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Evaluation of Anthropometric Measurements with Sociodemographic Characteristics and Nutritional Status of Female Health Professionals

Nural Erzurum Alim[1], Gözde Arıtıcı Çolak[2], Rahime Evra Karakaya[1], Selin Dündar[3]

[1]Ankara Yıldırım Beyazıt University, Department of Nutrition and Dietetics, Ankara, Turkey
[2]Acıbadem University, Department of Nutrition and Dietetics, Istanbul, Turkey
[3]T.C. Ministry of Health General Directorate of Public Health, Department of Cancer, Ankara, Turkey

ABSTRACT

This study was planned to evaluate the anthropometric measurements with sociodemographic characteristics and nutritional status of 134 women health professionals aged 20-50 years. Food frequency questionnaire form was applied by a trained dietitian for assessment of dietary intake. Anthropometric measurements such as body weight, height, waist circumference and hip circumference were taken. Physical activity status was determined by a one-day physical activity registration form. According to the BMI classification, 39.6% of women were overweight and 14.2% of them were obese. Daily carbohydrate intake was higher in normal weight (48.3%) than obese individuals (41.4%) ($p<0.05$). The prevalence of obesity is high among female health professionals. Unbalanced dietary macronutrient composition like low carbohydrate/high fat intake may lead to obesity.

Keywords: Obesity, women, nutritional status

Nural Erzurum Alim, Lecturer
Gözde Arıtıcı Çolak, Lecturer
Rahime Evra Karakaya, R.A.
Selin Dündar

KADIN SAĞLIK ÇALIŞANLARININ SOSYODEMOGRAFİK ÖZELLİKLERİ VE BESLENME DURUMLARI İLE ANTROPOMETRİK ÖLÇÜMLERİN DEĞERLENDİRİLMESİ

ÖZET

Bu çalışma, 20-50 yaşları arasındaki 134 kadın sağlık çalışanının sosyodemografik özellikleri ve beslenme durumu ile antropometrik ölçümlerinin değerlendirilmesi amacıyla planlanmıştır. Besin tüketim sıklığı anket formu, bireylerin besin alımını değerlendirmek amacıyla eğitimli bir diyetisyen tarafından uygulanmıştır. Vücut ağırlığı, boy uzunluğu, bel çevresi ve kalça çevresi gibi antropometrik ölçümler alınmıştır. Fiziksel aktivite durumu bir günlük fiziksel aktivite kayıt formu ile saptanmıştır. BKİ sınıflamasına göre kadınların %39.6'sı kilolu ve %14.2'si obez olarak saptanmıştır. Diyetle karbonhidrat alımı normal kilolu bireylerde (%48.3) obez bireylere (%41.4) göre daha yüksek bulunmuştur. Kadın sağlık çalışanları arasında obezite prevalansı yüksektir. Düşük karbonhidrat/yüksek yağ gibi diyetle dengesiz makrobesin alımı obeziteye yol açabilir.

Anahtar sözcükler: Obezite, kadınlar, beslenme durumu

Correspondence:
Lecturer Nural Erzurum Alim
Ankara Yıldırım Beyazıt University, Department of Nutrition and Dietetics, Ankara, Turkey
Phone: +90 312 906 10 00
E-mail: nalim@ybu.edu.tr

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World Health Organization (WHO) defines health as not only the absence of disease or infirmity but a complete physical, mental and social well being (1). Human health is influenced by many factors such as nutrition, inheritance, climate and environmental conditions, of which nutrition is one of the main factors. Nutrition is the use of nutrients for growth, survival and health protection (2). It plays an important role in the development of cardiovascular diseases, some types of cancers and non-communicable chronic diseases such as obesity (3). Therefore, nutrition is important in the treatment of diseases and the protection of health (2).

Nowadays, social and technological changes have occurred. In the past, the changes in lifestyles and the increase in individuality in the consumer culture have developed changes in the habits of food preparation and recipes sharing which led to the increase in the habits of eating quick and alone. According to this, the food preferences and contents of the individuals have also changed (4). There have been great differences in the amount of consuming ready-to-eat foods, time spent on food preparation and cooking methods (5). It is stated that unhealthy eating behaviors and physical inactivity level increase the risk of obesity, especially in working individuals. In a study conducted with 550 women, increase in family income, working status, being married and higher education status showed a significant relationship with body mass index (BMI) which is an indicator of nutritional status. The mean BMI of women was 25±4 kg/m^2 and the waist-hip ratio was 0.9±0.1 cm. It was determined that 8% of women were underweight, 44% were overweight or obese and 48% had an optimal nutritional status (6).

To be aware of the changes occurring in nutritional habits over time and to determine the relationship between nutritional habits and health, sociodemographic and economic factors will help to understand the causes and consequences of these changes (7). This study was planned and conducted to determine the nutritional status and evaluate the anthropometric measurements of female health professionals aged between 20-50 years working at the Ministry of Health, Directorate General of Public Health.

