65 – 96

www.manz.at

RdM

[Recht der Medizin]

mit Beilage
Ökonomie & Gesundheit

ISSN 1022-9434

Juni 2007

03

MANZ

Abdominal obesity and cardiometabolic risk factors in Austria, Central Europe

We evaluated the prevalence of abdominal obesity and metabolic syndrome in a representative survey among patients of Austrian primary care physicians. 70 primary care physicians across Austrian districts were selected based on the Austrian Health Structure Plan 2006. Measurements comprised waist circumference, height, weight and other cardiometabolic risk factors (smoking habit, blood glucose, blood pressure, triglycerides, total cholesterol, HDL cholesterol). 63 physicians enrolled 1054 patients (528 men and 526 women) in the analysis. According to the International Diabetes Federation (IDF) criteria, the prevalence of abdominal obesity was 61.2% in men and 73.2% in women, and the prevalence of metabolic syndrome was 38.6% in men and 34.3% in women. 65.6% of men and 53.2% of women had overweight (BMI $\geq$ 25 kg/m^2), and 23.3% of men and 20.8% of women were obese (BMI $\geq$ 30 kg/m^2). The prevalence of abdominal obesity and metabolic syndrome is high in Austria and measures against this epidemic should have top priority.

By Bernhard Schwarz

RdM-Ö&G 2007/3

Inhaltsübersicht:

A. Introduction

Being overweight, and abdominally obese in particular, is a major risk factor for developing coronary heart disease (CHD), as demonstrated in several prospective studies.[1),2),3),4)] The International Diabetes Federation (IDF) has published a worldwide definition of the metabolic syndrome,[5)] with abdominal obesity as the core parameter (Table 1). Cutoffs were more restrictive than in former US recommendations – the National Cholesterol Education Program Adult Treatment Panel (ATP) III criteria.[6)]

Table 1: Current definitions for abdominal obesity and metabolic syndrome

The IDF consensus world wide definition of the metabolic syndrome (5)
Abdominal obesity (waist circumference $\geq$ 94 cm for Europid men and $\geq$ 80 cm for Europid women)
plus any two of the following four factors
➜ raised triglyceride levels $\geq$ 150 mg/dl or specific treatment for this lipid abnormality
➜ reduced HDL cholesterol < 40 mg/dl in males and < 50 mg/dl in female
➜ raised blood pressure $\geq$ 130 mmHg systolic or $\geq$ 85 mmHg diastolic
➜ raised fasting plasma glucose $\geq$ 100 mg/dl or previously diagnosed type 2 diabetes

The NCEP ATP III definitions for North America (6)
Three or more of the following five factors:
➜ waist circumference > 102 cm for men and > 88 cm for women
➜ raised triglyceride levels $\geq$ 150 mg/dl
➜ reduced HDL cholesterol < 40 mg/dl in males and < 50 mg/dl in female
➜ raised blood pressure $\geq$ 130 mmHg systolic or $\geq$ 85 mmHg diastolic
➜ raised fasting plasma glucose $\geq$ 110 mg/dl

Austria is a central European country and its health insurance system is mainly publicly funded. Health in-

1) *Rexrode K. M./Carey V. J./Hennekens C. H. et al,* Abdominal adiposity and coronary heart disease in women, JAMA 1998, **280:** 1843–1848.
2) *Empana J. P./Ducimetiere P./Charles M. A./Jouven X.,* Sagittal abdominal diameter and risk of sudden death in asymptomatic middle-aged men: the Paris Prospective Study I, Circulation 2004, **110:** 2781–2785.
3) *Yusuf S./Hawken S./Ounpuu S. et al,* Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case control study, Lancet 2004, **364:** 937–952.
4) *Hauner H.,* Evidence based therapy of obesity, Internist 2006, **47:** 159–170.
5) *Zimmet P./Alberti G./Shaw J.,* A new IDF worldwide definition of the metabolic syndrome. The rationale and the results, Diabetes Voice 2005, **50:** 31–33. www.idf.org.
6) *Carr D.B./Utzschneider K.M./Hull R.L. et al,* Intra-abdominal fat is a major determinant of the National Cholesterol Education Program Adult Treatment Panel III criteria for the metabolic syndrome, Diabetes 2004, **53:** 2087–2094.

surance is compulsory and 97% of Austrians are covered. Medical service is initially delivered by primary care physicians, mainly general practitioners. The Austrian Health Structure Plan (Österreichischer Strukturplan Gesundheit = ÖSG) 2006 is the most important of the current restructuring processes in the health care system. In this health management scheme, Austria is divided into four service-delivering areas and 32 service-delivering regions.[7)]

The aim of the study was to evaluate the prevalence of both of abdominal obesity and metabolic syndrome in a representative sample of patients which were well-balanced for age, sex and regions of Austrian primary care physicians.

