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The relationship between mindful eating, body mass index and physical activity in nursing students – a cross-sectional study

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ABSTRACT

Introduction. One of the reasons of obesity in university students might be mindful eating.

Aim. This study was performed to evaluate the relationship between mindful eating, body mass index (BMI) and physical activity in nursing students.

Material and methods. This cross-sectional study was conducted with 718 nursing students in a university in Turkey. "Personal Information Form" and "Mindful Eating Questionnaire (MEQ)" were used as data collection tools.

Results. Statistically significant differences were found between some mean subscale and total scores of MEQ based on sex of the students, their state of exercising regularly, number of their meals, their state of having snacks, the type of bread they often consumed and the frequency of eating fast foods ($p < 0.05$). A significant relationship was found between age and BMI of the students and their mean subscale and total scores of MEQ ($p < 0.05$).

Conclusion. The older the nursing students grew, the higher their level of mindful eating became. Sociodemographic characteristics such as sex and presence of a person with obesity within the family affected subscales of their mindful eating. Mindful eating decreased as body mass index increased; and besides, mindful eating increased as physical activity increased.

Keywords. appetite, mindful eating, obesity

Introduction

Obesity is one of the chronic diseases that are qualified among endemic diseases affecting every age group today. Obesity prevalence especially among universi- ty students has been reported to be high due to several reasons.[1,2] In the prevalence study by Peltzer et al. which was performed to determine obesity level among university students in 22 different countries, 18.9 % of the

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male students were overweight, 5.8 % of them were individuals with obesity and 14.1 % of the female students were overweight and 5.2 % of them were individuals with obesity.[2] Basu et al. reported in the study conducted with 278 university students that 28% of them were individuals with obesity and 20 % were overweight.[1] Obesity is the etiological factor in the origin of many diseases such as cardiovascular diseases, Type II diabetes, metabolic syndrome and cancer.[3] Therefore, interventions have great importance in the prevention of university students from obesity.

Most studies conducted to prevent the obesity among university students were generally performed to identify wrong dietary behaviors, promote healthy dietary behaviors and physical activity.[4,5] However, only interventions may not be enough for obesity since young adulthood period is now evaluated in the scope of adolescence period and these children should cope with the psychological and hormonal problems of adolescence period. In addition, having a dormitory life away from the family may negatively affect healthy dietary behaviors of the students materially and morally.[4]

The significant point of healthy nutrition is the generation of nutritional awareness. Nutritional awareness brings along mindful eating. Mindful eating is defined as "paying attention to an eating experience with all of our senses (seeing, tasting, hearing, smelling, feeling); witnessing the emotional and physical responses that take place before, during and after the eating experience. Mindful eating is a type of eating that requires focusing on the food to be consumed by noticing what, how and why the individual eats, by having a hunger-satiety awareness, by realizing his/her eating behaviours and without being affected from environmental factors.[6,7] Fundamentally, mindful eating involves eating slowly and without distraction, listening to physical hunger cues and eating only until you're full, distinguishing between real hunger and non-hunger triggers for eating, engaging your senses by noticing colors/smells/sounds/textures/flavors, learning to cope with guilt and anxiety about food, eating to maintain overall health and well-being, noticing the effects food has on your feelings and figure, and appreciating the food. These things allow you to replace automatic thoughts and reactions with more conscious, healthier responses. Mindful eating is a technique that helps you gain control over your eating habits. Mindful eating has been shown to promote weight loss, reduce overeating, and help person feel better.[8,9]

Aim

This study was performed to evaluate the association between mindful eating, body mass index (BMI) and physical activity in university students. In line with this purpose, this research will contribute to the literature on the following issues: (1) Estimation of the relationship between mindful eating and the physical activity can contributes to the decrease in obesity. (2) If the nurses are knowledgeable enough about mindful eating, they could advise people about the mindful eating both in clinics and social environments. The questions of this study areas follows:

1. Are there differences in mindful eating levels based on sex, family history of obesity, regular exercise, number of meals, snacks, balanced diet, type of bread consumed, frequency of fast food consumption?
2. Are there correlations between mindful eating scores, age and BMI?