Materials and Methods

Design

This study was conducted to evaluate the nutritional and physical activity status of voluntary female health professionals working at the Ministry of Health, Directorate General of Public Health aged between 20-50 years from April 2017 to January 2018 in Ankara. A questionnaire form consisting of four sections (20 questions for demographic characteristics, 7 questions for nutritional habits, frequency of food consumption form and physical activity registration form) was applied on the participants by face-to-face interview method. The study was approved by the Institutional Review Board and Ethics Committee of Acıbadem University (Project No: 2017-7/21) on April 20, 2017, and all subjects were given written consents in accordance with the Declaration of Helsinki. The exclusion criteria consisted of women who were pregnant, lactating, unwilling to participate or absent during the study.

Assessment of dietary intake

The nutritional habits were evaluated with food frequency questionnaire. The portion sizes of the food items were determined by means of a picture booklet consisting of 80 food references. The energy and nutrition values were evaluated using the "Computer Aided Nutrition Program, Nutrition Package Information Systems Program (BEBIS)" which has been developed for Turkey (8).

Assessment of anthropometric measurements

All measurements were taken by a trained dietician. Anthropometric measurements such as BMI, waist circumference, waist-hip ratio and waist height ratio were determined according to the WHO criteria (9, 10, 11). Body weight, height, waist, and hip circumferences were measured and BMI was calculated (BMI = body weight (kg)/height (m^2)). Body weight of the participants was measured with light clothes on and without socks and shoes by Tanita Body Composition Analyzer UM-073. Height was measured in a standing position with head at Frankfort plane using the Seca 206 mechanical measuring tape, which is a commercial stadiometer. The waist circumference of the participants was measured as the smallest waist circumference which is between the bottom of the costal cartilage and the anterior superior iliac spine.

Assessment of physical activity status

Physical activity status of individuals was evaluated with the one-day physical activity registration form. Daily activity information such as sleep, eating, sitting, working, housework (low-to-moderate level), walking, wandering, working on the computer, sports activity and etc. were calculated as hours. Total energy cost was divided into 24 hours and the physical activity level (PAL) was determined.

Statistical analysis

Descriptive statistics were used to determine the group included in the study. Normal distribution assumption was checked before the group differences analysis was made. As the results of the tests did not comply with the normal distribution, non-parametric tests were found suitable. Kruskal-Wallis test was used for group comparisons. Bonferroni correction was used for multiple comparisons of the variables found to be significant in the Kruskal-Wallis test. Chi-square test was used for comparison of qualitative data. Data analysis was performed using SPSS (The Statistical Package for Social Sciences) version 23.0 (IBM SPSS Statistics 23.0).

Results

In the evaluation of anthropometric measurements, BMI classification according to WHO criteria reflected that 39.6% of women were overweight and 14.2% were obese. Women who were at increased risk for obesity were 33.6% and 23.7% of them were at substantial risk. In terms of waist-hip ratio, 40.7% of the participants were at a substantially increased risk for obesity. After the evaluation of waist height ratio, 48.4% were at increased risk and 8.9 were at a substantially increased risk for obesity (Table 1).

Sociodemographic characteristics of women indicate that age, marital status and education didn't affect BMI values ($p>0.05$). Nevertheless, a coexistent disease prevalence was significantly different between groups ($p<0.05$) and it was determined that 22.6% of obese individuals had a coexisting disease whereas 6.9% of them were absent of diseases (Table 2). In addition, one or more diseases were coexisting in obese individuals and the most common were hypertension (42.9%) and goiter diseases (35.7%) (unshown data).

According to the food frequency questionnaire, daily energy intake, energy expenditure and nutrient intake of participants were evaluated. Daily energy expenditure was also lower in normal, higher in overweight and much higher in obese group (1833.0 [1615.0-2237.0] kcal/d, 1933.0 [1716.0-2417.0] kcal/d, 2097.0 [1891.0-2538.0] kcal/d respectively) ($p<0.001$). Daily carbohydrate (CHO) intake was significantly higher in normal weight (48.3%) than obese individuals (41.4%) ($p<0.05$). In addition, daily Monounsaturated fatty acid (MUFA) intake was significantly lower in normal (13.8%) than the obese group (16.5%). No significant differences were found between groups in terms of daily energy intake, the difference between energy intake and expenditure, dietary protein, fat, saturated fat, Polyunsaturated fatty acid (PUFA), omega 3 fatty acids, omega 6 fatty acids or fiber intake ($p>0.05$) (Table 3).

