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Original article

How does emotional appetite and depression affect BMI and food consumption?

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Abstract. *Objective:* In this study, it was aimed to examine the relationship between body mass index (BMI) and food consumption by demonstrating emotional appetite and depression in young adults. *Methods:* This study carried out with 1324 university students whose mean age was 21.01±2.19 in Turkey. Food consumption records, Emotional Appetite Questionnaire (EMAQ), and Beck Depression Inventory (BDI) were used. *Results:* Participants' mean daily energy intake was 2026.69±724.86 calories, and the consumption of males was higher (p<.001). Males had higher EMAQ-P score than females (p<.05). EMAQ-N, EMAQ-NE, and BDI scores were the highest in the obese group (p<.05). A negative correlation was found between BDI and EMAQ-N (r=- .067, p<.05), also a positive correlation between BMI and EMAQ-N (r=.124, p<.01). Energy consumption and EMAQ-N (r=.070, p<.05), EMAQ-P (r=.060, p<.05) and BMI (r=.106, p<.01) were correlated. *Conclusion:* Detecting and recognizing emotional appetite at a young age can help cope with appetite in adulthood and older ages. More studies are needed to reveal the effects of mood and emotional states of young adults on food consumption, food preferences, and body composition.

Keywords: Emotional appetite, food consumption, depression, body mass index.

Introduction

Emotional eating is related to excessive food consumption, usually as a response to negative stimuli (1). Emotional eating often seen in the consumption of high-carbohydrate and energy-containing foods; makes individuals susceptible to binge eating. Overeating desire seen in the face of negative emotions such as sadness, anxiety, stress, and fear are defined as 'emotional eating' (2, 3), can be predictive of weight gain over time (1). Irregular eating attitudes and behaviors such as eating disorders, body dissatisfaction, obesity, and unhealthy weight loss are closely related to emotional eating and appetite (4, 5).

Appetite and emotions have important effects on eating behavior, but it is difficult to measure how each emotion affects eating separately (6). Although there are differences between individuals, negative emotions change eating habits by increasing food consumption, especially in young adults (4, 7, 8). It has been known that some people see eating as means of avoidance, while others see as a restriction, and studies were conducted on this subject (9).

Mood, eating and nutritional behavior has a complex relationship. Loss of appetite can be observed in situations such as depressive mood, anxiety, anger and some people can stay away from eating (10-12). However, in emotional eating, people tend to overeat foods with high fat, carbohydrates, and excess sugar (13-15). It is assumed that people regulate their emotions and moods by changing their food choices and amounts. Individuals experiencing a depressed mood prefer delicious foods to alleviate their negative emotions. In the short term, delicious foods provide some

relief from negative emotions, but chronic high energy consumption eventually increases depression, resulting in obesity (16, 17).

Physiological changes related to the consumed foods can improve the mood (12, 18). Neuropsychological substances such as neurotransmitters and hormones regulate eating behavior by providing homeostasis (19-21). For example, tryptophan contained in proteins crosses the blood-brain barrier and triggers serotonin secretion. Protein-carbohydrate-containing foods were given to people who deliberately increased stress levels and it was stated that stress factors were seen less in these people (22). In a study conducted by increasing stress levels, it was stated that people with high emotional eating scores tend to eat more fatty and sugary foods (23).

Depression, mood disorders, and emotional eating behavior are situations that have the potential to cause nutrition related chronic diseases; especially obesity, by affecting food choice and quantity (24-26). Apart from emotional eating, awareness and regulation of emotions are also important (27). Different types of diets can also cause depression and eating disorders (28-30). In recent years, depression increased in parallel with glucose and fructose consumption. Scientific results are important for public health improvement. Due to this importance, this study was planned depending on the need for studies showing the relationship between emotional eating, depression and food consumption. The present study was aimed to reveal the state of emotional eating and depression in young adults and to examine the relationship between emotional state and depression with food consumption, and BMI.

Materials and Methods

Participants and procedure

This cross-sectional study was carried out by face-to-face interview technique with students over the age of 18 who were studying at Istanbul Okan University between January-May 2019 and accepted to participate in the study. Ethical approval from the Istanbul Okan University Ethics Committee (Date: 12.12.2018, Number: 100, Decision: 8) and permission from the University Administrative Board were obtained in accordance with the Declaration of Helsinki.

