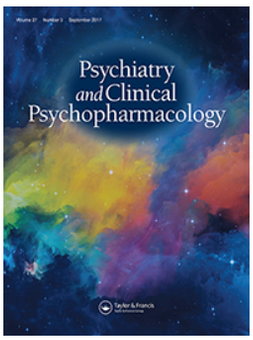

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Evaluation of peer effects on eating behaviors: a cluster analysis approach

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ABSTRACT

Objectives: In this study, we aimed to determine the effects of socio-demographic characteristics and the peer groups on the eating attitude and body mass index (BMI) of students at a medical school in Turkey.

Methods: This cross-sectional study was conducted with the participation of the students of Gulhane Military Medical Academy (GMMA). Ethical permissions of the study were obtained from the GMMA Ethics Committee. The target population of the study consisted of 703 students, 533 of whom (75.8%) agreed to participate in the study. The Eating Attitudes Test (EAT) was administered to the participants and their BMI was noted. The EAT consists of 10 questions that measure the socio-demographic characteristics of the participants and 40 questions that evaluate eating habits. In order to determine the peer groups of the students, each student was asked to provide the numbers of their three closest friends. Three peer groups were generated for each grade by applying cluster analysis and as a result 18 peer clusters were examined.

Results: In this study, the average EAT score was 12.5 ± 6.9, and the mean BMI was 23.1 ± 2.4. It was found that the EAT score of 2.4% of the students was equal to or exceeding 30; 0.4% were obese; 21.0% were overweight; and 2.1% were slim. There was a significant difference between the grade level of the students and sport habits (p values respectively; $p < .001$, $p = .015$) in terms of the comparison of the EAT score to socio-demographic characteristics. In the analysis of variance between 18 clusters generated according to the cluster analysis, a statistically significant difference was found in terms of both BMI and the EAT (p values <.001, <.001, respectively). This suggests that students with similar eating habits and similar BMI levels have a tendency to cluster among similar peer groups. The variables that effect the EAT scores and BMI levels of the students were evaluated by the analysis of covariance. It was found that students' smoking status ($p = .039$) had a statistically significant effect on BMI after it was adjusted according to peer group and grade. Also, it was found that the grade ($p = .011$) and peer cluster ($p = .021$) had a statistically significant effect on eating habits.

Conclusions: The peer groups may affect both eating attitudes and BMIs. In medical literature several studies exist that support these findings. But it is a novel approach to identify peer groups by using clustering algorithms and our study has been able to demonstrate the relationship of peer group and eating habits with this method.

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Peer effect; eating behavior; cluster analysis; epidemiologic study

Introduction

Personality is the unique image of the factors that affect perception, thinking, and behavior patterns of a human being. As well as one's innate characteristics, family, and environment also have an influence on the formation of personality. Personality, which is continually under the influence of internal and external stimuli, involves all of the behaviors of an individual [1].

The college/university education period of one's life is not only the final phase of puberty, but it also forms a very important period in which the physical, social, and psychological health and behavior development are shaped and personal traits become evident [2]. Previous research has shown that young adults gain power and a sense of belonging and confidence within small and large group environments. In these groups, individuals decide with their peers to jointly participate in activities that they would not do these alone. Behaviors, such as acquiring prestige, moving freely, and developing good and bad habits are acquired in these groups. Thus, peer groups form the main source of approval and rejection of the attitudes and behaviors of most individuals [3].

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†This manuscript was dedicated to Professor Necmettin Kocak, one of the prolific researchers from Gulhane Military Academy, who died due to Multiple Myeloma complications during the revision of this manuscript. He was a brilliant physician and astute researcher. The death of Prof. Necmettin Kocak is an irreplaceable loss for his colleagues. The legacy of his work will continue much beyond this manuscript and he will always be dearly missed.

Family structure and habits acquired in the family also affect many activities including eating behaviors in adolescents. For example, frequent family meals were found to be inversely associated with eating disorders (EDs) [4]. Health-related behaviors such as eating habits and physical activity can change through family and peer norms and modeling [5]. Peer effects have been determined to be an important target for health promotion interventions in a social context [6]. There are some findings that show that peer exposure is more associated with unhealthy behaviors than healthy behaviors [7].

