertriglicerydemii) u 146 (36,7%); HDL (< 40 mg/dl lub leczenie dyslipidemii) u 83 (20,9%); glukoza na czczo (≥ 100 mg/dl lub leczenie cukrzycy) w 173 (43,5%), podwyższone ciśnienie tętnicze (SBP > 130 mmHg lub DBP ≥ 85 mmHg lub leczenie nadciśnienia tętniczego) u 313 (78,6%).

Wnioski. Częstość występowania MS wśród populacji męskiej Warmii i Mazur wynosiła 45.75% i wykazywała istotny wzrost z wiekiem. Wyniki potwierdzają konieczność wczesnego wykrywania MS u mężczyzn w tym regionie Polski.

Słowa kluczowe: zespół metaboliczny, prewalencja, populacja mężczyzn

Introduction

According to the IDF 2005 definition of metabolic syndrome (MS) it is a cluster of cardiovascular risk factors which are considered to be strong predictors for the disease [1]. Abdominal obesity is one of the major underlying contributors to the MS [2]. For MS diagnosis, waist circumference depending on gender and race as well as two of four additional criteria have to be fulfilled. The cut-points criteria for IDF 2005 MS definition are: waist circumference for Europids ≥ 94 cm in male and ≥ 80 cm in female, triglycerides ≥ 1.7 mmol/l (150 mg/dl) or hypertriglyceridemia treatment, HDL-cholesterol < 1.03 mmol/l (40 mg/dl) in males, < 1.29 mmol/L (50 mg/dl) in females or dyslipidemia treatment, SBP ≥ 130 mmHg or DBP ≥ 85 mmHg or treatment of arterial hypertension, fasting plasma glucose ≥ 5.6 mmol/l (100 mg/dl) or treatment of type 2 diabetes [1].

Despite significant progress in the field of preventive healthcare, prevalence of MS and its clinical consequences are rapidly increasing [3]. Incorrect dietary habits and low physical activity are only some of the reasons for higher risk of metabolic abnormalities. Based on the results of WOBASZ study, it was found that the percentage of adult Poles with MS was 30.7% in men and 26.8% in women [4].

In Poland Warmia and Masuria region is characterized by the smallest proportion of people with the age of 65 years and more [5]. The objective of the study was to evaluate the prevalence of MS in male population of Warmia and Masuria region. The results may be crucial for the prevention efforts in the future.

Material and methods

ProM (Pro Men) Project is conducted by the Faculty of Medical Sciences at University of Warmia and Mazury. Between Dec 2014 and Dec 2016, 631 men from Warmia and Masuria region aged 19–82 (mean 47.2 ± 13.7) years were examined. Each subject signed an informed consent to participate in the project. The study protocol was approved by the ethics committee of the Regional Medical Chamber of Warmia and Mazury. The study was conducted with respect to guidelines of Good Clinical Practice. Standardized questionnaire with questions about lifestyle, physical activity, comorbidity and cardiovascular risk factors was completed for the subjects. Comorbidities study included presence or absence of arterial hypertension, diabetes mellitus, dyslipidemia. Anthropometric measurements were performed. In according to ESH/ESC guidelines [6], arterial blood pressure was measured 4 times by Omron M3/Japan, twice both on the left and right arm at an interval of 10 minutes. For statistical analysis, the second averaged measurement from the left and right arm were selected. 398 out of 631 men measured serum fasting glucose and lipidogram in a certified laboratory. Following age groups were identified in our study sample: < 30YOA, 30-47YOA, 48-64YOA, ≥ 65YOA. Two groups of 398 men were defined: MS+ who fulfilled MS criteria, MS- who did not fulfill MS criteria.

Statistical analysis was performed using the SPSS v.23 software (IBM Corp./USA). Data were compared using the chi-quadrat test, non-parametric test for 2-unpaired samples (Mann-Whitney U test) and Kruskal-Wallis test for k-unpaired samples. A p value of less than 0.05 was considered statistically significant. The confidence intervals (CI) were 95%.

Results

45.7% of 398 men with measured values of serum fasting glucose and lipidogram fulfilled the MS criteria. The number of MS+ and MS- differed not significantly ($p_{chi-quadrat}$ = 0,088). Detailed characteristics of the study group are listed in Table I and Table II.

The prevalence of MS increased with age (p < 0.001, Kruskal-Wallis test) (Fig.1).

