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Which predicts the cardiovascular risk best in elderly metabolic syndrome patients: ATP III or IDF?

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Aim: As metabolic syndrome (MetS) is one of the major determinants of cardiovascular disease, it is important to detect and intervene with MetS in order to minimize cardiovascular risk. The objectives of this study were to identify the prevalence of MetS in our elderly patients and to evaluate the ability IDF and ATP III to predict the cardiovascular risk.

Materials and methods: This cross-sectional study included patients above 65 years attending the outpatient clinic of a hospital over a 4-year period and who gave oral informed consent for participation in the study. ATP III and IDF criteria were compared according to their predictive value for identifying cardiovascular risk factors detected by Framingham risk scoring. SPSS ver. 11 was used for statistical analysis.

Results: Of the 211 patients (114 men, 97 women) included in the study, mean age was 70.1 ± 4.1 years for women and 70.6 ± 4.6 years for men (P > 0.05). Using the ATP III definition, metabolic syndrome prevalence was 29.9%. Based on the IDF definition, this rate was 46.4%. ATP III criteria had a better likelihood ratio for estimating cardiovascular risk than did IDF criteria (4 vs. 2.58).

Conclusion: MetS prevalence was high in our elderly population. MetS defined by ATP III criteria has a higher predictive ability for estimating cardiovascular risk in the elderly group than IDF criteria.

Key words: Metabolic syndrome, cardiovascular risk, prevalence, elderly

Yaşlı metabolik sendromlu hastalarda kardiyovasküler riski hangisi daha iyi öngördürebilir: ATP III mü, IDF mi?

Amaç: Kardiyovasküler hastalıkların en önemli belirteçlerinden olması nedeniyle metabolik sendrom (MetS), kardiyovasküler riski azaltmak açısından araştırılmalıdır. Çalışmanın amaçları; yaşlı hastalarda metabolik sendrom prevalansını saptamak ve ATP III ve IDF tanımlarının kardiyovasküler risk öngördürücülüğünü hesaplamaktır.

Yöntem ve gereç: Bu kesitsel araştırma, çalışma öncesi sözel aydınlatılmış onamları alınmış, 4 yıllık izlem süresi boyunca polikliniğimize başvuran 65 yaş üstü hastalara ait sonuçları içermektedir. Framingham risk skorlamasıyla tespit edilen risk faktörlerini öngördürücülükleri açısından, ATP III ve IDF kriterleri karşılaştırılmıştır. İstatistiksel analizler için SPSS ver.11 istatistik paket programı kullanılmıştır.

Bulgular: Çalışmaya alınan toplam 211 hasta (114 erkek, 97 kadın) için ortalama yaş kadınlarda 70,1 ± 4,1 ve erkeklerde 70,6 ± 4,6 (P > 0.05) yıl idi. Grup için MetS prevalansı, ATP III tanımına göre % 29,9, IDF tanımına göre ise % 46,4 idi. Kardiyovasküler riski öngörme açısından ATP III, IDF tanımlarına göre daha iyi olabilirlik oranına sahip bulundu (4'e karşı 2,8).

Sonuç: Seçilmiş hasta grubunda, MetS prevalansı yüksek olarak bulundu. Yaşlı hasta grubunda, ATP III kriterlerine göre tanımlanan MetS'un, IDF kriterlerine göre belirlenene kıyasla kardiyovasküler risk öngördürücülüğünün daha yüksek olduğu belirlendi.

Anahtar sözcükler: Metabolik sendrom, kardiyovasküler risk, prevalans, yaşlı

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Introduction

Metabolic syndrome (MetS) is very common in the adult population, but little is known about its frequency among the elderly (1). It is generally defined by clustering of some cardiovascular (CV) risk factors and the majority of patients have high cardiovascular risk (2). The Adult Treatment Panel III (ATP III) and International Diabetes Federation (IDF) criteria are commonly used for diagnosis of MetS (3,4), and Framingham risk scoring is used for the diagnosis of 10-year-cardiovascular risk (5).

As MetS is one of the major determinants of cardiovascular disease (CVD) (6), it is important to detect and to intervene with MetS in order to minimize CV risk at individual level. Moreover, groups of risk factors in MetS can have a synergistic effect and augment the cardiovascular risk in these patients (7). As age is a risk factor for CVD, the elderly population is at greater risk. Thus, investigation of the frequency and characteristics of MetS in this group is vital.