Peers are people of the same age and position as an individual [8]. Although the quality of peer relationships and the effects of socio-cultural environment on eating behaviors have been examined in previous studies [9,10], the effects of the individually chosen friends have yet to be examined. There are no studies that directly examine the effects of the peer group on eating behavior. This study examines the effects of socio-demographic characteristics on medical school students and the peer groups formed by cluster analysis on the Eating Attitude Test (EAT) and body mass index (BMI).

Material and methods

This cross-sectional study was conducted with the participation of the students and faculty members at the Gulhane Military Medical Academy (GMMA). In this study the sample was not selected in an effort to research the general population.

The data for this study were obtained after obtaining the necessary administrative permissions from the GMMA. Required ethical permissions of the study were obtained from the GMMA Ethics Committee.

Some demographic characteristics and life style choices were questioned. The questions in these forms were determined according to the medical literatures. The EAT was administered to the participants. The EAT consists of 10 questions that measure the socio-demographic characteristics of the participants and 40 questions that evaluate eating habits. In order to determine the peer group of the students, each student was asked to provide the numbers of their three closest friends. Three peer groups were generated in each group by means of cluster analysis. In this way the data and eating behaviors of these groups and their effects on BMI were investigated.

Our study groups included young students and changes between the statuses of the participants were frequent. We decided to use "never smoker" definition to determine smoking status. According to The Centers for Disease Control and Prevention, never smoker is defined as adults who have never smoked a cigarette or who smoked fewer than 100 cigarettes in their entire lifetime [11].

BMI

BMI is an index formulated by the World Health Organization (WHO) to identify obesity. It is calculated by dividing the person's weight (in kilograms) by the square of their height in meters (kg/m^2) [12].

EAT-40

The EAT was developed as a self-rating scale screening instrument developed by Garfinkel and Gardner to measure symptoms of anorexia nervosa, and it has been adapted into Turkish by Savasir and Erol [13,14]. The EAT is a six-point multiple choice Likert scale consisting of 40 items with a cut-off score of 30. In our study, a psychiatric interview by a psychiatrist using criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) was conducted with individuals with high EAT scores at the end of the study process [15].

When a response to Questions 1, 18, 19, 23, 27, or 39 in the scale was given as sometimes, it was evaluated as one point; rarely, as two points; never, as three points; and other options were zero points. When the response given to other questions of the scale was always, it was calculated as three points; very often as one point; and other options as zero points. The total score of the scale was acquired by adding the points obtained from each question.

Cluster analysis

Data universe is composed of open or hidden clusters. The method used to determine these groups is known as cluster analysis. Subgroups rather than individual data can be more easily analyzed and created in this way. Different methods can be used according to the properties of the clusters desired to be generated and determine the types of independent variables and measurements of the similarities. Two-stage cluster analysis is an approach used to discover the hidden clusters and can be used for both categorical and continuous variables. The number of clusters to be created can be determined by the model automatically as well as by the researchers. This method is appropriate for analyzing a large number of cases.

In order to determine the peer group of students and obtain relatively homogeneous cases, cluster analysis has been performed. A cluster analysis was run on 533 cases, each responding to items on close friends. Using a two-step cluster analysis produced three clusters for each grade [16–18].

Statistical analysis

In this study, students' hometowns have been grouped as Westen, Eastern, Northern, Southern, and Central

Anatolia, according to the quinary zoning system prepared by the Turkish Statistical Institute, and foreign students are labeled as "overseas" students [19].

The data obtained have been computerized by using the SPSS statistical software package. Frequency, percentage, mean, and standard deviation have been used as descriptive statistics. The Kolmogorov–Smirnov test was used to evaluate whether the continuous variables were normally distributed. One-way ANOVA and Student *t* test were used in the comparisons. Tukey's Post hoc test was used for pairwise comparisons. Pearson's correlation was used in the correlation of EAT and BMI points. ANCOVA analyses were used for multivariate statistics. The variables that affect the EAT scores and BMI levels of the students were examined by multivariate analysis of covariance. Statistical significance was considered at $p < .05$.