Table I. Clinical data of the study group. Parameters are presented as mean ± standard deviation. For metabolic syndrome criteria p value were not calculated
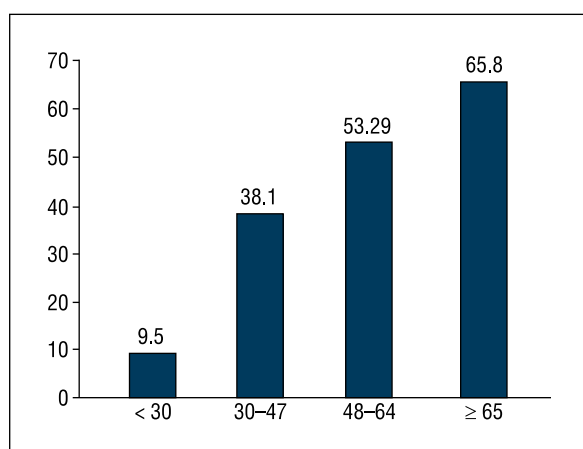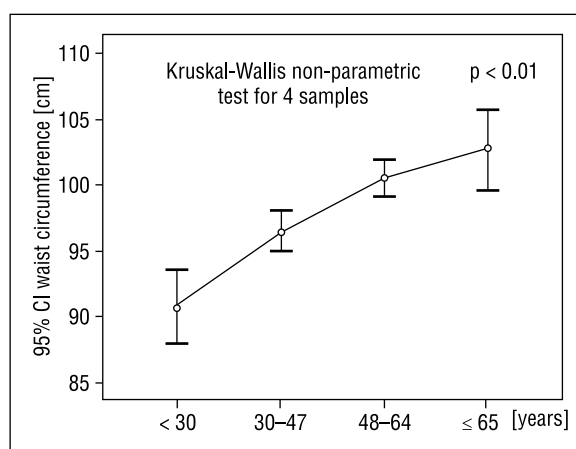
Parameters	All N = 398	MS- N = 216	MS+ N = 182	p Mann Whitney test
Age	48.22 ±12.53	45.38 ± 12.81	51.58 ± 11.33	< 0.001
Waist circumference [cm]	98.04 ± 12.11	91.47 ± 10.85	105.78 ± 8.38	—
SBP [mmHg]	137.25 ± 17.06	130.91 ± 14.36	144.77 ± 16.99	—
DBP [mmHg]	88.92 ± 10.92	85.05 ± 9.86	93.52 ± 10.34	—
Triglycerides [mg/dl]	141.16 ± 93.82	105.66 ± 61.43	183.30 ± 107.39	—
HDL-cholesterol [mg/dl]	52.11 ± 13.99	57.75 ± 13.30	45.41 ± 11.67	—
Glucose [mg/dl]	100.46 ± 23.67	93.08 ± 14.21	109.19 ± 29.09	—
Heart rate [bpm]	48.33 ± 11.06	45.87 ± 9.48	51.26 ± 12.08	0.001
Pulse pressure [mmHg]	72.60 ± 10.66	70.78 ± 10.43	74.76 ± 10.55	< 0.001

SBP — systolic blood pressure; DBP — diastolic blood pressure, glucose — serum fasting glucose; triglycerides and HDL-cholesterol were measured in serum

Table II. Clinical data of the study population in age groups. Parameters are presented as mean ± standard deviation

Parameters	< 30 n = 21	30–47 n = 168	48–64 n = 171	≥ 65 n = 38	p Kruskal Wallis test
Waist circumference [cm]	90.8 ± 11.3	96.4 ± 12.6	100.5 ± 10.9	102.7 ± 11.8	< 0.001
SBP [mmHg]	129.8 ± 12.3	132.2 ± 14.0	139.2 ± 17.8	144.7 ± 18.0	< 0.001
DBP [mmHg]	79.2 ± 8.3	87.5 ± 10.5	89.9 ± 10.8	88.2 ± 10.5	0.002
Triglycerides [mg/dl]	112.3 ± 75.9	139.2 ± 96.0	146.3 ± 87.9	142.4 ± 116.8	0.047
HDL-cholesterol [mg/dl]	55.1 ± 13.7	52.0 ± 14.5	51.8 ± 13.0	52.4 ± 16.2	0.71
Glucose [mg/dl]	88.9 ± 9.7	93.1 ± 12.1	106.7 ± 29.7	110.4 ± 23.4	< 0.001
Pulse pressure [mmHg]	50.6 ± 11.2	44.7 ± 8.0	49.3 ± 11.7	56.5 ± 12.4	< 0.001
Heart rate [bpm]	73.8 ± 10.3	73.3 ± 10.6	72.0 ± 11.1	71.1 ± 11.5	0.24

SBP — systolic blood pressure; DBP — diastolic blood pressure, glucose — serum fasting glucose; triglycerides and HDL-cholesterol were measured in serum

Figure I. The prevalence of metabolic syndrome according to age

Figure II. Waist circumference in age groups.

