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ORIGINAL ARTICLE

Evaluation of Food Disgust Profile in Applicants to a Dietitian Regarding Regulation of Nutritional Habits

Beslenme Alışkanlıklarının Düzenlenmesi ile İlgili Diyetisyene Başvuranlarda Gıda Tiksinme Profilinin Değerlendirilmesi

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ABSTRACT

Aim: It is aimed to evaluate the relationship between body mass index, food disgust profiles, and daily water consumption of clients who apply to a dietician to regulate their eating habits.
Methods: In this descriptive and retrospective study, 152 adult volunteers between the ages of 18-65, who had not had a flu infection in the last six weeks or any surgical operation in the last 3 months, and who were not pregnant, in the postpartum period or the menstrual cycle, were studied. The scores obtained from the Food Disgust Scale were accepted as data and the clients; body mass index and daily water consumption were evaluated with the SPSS 26 program.
Results: According to the data obtained from the study, participants in obesity class III found animal meat such as calves, lambs, goats, etc. displayed as whole, unprocessed animals at sales points to be statistically significantly disgusting.
Conclusions: The findings obtained in the study show that there is a positive correlation between obesity class III diagnosis and disgust sensitivity in individuals. Since this situation will affect the individuals' nutritional acceptance and daily food diversity, this finding can be taken into consideration in the evaluations of clinicians and dietitians, in the protein sources to be added and/or in the prescriptions to be recommended, and the success of the treatment can be optimized.

Keywords: Obesity, Body-mass index, Food disgust scale, Disgust sensitivity

ÖZ

Amaç: Bu çalışma ile; diyetisyene beslenme alışkanlıklarının düzenlenmesi ile ilgili başvuran danışanların, beden kütle indeksi ile gıda tiksinme profilleri ve günlük su tüketimleri arasındaki ilişkinin değerlendirilmesi amaçlanmaktadır.
Gereç ve Yöntemler: Tanımlayıcı ve retrospektif nitelikteki bu çalışmada, 18-65 yaş arası, son 6 hafta içerisinde gribal enfeksiyon, son 3 ay içerisinde ise herhangi bir cerrahi operasyon geçirmemiş; kadınlarda gebe, postpartum dönem ve mens siklusu içerisinde olmayan 152 erişkin gönüllü ile çalışılmıştır. Gıda tiksinme ölçeğinden (Food Disgust Scale) alınan skorlar veri olarak kabul edilmiş ve danışanların; vücut kitle indeksi ve günlük su tüketimleri SPSS 26 programı ile değerlendirilmiştir.
Bulgular: Çalışmadan elde edilen verilere göre; Obezite sınıf III'e dahil olan katılımcılar, satış noktalarında işlenmemiş bütün olarak sergilenen dana kuzu keçi/oğlak vs hayvan etlerini, istatistiksel olarak anlamlı düzeyde tiksindirici bulmuştur.
Sonuçlar: Çalışmada elde edilen bulgular, kişilerde Obezite sınıf III tanısı ile tiksinme duyarlılığının pozitif ilişkili olduğunu göstermektedir. Bu durum, kişilerin besin kabulu ve günlük besin çeşitliliklerini etkileyeceği için, klinisyen ve diyetisyenler değerlendirmelerinde, eklenecek protein kaynağı ve/veya önerilecek tariflerde söz konusu bulguyu dikkate almalı ve tedavi başarısı optimize edilmelidir.

Anahtar Kelimeler: Obezite, Beden kütle indeksi, Gıda tiksinme ölçeği, Tiksinme duyarlılığı,

Introduction

Disgust is defined as a universal emotion that is effective in directing cognitive and behavioral functioning against infection and/or contamination. It is considered an indicator of the defense system against pathogens and/or toxins (1-3).

According to many theorists, food and water consumption is the most prominent behavioral/cognitive domain in which disgust functions, compared to reproduction and social interaction (4-7). Since only a relatively small fraction of matter on earth contains accessible high-energy chemical bonds and nutrients, the remaining much larger portion, if consumed, causes harm to the organism, reducing its chances of survival and/or reproduction, i.e. causing an increase in entropy (8).

