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METABOLIC SYNDROME ON ADULTS IN GÜNYÜZÜ DISTRICT OF ESKIŞEHIR PROVINCE IN WEST TURKEY

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ABSTRACT

Purpose: The study's purpose was to determine the frequency of Metabolic Syndrome (MetS) in adults who have application to the Mobile Health Team in Günyüzü District of Eskişehir province in West Turkey.

Material-Method: This cross-sectional research was conducted between from 01st November to 31st December 2012. A total of 891 people formed the study group. For determine of MetS, National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) criteria were used. With Chi-square test, t-test, One-way ANOVA test, it were statistical analyzed. Statistical analyses were performed with SPSS 11.5 program.

Results: The average age is 52.99 ± 13.97 years, and 54.1% of the study group was female, 56.7% were primary school graduates and 49.2% were housewives. Of individuals 79.1% reported income as moderate. Of the study group 1.2% was found to be weak, 18.7% were normal, 39.7% were overweight and 40.4% were obese. Of the study group 36.9% have MetS. The frequency of MetS in females (41.3%) was significantly higher than males (31.8%) ($p<0.05$). It was determined that the MetS frequency increased as the Body Mass Index (BMI) increased ($p<0.05$). Alcohol use, irregular eating habits, sleep disorders, and low physical activity with MetS were found to be associated ($p<0.05$).

Conclusion: MetS frequency of the study group are compatible when the comparison with the other studies from Turkey. It has been determined that BMI increase, insufficient physical activity, excessive alcohol intake, sleep disorders and irregular eating habits increase the frequency of MetS.

Introduction:

Metabolic Syndrome (MetS) is an important issue of community health. Central obesity, hyperglycemia, hypertension and dyslipidemia get a place in MetS. Customized lifestyle changes, dietary recommendations, and exercise planning are very important issues in terms of preventive studies for MetS. Pharmacologic treatment is a secondary preference in fight with MetS (1, 2, 3). The world-wide obesity epidemic and increasing frequency of diabetes are priority effective factors about MetS frequency (4). In different parts of the world, the frequency of MetS varies between 7.9% and 43%, and 7% and 56% in men and in women, respectively (5, 6). In Turkey, Metabolic Syndrome Research (METSAR) study reported that the MetS frequency in adults over 20 years of age was 35% (7). The National Cholesterol Education Program's Adult Treatment Panel III (NCEP ATP III) (8), International Diabetes Federation (IDF) (9), and the World Health Organization (WHO) (10) identified differently criteria of MetS.

In our study, it was purposed to determine the frequency of MetS and to evaluate the factors affecting the MetS frequency in adults over 20 years of age who have application to the Mobile Health Team of the Eskişehir Provincial Health Directorate, and living in Günyüzü District of Eskişehir province in West Turkey.

Material-Method:

This is a cross sectional study. It was realized between from 01st November to 31st December 2012. Study area was Günyüzü District of Eskişehir. Eskişehir is a province of West Turkey.

Researchers called the people aged 20 or older requested for their application to Mobile Health Team. In the study period, 891 people who live in Günyüzü and who are 20 and older years old and participated in the study formed the study group.

Risk factors for MetS were questioned via a questionnaire prepared by researchers. For MetS diagnosis, the American Heart Association (AHA) National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP III) criteria were used. According to these criteria, the MetS diagnosis is based on the presence of at least three out of five criteria. The five criteria are: 1) abdominal obesity (waist circumference: > 102 cm in men, > 88 cm in women), 2) hypertriglyceridemia (≥ 150 mg / dl), 3) low levels of high-density lipid (<40mg/dl in men, <50 mg/dl in women), 4) hypertension (systolic blood pressure ≥ 130 mmHg and / or diastolic blood pressure ≥ 85 mg / dl), and 5) high fasting blood glucose level (> 100 mmHg) (8).

The International Physical Activity Questionnaire (IPAQ) Short Form was used to assess physical activity. This questionnaire consists of 4 sections and 7 questions in total. Metabolic Equivalent (MET) is calculated. High physical activity was accepted at 3000 MET-minute / week, moderate physical activity at 600 MET-minute / week and low physical activity at 600 MET-minute / week (11). For IPAQ, international validity and reliability study Craig et. al. (12) was realized. Öztürk et. al. (13) realized the validity and reliability study of IPAQ for Turkey.