Material and methods

Setting and sample

This cross-sectional study was carried out in a university in the Western Black Sea Region of Turkey. The study was conducted with nursing students due to their roles of health education and public awareness.The World Health Organization (WHO), on the other hand, defines 10-19 years as adolescence, 15-24 years as youth, and 10-24 years as young people, but considers these age groups within adolescent health.[10] The Healthy People Report has stated that the adolescence period extends up to the age of 25.[11] Our study was carried out on nursing students between the ages of 18-25 in adolescence. The universe of the study was composed of 944 nursing students in 2017-2018 academic years. The study was performed on whole universe without choosing a sample. The sample of the study included 718 nursing students who agreed to participate in the study during assigned dates (76.0% of the universe was reached). The inclusion criteria of the study are being a student in the departments of health, and a volunteer to participate in the study. The exclusion criteria of the study are not being a student in the departments of health and a volunteer to participate in the study.

In this study, 70.2% students were females, 29.8% were males, 55.4% were within the age of 21-25, 49.3% were within the weight of 60-90 kg, 77.9% were within the height of 160-180 cm, 3.5% had a problem with obesity, 15% were overweight, 72% were normal and 9.5% were underweight.

Data collection tools

The data were collected by "Personal Information Form" and "Mindful Eating Questionnaire (MEQ-30)".
Personal Information Form: This was a questionnaire form including open and close-ended questions prepared in accordance with the literature and expert opinions to identify the factors affecting sociodemographic characteristics and obesity.[6,7]

Mindful Eating Questionnaire (MEQ-30): Five items were taken from Mindful Eating Questionnaire (MEQ-28), and the remaining items were adapted from the same scale again; and the new scale was generated

with a total of 30 questions. When Likert-type scales are used in the studies, the number of options is generally five. For that reason, a 5-Likert type scale was used in the new version (1: never, 2: rarely, 3: sometimes, 4: often, 5: always). The subscales of the scale was classified into seven factors which were "Disinhibition", "Emotional Eating", "Eating Control", "Distraction", "Eating Discipline", "Awareness and Interference".[9]

Data collection

The study was conducted by the researchers between 03.01.2018-05.31.2018. The students were informed about the aim of the study in the classes at the arranged hours, and they were asked to participate in the study. Participation was on voluntary basis. Questionnaires were handed out to the students and they were asked to fill it out after they were informed briefly during the study.

Ethical considerations

An ethics committee approval and institutional authorization were obtained from Zonguldak Bülent Ecevit University Human Research Ethics Committee to conduct the study. The required written authorization was also obtained to use "Mindful eating questionnaire (MEQ-30).

Data assessment

Statistical Package for the Social Sciences 22.0 was used for statistical assessment. The normality of the data was assessed by Kolmogorow Smirnov test. In descriptive statistics, numerical data were expressed by mean ± standard deviation (minimum-maximum) and categorical data were expressed as numbers and percentages. Since parametric test assumptions could not be provided for numerical variables, Mann-Whitney U and Kruskal Wallis tests were used to compare both groups. Tukey test was used to determine where the difference originates in multiple comparisons. Correlation was assessed by Spearmen rho's test. The results were analyzed within a confidence interval of 95% and $p<0.05$ was considered as statistically significant.

Results

In this study, 64.5% had an irregular eating habit, 53.5% were eating a fixed menu at lunch, 58.8% were eating a fixed menu at dinner, 34.8% were eating candies, chocolates, etc. from canteen and 69.8% were often eating white bread. 23% students were smoking, 15.3% were consuming alcoholic drinks, 86.2% were eating fast-food and 64,8% were consuming sugar. Moreover,

Table 1. Comparison of mean scores from subscales of mindful eating questionnaire based on descriptive characteristics and physical activities (n=718)