Table 1. Anthropometric measurements of participants

	Women (n:134)	
	n	**%**
BMI (kg/m²)		
Normal	62	46.3
Overweight	53	39.6
Obese	19	14.2
Waist circumference (cm)		
Normal	56	42.7
Increased risk	44	33.6
Substantially increased risk	31	23.7
Waist hip ratio		
Normal	73	59.3
Substantially increased risk	50	40.7
Waist height ratio		
Underweight	3	2.4
Normal	50	40.3
Increased risk	60	48.4
Substantially increased risk	11	8.9

BMI: Body Mass Index

Table 2. Distribution of sociodemographic characteristics according to BMI

	BMI						
	Normal		*Overweight*		*Obese*		
	n	**%**	***n***	**%**	***n***	**%**	***p****
Age (year)							
20-39	25	56.8	15	34.1	4	9.1	0.13
40-49	31	46.3	27	40.3	9	13.4	
50 and above	6	26.1	11	47.8	6	26.1	
Marital status							
Married	48	42.9	47	42.0	17	15.2	0.20
Single or Widowed	14	63.6	6	27.3	2	9.1	
Education							
Highschool or equivalent	5	26.3	11	57.9	3	15.8	0.14
Undergraduate	39	45.9	35	41.2	11	12.9	
Postgraduate	18	60.0	7	23.3	5	16.7	
Coexistent disease							
No	42	58.3	25	34.7	5	6.9	**0.003**
Yes	20	32.3	28	45.2	14	22.6	

*Pearson Chi Square
BMI: Body Mass Index

Discussion

Nutritional status is affected by several determinants like sociodemographic characteristics and education. In this study, age, marital status and education status didn't affect the BMI. On the contrary, Sen and Verma (6) showed a significant relationship between marital status, education and BMI. BMI was positively correlated with married and graduate women. Another study showed that a higher educational level was significantly associated with higher BMI. The prevalence of overweight and obesity was above 70% in women aged median 35.4 years and finished at least primary education compared to 45% in women below the median age and no education (12).

Obesity is a multifactorial health problem with coexisting diseases (13). In a study conducted with urban women in India, obese individuals were associated with more than one diseases like allergies, anemia, hypertension, hypothyroid, high cholesterol (6). Our study demonstrated

Table 3. Basal metabolic rate, daily energy intake, energy expenditure and nutrient intake of participants

	BMI									
	Normal			Overweight			Obese			
	Median	Min	Max	Median	Min	Max	Median	Min	Max	p*
BMR (kcal)	1320.0	1134.0	1489.0	1409.0	1320.0	1590.0	1495.0	1414.0	1812.0	**<0.001**[a-b, a-c, b-c]
Energy intake (kcal/d)	2079.5	979.8	1448.7	1963.8	1110.5	3354.7	1952.9	1217.0	3656.2	0.61
Energy expenditure (kcal/d)	1833.0	1615.0	2237.0	1933.0	1716.0	2417.0	2097.0	1891.0	2538.0	**<0.001** [a-b, a-c, b-c]
Energy intake-expenditure (kcal/d)	256.9	-939.9	1599.6	-21.4	-1107.9	1427.7	-55.6	-876.0	1394.2	0.10
Carbohydrate (g/d)	252.2	85.9	436.2	236.2	104.1	475.2	230.4	87.0	468.9	0.42
Carbohydrate (%)	48.3	28.3	61.5	47.7	32.0	60.6	41.4	28.6	56.1	**0.04**[a-c]
Protein (g/d)	71.1	26.3	134.9	71.0	34.5	127.6	81.2	37.9	145.1	0.19
Protein (%)	13.4	8.1	21.9	14.1	10.4	20.8	14.5	10.0	21.4	0.29
Fat (g/d)	85.4	44.1	144.6	83.2	36.6	159.0	97.3	59.4	157.7	0.08
Fat (%)	36.3	25.3	54.6	38.2	26.1	50.1	40.9	30.5	56.9	0.08
Saturated fat (g/d)	32.4	16.0	60.7	31.7	14.3	75.5	36.6	17.8	63.1	0.12
Saturated fat (%)	14.2	8.1	22.1	14.8	9.2	22.0	15.4	8.7	24.6	0.50
MUFA (g/d)	30.9	16.6	64.5	30.9	14.6	65.3	37.9	18.6	87.0	**0.02**[a-c]
MUFA (%)	13.8	8.7	24.3	14.3	9.4	21.4	16.5	9.6	31.8	**0.03**[a-c]
PUFA (g/d)	12.3	4.4	39.2	13.1	3.6	43.7	13.1	5.3	26.6	0.80
PUFA (%)	5.2	3.2	15.2	5.9	2.5	14.6	6.1	3.9	8.1	0.57
Omega 3 fatty acids (%)	0.6	0.4	0.9	0.6	0.4	1.1	0.7	0.5	1.2	0.09
Omega 6 fatty acids (%)	4.6	2.7	14.8	5.3	2.10	13.9	5.5	3.1	7.5	0.59
Total fiber (g/d)	25.3	8.9	44.7	25.3	12.0	44.4	24.6	5.0	49.3	0.80
Soluble fiber (g/d)	7.1	2.3	13.4	7.2	4.0	13.5	7.0	1.8	12.8	0.89
İnsoluble fiber (g/d)	18.4	6.6	32.3	17.7	8.0	31.3	17.7	3.3	36.6	0.86