The universe of the research consisted of 16120 undergraduate students registered at Istanbul Okan University in the 2018-2019 academic years. With a 95% confidence level, minimum sample size was calculated as 376. Since the number of students enrolled in faculties at the undergraduate level varies, the sample selection was made with the stratified sampling method. The research was carried out with the participation of 1324 (F: 810; M: 514) volunteer students whose mean age was 21.01±2.19 years.

Instrumentations

The data of the research were collected by using face-to-face interview technique with questionnaire. First part of the questionnaire included information about gender, age, faculty, height and weight. Body mass index (BMI) was calculated by dividing body weight (kg) by the square of height (m^2). World Health Organization (WHO) BMI classification was used (29). A retrospective daily food consumption record was taken with the recall method. Daily energy, protein, carbohydrate, sucrose, glucose, fructose, fat, saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), omega 3, omega 6, cholesterol, and fiber consumption were calculated with the Nutrition Information System (BeBIS, Nutrition Information System Version 8.2, Germany) package program.

Emotional Appetite Questionnaire (EMAQ)

Emotional Appetite Questionnaire (EMAQ) was developed by Nolan et al. (2010) and its validity and reliability in Turkish was made by Demirel et al. (2014) (4, 10). In the questionnaire, the participants' score the levels of expressions in each item affecting their appetite as less (1-4), the same (5), and more (6-9). Emotional eating is evaluated in negative / positive emotions consisting of 14 items and negative / positive situations consisting of 8 items. Summing up the scores of negative emotions (EMAQ-NE) and negative situations (EMAQ-NS) and the EMAQ negative (EMAQ-N) total score, and the score of positive

emotions (EMAQ-PE) and positive situations (EMAQ-PS) with the EMAQ positive (EMAQ-P) total score can be obtained. The scale, which does not have any cut-off points related to emotional eating, evaluates in which emotions and situations, especially emotional eating may exist (10).

Beck Depression Inventory (BDI)

Beck Depression Inventory (BDI), which was designed to include the symptoms seen in depression, was developed by Beck (1984) and Turkish validity and reliability was conducted by Hisli (1989) (25, 30). The scale, which is in likert type, consists of 21 symptom categories. Each symptom category is evaluated with scores ranging from 0 to 3. The highest score that can be obtained from the scale with a cut-off score of 17 is 63. Getting a score of 17 and above on the scale suggests that the individual is at risk of depression. The higher the total score, the higher the severity of depression (25).

Statistical analysis

Descriptive statistical analyses were obtained. The compliance of continuous variables to normal distribution was evaluated using the Kolmogorov-Smirnov test. Since the data didn't show a normal distribution, Mann-Whitney U test was used to compare the means between two groups, and Kruskal-Wallis H test was used to compare more than two groups. Spearman correlation analysis was performed to determine the relationship between continuous variables. The statistical analysis of the data was done with IBM® SPSS® Statistics 23 program and worked with a significance level of $p<.05$.

Results

In the present study, 61.2% (n=810) of 1324 participants participating were female and 38.8% (n=514) were male. Mean age was 21.01±2.19 (F: 20.62±1.92; M: 21.61±2.43, $p<.001$) years. According to their BMI, 11.0% (F: 16.5%; M: 2.1%) of the participants with a mean BMI of 22.65±3.94 (F: 21.37±3.25; M: 24.67±4.08, $p<.001$) kg/m^2 were underweight, 67.4% (F: 72.3%; M: 59.7%) were normal, 17.2% (F: 9.0%; M: 30.2%) were overweight, 4.4% (F: 2.1%; M: 8.0%) were obese.

Daily energy and macronutrient consumption calculated from a daily food consumption record according to the gender and BMI classifications of the participants were given in Table 1. Mean daily energy, protein, lipid, MUFA, SFA, cholesterol ($p<.001$) and carbohydrate, omega 3 ($p<.05$) consumption of males were higher than females. According to the BMI classification, the energy, protein, carbohydrate, fructose and fiber consumption of the obese group were higher than the other groups (all $p<.05$).