Mindful eating questionnaire subscales	Characteristics					
	Sex		Familial history of obesity		Regular exercise	
	Female	Male	Yes	No	Yes	No
Disinhibition Mean±SD (min-max)	15.66 ± 3.86 (5-25)	15.53 ±11.12 (8-25)	15.29 ± 3.78 (5-25)	15.68 ± 3.75 (8-25)	16.19 ± 4.39 (5-25)	15.42 ± 3.48 (5- 25)
	U: -0.532; p: 0.594		U: -0.960; p: 0.908		**U: 2.416; p: 0.001**	
Emotionaleating Mean±SD (min-max)	15.00 ± 4.55 (5-25)	15.90 ± 11.12 (5-25)	15.50 ± 4.43 (5-25)	15.23 ± 4.58 (5-25)	15.8 ± 4.81 (5-25)	15.07 ± 4.45 (5-25)
	U: -2.101; p: 0.036		U: 0.572; p: 0.692		U: 1.982; p: 0.110	
Eatingcontrol Mean±SD (min-max)	13.87 ± 3.13 (4-20)	13.13 ± 11.12 (6-20)	12.90 ± 3.01 (4-20)	13.78 ± 3.06 (6-20)	13.50 ± 3.14 (6-20)	13.70 ± 3.04 (4-20)
	U: -3.040; p: 0.002		U: -2.705; p: 0.859		U: -0.786; p: 0.433	
Distraction Mean±SD (min-max)	15.18 ± 2.31 (8-24)	15.34 ± 11.12 (8-24)	15.16 ± 2.32 (8-24)	15.24 ± 2.33 (8-24)	15.17 ± 2.47 (9-23)	15.25 ± 2.27 (8-24)
	U: -0.744; p:0.457		U: -0.333; p: 0.713		U: -0.408; p: 0.100	
Eatingdiscipline Mean±SD (min-max)	11.34 ± 2.95 (4-20)	11.53 ± 11.12 (4-19)	11.37±3.30 (4-20)	11.40 ± 2.90 (4-19)	12.00 ± 3.39 (4-20)	11.18 ± 2.76 (4-19)
	U: -0.752; p: 0.452		U:-0.102; p: 0.060		**U:3.276; p: 0.003**	
Awareness Mean±SD (min-max)	14.73 ± 2.56 (8-22)	14.03 ± 11.12 (8-20)	14.52 ± 2.20 (8-22)	14.52 ± 2.61 (8-20)	14.86 ± 2.61 (9-22)	6.68 ± 1.76 (2-10)
	U: -3.301; p: 0.001		U: 0.010; p: 0.034		U: 2.141; p: 0.964	
Interference Mean±SD (min-max)	6.73 ± 11.12 (2-10)	6.62 ± 11.12 (2-10)	6.56 ± 1.94 (2-10)	6.72 ± 1.84 (2-10)	6.75 ± 2.09 (2-10)	6.68 ± 1.76 (2-10)
	U: -0.752; p: 0.452		U: -0.808; p: 0.386		**U: 0.459; p: 0.001**	
Total Mean±SD (min-max)	92.54 ± 11.12 (57-123)	92.10 ± 10.39 (66-131)	91.34 ± 10.01 (60-117)	92.59 ± 11.04 (57-131)	94.33 ± 12.02 (60-131)	91.73 ± 10.40 (57-123)
	U: -0.542; p: 0.588		U: 0.808; p: 0.386		**U: 2.826; p: 0.011**	

U:Mann Whithey U test.

73,7% of the students were not exercising regularly and 14.5% had a familial history of obesity.

Table 2. Correlation between mindful eating scores, age and body mass index in students who included in the study (n=718)

Mindful eating questionnaire	Age		Body Mass Index	
	r	p	r	p
Disinhibition	0.075	**0.045**	-0.094	**0.012**
Emotional eating	0.124	**0.001**	-.106	**0.004**
Eating control	0.028	0.452	-0.171	**<0.001**
Distraction	0.068	0.070	0.033	0.378
Eating discipline	0.021	0.569	0.078	**0.037**
Awareness	-.033	0.372	-0.031	0.400
Interference	0.67	0.71	-1.111	**0.003**
Total score	-0.175	**<0.001**	0.074	**0.048**

The lowest mean score was obtained from interference factor (6.70±1.85), eating discipline (11.40±2.96), eating control (13.65±3.06) and awareness (14.52±2.55), respectively. It was seen that the lowest score obtained by the students from MEQ-30 was 57, and the highest score was 131.

Statistically significant differences were found between their scores of emotional eating, eating control, and awareness subscales based on the sex ($p<0.05$). In this study, awareness of males was found to be higher in emotional eating, eating control and awareness than the females. Statistically significant differences were found between the scores in awareness subscale based on the familial history of obesity ($p<0.05$). Emotional eating and eating control awareness of the students who had a familial history of obesity were low. Statistically significant differences were found between their subscale scores of disinhibition, eating discipline and interference, and their score of total scale based on their physical activity characteristics ($p<0.05$). Eating discipline, interference and mindful eating in general were found to be high among the students who were exercising regularly (Table 1).

A positive correlation was found between ages and disinhibition, emotional eating subscales. A negative and significant correlation was found between age and total MEQ-30 score ($p<0.05$). As the age of the students became older, their emotional eating increased, but not their eating awareness. A negative and significant correlation was found between BMI and disinhibition, emotional eating, eating control; and a positive correlation was found between BMI and eating discipline, total MEQ-30 score ($p<0.05$). As the BMI of the students increased, eating discipline and eating awareness raised but not their disinhibition, emotional eating, eating control (Table 2).