* Kruskal-Wallis test
BMI: Body Mass Index, **BMR:** Basal Metabolic Rate, **MUFA:** Monounsaturated fatty acid, **PUFA:** Polyunsaturated fatty acid
a: Normal, **b:** Overweight, **c:** Obese

similar results as the prevalence of coexistent diseases like hypertension and goiter were higher in obese individuals.

Energy balance and diet composition are the main factors for obesity. Increased energy intake and decrease in energy expenditure results in weight gain (14). In addition, the dietary composition of macronutrients is associated with an increased risk of obesity. Studies on the effects of low CHO/high fat, low fat/high CHO diets on body composition and weight loss are conflicting (15,16). In this study, obese individuals consumed lower carbohydrate and higher fat than individuals under normal weight suggesting that diets in high fat may contribute to the development of obesity. In a 16-week dietary intervention study, obese women lost more body weight (13.5±1.2%) in high CHO/low-fat diet (60/20%), whereas weight loss was lower in low CHO /high-fat diet (40/40 %) (17). In another study, low fat/high CHO (20-25/60-65%) and moderate fat/low CHO (40-45/40-45%) hypoenergetic diets were applied to obese women for 10 weeks remarking that energy restriction was more influential of adipose gene expression than the composition in fat and CHO. However, participants' anthropometric measurements didn't differ in terms of diets (18). When dietary intervention studies for 6 months or more with low CHO (≤45%) and low-fat diets (≤30%) were compared in a meta-analysis study, low CHO diets were found to be as effective as low fat diets at reducing weight and improving the metabolic risk factors in obese individuals, although reductions in anthropometric measurements didn't differ between groups (19).

The dietary fat distribution is also a key factor in the development of obesity and related metabolic diseases. High saturated fat intake may lead to lipogenesis and increase the risk for obesity (20). In our study, saturated fat intake was higher than the recommendations in the

obese group suggesting that it may lead to adiposity. The effects of different fats on weight gain in women were evaluated in Nurse's Health Study regarding that overall fat intake had a weak positive correlation whereas saturated and trans fat had a stronger influence on weight gain (21). Enos *et al*., (22) examined the influence of different dietary saturated fat distributions (6%, 12% and 24%) on adiposity resulting that 12% saturated fat intake led to the greatest adiposity and macrophage infiltration and insulin resistance, whereas 24% saturated fat diet had the lowest influence on these outcomes in mice. On the contrary, PUFAs and MUFAs play an important role in weight management and diminishing abdominal obesity by improving insulin sensitivity, maintaining blood lipids or gene expression (23,24,25). Recently, few studies have shown the influence of MUFAs in the prevention of high blood lipids when replaced with saturated fatty acids (26,27). Hunter *et al*., (26) collectively demonstrated that when oleic acid was replaced with stearic acid, stearic acid was more prone to increase LDL cholesterol, total/HDL cholesterol ratio and decrease HDL cholesterol compared to oleic acid. These results suggest that replacement of MUFAs with SFA may reduce the risk of obesity by lowering blood lipids. Another study substituting MUFA for saturated fat in normal and overweight individuals indicated that MUFA rich diet (17% saturated fat, 14% MUFA, 6% PUFA) improved insulin sensitivity compared to saturated fat rich diet (8% saturated fat, 23% MUFA, 6% PUFA) ;however, positive impact of MUFA wasn't seen in individuals with high fat intake (above 37%) (27). Our data show that MUFA intake of the obese group was above the recommendations; however, high total and saturated fat intake may have contributed to obesity by inhibiting the beneficial effect of MUFA.

Conclusion

Obesity is a global health problem especially among working women due to several factors like sociodemographic characteristics, unhealthy eating habits or physical inactivity. Based on the findings of this study, obesity wasn't associated with age, marital status and education level in women. In addition, obesity may influence the development of other chronic diseases as for hypertension and goiter were the most coexistent diseases in this study. According to the low CHO and high fat intake of obese women, BMI status may be associated with unhealthy eating habits. Moreover, an unbalanced dietary fat composition like high saturated fat intake may contribute to the development of obesity. Consequently, female workers are at increased risk of obesity specifically due to several environmental risk factors. For this reason, it is important for health care providers to educate women about health and nutrition and take precautions against these risk factors in order to enhance the quality of life and ease the burden of obesity.

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