B. Methods

70 physicians were invited to participate in the study, with a target recruitment of 1.260 patients. The selection of physicians was based on the ÖSG 2006, with the aim of an equal distribution of physicians across the service areas. Each physician was asked to recruit 18 patients, three men and three women, from each of three age groups (30 to 44 years, 45 to 59 years, and 60 to 74 years).

The study population consisted of patients who wanted to participate in standardised health screening programmes. These programmes are offered once a year, free of charge, to members of the public with health insurance. Quality standards of measurements were according to the standards applied by the sick funds covering the costs of care.[8)] Physicians were advised that patients included in the survey should be recruited in the order they visited their office and not selected in any way. Recruitment started in September 2005 and ended in February 2006.

ANOVA and T-tests were performed for testing differences between regions in sex and age, which are both most important confounders for cardiometabolic risk factors and could thus bias results. Chi-square test was used for testing differences between areas in prevalence of cardiometabolic risk and Pearson correlation was calculated for testing trends of cardiometabolic risk with age-group.

C. Results

63 physicians (90% of those invited) recruited 1.054 patients (84% of the planned number) into the study. Some of the participating investigators could not recruit a total of 18 patients. Seven physicians did not recruit any patient because of administrative reasons. 528 men and 526 women were included in the study. Patient data were not evaluated in case they were not complete or failed to meet inclusion criteria.

7) Österreichisches Bundesinstitut für Gesundheitswesen, Österreichischer Strukturplan Gesundheit (ÖSG). *Bundesministerium für Gesundheit und Frauen* (ed), Wien 2006, www.bmgf.gv.at
8) www.sozialversicherung.at/vorsorgeuntersuchung-grundlagen

Table 2: Prevalence (%) of abdominal obesity and metabolic syndrome based on IDF criteria compared with ATP III guidelines and elevated body mass index by service area and sex

	IDF (5)		ATP III (6)		BMI (4)	
	Abdominal obesity[1]	Metabolic syndrome[2]	Abdominal obesity[3]	Metabolic syndrome[2]	≥ 25	≥ 30
Men						
East	63.4% (n=147)	41.8% (n=97)	45.3% (n=105)	34.9% (n=81)	72.7% (n=168)	28.1% (n=65)
South	50.5% (n=51)	34.6% (n=35)	32.7% (n=33)	26.7% (n=27)	64.4% (n=65)	24.8% (n=25)
West	64.5% (n=40)	33.9% (n=21)	22.6% (n=14)	14.5% (n=9)	50.0% (n=31)	17.7% (n=11)
North	64.1% (n=84)	38.1% (n=50)	36.1% (n=48)	29.3% (n=39)	61.6% (n=82)	16.5% (n=22)
Chi²-Test	n.s.*	n.s.	p=0.05	p=0.016	p=0.011	
Total	**61.2% (n=322)**	**38.6% (n=203)**	**37.9% (n=200)**	**29.5% (n=156)**	**65.6% (n=346)**	**23.3% (n=123)**
Women						
East	72.4% (n=163)	33.7% (n=76)	41.3% (n=93)	22.2% (n=50)	53.5% (n=122)	19.3% (n=44)
South	74.3% (n=78)	35.2% (n=37)	48.6% (n=51)	22.9% (n=24)	49.5% (n=51)	18.4% (n=19)
West	69.4% (n=43)	33.9% (n=21)	37.1% (n=23)	21.0% (n=13)	53.2% (n=33)	25.8% (n=16)
North	75.6% (n=96)	34.6% (n=44)	44.9% (n=57)	25.2% (n=32)	55.7% (n=73)	22.9% (n=30)
Chi²-Test	n.s.	n.s.	n.s.	n.s.	n.s.	
Total	**73.2% (n=380)**	**34.3% (n=178)**	**43.2% (n=224)**	**22.9% (n=119)**	**53.2% (n=279)**	**20.8% (n=109)**

**statistically not significant*
1 Waist circumference for Europid men ≥ 94 cm and for Europid women ≥ 80 cm.
2 See Table 1.
3 Waist circumference for men > 102 cm and for women > 88 cm