Significant differences were found between their subscale scores of eating discipline based on the number of their meals and emotional eating according to

Table 3. Comparison of mean scores of students from Mindful Eating Questionnaire based on their eating habits (n=718)

Mindful eating questionnaire subscales	Characteristics						
	Number of meals			Snacks		Balanced diet	
	1	2	3	Yes	No	Yes	No
Disinhibition Mean±SD (min-max)	16.68 ± 4.60 (8-25)	15.79 ± 3.63 (5-25)	15.44 ± 3.78 (5-25)	15.63 ± 3.79 (5-25)	15.61 ± 3.72 (5-25)	16.35 ± 3.75 (5-25)	15.37 ± 3.73 (5-25)
	KW: 0.345; p: 0.238			U: 0.040; p: 0.343		**U: -3.392; p: 0.001**	
Emotional eating Mean±SD (min-max)	16.16 ± 4.52 (9-25)	15.30 ±4.68 (5-25)	15.19 ±4.48 (5-25)	15.35 ±4.31 (5-25)	15.19 ± 4.79 (5-25)	16.23 ± 4.45 (5-25)	14.94 ± 4.55 (5-25)
	KW: 0.832; p: 0.713			**U: 0.460; p: 0.030**		**U: -3.253; p: 0.001**	
Eating control Mean±SD (min-max)	13.32 ± 2.89 (8-20)	13.55 ±2.97 (6-20)	13.74 ±3.14 (4-20)	13.72 ±3.09 (4-20)	13.58 ± 3.04 (4-20)	14.01 ± 3.15 (4-20)	13.53 ± 3.03 (4-20)
	KW: 0.892; p: 0.687			U: 0.586; p: 0.921		U: -1,711; p: 0.087	
Distraction Mean±SD (min-max)	15.12 ± 2.55 (12-24)	15.05 ±2.39 (8-24)	15.36 ±2.26 (8-22)	15.22 ±2.30 (9-24)	15.23 ± 2.35 (8-23)	15.18 ± 2.13 (10-22)	15.24 ± 2.39 (8-24)
	KW: 0.322; p: 0.124			U: -0.066; p: 0.770		U: -0.232; p: 0.816	
Eating discipline Mean±SD (min-max)	10.32 ± 3.35 (4-16)	11.15 ± 2.97 (4-20)	11.64±2.91 (4-19)	11.58±2.95 (4-20)	11.22 ± 2.97 (4-20)	12.27 ± 3.16 (4-20)	11.10±2.84 (4-20)
	KW: 0.752; p: 0.024			U: 1.640; p: 0.836		**U: -4.761; p: <0.000**	
Awareness Mean±SD (min-max)	14.04 ± 2.93 (8-18)	14.54 ±2.42 (9-22)	14.54±2.62 (8-22)	14.69±2.66 (8-22)	14.36 ± 2.44 (8-22)	15.05 ± 2.57 (10-22)	14.34±2.53 (8-22)
	KW: 0.432; p: 0.818			U: 1.697; p: 0.093		**U: -2.864; p: 0.004**	
Interference Mean±SD (min-max)	6.84 ± 1.97 (2-10)	6.75 ± 1.80 (2-10)	6.65 ± 1.89 (2-10)	6.69 ± 1.88 (2-10)	6.70 ± 1.82 (2-10)	7.01 ± 2.03 (2-10)	6.59 ± 1.78 (2-10)
	KW: 0.982; p: 0.737			U: -0.068; p: 0.538		**U: -2.960; p: 0.003**	
Total Mean±SD (min-max)	92.48 ± 11.78 (66-112)	92.16 ± 10.53 (63-122)	92.58 ± 11.13 (57-131)	92.90 ±10.95 (57-131)	91.93 ± 10.85 (60-123)	96.13 ± 11.42 (60-131)	91.16 ± 10.44 (57-123)
	KW: 0.633; p: 0.954			U: 1.189; p: 0.751		**U: -5.450; p: 0.001**	

U: Mann Whitney U test., KW: Kruskall Wallis test.

Table 4. Comparison of mean scores of students from mindful eating subscales based on the products consumed (n=718)