Results

The target population of the study consisted of 703 students, 533 of whom (75.8%) agreed to participate in the study. When the socio-demographic data of the participants were examined, it was determined that the first university level constituted the most populous class with 23.8% ($n = 127$). When the regional distributions of hometowns were examined, most participants 27.0% ($n = 138$) were from Central Anatolia. In total, 70.3% ($n = 351$) of their families reside in the city center. Maternal education showed that 36.4% ($n = 194$) graduated from secondary school, whereas paternal education showed that 40.1% ($n = 212$) had postgraduate education. The smoking and sports habits of the participants indicated that 80.9% of the participants ($n = 431$) did not smoke and 49.5% of them did not regularly engage in sports.

In this study, the average EAT score was 12.5 ± 6.9, and the mean BMI was 23.1 ± 2.4. It was found that the EAT score of 2.4% ($n = 13$) of the students was 30 and over. Two of the 13 participants could not be reached because they had relocated. No individual has taken a diagnosis of any malnutrition or ED at a clinically significant level. Also, it was found from the BMI score that 0.4% students ($n = 2$) were obese; 21.0% ($n = 112$) were overweight; and 2.1% ($n = 11$) were slim. In the comparison of the EAT score to socio-demographic characteristics, there was a significant difference between the grade level and sport habits

Table 1. Socio-demographic characteristics of the participants and comparison of these characteristics according to BMI and EAT.

				BMI		EAT	
Characteristic		*n*	%	Mean	SD	Mean	SD
Grade	1	127	23.8	22.8	2.4	13.0	7.7
	2	126	23.6	22.4	2.4	11.4	5.3
	3	91	17.1	23.4	2.0	11.0	5.3
	4	69	12.9	23.5	2.3	12.2	7.2
	5	75	14.1	24.1	2.2	15.4	8.4
	6	45	8.4	23.3	2.3	12.4	6.3
	p			$F = 6.37$, $p < .001$* [a,b,c,d]		$F = 4.59$, $p < .001$*[d,e]	
Hometown in Anatolia	Western	132	25.8	23.0	2.3	11.2	6.0
	Southern	47	9.2	23.0	2.5	12.1	5.8
	Central	138	27.0	23.0	2.4	12.6	7.0
	Northern	49	9.6	23.3	2.3	11.9	7.4
	Eastern	65	12.7	23.6	2.1	12.9	7.7
	Abroad/overseas	80	15.7	22.8	2.4	12.8	6.2
	P			$F = 1.22$, $p = .301$*		$F = 1.03$, $p = .400$*	
Place of residence	Village	60	12.0	23.2	2.1	12.4	6.0
	Town – district	88	17.6	23.3	2.3	12.8	7.6
	City	351	70.3	23.1	2.4	12.3	6.7
	p			$F = 0.44$, $p = .645$*		$F = 0.16$, $p = .850$*	
Sport status	Never	19	3.6	23.0	2.7	9.8	4.4
	Irregular	264	49.5	23.2	2.2	12.7	6.8
	Regular rarely	173	32.5	23.0	2.4	11.6	7.0
	Regular often	77	14.4	23.1	2.7	14.1	7.1
	p			$F = 0.25$, $p = .862$*		$F = 3.53$, $p = .015$*[,f]	
Mother education level	Elementary school	45	8.5	23.4	2.2	12.4	8.4
	Secondary school	194	36.7	23.2	2.3	11.9	6.8
	High school	73	13.8	23.0	2.4	11.9	5.6
	University	102	19.3	23.0	2.5	13.9	8.0
	Postgraduate	115	21.7	23.2	2.4	12.4	5.7
	p			$F = 0.31$, $p = .870$*		$F = 0.56$, $p = .183$*	
Father education level	Elementary school	10	1.9	22.8	1.9	9.3	2.9
	Secondary school	115	21.7	23.3	2.5	12.6	7.6
	High school	56	10.6	23.1	2.5	12.3	6.4
	University	136	25.7	23.1	2.4	12.7	7.5
	Postgraduate	212	40.1	23.1	2.3	12.5	6.2
	p			$F = 0.19$, $p = .946$*		$F = 0.60$, $p = .666$*	
Smoking status	Never smoking	431	80.9	23.0	2.3	12.4	6.9
	Smoking/smoked	102	19.1	23.7	2.4	12.9	6.9
	p			$T = 2.90$, $p = .004$**		$T = 0.74$, $p = .460$**	