EMAQ and BDI scores were given in Table 2 according to the gender and BMI classifications. Participants' mean scores of EMAQ negative (EMAQ-N) was 51.75±20.72; EMAQ positive (EMAQ-P) was 46.79±18.51, BDI was 12.45±8.77. EMAQ negative situation (EMAQ-NS) and EMAQ-P ($p<.05$), EMAQ positive emotion (EMAQ-PE) ($p<.001$) scores of males were higher than females, and BDI scores ($p<.05$) were found to be lower. According to the BMI classification, EMAQ-N, EMAQ negative emotion (EMAQ-NE) and BDI scores were higher in the obese group than the other groups (all $p<.05$). EMAQ-NS scores were higher in overweight and obese groups than underweight and normal weight groups ($p<.05$).

When the depression risk was classified according to BDI scores, it was found that 26.7% (F: 28.0; M: 24.5, $p>.05$) of the participants were at the risk of depression. There was no statistically significant difference between depression risk and emotional appetite ($p>.05$).

Correlations between EMAQ, BDI, BMI and age were presented in Table 3. A positive correlation was found between EMAQ-N and EMAQ-P ($p<.01$). BDI and EMAQ-N, EMAQ-NE and EMAQ-NS had negative correlations ($p < .05$). There was a positive correlation between BMI and EMAQ-N, EMA-NE, and EMAQ-NS ($p<.01$), and a negative relationship between EMAQ-PS ($p<.05$). A positive correlation was found between age and BMI ($p<.01$).

Correlations between EMAQ, BDI, BMI, age, energy and macronutrients were presented in Table 4.

Table 1. Energy and macro-nutrient consumption according to gender and BMI classification

Nutrient	Total (n=1324)	Gender		Z	p1	BMI Clasification				F	p2
		Female (n=810)	Male (n=514)			Under-weight (n=145)	Normal weight (n=893)	Over-weight (n=228)	Obese (n=58)		
Energy (kcal)	2026.69 ± 724.86	1967.19 ± 715.60	2120.45 ± 730.12	-4.741	0.000**	1930.93 ± 654.71	2010.16 ± 707.97	2059.53 ± 764.16	2391.49 ± 880.79	16.433	0.001*
Protein (g)	86.93 ± 36.02	83.44 ± 35.77	92.43 ± 35.76	-5.217	0.000**	80.01 ± 31.97	86.44 ± 35.85	89.55 ± 36.99	101.54 ± 40.02	14.534	0.002*
Carbohydrate (g)	259.13 ± 128.00	253.21 ± 125.75	268.44 ± 131.04	-2.424	0.015*	246.08 ± 117.14	256.53 ± 124.71	262.21 ± 133.97	319.53 ± 162.70	9.305	0.025*
Sucrose (g)	34.30 ± 32.29	34,56 ± 32.40	33.89 ± 32.16	-0.855	0.393	30.94 ± 25.89	34.63 ± 33.13	33.51 ± 31.12	40.80 ± 37.55	3.916	0.271
Glucose (g)	9.84 ± 9.83	9.66 ± 9.52	10.13 ± 10.31	-0.142	0.887	8.33 ± 9.34	9.88 ± 9.54	10.23 ± 10.79	11.45 ± 11.28	6.499	0.090
Fructose (g)	17.15 ± 15.31	17.51 ± 15.96	16.58 ± 14.21	-0.676	0.499	15.49 ± 14.40	16.79 ± 14.82	18.91 ± 17.51	19.97 ± 15.11	8.398	0.038*
Fat (g)	64.32 ± 24.23	62.10 ± 23.98	67.82 ± 24.24	-4.653	0.000**	62.85 ± 25.47	63.91 ± 23.53	65.32 ± 24.49	70.38 ± 20.79	3.000	0.392
SFA (g)	23.59 ± 10.85	22.22 ± 10.53	25.75 ± 11.00	-6,107	0.000**	22.73 ± 10.93	23.39 ± 10.55	24.14 ± 11.18	26.59 ± 13.27	4.246	0.236
MUFA (g)	24.40 ± 10.83	23.27 ± 10.25	26.19 ± 11.48	-4,674	0.000**	22.96 ± 10.77	24.36 ± 10.64	24.89 ± 11.34	26.83 ± 11.56	5.499	0.139
PUFA (g)	16.32 ± 10.46	16.61 ± 11.21	15.87 ± 9.15	-0.312	0.755	17.16 ± 12.27	16.15 ± 10.26	16.29 ± 9.61	16.97 ± 11.89	0.560	0.906
Omega 3 (g)	1.07 ± 0.91	1.03 ± 0.94	1.13 ± 0.87	-3,098	0.002*	1.09 ± 0.95	1.07 ± 0.91	1.07 ± 0.91	1.02 ± 0.90	0.269	0.966
Omega 6 (g)	15.25 ± 10.18	15.57 ± 10.88	14.75 ± 8.95	-0.003	0.997	16.06 ± 11.89	15.09 ± 9.99	15.23 ± 9.35	15.94 ± 11.63	0.543	0.909
Cholesterol (mg)	168.78 ± 71.93	161.96 ± 70.17	179.52 ± 73.41	-4.248	0.000**	161.57 ± 68.35	168.24 ± 72.05	169.73 ± 71.45	191.30 ± 77.87	5.512	0.138
Fiber (g)	25.03 ± 6.79	24.94 ± 6.82	25.17 ± 6.76	-0.678	0.498	24.08 ± 5.93	25.06 ± 6.57	24.82 ± 7.84	27.69 ± 7.23	12,237	0.007*