Mindful eating questionnaire subscales	Characteristics									
	Type of bread often consumed					Frequency of fastfood consumption				
	White bread	Wheat, rye, oat bread	Whole wheat-bread	I do not eat bread	Other	I do not consume	Every-day	Once every three days	Once a week	Once a month
Disinhibition	15.41	16.18	15.79	16.28	16.70	16.36	15.91	15.30	15.21	15.94
Mean±SD	± 3.79	± 3.31	± 3.24	± 4.08	± 5.16	± 3.52	± 4.31	± 3.90	± 3.62	± 3.66
(min-max)	(5-25)	(6-24)	(9-24)	(8-24)	(9-24)	(9-24)	(6-25)	(6-25)	(5-24)	(9-25)
	KW: 1.578; p: 0.178					KW: 2.319; p: 0.056				
Emotional eating	14.94	16.03	15.91	16.08	16.40	16.42	15.46	14.96	14.87	15.37
Mean±SD	± 4.47	± 4.46	± 4.48	± 5.09	± 4.62	± 4.64	± 4.89	± 4.40	± 4.73	± 4.20
(min-max)	(5-25)	(5-25)	(5-25)	(5-25)	(9-23)	(5-25)	(5-25)	(5-25)	(5-25)	(5-25)
	KW: 2.174; p: 0.070					KW: 2.225; p: 0.065				
Eating control	13.59	13.44	13.72	14.23	13.00	13.56	14.40	13.35	13.67	13.66
Mean±SD	± 3.02	± 2.97	± 3.12	± 3.49	± 2.26	± 2.70	± 3.07	± 2.90	± 3.22	± 3.15
(min-max)	(4-20)	(7-20)	(8-20)	(4-20)	(10-17)	(7-20)	(7-20)	(4-20)	(4-20)	(7-20)
	KW: 0.887; p: 0.471					KW: 1.303; p: 0.267				
Distraction	15.23	15.21	15.20	1.45	13.90	15.01	14.67	15.07	15.20	15.73
Mean±SD	± 2.32	± 2.19	± 2.35	± 2.54	± 1.37	± 2.36	± 2.55	± 2.29	± 2.20	± 2.36
(min-max)	(8-24)	(10-19)	(10-20)	(9-21)	(11-15)	(8-20)	(9-21)	(8-21)	(9-23)	(10-24)
	KW: 0.982; p: 0.416					**KW: 3.348; p: 0.010**				
Eating discipline	11.23	12.36	12.01	11.30	9.80	11.66	9.96	11.14	11.37	12.01
Mean±SD	± 2.99	± 2.59	± 2.89	± 2.89	± 3.45	± 3.12	± 2.91	± 2.92	± 2.80	± 2.97
(min-max)	(4-20)	(6-20)	(7-18)	(6-20)	(4-16)	(5-20)	(4-17)	(4-18)	(5-19)	(4-20)
	KW: 3.641; p: 0.006					**KW: 6.132; p: 0.001**				
Awareness	14.22	14.98	14.88	15.73	15.10	15.06	14.48	14.48	14.34	14.52
Mean±SD	± 2.47	± 2.64	± 2.63	± 2.61	± 1.91	± 3.07	± 2.44	± 2.79	± 2.43	± 2.21
(min-max)	(8-22)	(10-21)	(10-22)	(11-22)	(12-18)	(9-22)	(10-19)	(8-21)	(8-21)	(8-20)
	KW: 6.996; p: 0.001					KW: 1.365; p:0.244				
Interference	6.62	6.78	6.79	7.02	6.90	7.31	6.62	6.34	6.57	6.87
Mean±SD	± 1.83	± 1.97	± 2.01	± 1.65	± 2.46	± 1.77	± 2.01	± 1.90	± 1.68	± 1.94
(min-max)	(2-10)	(2-10)	(2-10)	(2-10)	(2-10)	(2-10)	(2-10)	(2-10)	(2-10)	(2-10)
	KW: 0.861; p:0.487					**KW: 4.753; p:0.001**				
Total	91.28	95.01	94.33	96.12	91.80	95.40	91.54	90.67	91.27	94.13
Mean±SD	± 1.051	± 10.27	± 11.06	± 12.51	± 12.18	± 10.86	± 10.52	± 10.48	± 10.97	± 10.87
(min-max)	(57-122)	(73-122)	(74-129)	(70-131)	(73-108)	(63-122)	(69-116)	(57-123)	(60-122)	(66-131)
	KW: 5.019; p:0.001					**KW: 4.673; p:0.001**				

KW: Kruskall Wallis test

the number of having snacks (*p*<0.05). Emotional eating awareness of the students with two and three snacks was found to be high (Table 3).

Significant differences were found between their eating discipline, awareness and total scores based on the type of bread they often consumed (*p*<0.05). Significant differences were found between their disinhibition, emotional eating, distraction, eating discipline, interference and total scores based on eating fast food (*p*<0.05). Mindful eating levels were high among the students not consuming white bread and fast food (Table 4).