Note: Statistically significant differences between a: 2nd-3rd, b: 2nd-4th, c: 5th-1st, d: 5th-2nd, e: 5th-3rd graders, f: never regular oftenly, according to Tukey's HSD tests.

*One-way ANOVA test, **Independent sample *t* test was used in the comparison.

Table 2. Comparison of 18 peer groups generated as a result of cluster analysis according to BMI and EAT.

Characteristic	BMI		EAT	
	Mean	SD	Mean	SD
Peer group (*n*)				
1 (38)	23.7	2.4	16.8	9.9
2 (38)	22.7	2.0	9.5	4.9
3 (51)	22.3	2.5	12.9	6.2
4 (56)	22.4	2.8	12.3	6.2
5 (36)	22.9	2.1	10.1	2.5
6 (34)	21.8	2.1	11.2	5.7
7 (30)	23.0	1.6	11.0	4.5
8 (32)	22.8	2.0	10.4	5.2
9 (27)	24.6	2.0	11.6	6.4
10 (21)	23.8	1.8	14.9	8.6
11 (30)	23.0	2.4	11.8	6.4
12 (17)	23.9	2.5	8.8	4.2
13 (18)	23.8	2.2	18.4	9.4
14 (32)	23.8	2.4	17.5	8.5
15 (25)	24.8	1.8	10.6	4.8
16 (11)	24.6	1.8	7.7	3.9
17 (14)	22.8	2.0	10.4	3.2
18 (19)	23.0	2.6	16.9	6.5
p	$F = 4.09$, $p < .001$*		$F = 5.97$, $p < .001$	

*One-way ANOVA was used.

(p values respectively; $p < .001$, $p = .015$). It was found that a significant difference was found in the fifth-grade medical students (M5) and for those who regularly engaged in sports. When BMI values were compared to socio-demographic characteristics, a significant difference was found between the grade level and smoking habits (p values respectively; $p < .001$, $p = .004$). It was determined that this significant difference results from the higher BMI scores among the fifth-grade medical students and the "smoking"/"used to smoke" group (Table 1).

There is not an important correlation found between EAT and BMI scores, the correlation coefficient was too weak ($p = .030$, $r = 0.094$).

In the analysis of variance between 18 clusters generated according to the cluster analysis, a statistically significant difference was found in terms of both BMI and the EAT (p values <.001, <.001 respectively). This suggests that students with similar eating habits and similar BMI levels have a tendency to cluster among similar peer groups (Table 2).

The variables that effect the EAT scores and BMI levels of the students were evaluated by the analysis of covariance. As seen in Table 3, it was found that students' smoking status ($p = .039$) had a statistically significant effect on BMI after it has adjusted according to peer group and grade. Also, it was found that the grade ($p = .011$) and peer cluster ($p = .021$) had a statistically significant effect on eating habits.

Table 3. Evaluation of peer group effect on EAT-40 and BMI level and other covariates by analysis of covariance.

	EAT			BMI		
Source	Type III Sum of squares	*F*	*p*	Type III Sum of squares	*F*	*p*
Grade	299.757	6.445	0.011	5.498	1.021	0.313
Peer group	249.378	5.362	0.021	0.838	0.156	0.693
Smoking	0.440	0.009	0.923	23.168	4.303	0.039

Discussion

The grade level of the university students and the EAT and BMI have been compared, and significant differences were found. There were statistically significant differences between second–third, second–fourth, and fifth–first grades in terms of BMI and between fifth–second and fifth–third grades in terms of EAT scores.