Table 3: Prevalence (%) of abdominal obesity and metabolic syndrome based on IDF criteria compared with ATP III guidelines and elevated body mass index by age and sex						
	IDF (5)		ATP III (6)		BMI (4)	
Age	Abdominal obesity[1]	Metabolic syndrome[2]	Abdominal obesity[3]	Metabolic syndrome[2]	≥ 25	≥ 30
Men						
30–44 yrs	48.8% (n=84)	23.8% (n=41)	27.0% (n=47)	18.4% (n=32)	56.9% (n=99)	21.3% (n=37)
45–59 yrs	67.0% (n=120)	44.1% (n=79)	40.8% (n=73)	32.4% (n=58)	71.0% (n=127)	24.6% (n=44)
60–74 yrs	67.4% (n=118)	47.4% (n=83)	45.7% (n=80)	37.7% (n=66)	68.9% (n=120)	24.1% (n=42)
Pearson correl.	p < 0,001	p < 0,001	p < 0,001	p < 0,001	n.s.*	
Total	**61.2% (n=322)**	**38.6% (n=203)**	**37.9% (n=200)**	**29.5% (n=156)**	**65.6% (n=346)**	**23.3% (n=123)**
Women						
30–44 yrs	56.4% (n=97)	18.6% (n=32)	23.8% (n=41)	11.6% (n=20)	30.7% (n=53)	11.0% (n=19)
45–59 yrs	75.7% (n=134)	35.6% (n=63)	46.9% (n=83)	26.0% (n=46)	56.4% (n=101)	22.9% (n=41)
60–74 yrs	87.6% (n=149)	48.8% (n=83)	58.8% (n=100)	31.2% (n=53)	72.7% (n=125)	28.5% (n=49)
Pearson correl.	p < 0,001	p < 0,001	p < 0,001	p < 0,001	p < 0,001	
Total	**73.2% (n=380)**	**34.3% (n=178)**	**43,2% (n=224)**	**22.9% (n=119)**	**53.2% (n=279)**	**20.8% (n=109)**

**statistically not significant*
1 Waist circumference for Europid men ≥ 94 cm and for Europid women ≥80 cm.
2 See Table 1.
3 Waist circumference for men > 102 cm and for women > 88 cm.

348 patients were in the 30 to 44 year age group, 358 in the 45 to 59 year age group, and 348 in the 60 to 74 year age group. 460 patients were from the region "East", comprising the provinces Vienna, Lower Austria und Burgenland, 206 patients from the "South" (provinces Styria and Carinthia), 124 from the "West" (provinces Vorarlberg und Tyrol), and 264 from the "North" (provinces Salzburg and Upper Austria). Different statistical tests were performed for detection of differences in the age distribution between men and women, and between regions; none showed statistical significance.

Based on IDF criteria, the prevalence of abdominal obesity was 61.2% in men and 73.2% in women. Metabolic syndrome was present in 38.6% of men and in 34.3% of women. Based on ATP III recommendations, 37.9% of men and 43.2% of women had abdominal obesity. Evaluation of BMI showed 65.6% of men and 53.2% of women had a BMI of ≥ 25 kg/m². Obesity, ie BMI ≥ 30 kg/m², was prevalent among 23.3% of men and 20.8% of women (Table 2).

In men Chi-square test of areas with obesity and cardiometabolic syndrome showed statistical significant results only with regard to ATP III criteria and obesity, but not for IDF benchmarks. Generally in men highest prevalence was in the east and lowest in the west. In women no significant differences could be detected between areas. Increasing age was associated in both men and women with an increased prevalence of cardiometabolic risk, with the exception of body mass index (BMI) in men. In young men (age 30–44) prevalence of BMI ≥ 30 kg/m² was almost as high as in older age-groups, and both BMI ≥ 25 kg/m² and BMI ≥ 30 kg/m² were most prevalent in middle-aged men (age 45–59). Details of prevalence for each subgroup are presented in tables 2 and 3.