In other words; three categories of threats can cause an increase in the entropy of living systems: mechanical, chemical, and biological. Mechanical threats detected in the mouth; (thorns/bones, extreme temperatures, and other threats that can cause direct tissue damage) trigger the perception of pain by stimulating the nociceptor cells of the peripheral nervous system; Chemical threats, especially plant-derived toxins and biological threats, that is, pathogenic microorganisms, are evaluated through the central nervous system and contribute to increased disgust (9).

These data are important physicochemical, neurological, and gastronomic universal clues that direct today's theorists and clinicians to further research on disgust and food choice.

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The study on food disgust detection was first conducted by Santos and Booth among university students in England, and the data were shared in 1996. A scale has not yet been created, but it has been determined that the most avoided meat products are beef and/or lamb rather than fish (10). In 1997, it was described by Alaoui-Ismaï¨li and his colleagues that disgust could develop due to some odors (methyl methacrylate and propionic acid) (11). In 2004, Nordin et al. investigated the variables important for nutritional intake and their gender-related differences. While food avoidance and disgust are higher in women than in men, 69% to 38%; no difference was detected in the reasons (12). However, the data were interpreted with the help of the food disgust scale and the food neophobia scale, for which a food disgust scale has not yet been created.

The food disgust scale was only developed by Hartmann and Siegrist in 2018, and its Turkish version was created by Songur Bozdag and her colleagues in 2023 (13,14).

When the disgust scale, which was previously considered a psychological test, was validated as a food disgust scale; We aimed to determine not only the stimuli related to food and food preparation/serving that cause disgust in people but also determine whether it provides statistically significant data in young adults with impaired metabolic and different body mass index (BMI) values (15).

Materials and Methods

Research and sample selection

Inclusion criteria of the participants in the study; it was determined that the participants between the ages of 18 and 65 who consulted a dietitian to regulate their eating habits, have not had a flu infection in the last 6 weeks or had any surgical operation in the last 3 months; The study included 152 adult volunteers in women who were not pregnant, in the postpartum period, or the menstrual cycle. Participants who did not meet these criteria were not included in the study.

Data collection and evaluation

The research is a descriptive study and the data of the participants were collected digitally between November 2023 and January 2024. To increase the possibility of accurate and reliable data collection; the minimum sample size was determined with the G*Power (v3.1.9.7) program. In the power analysis, a = 0.05, effect size = 0.2, and 95% power were selected and a total of 152 participants was calculated (16,17).

Food Disgusting Scale

The data of the study were obtained using the Food Disgust Scale. The scale includes 8 different subheadings that may cause disgust towards foods (animal meat, inadequate hygiene, human-caused contamination, mold, rotten fruit, fish, rotten vegetables, living sources of pollution) and suggestions that will detail the content under each heading. These propositions were asked to be rated between "Not at All Disgusting (1)" and "Quite Disgusting (6)" (6-point Likert scale).

Analysis of Data

SPSS 26 program was used for statistical analysis of the data in the study. The One-way ANOVA test was used for multiple-group comparisons. Bonferroni tests were performed for the correlation of significant groups and $p<0.05$ was considered statistically significant.

Ethical issues and permissions

Participants were evaluated after approval was obtained Istanbul Esenyurt University Ethics Committee (Decision No: E-12483425-299-38573-2023). The study was conducted under the principles of the Declaration of Helsinki. A voluntary "Informed Consent" form was obtained from all participants in the study.

Results

Daily Water Consumption

There is no significant difference between classifications according to BMI values and daily water consumption ($p=0.144$) (Table 1).

