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METABOLIC SYNDROME RISK FACTORS IN INDIVIDUALS REFERRED TO A FAMILY HEALTH CENTER

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Contribution

SO and GC conceived the idea and designed the study. BB did data collection and manuscript writing did review. All authors contributed equally to the submitted manuscript.

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ABSTRACT

Objective: To determine the prevalence and risk factors of metabolic syndrome in adults in accordance with the diagnosis criteria determined by International Diabetes Foundation (IDF).

Methodology: A descriptive study was conducted with 201 individuals who were referred to a family health center in Istanbul in Turkey owing to any health problem. Percentage, mean, frequency and chi-square were used for statistical evaluation. Statistical significance was taken as $p < 0.05$.

Results: The mean age of the individuals participating in the study was 58.5 ± 2 , 49.3% were female and 50.7% were male. Average body mass index of individuals was 26.3 ± 5 , average LDL value was 126.12 ± 37 , average triglyceride was 169.9 ± 66 mg/dl, mean of systolic blood pressure was 126.65 ± 20.85 mmHg and average fasting glucose was 116.35 ± 50.57 mg/dl. Metabolic syndrome was found in 56.21% of the individuals according to IDF criteria. 63.68% of the individuals were under risk for waist circumference and 58.7% and 67.66% of them were under risk in terms of triglyceride values and HDL, respectively. There was not difference between genders and metabolic syndrome ($p = .39$). There was not difference between the age groups in terms of the presence of metabolic syndrome ($p = .37$). However, 82.3% of the individuals with metabolic syndrome were aged 50 and over.

Conclusion: It was found that individuals were under risk for diabetes, waist circumference, HDL and triglyceride. The prevalence of metabolic syndrome was found to be high in individuals.

Key Words: Metabolic Syndrome, International Diabetes Foundation, Waist Circumference, Diabetes, Triglyceride.

INTRODUCTION

Metabolic syndrome (metS) is a group of cardiovascular risk factors such as diabetes and impaired glucose intolerance, abdominal obesity, high blood pressure and high cholesterol. It was found that approximately 20-25% of the adults in the world have metS. Individuals with metS are twice as likely to have cardiovascular disease as compared to non-metS individuals and metS increases the risk of diabetes fivefold. In studies, metS shows an increasing worldwide prevalence and creates a serious public health and clinical problem.

Several expert groups determined metS criteria. There is no metS criterion specified by strict international limits. According to World Health Organization (WHO) -1999 metS diagnostic criteria, the individual diagnosed with insulin resistance, impaired glucose tolerance or diabetes mellitus must have at least two criteria from high blood pressure, abdominal obesity, dyslipidemia and microalbuminuria. According to metS diagnostic criteria of National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) -2001; there must be at least three criteria from abdominal obesity (waist circumference: >102 cm in males, >88 cm in females), hypertriglyceridemia (≥ 150 mg / dl), hypertension (blood pressure $\geq 130/85$ mmHg), Hyperglycaemia (fasting blood glucose ≥ 110 mg / dl) and low HDL (<50 mg / dl in females and <40 mg / dl in males). According to the metS diagnostic criteria of the International Diabetes Foundation (IDF) -2005, in individuals with abdominal obesity (≥ 80 cm in women, ≥ 94 cm in men) must have at least two criteria from triglycerides ≥ 150 mg / dl, fasting blood glucose ≥ 100 mg / dl, or type 2 diabetes mellitus, blood pressure $\geq 130/85$ mmHg, HDL: <40 mg / dl in men, <50 mg / dl in women. These diagnostic criteria are usually used in most studies.

In the study on 6196 individuals (3436 men, 2766 women) in Korea of Sung et al., individuals were evaluated in accordance with WHO, ATP III and IDF metS criteria. According to IDF, in 22.2% of men and 25.4% of women; according to ATP III, in 26% of men and 19.3% of women; according to WHO, 17.1% of men and 10.3% of women have metS. In Olivera et al.'s study conducted on 267 adults, according to IDF, metS was found in 153 adults. Yu et al. found that, according to IDF, metS prevalence of 5866 hypertensive people in the northeast of China was found to be 43.1%. MetS prevalence was found to be significantly higher and increased. In Turkey, 9.2 million people aged 30 years or older have metS and 53% of individuals with coronary artery disease have metS at the same time. The incidence of metS in our country is quite high, 28% in males and 40% in females. As seen in studies, the prevalence of metS tends to rise in many countries and leads to many chronic diseases in adults.

This study was planned as descriptive study to determine the prevalence and risk factors of metabolic syndrome in adults in accordance with the diagnosis criteria determined by International Diabetes Foundation (IDF).