Epworth Sleepiness Scale was used to measure overall sleep level. The scale refers to the measurement of the general level of daytime sleepiness. A total of 8 items are included, and scoring is done between from 0 to 3 points for each item. High score is 24 points. A score of 10 points out of a total of 24 points was accepted as evidence of the presence of pathological sleepiness (14).

Alcohol intake was categorized as "not use, rarely and excessive".

No three main meals a day was evaluated as irregular eating habits.

Independent variables in the study are age, gender, educational status, working status, income level, presence of chronic illness, smoking and alcohol use, sleep pattern, eating habits and physical activity level.

For our study, necessary permissions were obtained from the Eskişehir Public Health Directorate. Verbal approvals were obtained from the participants.

The results of the study were presented as a poster at the 16th National Public Health Congress (Antalya, Turkey, 27-31 October 2013).

The descriptive data were given as number, percentage, and

average ± standard deviation. With Chi-square test, t-test, One-way ANOVA test, it were statistical analyzed. Statistical analyses were performed with SPSS 11.5 program. p<0.05 values were accepted for statistical significance.

Results:

The average age is 52.99 ± 13.97 years. In the study group, 54.1% of the study group was female, 56.7% were primary school graduates and 49.2% were housewives. Of individuals 79.1% reported income as moderate.

Of the study group 1.2% was found to be weak, 18.7% were normal, 39.7% were overweight and 40.4% were obese. According NCEP ATPIII, MetS frequency was 36.9%. The frequency of MetS in females (41.3%) was significantly higher than males (31.8%) (p< 0.05). It was determined that the MetS frequency increased as the BMI increased (p<0.05). Alcohol use, irregular eating habits, sleep disorders, and low physical activity with MetS were found to be associated (p<0.05). The rate of those living longer than 10 years in the study area was 86.2%.

The frequency of abdominal obesity in females (80.5%) was significantly higher than males (50.5%) (p<0.05).

In terms of the other MetS components, there was no difference between individuals with MetS and individuals without MetS (for each one p>0.05).

Excessive alcohol intake frequency was 6.2% (n: 55). Individuals with excessive alcohol intake have higher MetS frequency more than the others (p<0.05).

Irregular eating habits frequency was 9.9% (n: 89). Individuals with irregular eating habits was higher MetS frequency more than the others (p<0.05).

The number of individuals with sleeping disorders was found 153 (17.2%). Individuals with sleeping disorders had a higher frequency of MetS (p<0.05).

According IPAQ, 451 (50.6%) individuals had low level physical activity, and 225 (25.3%) individuals had middle level physical activity, and 215 (24.1%) individuals had high level physical activity. As the physical activity increased, the frequency of MetS decreased (p<0.05).

The distribution of some features of the study group was presented in Table 1.

Discussion:

In our study, we found about 40% overweight and 40% obese. For general of Turkey, TEKHARF study reported that 21.1% for adult males and 43% for adult females, obesity prevalence for 2000 years (15). Turkey Nutrition and Health Survey (TNHS, 2010), the prevalence of overweight / obesity among 19 and over age population in Turkey was 30.3% and 34.6% respectively (16). High average age of the study group may explain high frequency of overweight and obesity. The proportion of those with at least three components for MetS was approximately 37%. This result is consistent with general of Turkey. Metabolic Syndrome Research (METSAR) reported MetS prevalence for Turkey as 35% (7).

It is known that female gender is a risk factor for MetS, and abdominal obesity is more common in females (17, 18). Our study results are consistent with the literature. MetS frequency was 41.3 in females and 31.8% in males, and abdominal obesity frequency was 80.5 in females and 50.5% in males.