*1Mann-Whitney U test, 2Kruskal-Wallis H test, **p<0.001; *p<0.05*

BMI: Body mass index, SFA: Saturated fatty acids, MUFA: Monounsaturated fatty acids, PUFA: Polyunsaturated fatty acids.

Table 2. EMAQ and BDI scores according to gender and BMI classification

Scales	Total (n=1324)	Gender		Z	p1	BMI Clasification				F	p2
		Female (n=810)	Male (n=514)			Underweight (n=145)	Normal weight (n=893)	Overweight (n=228)	Obese (n=58)		
EMAQ											
EMAQ-N	51.75 ± 20.72	51.14 ± 20.38	52.70 ± 21.23	-1.697	0.090	47.98 ± 19.46	51.43 ± 20.35	54.37 ± 22.61	55.81 ± 20.23	10.180	0.017*
EMAQ-NE	34.43 ± 14.02	34.02 ± 14.31	35.08 ± 13.54	-1,876	0.061	31.58 ± 13.90	34.51 ± 13.91	35.33 ± 14.64	36.79 ± 12.64	9.419	0.024*
EMAQ-NS	17.32 ± 12.24	17.11 ± 12.56	17.63 ± 11.72	-2.628	0.009*	16.40 ± 11.37	16.91 ± 12.09	19.04 ± 13.25	19.02 ± 12.09	11.350	0.010*
EMAQ-P	46.79 ± 18.51	45.70 ± 15.22	48.52 ± 22.65	-2.217	0.027*	51.10 ± 27.64	46.29 ± 14.97	46.41 ± 23.97	45.31 ± 12.98	7.396	0.060
EMAQ-PE	28.85 ± 14.23	27.68 ± 9.43	30.69 ± 19.39	-3.968	0.000**	31.37 ± 25.05	28.47 ± 9.42	28.86 ± 20.27	28.36 ± 8.19	4.560	0.514
EMAQ-PS	17.95 ± 9.92	18.02 ± 10.33	17.83 ± 9.25	-1.282	0.200	19.73 ± 11.97	17.82 ± 9.66	17.56 ± 9.93	16.95 ± 7.81	4.560	0.207
BDI	12.45 ± 8.77	12.77 ± 8.58	11.93 ± 9.05	-2,443	0.015*	13.72 ± 9.13	12.16 ± 8.76	12.17 ± 8.33	14.78 ± 9.34	4.560	0.037*

*1Mann-Whitney U test, 2Kruskal-Wallis H test, **p<0.001; *p<0.05*

BMI: Body mass index, EMAQ: Emotional Appetite Questionnaire, BDI: Beck Depression Inventory.