Figures 2–7 show the mean values of MS criteria in age groups.

Waist circumference, systolic blood pressure and serum fasting glucose level increased with age (p < 0.001, Kruskal-Wallis test).

The MS criterion fulfilled with the highest prevalence both in MS+ and MS- was SBP ≥ 130 mmHg or DBP ≥ 85 mmHg or treatment of hypertension (n = 172, 95%; n = 141, 65% respectively). The tendency was observed in all age groups. 100% of the MS+

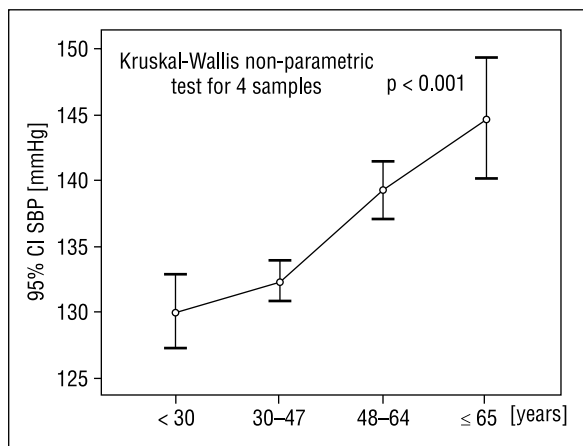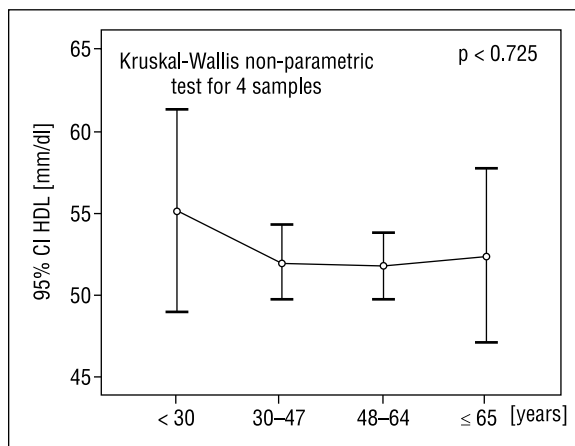**Figure III.** Systolic blood pressure in age groups
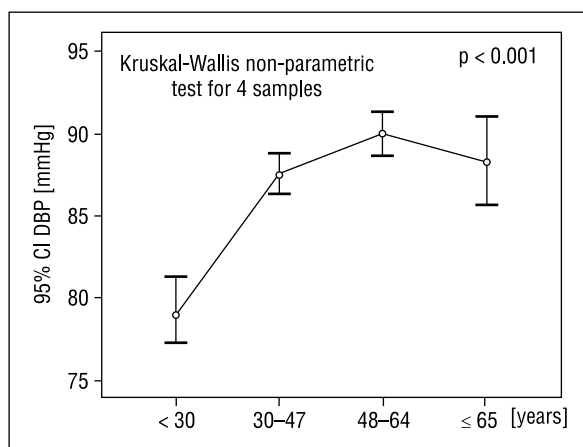

Figure VI. HDL-cholesterol level in age groups

Figure IV. Diastolic blood pressure in age groups
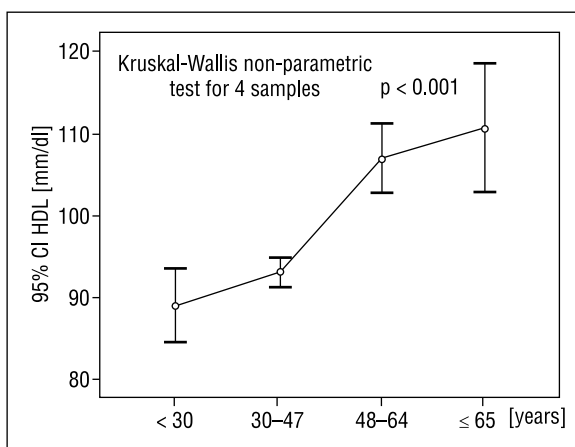