Table 1. Distribution of daily water intake according to BMI values

Classification	BMI kg/m²	Participants	Water Intake		
			Mean	SD	Min./Max
Underweight	<18.5	-	-	-	-
Normal weight	18.5-24.9	54	5.74	0.782	1-6
Overweight	25.0-29.9	61	5.77	0.798	1-6
Obesity class I	30.0-34.9	23	5.78	0.600	4-6
Obesity class II	35.0-39.9	5	4.80	2.168	1-6
Obesity class III	≥40.0	8	5.88	0.354	5-6

Animal meat

Displaying raw meat on the shelves created a statistically significant difference in terms of food disgusting scale between the participants in the Overweight-Obesity class III (Mean: 2.77±1.644 / 4.63±

1.408; p=0.035) and Obesity class II-Obesity class III classifications (Mean: 1.40±0.548/ 4.63± 1.408 p=0.010). According to the BMI classification participants in obesity class III find the visual of raw meat in its whole/ uncut form disgusting (Table 2) (Table 3).

Poor hygiene

There is no statistically significant difference between BMI classification and Food Disgusting Score about Poor hygiene (Table 2) (Table 3). The poor hygiene characteristics of the person serving the food were found highly disgusting and became a parameter preventing consumption.

Table 2. Statistical comparison of participants' BMI classes and food disgusting scale scores: Post-Hoc and Bonferroni

Food Disgusting Scale Items with Subgroups	BMI Category (Parametric Test-One Way ANOVA-Post-Hoc, Bonferroni)									
1. Animal meat	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
1. 1	0.300	0.944	0.106	1.000	0.952	0.443	0.776	0.296	0.970	0.208
1. 2	0.946	0.831	0.675	0.905	0.987	0.838	0.720	0.950	0.598	0.455
1. 3	0.841	0.553	0.515	1.000	0.941	0.768	0.982	0.950	0.875	0.682
1. 4	0.825	0.999	0.204	0.135	0.983	0.414	0.035	0.319	0.142	0.010
2. Poor hygiene	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
2. 1	1.000	1.000	0.994	1.000	1.000	0.997	1.000	0.998	1.000	0.998
2. 2	0.700	0.970	0.806	0.998	0.997	0.976	0.877	0.951	0.963	0.803
2. 3	0.977	0.792	0.594	0.977	0.955	0.735	0.999	0.928	0.971	0.780
2. 4	0.267	1.000	0.996	0.991	0.516	0.763	0.589	0.997	0.995	1.000
2. 5	0.890	1.000	0.778	0.890	0.913	0.938	1.000	0.779	0.973	0.981
3. Human-caused contamination	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
3. 1	0.931	0.962	1.000	0.961	1.000	0.995	0.817	0.994	0.840	0.995
3. 2	0.773	0.783	1.000	0.968	0.999	0.997	0.739	0.990	0.701	0.985
3. 3	0.878	0.537	1.000	0.857	0.914	0.989	0.989	0.907	0.346	0.978
3. 4	0.756	0.053	0.616	0.987	0.329	0.877	0.805	1.000	0.212	0.563
4. Mold	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
4. 1	0.894	0.988	0.983	1.000	0.752	1.000	0.996	0.942	0.996	0.995
4. 2	0.998	0.965	0.637	0.807	0.993	0.712	0.877	0.863	0.972	0.994
4. 3	0.977	0.900	1.000	0.999	0.991	0.996	0.981	0.977	0.996	1.000
4. 4	0.546	0.989	0.985	0.996	0.962	0.789	0.995	0.948	1.000	0.963
5. Decaying fruit	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
5. 1	0.996	0.999	1.000	0.886	1.000	1.000	0.943	1.000	0.954	0.991
5. 2	0.688	0.968	1.000	0.961	0.997	0.995	1.000	1.000	0.999	0.997
5. 3	0.999	0.999	0.806	0.170	0.987	0.740	0.216	0.897	0.170	0.123
5. 4	1.000	0.898	1.000	0.728	0.874	1.000	0.705	0.984	0.975	0.899
6. Fish	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
6. 1	0.996	0.999	1.000	0.886	1.000	1.000	0.943	1.000	0.954	0.991
6. 2	0.668	0.968	1.000	0.961	0.997	0.995	1.000	1.000	0.999	0.997
6. 3	0.999	0.999	0.806	0.170	0.987	0.740	0.216	0.897	0.170	0.123
6. 4	1.000	0.898	1.000	0.728	0.874	1.000	0.705	0.984	0.975	0.899
7. Decaying vegetables	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
7. 1	0.099	1.000	1.000	0.212	1.000	1.000	1.000	1.000	1.000	0.659
7. 2	0.953	0.763	0.943	0.999	0.964	0.990	1.000	1.000	0.988	0.991
7. 3	0.948	0.999	1.000	1.000	0.918	1.000	0.997	0.999	1.000	1.000
7. 4	1.000	0.898	1.000	0.728	0.874	1.000	0.705	0.984	0.975	0.899
8. Living contaminants	**2-3**	**2-4**	**2-5**	**2-6**	**3-4**	**3-5**	**3-6**	**4-5**	**4-6**	**5-6**
8. 1	1.000	0.904	1.000	0.951	0.882	1.000	0.943	0.983	1.000	0.980
8. 2	0.971	0.970	0.999	1.000	0.796	0.989	0.970	1.000	0.997	1.000
8. 3	0.912	0.581	0.994	0.505	0.914	0.942	0.762	0.788	0.979	0.631