METHODOLOGY

This study was conducted at a family health center between June-August 2015. It is a health institution located in Istanbul province in Turkey, providing primary health care services every day on

weekdays. The questionnaire contains parameters such as age, gender, HDL, LDL and blood pressure of the individual. Fasting blood sugar, LDL-cholesterol, triglyceride and HDL-cholesterol measurements were obtained from patients' laboratory results according to the metS criteria of the International Diabetes Federation. Blood pressure measurements, body mass index, weight, height, waist circumference were obtained by measurements made by researchers. The patient's blood pressure and waist circumference were measured in accordance with standard measurement rules. The blood pressure was measured with the right arm in the sitting position, and the waist circumference was measured in the middle of the belly button. Within the scope of the research, patients over 20 years of age who accepted to participate in the study, had no communication difficulties, referred to the family health center and whose HDL-cholesterol values, blood glucose, triglyceride and LDL-cholesterol were examined.

Percentage, mean, frequency and chi-square were used for statistical evaluation. Statistical significance was taken as $p < 0.05$.

Written consent was obtained from the family health center where the study was conducted. Verbal and written approvals of participants were taken. Since individual rights are to be protected, this study has thoroughly abided by the Human Rights Helsinki Declaration.

RESULTS

Total of 201 patients were included in the study. About 50.7% of the individuals participating in the survey were male, 49.3% were female.

The average age of the individuals participating in the study was 58.47 ± 14.55 . Waist circumference average was 95.01 ± 19.35 cm, mean body mass index was 26.30 ± 5.34 kg / m², average of systolic blood pressure was 126.65 ± 20.85 mmHg, diastolic blood pressure average was 76.20 ± 15.10 mmHg, triglyceride value average was 169.94 ± 65.86 mg / dl, mean of fasting blood glucose was 116.35 ± 50.57 mg / dl. Waist circumference average of male was 98.23 ± 20.32 cm, mean HDL value of them was 38.15 ± 8.46 mg / dl; waist circumference average of women was 91.69 ± 17.79 cm and the mean HDL values of women were 43.37 ± 11.37 mg / dl (Table 1). There was no significant difference between age groups and metS ($p = 0.37$). However, the prevalence of metS (82.4%) was high in the age group of 50 and over. There was no difference between the genders in terms of metS ($p = 0.39$) (Table 2).

According to the IDF criteria, 56.21% of individuals (those with ≥ 3 criteria) were found to have metS. 63.68% of the individuals with regard to waist circumference, 67.66% of the individuals in terms of HDL, 58.7% of the individuals in terms of triglycerides and 43.56% of the individuals in terms of fasting blood sugar were found to be at risk. It was found that 62.7% of males had HDL value of below 50 and 59.8% of them had triglyceride value of ≥ 150 . It was determined that 73.73% of women had waist circumference of ≥ 80 cm and 72.7% of them had HDL <40 mg / dl (Table 3).

Table 1: The Relationship Between Mets Prevalence According to Age and Gender (n=201)

Variables	All Patients	Men	Women
	Mean±SD	Mean±SD	Mean±SD
Age	58.47±14.55	60.35±12.47	56.54±16.26
Waist Circumference	95.01±19.35	98.23±20.32	91.69±17.79
Body mass index	26.30±5.34	26.23±3.97	26.36±6.48
Systolic blood pressure	126.65±20.85	130.72±19.61	122.45±21.36
Diastolic blood pressure	76.20±15.16	77.59±16.10	74.76±14.05
HDL	40.72±10.31	38.15±8.46	43.37±11.37
LDL	126.12±36.89	127.01±35.32	125.20±38.59
Triglyceride	169.94±65.86	171.84±64.29	167.97±67.72
Fasting blood sugar	116.35±50.57	118.77±49.44	113.85±51.85

Table 2: The Relationship Between Mets Prevalence According to Age and Gender (n=201)

Age	MetS		No MetS		Significance
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	P value
18-29	4	3.5	7	8	0.37
30-39	4	3.5	5	5.7	
40-49	12	10.6	6	6.8	
≥50	93	82.4	70	79.5	
Total	113	100	88	100	
Gender					0.39
Female	59	55.7	40	43.3	
Male	54	57.3	48	44.7	

Table 3: Frequency of Mets Criteria and Mets Prevalence According to IDF (n=201)