Discussion
Discussion of MEQ-30 scores based on descriptive characteristics
Mindful eating is a type of eating that requires focusing on the food to be consumed by noticing what, how and why the individual eats, by having a hunger-sati-ety awareness, by realizing his/her eating behaviors and without being affected from environmental factors.[6,7] Today, the incidence of the studies on mindful eating is increasing. Today, the studies on mindful eating has been increasing. As this issue, associated with what, how much and how is eaten, raises an awareness for food intake, the individual can enable his/her weight management. Mindful eating of the individuals can be enhanced especially at the end of interventions/trainings/therapies, and weight loss can be managed among the individuals with weight and obesity.[7,13] In this study, 15% of the students were overweight, 3.5% had a problem with obesity and their mindful eating was at a moderate level.

Gaspar et al. indicated that mindful eating was low among the adolescents, and males were less successful than the females in managing themselves about eating.[14] Females can limit themselves while eating since they

care for their physical appearance during adolescence period.[15] However, women had a high tendency for emotional eating due to the physiological and psychological needs brought by menstruation cycle.[16] In addition, control mechanisms of the women are interrupted under stress and it might become difficult for them to cope with the situation, and thus, eating control might not be managed.[17] In this study, awareness of males was found to be higher in emotional eating, eating control and awareness than the females at minimal level.

When the relationship between the age of the students and MEQ-30 was examined, a positive and significant correlation was found between disinhibition and emotional eating subscales and a negative and significant correlation between total scores from MEQ-30. The students could limit themselves in eating, and as their age increased, they were aware of the fact that seeking solution in eating was wrong under stress. However, when the other subscales were considered, their mindful eating decreased in general with increasing age due to their lack of knowledge level regarding healthy nutrition. In a study performed on university students, obesity risk was higher among the ones who had wrong dietary habits.[5] Yet, obesity risk was reported to be low among the individuals who had a high level of mindful eating due to the fewer incidences of wrong dietary habits.[18] In this study, the scores of disinhibition, emotional eating, eating control and interference subscales decreased with the increase in body mass index values of the students. In other words, students with a high body mass index could not limit themselves in eating; they could not understand the difference between hunger and satiety and exhibited engorgement behaviors. Similarly, in the study performed with 2755 university students by Moor et al., a negative correlation was reported between body mass index values of the students and their disinhibition and emotional eating scores.[19] In addition, the students with a high body mass index got a higher total and eating discipline scoresin this study. At this point, the students with a high body mass index had the knowledge of a decent diet plan and ideal amount of food for consumption in order to have a good body image, and their mindful eating level was high.

Aktaş et al. emphasized that students, who had a familial history of obesity, were under 1.27 times more risk for being overweight and for being an individual with obesity compared to the ones who did not.[20] Studies generally investigate the relationship between being an individual with obesity and familial history of obesity. However, no study was found in the literature that investigates mindful eating levels of the ones who had a person with obesity in their families. In this study, emotional eating and eating control awareness of the students who had a familial history of obesity were low. It was associated with the fact that families were role mod-els for their children in eating as well as in all issues. Especially children who had someone in their families with obesity were considered to observe their eating behaviors and habits and learn about them, and put into practice.[21] This can be interpreted as awareness is low among the children of the parents who cannot discriminate hunger/eating desire brought by stress and who cannot control their way and routine of eating.

Discussion of MEQ-30 scores based on the students' state of physical activity

Previous studies have investigated the relationship between physical activity and eating behaviors/attitudes.[5,15,22] There is only a limited number of studies evaluating the effect of physical activity on mindful eating.[17,21] Moor et al. reported that emotional eating behaviors of the university students decreased with the increase in the amount of their physical activity; but, it did not have any effect on mindful eating.[19] Mason et al. stated that training for mindful eating was only effective when given along with physical exercise and dietary education.[23] As similar to the study by Moor et al. eating discipline, interference and mindful eating in general were found to be high among the students exercising regularly in this study.[19] They made a lot of efforts in order to manage their weight and have a good body image. At this point, mindful eating is performed with physical exercise and there is a relationship between mindful eating and physical exercise as also indicated in the study by Mason et al.[23]

Discussion of MEQ-30 scores based on eating habits of the students and the products they consumed