1: Underweight; 2: Normal weight; 3: Overweight; 4: Obesity class I; 5: Obesity class II, 6: Obesity class III, BMI: Body mass index

Table 3. Descriptive statistics of Food Disgusting Scale and distribution of participant answers according to BMI categories

BMI Category	n	Mean	SD	Min.	Max.
Food Disgusting Scale Items					
1. Animal meat					
1.1 Presence of animal cartilage in my mouth while eating meat					
Normal weight	54	4.260	1.456	1	6
Overweight	61	3.670	1.680	1	6
Obesity class I	23	3.960	1.718	1	6
Obesity class II	5	2.400	1.949	1	5
Obesity class III	8	4.380	1.685	2	6
1.2 To see raw meat					
Normal weight	54	2.590	1.754	1	6
Overweight	61	2.370	1.517	1	6
Obesity class I	23	2.170	1.557	1	6
Obesity class II	5	1.600	0.548	1	2
Obesity class III	8	3.130	1.642	1	6
1.3 To eat bloody steak that					
Normal weight	54	4.980	1.173	2	6
Overweight	61	4.730	1.357	1	6
Obesity class I	23	4.480	1.473	1	6
Obesity class II	5	4.000	1.732	1	5
Obesity class III	8	5.000	1.512	2	6
1.4 To see a whole calf/lamb/kid on a brochure/hanger					
Normal weight	54	3.110	1.839	1	6
Overweight	61	2.770	1.644	1	6
Obesity class I	23	3.000	1.732	1	6
Obesity class II	5	1.400	0.548	1	2
Obesity class III	8	4.630	1.408	2	6
2. Poor hygiene					
2.1 To eat with a dirty fork/knife in a restaurant					
Normal weight	54	5.890	0.372	4	6
Overweight	61	5.870	0.558	2	6
Obesity class I	23	5.870	0.344	5	6
Obesity class II	5	5.800	0.447	5	6
Obesity class III	8	5.880	0.354	5	6
2.2 To eat food prepared by a chef with greasy hair and dirty nails					
Normal weight	54	5.960	0.191	5	6
Overweight	61	5.890	0.367	4	6
Obesity class I	23	5.910	0.417	4	6
Obesity class II	5	5.800	0.447	5	6
Obesity class III	8	6.000	0.000	6	6
2.3 If a chef at a restaurant has a cut and/or open wound					
Normal weight	54	5.520	0.666	4	6
Overweight	61	5.440	0.738	4	6
Obesity class I	23	5.300	0.926	4	6
Obesity class II	5	5.000	1,000	4	6
Obesity class III	8	5.500	0.926	4	6
2.4 If a chef at a restaurant blows her/his nose before serving your meal					
Normal weight	54	5.910	0.293	5	6
Overweight	61	5.710	0.733	2	6
Obesity class I	23	5.910	0.417	4	6
Obesity class II	5	6.000	0.000	6	6
Obesity class III	8	6.000	0.000	6	6
2.5 If hair comes out of your soup					
Normal weight	54	5.850	0.359	5	6
Overweight	61	5.770	0.529	4	6
Obesity class I	23	5.870	0.458	4	6
Obesity class II	5	5.600	0.894	4	6
Obesity class III	8	5.750	0.463	5	6
3. Human-caused contamination					
3.1 Offered food by a neighbor I barely know					
Normal weight	54	3.560	1.284	1	6
Overweight	61	3.370	1.258	1	6
Obesity class I	23	3.350	1.265	1	5
Obesity class II	5	3.600	0.894	2	4
Obesity class III	8	3.880	0.835	2	5
3.2 If a friend bites my bread					
Normal weight	54	n	1.379	2	6
Overweight	61	3.970	1.568	1	6
Obesity class I	23	3.870	1.325	1	6
Obesity class II	5	4.200	0.447	4	5
Obesity class III	8	4.630	1.302	2	6
3.3 If a friend drinks from the glass I drink from					
Normal weight	54	4.330	1.332	1	6
Overweight	61	4.080	1.582	1	6
Obesity class I	23	3.780	1.506	1	6
Obesity class II	5	4.400	0.548	4	5
Obesity class III	8	4.880	0.835	4	6
3.4 If my friends and/or acquaintances touch my food					
Normal weight	54	4.110	1.355	1	6
Overweight	61	3.810	1.447	1	6
Obesity class I	23	3.170	1.302	1	5
Obesity class II	5	3.200	1.095	2	4
Obesity class III	8	4.380	1.188	2	6
4. Mold					
4.1 To eat the unmoulded part of a moldy tomato					
Normal weight	54	4.170	1.489	1	6
Overweight	61	3.920	1.518	1	6
Obesity class I	23	4.350	1.112	2	6
Obesity class II	5	3.800	1.789	2	6
Obesity class III	8	4.130	1.553	2	6