N: Negative, P: Positive, NS: Negative situation, NE: Negative emotion, PS: Positive situation, PE: Positive emotion.

Table 3. Correlations between EMAQ, BDI, BMI and age (n=1324)

Variable	EMAQ-N	EMAQ-NE	EMAQ-NS	EMAQ-P	EMAQ-PE	EMAQ-PS	BDI	BMI (kg/m2)	Age (year)
EMAQ-N	1	0.844**	0.766**	0.077**	-0.019	0.154**	-0.067*	0.124**	0.023
EMAQ-NE		1	0.377**	0.007	0.880**	0.015	-0.063*	0.124**	0.048
EMAQ-NS			1	0.110**	-0.098**	0.232**	-0.054*	0.105**	0.012
EMAQ-P				1	0.791**	0.813**	-0.021	-0.066*	-0.002
EMAQ-PE					1	0.390**	-0.036	-0.016	0.050
EMAQ-PS						1	-0.023	-0.064*	-0.022
BDI							1	0.006	-0.007
BMI (kg/m2)								1	0.180**
Age (year)									1

*Spearman rho correlation, **p<0.01; *p<0.05*

EMAQ: Emotional Appetite Questionnaire, BDI: Beck Depression Inventory, BMI: Body mass index.

N: Negative, P: Positive, NS: Negative situation, NE: Negative emotion, PS: Positive situation, PE: Positive emotion.

Table 4. Correlations between EMAQ, BDI, BMI, age, macro-nutrient consumption (n=1324)

Nutrient	EMAQ-N	EMAQ-NE	EMAQ-NS	EMAQ-P	EMAQ-PE	EMAQ-PS	BDI	BMI (kg/m2)	Age (year)
Energy (kcal)	0.070*	0.076**	0.042	0.060*	0.092**	0.009	-0.023	0.106**	0.004
Protein (g)	0.072**	0.059*	0.069*	0.055*	0.063*	0.021	0.014	0.119**	0.076**
Carbohydrate (g)º	0.060*	0.066*	0.027	0.043	0.074**	0.006	-0.007	0.062*	-0.051
Sucrose (g)	0.010	-0.001	0.014	0.055*	0.043	0.046	-0.035	0.011	-0.041
Glucose (g)	0.005	0.011	0.003	0.074**	0.083**	0.040	-0.067*	0.033	-0.012
Fructose (g)	0.013	0.020	0.009	0.040	0.063*	0.007	-0.071*	0.051	-0.077**
Fat (g)	0.077**	0.069*	0.067*	0.049	0.052	0.023	-0.045	0.076**	0.036
SFA (g)	0.077**	0.102**	0.041	0.013	0.078**	-0.023	-0.052	0.084**	0.056*
MUFA (g)	0.073**	0.067*	0.067*	0.048	0.068*	0.022	-0.047	0.086**	0.098**
PUFA (g)	0.010	-0.017	0.032	0.014	-0.044	0.014	0.005	0.023	-0.051
Omega 3 (g)	-0.041	-0.018	-0.049	-0.001	-0.022	0.001	0.013	0.026	0.064*
Omega 6 (g)	0.012	-0.018	0.037	0.015	-0.044	0.015	0.006	0.021	-0.057*
Cholesterol (mg)	0.030	0.065*	0.013	0.007	0.049	-0.014	-0.028	0.052	0.013
Fiber (g)	0.107**	0.104**	0.064*	0.047	0.065*	0.026	-0.059*	0.049	-0.035

*Spearman rho correlation, **p<0.01; *p<0.05*

EMAQ: Emotional Appetite Questionnaire, BDI: Beck Depression Inventory, BMI: Body mass index.

N: Negative, P: Positive, NS: Negative situation, NE: Negative emotion, PS: Positive situation, PE: Positive emotion.

SFA: Saturated fatty acids, MUFA: Monounsaturated fatty acids, PUFA: Polyunsaturated fatty acids.