In addition, other independent variables such as alcohol use, irregular eating habits, low level physical activity, and sleep disorders were found to be statistically significant (p <0.05) in relation to MetS in this study. Among South Korean adults, it reported that excessive alcohol use behaviors increased the risk of hypertension, diabetes, dyslipidemia, abdominal obesity, and MetS (19). In Turkey, Erem et al. (20) showed a positive relationship between alcohol use and MetS frequency. Epidemiologic studies have shown that lipid profiling has become suitable with an increase in the number of daily meals. Irregular eating habits are known to cause insulin resistance. It may be claim that the formation of MetS and the increased risk of cardiovascular disease are related to irregular eating habits (21, 22). In many studies it has been shown that low physical activity is effective in MetS formation, high physical activity is important in prevention for MetS, and enhancing physical activity is in MetS treatment (23, 24, 25). Wolk & Somers (26) discussed that evidence that sleep disorders (obstructive sleep apnoea, sleep deprivation and shift work) may independently lead to the development of both insulin resistance and metabolic syndrome. Our study has presented results in this direction.

Limitations and Strengths: In the study, data on some components of MetS have not been adequately discussed with cause of some participants refused to the some measurements for related MetS screening. However, with this study, a health screening for MetS for the people of Günyüzü district was carried out.

Conclusion:

MetS frequency of the study group are compatible when the comparison with the other studies from Turkey. It has been determined that BMI increase, insufficient physical activity, excessive alcohol intake, sleep disorders and irregular eating habits increase the frequency of MetS. For the study group, the primary goal should be to develop healthy lifestyle behaviors for the prevention of cardiovascular diseases and diabetes, and to continued education program on metabolic syndrome, obesity, adequate and balanced nutrition and physical activity.

Table 1.The distribution of some features of the study group

Features	**%**	**Features**	**%**
Average age (years)	52.99 ± 13.97 (average ± sd)	**Obesity status**	
Gender		Weak	1.2
Male	45.9	Normal	18.7
Female	54.1	Overweight	39.7
Family income		Obese	40.4
Low	2.1	**Excessive alcohol intake**	6.2
Middle	79.1	**Irregular eating habits**	9.9
High	18.8	**Sleeping disorders**	17.2
Education level		**Physical activity**	
Primary school	56.7	Low	50.6
Secondary school	35.3	Middle	25.3
High school and upper	8.0	High	24.1
Job status		**MetS**	
Housewife	49.2	Yes (At least three of the 5 components)	36.9
Unemployed	5.5	No	63.1
Employed	45.3		

References:

1. Oh EG, Bang SY, Hyun SS, Kim SH, Chu SH, Jeon JY, et al. Effects of a 6-month lifestyle modification intervention on the cardiometabolic risk factors and health-related qualities of life in women with metabolic syndrome. Metabolism. 2010;59(7):1035-1043.
2. Yahia N, Brown C, Rapley M, Chung M. Assessment of college students' awareness and knowledge about conditions relevant to metabolic syndrome. Diabetology & metabolic syndrome. 2014;6(1):111.
3. Alefishat EA, Farha RKA, Al-Debei MM. Self-Reported Adherence among Individuals at High Risk of Metabolic Syndrome: Effect of Knowledge and Attitude. Medical Principles and Practice. 2017;26(2):157-163.
4. Oguz A, Temizhan A, Abaci A, Kozan Ö, Erol Ç, Öngen Z, et al. Obesity and abdominal obesity; an alarming challenge for cardio-metabolic risk in Turkish adults. The Anatolian Journal of Cardiology. 2008;8(6):401-406.
5. Frisman GH, Berterö C. Having knowledge of metabolic syndrome: Does the meaning and consequences of the risk factors influence the life situation of Swedish adults?. Nursing & health sciences. 2008;10(4):300-305.
6. Gündogan K, Bayram F, Capak M, Tanriverdi F, Karaman A, Ozturk A, et al. Frequency of metabolic syndrome in the Mediterranean region of Turkey: evaluation of hypertension, diabetes mellitus, obesity, and dyslipidemia. Metabolic syndrome and related disorders. 2009;7(5):427-434.
7. Türk Kardiyoloji Derneği METSAR Türkiye Metabolik Sendrom Arastirmasi. 21. Ulusal Antalya: Kardiyoloji Kongresi, Antalya, 2005.
8. Expert Panel on Detection and Evaluation of Treatment of High Blood Cholestrol in Adults Executive Summary of the Third Report of the National Cholestrol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholestrol in Adults. Journal of American Medicine Association. 2001;285:2486-97.
9. Amarasekara P, de Silva A, Swarnamali H, Senarath U, Katulanda P. Knowledge, attitudes, and practices on lifestyle and cardiovascular risk factors among metabolic syndrome patients in an Urban Tertiary Care Institute in Sri Lanka. Asia Pacific Journal of Public Health. 2016;28(1_suppl), 32S-40S.
10. Näslindh–Ylispangar A, Sihvonen M, Vanhanen H, Kekki P. Self–Rated Health and Risk Factors for Metabolic Syndrome Among Middle–Aged Men. Public Health Nursing. 2005;22(6):515-522.
11. Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) – Short and Long Forms, November 2005. http://www.ipaq.ki.se/scoring.pdf (Available: 27.06.2014).
12. Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003;35:1381-95.
13. Öztürk M. Üniversitede eğitim-öğretim gören öğrencilerde Uluslararası Fiziksel Aktivite Anketinin geçerliliği ve güvenirliği ve fiziksel aktivite düzeylerinin belirlenmesi. [Bilim Uzmanlığı Tezi]. Ankara: Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü; 2005.
14. Muşlu C, Baltacı D, Kutanis R, Kara İH. Quality of Life, Anxiety and Depression in Nurses Working at Primary Health Care and Hospitals. Konuralp Tıp Dergisi. 201;4(1):17-23.
15. Sansoy V. Türk erişkinlerinde beden kitle indeksi, bel çevresi ve bel kalça oranları. Ed: Onat A. TEKHARF Yüzyıl Dönümünde Türk Erişkinlerinde Koroner Risk Haritası ve Koroner Kalp Hastalığı. İstanbul: Argos Matbaacılık; 2001. p.68-73.
16. Türkiye Beslenme ve Saglik Arastirmasi-2010. Beslenme Durumu ve Aliskanliklarinin Degerlendirilmesi Sonuç Raporu. Hacettepe Universitesi Saglik Bilimleri Fakultesi Beslenme ve Diyetetik Bolumu, Şubat, 2014. http://www.sagem.gov.tr/TBSA_Beslenme_Yayini.pdf (Available: 30.06.2014).
17. Alefishat EA, Abu Farha RK, Al-Debei MM. Self-Reported Adherence among Individuals at High Risk of Metabolic Syndrome: Effect of Knowledge and Attitude. Medical Principles and Practice. 2017;26(2):157-163.
18. Suliga E, Wronka I, Pawlińska-Chmara R. The prevalence and correlates of abdominal obesity in female students. Pediatric Endocrinology, Diabetes & Metabolism. 2011;17(4): 201-2015.
19. Kim J, Chu SK, Kim K, Moon JR. Alcohol use behaviors and risk of metabolic syndrome in South Korean middle-aged men. BMC Public Health. 2011;11(1):489.
20. Erem C, Hacıhasanoglu A, Deger O, Topbaş M, Hosver I, Ersoz HO, et al. Prevalence of metabolic syndrome and associated risk factors among Turkish adults: Trabzon MetS study. Endocrine. 2008;33(1):9-20.
21. Sierra–Johnson J, Undén AL, Linestrand M, Rosell M, Sjogren P, Kolak M, et al. Eating meals irregularly: a novel environmental risk factor for the metabolic syndrome. Obesity. 2008;16(6):1302-1307.
22. Shin A, Lim SY, Sung J, Shin HR, Kim J. Dietary intake, eating habits, and metabolic syndrome in Korean men. Journal of the Academy of Nutrition and Dietetics. 2009;109(4): 633-640.
23. Laaksonen DE, Lakka HM, Salonen JT, Niskanen LK, Rauramaa R, Lakka TA. Low levels of leisure-time physical activity and cardiorespiratory fitness predict development of the metabolic syndrome. Diabetes care. 2002;25(9):1612-1618.
24. Lakka TA, Laaksonen DE. Physical activity in prevention and treatment of the metabolic syndrome. Applied physiology, nutrition, and metabolism. 2007;32(1):76-88.
25. Rennie KL, McCarthy N, Yazdgerdi S, Marmot M, Brunner E. Association of the metabolic syndrome with both vigorous and moderate physical activity. International journal of epidemiology. 2003;32(4):600-606.
26. Wolk R, Somers VK. Sleep and the metabolic syndrome. Experimental Physiology. 2007;92(1):67-78.