Many factors such as gender, family, environment, and education have effects on eating attitudes. The effects of socio-demographic characteristics on the EAT score showed that students' hometowns, places of residence, and parental education did not have a statistically significant effect on eating attitudes. However, EAT scores have been found to be statistically high among those who regularly engage in sports. In a study carried out by Al-Subaie et al., it was determined that BMI, speaking a different language, and living in a different country for a period had an effect on eating attitude. It was shown that a small family structure and higher parental education also had an effect on a person's diet [20]. In a study conducted by Wong et al., it was determined that the factors affecting eating attitudes are gender, body weight, body dissatisfaction, and the expected shape of the body [21]. Consistent with this, Toro et al. carried out study in adolescents, the highest EAT scores were obtained from girls, older adolescents, overweight adolescents, adolescents imposing restrictive diets, and people who thought that they were obese and wanted to change their body size [22]. In our study, a statistically significant relationship has not been found between the EAT scores and the BMI scores of participants. Additionally, it was found that BMI and EAT scores had weak positive correlations.

The relationship between smoking and BMI in adults is still controversial. When the effects of smoking on the EAT and BMI were examined in this study, a statistically significantly higher BMI was identified among the "smokes"/"smoking" group, but no significant differences were found in the EAT. This finding about smoking was very significant in our study. Even after it had been adjusted according to peer group and grade by the analysis of covariance, students' smoking status had a statistically significant effect on BMI. Consistent with our study, some studies have also indicated that smokers have higher BMI scores [23–25]. In another study by Liu et al. on Taiwanese adolescents, it was found that higher BMI scores were obtained from those using alcohol and having a low paternal education level [26]. There are several explanations for the relation between smoking and increased BMI in the literature. These include obese adolescents who try to lose weight and are more likely

to smoke [27,28]; smoking increases BMI by changing the glucocorticoid metabolism [25], and the BMI correlates with central dopaminergic activity [29]. In addition, it has been shown that the dopaminergic activity is associated with smoking [30]. This information suggests that central neurotransmitters play an important role in the relationship between smoking and BMI.

EDs are a major problem for young people at college [31]. It has been emphasized that genetic, biological, social, and other factors have an influence on these disorders and cultural and ethnic differences may also have an impact [32,33]. Similarly, it has been suggested that there may be possible links between body image, stress level, personality characteristics, and intra-damaged family relationships [34,35]. Family structure seems to have an especially significant impact on eating behavior, but it has been reported that new research should be conducted with different variables on this subject [36,37]. Common findings related to EDs in previous studies include: disorders are more prevalent in girls, comorbid psychiatric diagnoses (especially major depressive disorder) often occur, and the diagnoses of disease has occurred at lower rates compared to eating attitude disorders [38–40]. In our study, it was found that EAT scores for 2.4% ($n = 13$) of the participants in the study were at the cut-off score of 30 and over. In a recent study on an extensive sample, it was found that there may be EDs in 5.25% of the sample; following the structured clinical interviews, the frequency of ED has been found as 1.52% [41]. In another study, 4.83% of the participants received points over the EAT cut-off score [42]. The rate in our study was lower than the ones in previous studies. These differences can be explained by the fact that the majority of the participants in our study were men.

Nutrition and EDs have been classified as pica, rumination disorder, avoidant/restricted food intake disorder, anorexia nervosa, bulimia nervosa, englutting ED, and other and unspecified eating and nutrition disorders classified in the DSM-5 [15]. In a previous study carried out using the DSM-IV criteria, the prevalence of bulimia nervosa was 0.63%; the prevalence of englutting ED was 0.81%, and the prevalence of an ED diagnosis was significantly higher in women. Comorbid I axis diagnosis has been found in 47% of patients with the most common comorbid major depressive disorder [41]. In our study, not determining intense symptoms at a level to diagnose in the interview using DSM 5 criteria in individuals with high EAT scores accounts for the low diagnosis rates especially determined in men in previous studies. In another study, it was found that point prevalence was 0.034% for anorexia nervosa, 0.79% for bulimia nervosa, 1.51% for EDs that cannot be specified, 0.99% for englutting ED, and 2.33% for all EDs. Furthermore, it was found that only englutting ED was diagnosed for male students [43]. Variables directly associated with men need to be further studied [15]. Conducting our study in a separate population in a communal living space may also have influenced the results. Thus, girls with some level of depression showed a greater tendency to adopt EDs as a daily habit [44].