Positive correlations were found between EMAQ-N and energy, carbohydrate (p<.05) and protein, fat, SFA, MUFA and fiber consumption (p<.01). Also, EMAQ-P had a positive correlation with energy, protein, sucrose and glucose (p<.01) consumption. Negative correlation was found between BDI and glucose,

fructose and fiber (all p<.05). BMI had a positive correlation with energy, protein, fat, SFA, MUFA (p<.01) and carbohydrate (p<.05) consumption.

Discussion

In our study, the relationships between emotional appetite and depression risk and BMI and food consumption were evaluated. The study, in which the original emotional appetite questionnaire was used, conducted with 232 undergraduate students and employees (73.7% were female) aged 18-52 with mean age of 20.0 ± 4.6 (4). In the adaptation of the scale, Demirel et al. (2014) studied with 196 volunteer students, 57.7% of them were female (10). Similarly, in our study there were 1324 participants whose mean age was 21.01 ± 2.19 years, 61.2% were women and 38.8% (n = 514) were male. Mean BMI was in normal range in most of the studies with EMAQ as in our study (7, 13, 24, 27).

Energy intake of males can generally be higher than women, and energy intake recommended by WHO is in accordance with. In this study, mean daily energy, protein, fat, SFA, MUFA, omega 3, cholesterol and carbohydrate intake consumption of males were found higher than females. In this study, considering increased energy intake due to the increase in food consumption; a positive relationship was found between BMI and energy, protein, fat, SFA, MUFA, and carbohydrate consumption. In addition, obese participants were found to have more energy, protein, carbohydrate, fructose, and fiber consumption than the others.

Mean scale scores were found as EMAQ-N 51.75 ± 20.72, EMAQ-P 46.79 ± 18.51, and BDI 12.45 ± 8.77. It was stated that 26.7% of the participants were at the risk of depression, but no significant difference was found between the risk and emotional appetite score. Differences according to gender have been examined in detail. In our study, EMAQ-NS and EMAQ-P and EMAQ-PE scores of men were higher than women. In the original study of the scale, EMAQ-PE and PS scores of men were higher than women, there were no gender differences on NE and NS sub scores of EMAQ (4). Demirel et al. (2014), Jones and Herr (2018), and Sanlier et al. (2017) couldn't find any EMAQ and subscale score differences between genders (10, 27, 28). In a study, it was found that male participants had higher EMAQ-N scores than females (11). Barnhart et al. (2020) used EMAQ's positive emotional eating subscale in their study, and stated that positive emotional eating had a relationship with BMI but not with gender (8). Emotional appetite can be changed with gender depending on the sample and age group of the study.

Watford et al. (2019) stated that there was a significant correlation between BMI, gender and EMAQ (6). Braden et al. (2018) conducted a study on obese patients; there were no significant correlation between gender, BMI and EMAQ (1). Again, in a study with patients with a bariatric surgery, it was stated that EMAQ-P scores were higher in females and there was a positive correlation between BMI and EMAQ (18). Erkaya et al. (2020) stated that males had higher EMAQ-NE scores (13). Budak et al. (2019) studied with bariatric surgery patients' BMI was negatively correlated with EMAQ-NE (17). In our study, there was a positive correlation between BMI and EMAQ-N, EMAQ-NE, and EMAQ-NS; and a negative correlation between BMI and EMAQ-PS. In addition, the correlations between EMAQ-P, EMAQ-PE scores and BMI were negative and significant. Nolan et al. (2010) found a correlation between EMAQ-PE and BMI (4). In another study, significant positive correlations determined between negative total scores of EMAQ and BMI (10). Obese group had higher EMAQ-N, EMAQ-NE and BDI scores, and EMAQ-NS scores in overweight and obese groups were higher than underweight and normal weight groups. Erkaya et al. (2020) found that BMI normal group had higher EMAQ-PE scores (13). Arslan and Aydemir (2019) stated that obese participants had higher scores of total EMAQ and NE, NS subscales (24). In all studies, BMI had a relationship with emotional appetite; it can be double-sided effect.