Figure VII. Fasting plasma glucose level in age groups
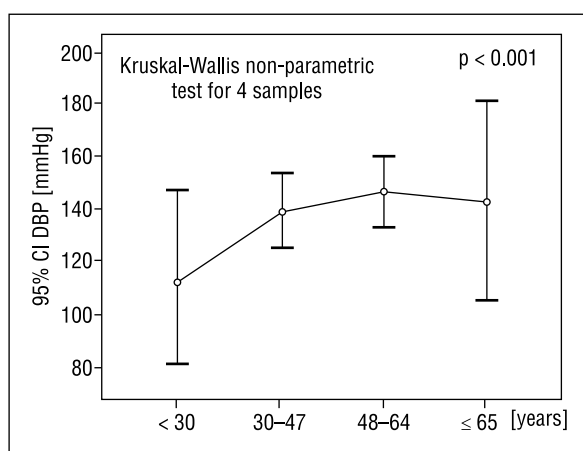

Figure V. Triglycerides level in age groups

subjects with the age of 65 years and more fulfilled the discussed criterion. 96% (n = 24) of MS+ ≥ 65 years subjects were treated for diabetes type 2 or had elevated serum fasting glucose (Tab. III).

Discussion

The prevalence of MS in study population was 45.7%. This is much higher than the results obtained in WOBASZ study where the MS (IDF criteria) was found in 30.7% of men in Poland [4]. Different analyses in Europe and around the world also showed lower rates of subjects with diagnosed MS (according to the IDF definition): 28.5% of men in Spain [7], 39.9% of men in USA [8].

The comparison of data is complicated by the fact of using different definitions of MS. Several population studies have reported an increase in the prevalence of the MS with age regardless of the used criteria [9].

In WOBASZ [4] study mean waist circumference in MS+ was 106cm, in MS- 90.6 cm. Results in our investigation (mean waist circumference in MS+ 105.7 cm, in MS- 97.5 cm) stay in agree with WOBASZ. SBP, DBP, serum fasting glucose, HDL-cholesterol in our study correspond with

Table III. Prevalence of MS fulfilled criteria in age groups. Data are presented as numbers and percentages of examined patients

Fulfilled MS criteria	All			< 30		30–47		48–64		≥ 65	
	n = 398	MS+ n = 182	MS- n = 216	MS+ n = 2	MS- n = 19	MS+ n = 64	MS- n = 104	MS+ n = 91	MS- n = 80	MS+ n = 25	MS- n = 13
Waist circumference	254 64%	182 100%	72 33%	0	5 26%	64 100%	31 30%	91 100%	31 39%	25 100%	5 38%
Triglycerides	146 37%	114 63%	32 15%	0	4 21%	44 69%	15 14%	54 59%	12 15%	15 60%	1 8%
HDL-cholesterol	83 21%	70 38%	13 6%	0	1 5%	28 44%	7 7%	31 34%	3 4%	10 40%	24 15%
SBP or DBP	313 79%	172 95%	141 65%	0	14 74%	59 92%	54 52%	86 95%	63 79%	25 100%	10 77%
Glucose	173 44%	122 67%	51 24%	0	3 16%	28 44%	17 16%	70 77%	24 30%	24 96%	7 54%

SBP — systolic blood pressure; DBP — diastolic blood pressure

WOBASZ data and differ < 5%. We observe higher triglycerides both in MS+ (by 20%) and MS- (by 8%) in comparison to WOBASZ.

The most prevalent MS criterion fulfilled by the subjects was elevated blood pressure or treatment of arterial hypertension. It was diagnosed in 78.6% of the subjects which corresponds to data obtained in the Norwegian HUNT2 study — 72.8% [10]. A comparison of the prevalence of the other components of MS between HUNT2 and ProM study show similar results for triglycerides level: it was 36.7% in ProM and 33.3% in HUNT2 study. Waist circumference criterion was fulfilled by 42% of men in HUNT2 survey. It was 20% lower than in Warmia and Masuria region.

The prevalence of the low HDL-cholesterol criterion is lower in our study: 20.9% to 28.3% in HUNT2. We observe higher prevalence of elevated glucose level: 43.5% in ProM vs. 32.7% in HUNT2.

The results obtained in the ProM project indicate a higher prevalence of MS in men in Warmia and Masuria than in male population of Poland. The further study to understand the reasons of the phenomenon should be concerned. The study confirms the necessity of early prevention of MS in that region of Poland.

Acknowledgments

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