As well as the influence of biological factors, intra-family relationships have a significant role in the etiology of EDs. For example, it is thought that for patients with anorexia nervosa, the fundamental process is a mental organization that rejects the basic processes of individuation and independence of puberty, and this process becomes evident in puberty [45]. In addition, it is reported that psychiatric conditions/disorders such as broken family relationships, depression, anxiety, alcoholism, and EDs have been more frequently encountered in families of patients with EDs [46].

It has been previously highlighted that negative relationships of the person with the people they are connected to could be related to insecure attachment styles [47]. In this context, peer relationships are important for the population who are attending the college/university, as the majority of them are living separate from their families and in another city.

Peer relationships influence every period of human life and the same age groups' affecting each other is more frequent among adults [48,49]. Great importance has been given to peers in regard to taking advice and modeling during the college/university education period. This attitude is especially prominent in daily events, fashion, and free time activities [50]. In this study undertaken by medical students, in the variance analysis carried among 18 peers clusters formed according to clustering analysis, statistically significant differences have been found in terms of the EAT. Students with similar eating attitudes have a tendency to cluster in the same peer group. Also the variables effecting the EAT scores and BMI levels have been analyzed as multivariate by the analysis of covariance, it was found that students' smoking status had a statistically significant effect on BMI. Also, the grade and peer cluster had a statistically significant effect on eating habits.

These results support our hypothesis that peer groups will have an important role among students at this age, and it is an important finding that previous studies have pointed out but not studied directly. In the literature, there are no studies which directly compare the effects of peer groups on the EAT and BMI. Presenting this relationship with this work is an important finding of this study.

The limitations of the study include not administering a psychiatric interview to all of the participants. Furthermore, the population of the study comprised men to a large extent. Conducting a similar study with a group consisting of primarily women will help

to evaluate the results of the present study. Another limitation is the co-linearity of the grade and the peer groups. But when we evaluated the variables in the same equation, both of them were found to be statistically significant. We thought that removing one of them would not end up in a biased result.

Conclusion

The peer groups may affect both eating attitudes and BMIs. In medical literature many studies exist that would support these findings. But this present study has a novel approach to identify peer groups by using clustering algorithms.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

[1] Tinar MY. Work life and personality. Mercek J. 1999;14. Mess Press. Turkish.

[2] Bao XM, Ji CY, Yin XJ. Analysis on the trends of the Chinese university students' physical change from 1985 to 2005. Mod Preventive Med. 2008;35:17.

[3] Horroks J. Adolescent attitudes and goals. Chicago (IL): Aldine Publications; 1965; p. 15–27.

[4] Harrison ME, Norris ML, Obeid N, et al. Systematic review of the effects of family meal frequency on psychosocial outcomes in youth. Can Fam Physician. 2015;61(2):e96–e106.

[5] te Velde SJ, Chin APaw MJ, De Bourdeaudhuij I, et al. Parents and friends both matter: simultaneous and interactive influences of parents and friends on European schoolchildren's energy balance-related behaviours – the ENERGY cross-sectional study. Int J Behav Nutr Phys Act. 2014;11:82.

[6] Dohnke B, Steinhilber A, Fuchs T. Adolescents' eating behaviour in general and in the peer context: testing the prototype-willingness model. Psychol Health. 2015;30(4):381–399.

[7] Shin HS, Valente TW, Riggs NR, et al. The interaction of social networks and child obesity prevention program effects: the pathways trial. Obesity (Silver Spring). 2014;22(6):1520–1526.

[8] Sadikoglu G. Peer relationships and problems. Family psychology and education. Dursun G, editor. Eskisehir: Anadolu University Press, 2002. p. 58–63. Turkish.

[9] Le Grange D, O'Connor M, Hughes EK, et al. Developmental antecedents of abnormal eating attitudes and behaviours in adolescence. Int J Eat Disord. 2014;47(7):813–824.