In our study, BDI scores of males were found to be lower. Bourdier et al. (2018) found that high BMI group had the most EMAQ-NS scores. In the same study, they found that high EMAQ-NS group was in a risk of eating disorders and had higher DASS-21 scores (7). Braden et al. (2018) implied that greater BMI was

related to depression subscale of Emotional Eating Scale but there were no correlation with EMAQ (1). Budak et al. (2019) stated that BDI scores were positively correlated with EMAQ-NE and EMAQ-NS (17). Correlations between EMAQ-N and EMAQ-P were positive in this study. Negative correlations were found between BDI and EMAQ-N, EMAQ-NE and EMAQ-NS. Similar to our study, highly significant positive correlation was found between EMAQ-NE and EMAQ-NS (4). Sanlier et al. (2017) stated that there was a positive correlation between EMAQ-P and EMAQ-N adjusted for BMI and gender (28). Barnhart et al. (2020) found EMAQ-P was correlated with EMAQ-N scores (8). Depression has a strong relationship with both emotions and body mass index. It can trigger to eat more or less by individual.

In the present study, there were significant positive correlations between EMAQ-N and protein, lipid, SFA, MUFA, fiber, energy, carbohydrate intake. Also, positive correlations were found between EMAQ-P and energy, protein, sucrose and glucose consumption. Jones and Herr (2018) studied emotion differentiations (the ability to identify and label emotional experiences) with emotional appetite and they found that caloric intake had no relationship with EMAQ-N and EMAQ-P but it had a strong negative correlation with negative differentiation (27). Müftüoğlu and Küçükağlağ(2019) found that having more meals were correlated with EMAQ total scores (18). Increase in energy intake may be related with both positive and negative emotional appetite.

Emotional appetite can be triggered by depression and unconscious food consumption. Recognizing emotional appetite at a young age can help to cope with appetite in adulthood and old age. Nutritional knowledge is important for the regulation of emotions and coping with emotional appetite. More studies are needed to reveal the effects of mood and emotional states of young adults on food consumption / preferences and body composition.

Limitations

This study has some limitations. Only volunteer university students participated in the study, and the data of the research were based on the participants' own statements. Food consumption record was taken for only one day with the recall method. Taking food consumption record for at least three days by observation or prospective recording method would reflect the food consumption more accurately. However, it was not possible in this study due to the sample size and time constraints.

Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Braden A, Musher-Eizenman D, Watford T, Emley E. Eating when depressed, anxious, bored, or happy: Are emotional eating types associated with unique psychological and physical health correlates? Appetite 2018; 125: 410–7.
2. Arnow B, Kenardy J, Agras WS. The emotional eating scale:The development of a measure 2 to assess coping with negative affect by eating. International J of Eating Disorders 1995; 18(1): 79–90.
3. Sevinçer GM, Konuk N. Emosyonel Yeme. Journal of Mood Disorders 2013; 3(1): 171–8.
4. Nolan LJ, Halperin LB, Geliebter A. Emotional Appetite Questionnaire. Construct validity and relationship with BMI. Appetite 2010; 54(2): 314–9.
5. Boutelle KN, Braden A, Knatz-Peck S, Anderson LK, Rhee KE. An open trial targeting emotional eating among adolescents with overweight or obesity. Cogn Behav Pract 2017; 24(3): 363–73.
6. Watford, TS, Braden AL, Emley EA. Mediation of the Association Between Mindfulness and Emotional Eating Among Overweight Individuals. Mindfulness 2019; 10(6): 1153-62.
7. Bourdier L, Morvan Y, Kotbagi G, Kern L, Romo L, Berthoz S. Examination of emotion-induced changes in eating: A latent profile analysis of the Emotional Appetite Questionnaire. Appetite 2018; 123: 72-81.
8. Barnhart WR, Braden AL, Jordan AK. Negative and positive emotional eating uniquely interact with ease of activation, intensity, and duration of emotional reactivity to predict increased binge eating. Appetite 2020; 104688.
9. Macht M, Müller J. Increased negative emotional responses in PROP Supertasters. Physiology and Behaviour 2007; 90 (2-3): 466–72.
10. Demirel B, Yavuz FK, Karadere ME, afak Y, Türkçapar MH. Duygusal İştah Anketi'nin Türkçe geçerlik ve