The objectives of this study were to identify the prevalence of MetS in a selected group of elderly patients and to determine the predictive ability of IDF and ATP III criteria for cardiovascular risk in this group.

Materials and methods

Setting

The study was conducted in the outpatient clinic of Family Medicine department of Süleyman Demirel University. This department was established in August 2000 in Isparta and began to accept ambulatory patients in December 2001. As a family medicine and check-up clinic, admissions were available every day by appointment. The hospital serves a district with a population of about 1,500,000.

Study participants

A cross-sectional study was conducted in patients above 65 years admitted to our outpatient clinic over a 4-year period, if they gave oral informed consent to participate in the study. For each patient, medical history and physical examination were completed in a standardized manner by 2 of the authors, SAD and SO. MetS prevalence was evaluated among our patient population using both the ATP III and IDF criteria. Their 10-year cardiovascular risk was assessed based on the Framingham risk scoring tables risk score sheets, online version (5). All diagnostic procedures followed the international guidelines. Body mass index (BMI) was used for assessment of obesity. Smoking status was assessed in each patient. The predictive ability of ATP III and IDF criteria for detecting 10-year cardiovascular risk was compared and contrasted in the study group.

Statistical analyses

Student's t, chi-square, McNemar, kappa, Fisher's exact, and correlation tests were used for statistical analyses, as appropriate. Some variables were re-categorized for analyses. A P-value of less than 0.05 was considered statistically significant.

Results

Of a total of 211 patients (114 men and 97 women) included in the study, the mean age was 70.1 ± 4.1 for women and 70.6 ± 4.6 for men ($P > 0.05$). Triglyceride levels were higher in males, while systolic blood pressure, HDL, and BMI levels were higher in females (Table 1).

Patients were classified based on their CVD risk groups as *those having no risk* [26 patients (14 women, 12 men)], those with *low risk* [81 patients (43 women, 38 men)], those of *moderate risk* [60 patients (28 women, 32 men)], those with *high CVD risk* [40 patients (26 women, 14 men)] and *those with very high risk* [4 patients (3 women, 1 man)]. There was no statistically significant difference in distribution of CVD risk by gender ($P > 0.05$).

The frequency of low HDL was detected as 48.3% (56 women, 46 men); diabetes was present in 8.5% (12 women, 6 men). The frequency of high fasting glucose was 26.5% (28 women, 28 men), of abdominal obesity was 76.8% (92 women and 70 men)], of hypertension was 49.3% (60 women, 44 men), and of hypertriglyceridemia was 37.4% (35 women and 44 men).

Patients with cardiovascular risk had higher systolic and higher diastolic blood pressure levels ($P < 0.001$). They also had higher BMI, fasting blood sugar, abdominal circumference, and lipid levels compared to patients with no CV risk ($P < 0.001$). Both groups considered their own health status as "moderate". Some features of the patients according to their cardiovascular risk are presented in Table 2.

Table 1. Distribution of some health-related characteristics of study participants by gender.

	Gender		
	Female n = 114 (Mean ± SD)	Male n = 97 (Mean ± SD)	P value
Weight (kg)	71.4 ± 10.8	80.2.±.11.2	**P < 0.01**
Height (cm)	157.7 ± 5.4	171.6 ± 6.2	**P < 0.01**
BMI (kg/m^2)	28.8 ± 4.4	27.2 ± 3.3	**P < 0.01**
Abdominal circumference (cm)	88.2 ± 13.1	87.4 ± 12.9	P > 0.05
Systolic BP (mmHg)	134.5 ± 17.8	129.5 ± 15.9	**P < 0.01**
Diastolic BP	83.7 ± 11.0	83.2 ± 12.4	P > 0.05
Blood sugar	104.2 ± 32.6	99.3 ± 21.6	P > 0.05
T-K	202.2 ± 33.8	203.1 ± 40.6	P > 0.05
TG	132.7 ± 78.7	171.1 ± 104.8	**P < 0.01**
LDL	124.0 ± 29.5	130.2 ± 35.8	P > 0.05
HDL	52.4 ± 13.8	43.6 ± 11.5	**P < 0.01**

Table 2. Features of the patients according to their cardiovascular risk.