[10] Verstraeten R, Van Royen K, Ochoa-Avilés A, et al. A conceptual framework for healthy eating behavior in Ecuadorian adolescents: a qualitative study. PLoS One. 2014;9(1):e87183.

[11] NHIS - Adult tobacco use - Glossary [Internet]. [cited 18 Jun 2017]. Available at https://www.cdc.gov/nchs/nhis/tobacco/tobacco_glossary.htm

[12] Body mass index - BMI. In: Nutrition:a healthy lifestyle [Internet]. World Health Organization; [cited 18 Jun 2017]. Available at http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi

[13] Garner DM, Garfinkel PE. The eating attitudes test: an index of the symptoms of anorexia nervosa. Psychol Med. 1979;9(2):273–279.

[14] Savasir I, Erol N. Eating attitudes test: anorexia nervosa symptoms index. J Psychol. 1989;7(23):19–25.

[15] American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington (VA): American Psychiatric Association; 2013.

[16] Chan MF, Ho A, Day MC. Investigating the knowledge, attitudes and practice patterns of operating room staff towards standard and transmission-based precautions: results of a cluster analysis. J Clin Nurs [Internet]. 2008 [cited 2015 Jan 4];17(8):1051–1062.

[17] Haldar P, Pavord ID, Shaw DE, et al. Cluster analysis and clinical asthma phenotypes. Am J Respir Crit Care Med [Internet]. American Thoracic Society, 2008 [cited 2014 Dec 9];178(3):218–224.

[18] Alpar R. Introduction to the applied multivariate statistical methods 1 [Internet]. Nobel Publishing; 2003 [cited 2015 Jan 4]. Available from: https://books.google.com/books?id=GD-qXwAACAAJ&pgis=1

[19] [19] Turkey Demographic and Health Survey 1993, Ministry of Health (Turkey), Hacettepe University Institute of Population Studies and Macro International, Inc., Turkey, XVIII; 1994.

[20] Al-Subaie AS. Some correlates of dieting behavior in Saudi schoolgirls. Int J Eat Disord. 2000;28(2):242–246.

[21] Wong Y, Lin JS, Chang YJ. Body satisfaction, emotional intelligence, and the development of disturbed eating: a survey of Taiwanese students. Asia Pac J Clin Nutr. 2014;23(4):651–659.

[22] Toro J, Castro J, Garcia M, et al. Eating attitudes, sociodemographic factors and body shape evaluation in adolescence. Br J Med Psychol. 1989;62(Pt 1):61–70.

[23] Canoy D, Wareham N, Luben R, et al. Cigarette smoking and fat distribution in 21,828 British men and women: a population-based study. Obes Res. 2005;13(8):1466–1475.

[24] Chiolero A, Jacot-Sadowski I, Faeh D, et al. Association of cigarettes smoked daily with obesity in a general adult population. Obesity (Silver Spring). 2007;15(5):1311–1318.

[25] Saarni SE, Pietilainen K, Kantonen S, et al. Association of smoking in adolescence with abdominal obesity in adulthood: a follow-up study of 5 birth cohorts of Finnish twins. Am J Public Health. 2009;99(2):348–354.

[26] Liu TL, Yen JY, Ko CH, et al. Associations between substance use and body mass index: moderating effects of sociodemographic characteristics among Taiwanese adolescents. Kaohsiung J Med Sci. 2010;26(6):281–289.

[27] Koval JJ, Pederson LL, Zhang X, et al. Can young adult smoking status be predicted from concern about body weight and self-reported BMI among adolescents? Results from a ten-year cohort study. Nicotine Tob Res. 2008;10(9):1449–1455.

[28] Kaufman AR, Augustson EM. Predictors of regular cigarette smoking among adolescent females: does body image matter? Nicotine Tob Res. 2008;10(8):1301–1309.

[29] Chen PS, Yang YK, Yeh TL, et al. Correlation between body mass index and striatal dopamine transporter availability in healthy volunteers-a SPECT study. Neuroimage. 2008;40(1):275–279.