güvenilirliği, BKİ ve duygusal şemalarla ilişkisi. JCBPR, 2014; 3: 171-81.
11. Ibrahim M, Thearle MS, Krakoff J, Gluck ME. Perceived stress and anhedonia predict short-and long-term weight change, respectively, in healthy adults. Eating behaviors 2016; 21: 214–9.
12. Meule A, Richard A, Schnepper R, Reichenberger J, Georgii C, Naab S, et al. Emotion regulation and emotional eating in anorexia nervosa and bulimia nervosa. Eating Disorders 2019; 1–17.
13. Erkaya ZB, Oğuzöncül AF, Kurt O. Bir Sağlık Meslek Yüksekokulundaki Öğrencilerde Duygusal İştah ile Obezite Arasındaki İlişkinin Değerlendirilmesi. Balıkesir Sağlık Bilimleri Dergisi 2020; 9(1): 37–44.
14. Konttinen H, Mannisto S, Sarlio-Lahteenkorva S, Silventoinen K, Haukkala A. Emotional eating, depressive symptoms and self-reported food consumption.A population-based study. Appetite 2010; 54(3): 473–9.
15. Konttinen H. Dietary habits and obesity: the role of emotional and cognitive factors. (Academic dissertation). Helsinki, Helsinki University. 2012.
16. Singh M. Mood, Food and Obesity. Frontiers in Psychology 2014; 5: 925
17. Budak E, Taymur İ, Çaycı HM, enormancı G. The relationship between emotional appetite and bipolar features in obese and non-obese individuals. European Research Journal 2019; 5(6): 981–9.
18. Müftüoğlu S, Küçükağdaş Ş. Bariatrik Cerrahi Sonrası Bireylerin İştah Kontrolü ve Yeme Bağımlılıklarının Değerlendirilmesi. Beslenme ve Diyet Dergisi 2019; 47(2): 30–9.
19. Saper CB, Chou TC, Elmquist JK. The need to feed: homeostatic and hedonic control of eating. Neuron 2002; 36(2): 199–211.
20. Martens MJ, Rutters F, Lemmens SG, Born JM, Westerterp-Plantenga MS. Effects of single macronutrients on serum cortisol concentrations in normal weight men. Physiol Behav 2010; 101(5): 563–7.
21. Lutter M. Nestler EJ. Homeostatic and Hedonic Signals Interact in the Regulation of Food Intake. J Nutr 2009; 139(3): 629–32.
22. Markus CR, Panhuysen G, Tuiten A, Koppeschaar H, Fekkes D, Peters ML. Does carbohydrate-rich, protein-poor food prevent adeterioration of mood and cognitive performance of stress-prone subjects when subjected so stressful task? Appetite 1998; 31(1): 49-65.
23. Oliver G, Wardle J, Gibson EL. Stress and food choice: a laboratory study. Psychosomatic Medicine 2000; 853-65.
24. Arslan M, Aydemir İ. Relationship between emotional appetite, eating attitudes, sleep quality, and body mass index in healthcare workers: a multi-centre study. Psychi and Clinical Psychopharmacology 2019; 29(3): 346–53.
25. Hisli N. Beck depresyon envanterinin üniversite öğrencileri için geçerliği, güvenirliği. Psikoloji Dergisi 1989; 7(23): 3–13
26. Lovibond PF, Lovibond SH. The structure of negative emotional states: 691 comparison of the Depression Anxiety Stress Scales (DASS) with the Beck 692 Depression and Anxiety Inventories. Behaviour Research and Therapy 1995; 33(3), 335–43.
27. Jones AC, Herr NR. Emotion differentiation mediates the association between emotion regulation difficulties and caloric intake. Eating behaviors 2018; 29: 35–40.
28. Sanlier N, Varli SN, Macit MS, Mortas H, Tatar T. Evaluation of disordered eating tendencies in young adults. Eating and Weight Disorders 2017; 22(4): 623–31.
29. WHO. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. WHO Technical report Series, No.894, Geneva 2000.
30. Beck AT. Internal consistencies of the original and the revised Beck Depression Inventory. Journal of Clinical Psychology 1984; 40(6): 1365–7.

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