D. Discussion

Based on IDF criteria, two thirds of men and almost three quarters of women had abdominal obesity and a substantial proportion (more than a third) of both men and women were high risk patients for cardiovascular disease due to metabolic syndrome. Prevalence of abdominal obesity was higher than reported in earlier studies from different countries across Europe.[9),10),11)12),13),14)] This was not only due to the lo-

9) *Liese A. D./Doring A./Hense H. W./Keil U.,* Five year changes in waist circumference, body mass index and obesity in Augsburg, Germany, Eur J Nutr 2001, **40:** 282–288.
10) *Charles M. A./Basdevant A./Eschwege E.,* [Prevalence of obesity in adults in France: the situation in 2000 established from the OBEPI study], Ann Endocrinol (Paris) 2002, **63:** 154–158.
11) *Alvarez Leon E. E./Ribas Barba L./Serra Majem L.,* [Prevalence of the metabolic syndrome in the population of Canary Islands, Spain], Med Clin (Barc) 2003, **120:** 172–174.
12) *OECI* (Osservatori Epidemiologico Cardiovascolare Italiano), Ital Heart J 2004, **5** (Suppl 3): 49–92.
13) *Ruston D./Hoare J./Hendersom L./Gregory J.,* The National Diet and Nutrition Survey: adults aged 19 to 64 years Volume 4, London: Office of National Statistics (UK), 2004.
14) *Visscher T. L. S./Seidell J. C.,* Time trends (1993–1997) and seasonal variation in body mass index and waist circumference in the Netherlands, Int J Obes 2004, **28:** 1309–1316.

wer thresholds of waist circumference in the IDF worldwide consensus. Even with ATP III-based limits the prevalence was almost 38% in men and 43.2% in women, and thus higher compared with former European studies[9)–14)] and comparable with an earlier US report, which cited prevalences of 37% for men and 55% for women.[15)]

Participants of our study were well balanced and representative with regard to patients of primary care physicians by area and age. Nevertheless differences to a representative sample of Austrian inhabitants cannot be excluded. A selection bias towards higher disease risk could exist due to the fact that our participants were patients. On the other hand participants were volunteers in a health screening programme which might lead to a selection towards generally better health attitudes and thus lower risk than in the average population. Which effect dominates within our sample and how much cannot be stated.

Both obesity and metabolic syndrome are of main importance for health care systems. Direct costs of obesity are estimated to be in a range of 1–5% of total health care costs in Europe, mainly due to different cardiometabolic diseases.[16)] Including private copayments total health care costs in Austria are estimated to be around € 20 billion per year, resulting in direct costs of obesity and associated diseases in Austria of at least € 200 million. Based on the high prevalence of obesity in Austria health care costs are more likely to be close to the upper bound of 5%, which would equal € 1 billion per year.

Additionally in Austria about 17.000 cases of sick leaves per year with an average of 19.4 days can be expected due to diagnosis of obesity. Other obesity associated diseases causing sick leaves mainly of musculoskeletal origin are not included in these values.[17)]

Studies evaluating cost-effectiveness of obesity prevention programmes are supporting implementation of preventive measures, especially when focusing on children. A school based obesity prevention programme of the Harvard Medical School reduced prevalence from 23.6% to 20.4% in a two-year follow-up of 310 school children, saving 4.1 quality adjusted life years (QALY). Incremental costs per QALY gained were USD 4.305.[18)]

In summing up – the prevalence of metabolic syndrome is high in our patient population, with a special trend towards high risk in men living in the Austrian east. We therefore conclude that the risk for cardiovascular disease is high in absolute terms and measures against this epidemic should have top priority.

15) *Ford E. S./Mokdad A. H./Giles W. H.,* Trends in waist circumference among U.S. adults, Obes Res 2003, **11:** 1223–1231.
16) *Carter R./Moodie M.,* The cost effectiveness of obesity prevention, in *Crawford M.* (ed), Obesity prevention and public health, Oxford University Press, 2006, pp 165–204.
17) *Statistik Austria,* Statistisches Jahrbuch 2006 (Wien 2006).
18) *Wang L. Y./Yang Q./Lowry R./Wechsler H.,* Economic analysis of a school-based obesity prevention program (2003) Obes Res **11,**1313–1324.

➜ Summary

A representative survey for evaluating prevalence of abdominal obesity and cardiometabolic risk factors was performed in patients of Austrian primary care physicians participating in a standardised reimbursed health screening program. According to International Diabetes Federation criteria 61.2% of men and 73.2% of women had abdominal obesity and 38.6% of men and 34.3% of women had a metabolic syndrome.

➜ According to subject

About the Author:
Prof. Dr. Bernhard Schwarz, Adress for correspondence:
Karl Landsteiner Institute for Health Economics, Center for Public Health, Medical University Vienna c/o Halsriegelstraße 26, A-2500 Baden, Austria.

Acknowledgement:
The study was supported by
sanofi-aventis GmbH, Österreich