Risky behaviors which are hormonal and associated with psychological reasons are exhibited during adolescence period. Habits regarding eating are shown among these risky behaviors.[24] However, one of the most important criteria of mindful eating is regular diet, eating habits and eating discipline.[12] In the study by Tözün et al., it was found that 33.9% of the university students skipped a meal, ate less than three main meals per day and did not have snacks regularly.[5] Similarly, it was found in this study that the students did not have regular meals, skipped a meal and did not have snacks. When we examined the effects of the data regarding the balanced diet and their meals on the eating awareness, the students who had two and three main meals had higher subscale scores of eating discipline. In other words, the students with a regular number of main meals made their eating plans truly and had a mindful eating habit. However, whether students had regular meals or not did not have an effect on mindful eating. The reason was thought to be that students had difficulty in organizing meal hours due to the pace of school and courses and that did not have an effect on mindful eating. A significant correlation was found between the state of having snacks and emotional eat-

ing subscale of MEQ-30. Having snacks helps to struggle with insulin resistance, keeps blood glucose level at a specific level and thus, hunger is not experienced.[25] However, stress may lead to the emergence of desire for eating with the loss of hunger and satiety awareness.[26,27] Emotional eating awareness of the students who were having two and three snacks was found to be high in the study. The reason was thought to be the absence of blood glucose fluctuations.

Mindful eating level of the students with a balanced diet was found to be high in accordance with their subscale scores of disinhibition, emotional eating, eating discipline, awareness and interference and with their total score in general. Their high level of knowledge about diet, their ability to understand the difference between hunger/satiety and their awareness for focusing on the meal are the indicators of their balanced diet. Therefore, high level of mindful eating is an expected condition among the students with a balanced diet.

In the study performed with 1578 university students by Wright et al., it was reported that 40% of the students avoided to eat fatty foods such as fast food which caused obesity.[28] In the study by Altun and Kutlu, the students stated that they were consuming carbohydrates and fatty foods more although they knew protein group foods were more beneficial for health.[15] It was observed in this study that the consumption of fast food, white bread and sugary foods was also found to be high.

In the study by Tözün et al., it was found that 74.3% of the students consumed white bread and 69.8% in this current study.[5] Intensive course program and rapid pace of time were considered as the potential reasons. However, the consumption of white bread and fast food which have high glycemic index affect carbohydrate mechanism and it can be the cause and inducer of many diseases by leading to insulin resistance.[29] In this study, mindful eating levels were high among the students who were not consuming white bread and fast food; in other words, they were aware that consumption of high amount of carbohydrates was wrong.

Limitations and strengths

The only limitation of thes tudy is that the sample consists of the nursing students. The results of the study may not be open to generalization. There may be different applications in other departments such as medicine, dentist, pharmacy. The strength of this study is the sample size. The sample of the study consisted of 718 nursing students (76.0%of the universe was reached).

Conclusions

Mindful eating level increased as age increased among the nursing students in university. Sociodemographic characteristics such as sex and presence of a person with obesity in the family may affect subscales of mindful eating. Based on BMI, states of being overweight and obese were led by the lack of mindful eating and physical activity. Mindful eating level decreased as BMI increased; and besides, mindful eating level increased with physical activity. Based on these conclusions, it is suggested in this study that nutritional awareness be raised from childhood, the students with high BMI be identified, trainings be organized to make the students alter their dietary attitudes, projects be organized for healthy weight loss and for the promotion of physical activity with the partnership of Diabetes and Obesity Center and School of Physical Education in university in order to develop mindful eating.

Clinical implications
– Mindful eating level increased with the age among the nursing students in the university.
– Estimation of the relationship between mindful eating and the physical activity contributes to the decrease in obesity.
– If the nurses have the enough knowledge level about mindful eating, they could advise people about the mindful eating both in clinics and social environments.

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References
1. Basu M, Sarkar K, Shahbabu B, et al. Pattern and determinants of overweight and obesity among medical students of kolkata. Int J *Pharm Sci Res*. 2016;7(1):377-386.
2. Peltzer K, Pengpid S, Alafia Samuels T, et al. Prevalence of overweight/obesity and its associated factors among university students from 22 countries. *Int J Environ Res Publ Health*. 2014;11(7):7425-7441.
3. Webber L, Divajeva D, Marsh T, et al. The future burden of obesity-related diseases in the 53 WHO European-Region countries and the impact of effective interventions: A modelling study. *BMJ Open*. 2014;4(7):1-8.
4. Arslan SA, Daskapan A, Cakır B. Specification of nutritional and physical activity habits of university students. *TAF Prev Med Bull*. 2016;15(3):171-180.
5. Tozun M, Sozmen MK, Babaoglu AB. Association of dietary habits with obesity, physical activity and quality of life in health related faculties of a university in west Turkey. *ESTUDAM J Publ Health*. 2017;2(1):1-16.
6. Alberts HJEM, Thewissen R, Raes L. Dealing with problematic eating behaviour. The effects of a mindfulness-based intervention on eating behaviour, food cravings, dichotomous thinking and body image concern. *Appetite*. 2012;58(3):847-851.