Features	**CV RISK**[1]		
	(-) n = 26 (Mean ± SD)	(+) n = 185 (Mean ± SD)	P value
Age	67.7 ± 2.8	70.7 ± 4.4	**P < 0.01**
Weight	63.3 ± 9.2	77.2 ± 11.1	**P < 0.01**
Height (cm)	164.7 ± 10.2	163.9 ± 8.9	P > 0.05
BMI (kg/m^2)	23.2 ± 1.6	28.7 ± 3.7	**P < 0.01**
Abdominal circumference (cm)	71.2 ± 7.9	90.2 ± 11.8	**P < 0.01**
Systolic BP (mmHg)	116.4 ± 9.8	134.4 ± 16.7	**P < 0.01**
Diastolic BP	74.8 ± 9.1	84.7 ± 11.5	**P < 0.01**
Blood sugar	90.4 ± 8.4	103.6 ± 29.5	**P < 0.01**
T-K	174.8 ± 30.1	206.5 ± 36.3	**P < 0.01**
TG	99.0 ± 47.2	157.6 ± 96.1	**P < 0.01**
LDL	105.5 ± 27.9	129.9 ± 32.2	**P < 0.01**
HDL	50.2 ± 13.8	48.0 ± 13.5	P > 0.05

[1]As defined by the Framingham CVD risk. (+) means positive and (-) means negative CV risk

According to the ATP III definition, metabolic syndrome prevalence was 29.9% (34.2% among women and 24.7% among men) and there was no significant difference between males and females (P > 0.05). According to the IDF definition, this rate was 46.4% (50.9% among women and 41.2% among men) and there was no significance between genders (P > 0.05). In the study group, only 25 women had an abdominal circumference lower than 80 cm (21.9%).

Table 3. Likelihood ratio of ATP III and IDF criteria for estimating the cardiovascular risk according to the patient groups.

Group	ATP III	IDF
Non-diabetic	4.7	3.9
IFG/IGT	3.3	1.5
DM	1.1	1.1
Normal weight	17.9	0
Overweight	4.4	1.7
Obese and morbid obese	1.7	1.7
Normal BP	0	0
PreHT	4.1	1.5
Grade I	1.8	1.9
Grade II	3.5	2.6
Female	2.9	2.4
Male	7.4	2.8

The consistency of ATP III and IDF was moderate ($P < 0.001$ and kappa value was 0.541). The accuracy was 0.777 ($P < 0.001$).

When ATP III criteria based decisions were compared with the Framingham risk scoring, sensitivity was 48%, specificity was 88%, likelihood ratio (LR) was 4, negative predictive value (NPV) was 64%, and positive predictive value (PPV) was 79%. For IDF, these scores were as follows: sensitivity 67%, specificity 74%, LR 2.58, NPV 70%, and PPV 71%. The likelihood ratios of the ATP III and IDF criteria for estimating the cardiovascular risks are shown in Table 3: ATP III had higher LR in participants with no CVD risk and in males.

Discussion

In our elderly population, one third had MetS. This is concordant with Onat's and Gemalmaz's study but discordant with the METSAR study, which found a MetS prevalence of about two thirds in the elderly (9-11). In our study, MetS prevalence was higher in women and this is concordant with the literature (12). In an Italian study, the prevalence of MetS according to ATP III criteria is 31.5% in men and 59.8% in women, which is higher than in our study (13). In the Iranian population, the IDF definition for MetS has a good concordance with the ATP III definition and this is concordant with our study (14).

Our results showed higher triglyceride levels in males, which is concordant with other studies (9,12). Moreover, BMI was greater in women than in men and this is also concordant with these studies.

Our study also reveals that, in elderly patients, ATP III can predict MetS better than IDF. This result contradicts the Chinese study but similar to the Korean studies in this field (12,15). Additionally, the IDF definition determined a higher prevalence of metabolic syndrome in our population. This is also similar to the literature (10). This may be due to the lower abdominal circumference levels accepted as the cut-off point in IDF criteria.

Especially for normal weight patients and for the male group, ATP III has a greater LH ratio for cardiovascular risk prediction. In Onat's study ATP III can predict cardiovascular risk better than their definition (TEKHARF-def MetS) in women (9). Our study is concordant with Waterhouse's study, which recommends the ATP III definition of MetS for the prediction of cardiovascular disease (16).

In conclusion, Mets prevalence was high in our elderly population. As CVD mostly originates on the basis of MetS, it is important to predict cardiovascular risk in MetS patients. MetS defined by ATP III criteria is better for estimating cardiovascular risk in the elderly group than IDF.

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