MetS Criterias	All Patients (n = 201)		Male (n = 102)		Female (n = 99)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Waist Circumference (male ≥94 cm, female ≥80 cm)	128	63.68	55	53.92	73	73.73
HDL (female <40 mg / dl, male <50 mg / dl)	136	67.66	64	62.7	72	72.7
Blood pressure (≥130 / 85 mmHg)	44	21.89	27	26.47	17	17.2
Triglyceride (≥150 mg / dl)	118	58.70	61	59.8	57	57.6
Fasting blood sugar (≥100 mg / dL)	88	43.56	51	50.0	37	37.4
Body mass index (≥30 kg / m ²)	43	21.39	16	15.68	27	27.7
Criterion Number Rate (by IDF)						
0	6	2.98	1	1.0	5	5.1
1	24	11.94	12	11.8	12	12.1
2	47	23.38	26	25.5	21	21.2
3	66	32.83	35	34.3	31	31.3
4	46	22.88	24	23.5	22	22.2
5	12	0.5	4	3.9	8	8.1
Criterion Number Average	3.78±1.18		3.79±1.08		3.77±1.29	

DISCUSSION

The prevalence of metS was found to be 56.21% according to IDF criteria in our study (Table 3). In a study conducted in Turkey, the prevalence of metS in 244 individuals over 20 years of age was found to be 41.4%. In other studies conducted in adults in Turkey, the prevalence of metS was seen to be 35.3% and 53%. In several other studies, the rate of metS was found to be between 33 and 35%. MetS was found in 22.9% of males and 25.4% of females in the study on 6196 individuals in Korea. In Iran, the prevalence of metS was found to be 18.9%, and in Saudi Arabia, the prevalence of metS was seen to be 28.3% in 4578 individuals aged 15-64. In two national studies conducted in the USA, the prevalence of metS was 23-24%. It was found that 153 of 267 adults in the University of São Paulo had metS. In Canada, the prevalence of metS was 22.3% in 1693 adults. In a meta-analysis study, the prevalence of metS in non-diabetic Europeans was found to be 15%. In Finland, the prevalence of metS in 991 adults was found to be 8-10%. In China, the prevalence of metS was found to be 10-11%. Considering at the above studies, it is seen that the prevalence of metS in Turkey is higher than in other countries. The metS prevalence of Asian, European and American countries seems to be close to each other. In China, the prevalence of metS is lower than other countries. This may be due to the fact that the body structures and nutrition of the individuals in China are different from other countries. MetS is a serious problem for adults in Turkey. This may be due to the inadequacy of physical activity and unbalanced and unhealthy diet.

There was not difference between genders in terms of metS in our study ($p=0.39$) (Table 2). In a study conducted in Turkey, the prevalence of metS was found 28% for males and 40% for females and these values are quite high. In a few studies in Turkey, the prevalence of metS was found to be higher in women than in men. In a study conducted in Brazil, the prevalence of metS was found to be 76.2% for women and 55.6% for men. In studies conducted in China and Bangladesh, metS prevalence was determined to be higher in women than in men. According to the above studies, the prevalence of metS in women is higher.

In our study, it was seen that waist circumference, low HDL, high triglyceride and high fasting blood glucose were the most important determinants of metS (Table 3). Obeidat et al. found that waist-to-hip ratio and waist circumference were the strongest predictors of metS. In Rao et al. study, it was seen that hypertension, high fasting plasma glucose, low HDL cholesterol, and waist circumference elevation were the predictors of metS. In Soares et al. study, high waist circumference and low HDL were determined as the most important components of metS. MetS has more than one determinant. In our study and other studies, it was seen that waist circumference is an important common determinant of metS.

There wasn't difference between the age groups and metS in our study ($p=0.37$). However, the prevalence of metS was determined to be 82.3% over 50 years of age (Table 2). Aljohani's study showed a parallel increase in the prevalence of metS and age. In the study of De Carvalho Vidigal et al., the prevalence of metS was found to be 1.3% between 20-29, 5.6% between 30-39 and 26.3% over 40 years of age. In Tabatabaie et al. study, also, it was found that the prevalence of metS increases with age. It

was observed that there is a 15% increase every 10 years. In another study, it was found that the prevalence of metS increased in people over the age of 50. In another study, it was seen that the prevalence of metS was 6.7% in the 20-29 age group and 43.5% in the 60-69 age group. Our study is similar to the above studies. This is because, changes in metabolism with age are the basis for the development of various diseases. It can be observed that, with age, there is also an increase in chronic diseases and metS.

CONCLUSION

In this study, it was found that approximately half of adults have metS. This case is an important health problem for adults. Because, metS affects many systems and it leads to an increase in chronic diseases. To reduce prevalence, adults should be directed to healthy eating and increased physical activity.

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