[30] Yang YK, Yao WJ, Yeh TL, et al. Decreased dopamine transporter availability in male smokers – a dual isotope SPECT study. Prog Neuropsychopharmacol Biol Psychiatry. 2008;32(1):274–279.

[31] Ilhan MN, Ozkan S, Aksakal FN, et al. Possible frequency of eating disorders in the medical students. J Psychiatry Turkey. 2006;8(3):151–155. Turkish.
[32] Akdeniz F. The etiology of eating disorders and the role of leptin in the treatment. Periodicals Ege Psychiatry. 1999;4(2):185–202. Turkish.
[33] Gitau TM, Micklesfield LK, Pettifor JM, et al. Eating attitudes, body image satisfaction and self-esteem of South African black and white male adolescents and their perception of female body silhouettes. J Child Adolesc Ment Health. 2014;26(3):193–205.
[34] Hay P, Williams SE. Exploring relationships over time between psychological distress, perceived stress, life events and immature defense style on disordered eating pathology. BMC Psychol. 2013;1(1):27.
[35] Oktay M, Baltaci I. The psychology of eating disorders. Turkiye Klinikleri J Psychiatry-Special Topics. 2008;1(1):21–26.
[36] Mateos-Agut M, García-Alonso I, De la Gándara-Martín JJ, et al. Family structure and eating behaviour disorders. Actas Esp Psiquiatr. 2014;42(6):267–280.
[37] Siyez DM, Uzbas A. The relationship between the anorexic eating attitudes of a group of university student and the family structure. New Symposium. 2006;44(1):37–43. Turkish.
[38] Maner F. Eating disorders. Compilations, Facts and Assumptions in Psychiatry (RCHP). 2007;1(1):21–28. Turkish.
[39] Memon AA, Adil SE, Siddiqui EU, et al. Eating disorders in medical students of Karachi, Pakistan-a cross-sectional study. BMC Res Notes. 2012;5:84.
[40] Unsal A, Ayranci U, Arslan G, et al. Connection between eating disorders and depression among male and female college students in Kutahya, Turkey. Journal of Anatolian Psychiatry. 2010;11(2):112–119.
[41] Semiz M, Kavakci O, Yagiz A, et al. The prevalence of eating disorders and comorbid psychiatric disorders in the Sivas province. Turkish J Psychiatry. 2013;24 (3):149–157. Turkish.
[42] Toker DE, Hocaoglu C. The relationship between eating behaviours and socio-demographic characteristics of K.T.U. Trabzon health high school students. Anatolian J Psychiatry. 2009;10(Appendix 1):91–92.
[43] Vardar E, Erzengin M. The prevalence of eating disorders (EDs) and comorbid psychiatric disorders in adolescents: a two-stage community-based study. Turkish J Psychiatry. 2011;22(4):205–212. Turkish.
[44] Fortes LD, Filgueiras JF, Ferreira ME. Risk behaviours for eating disorders and depressive symptoms: a study of female adolescents in Juiz de Fora, Minas Gerais State, Brazil. Cad Saude Publica. 2014;30(11):2443–2450.
[45] Ertan T. Characteristics of family structure in eating disorders; properties of interference each others of individuals in the family media. Turkiye Klinikleri Special J Psychiatr. 2008;1(1):17–20. Turkish.
[46] Toker DE, Hocaoolu C. Eating disorders and family structure: a review. Dusunen Adam J Psychiatry Neurol Sci. 2009;22(1–4):36–42. Turkish.
[47] Alantar Z, Maner F. Eating disorders from the point of the attachment theory. Anatolian J Psychiatry. 2008;9 (2):97–104.
[48] Bayraktar F. The importance of parent/peer relationships in positive adolescent development. Turkish J Child Adolesc Mental Health. 2007;14(3):157–166. Turkish.
[49] Nazli S. Comprehensive developmental guidance program. 3rd ed. Ankara: Savas Press; 2008. p. 94–98. Turkish.
[50] Coleman, JC, Henry LB. The nature of adolescence. London: Routledge; 1999.