7. Ozkan N, Bilici S. New approaches in eating behavior: Intuitive eating and mindful eating. *Gazi Univ J Health.* 2018;3(2):16-24.

8. Peitz D, Schulze J, Warschburger P. getting a deeperunderstanding of mindfulness in thecontext of eatingbehavior: Development And Validation of The Mindful Eating İnventory. *Appetite.* 2020;159:105039.

9. Tapper K, Seguias L. Theeffects of mindfuleating on foodconsumptionover a half-dayperiod. *Appetite.* 2020;145: 104495.

10. World Health Organization 2020. Orientation Program on Adolescent Health for Healthcare Providers. Availablefrom: https://www.who.int/maternal_child_adolescent/ documents/pdfs/9241591269_op_handout.pdf (Date of access: 09/15/2020)

11. Adolescent Health 2020. Healthy People 2020. Available from: https://www.healthypeople.gov/2020/topics-objectives/topic/Adolescent-Health (Date of access: 09/15/2020)

12. Kose G, Tayfur M, BirinciogluI, Dönmez A. Adaptation study of the Mindful Eating Questionnaire (MEQ) into Turkish. *J Cogn Behav Psychothera Res.* 2016;3:125-134.

13. Warren JM, Smith N, Ashwell M. A structured literature review on the role of mindfulness, mindful eating and intuitive eating in changing eating behaviours: Effectiveness and associated potential mechanisms. *Nutr Res Rev.* 2017;30(2):272-283.

14. Gaspar de Matos M, Palmeira AL, Gaspar T, et al. Social support influences on eating awareness in children and adolescents: the mediating effect of self-regulatory strategies. *Glob Publ Health.* 2016;11(4):437-448.

15. Altun M, Kutlu Y. The views of adolescent about the eating behaviour: A qualitative study. *FN J Nurs.* 2015;23(3):174-184.

16. Serin Y, Sanlıer N. Emotional eating, the factors which affect food intake and basic approaches of nursing care. *J Psyc Nurs.*2018;9(2):135-146.

17. Klatzkin RR, Gaffney S, Cyrus K, et al. Stress-induced eating in women with binge-eating disorder and obesity. *Biol Psychol.* 2018;131:96-106.

18. Camilleri GM, Méjean C, Bellisle F, et al. Association between Mindfulness and weight status in a general population from the NutriNet-Santé study. *PLoS ONE.* 2015;10(6):1-14.

19. Moor KR, Scott AJ, McIntosh WD. Mindful eating and its relationship to body mass index and physical activity among university students. *Mindfulness.* 2013;4(3):269-274.

20. Aktas D, Oztürk FN, Kapan Y. Determination of the obesity prevalence and affecting risk factors, of eating habits among adolescents. *TAF Prev Med Bull.* 2015;14(5):406-412.

21. Anzman SL, Rollins BY, Birch LL. Parental influence on children's early eating environments and obesity risk: Implications for prevention. *Int J Obes.* 2010;34(7):1116-1124.

22. Choudhary K, Mathur P, Garg M, Gupta PP. Prevalence of overweight and obesity amongst adolescents and identification of risk factors. *Int J Contem Pediatr.* 2017;4(4):1153.

23. Mason AE, Epel ES, Kristeller J, et al. Effects of a mindfulness-based intervention on mindful eating, sweets consumption, and fasting glucose levels in obese adults: data from the SHINE randomized controlled trial. *J Behav Med.* 2016;39(2):201-213.

24. Kürtüncü M, Uzun M, Ayoğlu FN. The effect of adolescent training program on risky health behaviours and heatth percepiton. *J High Educ Sci.* 2015;5(2):187-195.

25. Savas HB, Gültekin F. Insulin resistance and clinical significance. *Med J Süleyman Demiral Univ.* 2017;24(3):116-125.

26. Rosenbaum DL, White KS. The relation of anxiety, depression, and stress to binge eating behavior. *J Health Psychol.* 2015;20(6):887-898.

27. Van Strien T, Cebolla A, Etchemendy E, et al. Emotional eating and food intake after sadness and joy. *Appetite.* 2013;66:20-25.

28. Wright M, Adair L, James C, et al. The association of nutrition behaviors and physical activity with general and central obesity in Caribbean undergraduate students. *Rev Panam Salud Publica.* 2015;38(4):278-285.

29. Dogan B, Yörük N, Oner C, et al. Evaluation of diabetes risk and eating habits of university students and personnel. *Turk J* Fam *Prac.* 2017;21(2):50-55.