	4.2 To eat moldy bread				
	n	Mean	SD	Min.	Max.
Normal weight	54	5.360	0.834	2	6
Overweight	61	5.310	0.781	4	6
Obesity class I	23	5.220	0.902	4	6
Obesity class II	5	4.800	0.837	4	6
Obesity class III	8	5.000	1.414	2	6
	4.3 Cutting the moldy part of a hard cheese and eating the mold-free part				
	n	Mean	SD	Min.	Max.
Normal weight	54	3.910	1.713	1	6
Overweight	61	4.080	1.563	1	6
Obesity class I	23	4.260	1.453	2	6
Obesity class II	5	3.800	1.789	2	6
Obesity class III	8	3.750	1.282	2	6
	4.4 To eat marmalade/jam with mold removed from its surface				
	n	Mean	SD	Min.	Max.
Normal weight	54	4.170	1.702	1	6
Overweight	61	4.600	1.336	1	6
Obesity class I	23	4.350	1.526	1	6
Obesity class II	5	3.800	1.643	2	5
Obesity class III	8	4.380	1.302	2	6
	5. Decaying fruit				
	5.1 To eat overripe fruit				
	n	Mean	SD	Min.	Max.
Normal weight	54	2.870	1.441	1	6
Overweight	61	2.970	1.471	1	6
Obesity class I	23	2.960	1.261	1	5
Obesity class II	5	3,000	1.414	1	4
Obesity class III	8	3.380	1.598	1	6
	5.2 To eat a banana with black spots				
	n	Mean	SD	Min.	Max.
Normal weight	54	2.520	1.314	1	6
Overweight	61	2,850	1.447	1	6
Obesity class I	23	2.740	1.322	1	6
Obesity class II	5	2.600	1.342	1	4
Obesity class III	8	2.880	1.553	1	5
	5.3 To eat crushed fruits (e.g. apples and peaches) still intact				
	n	Mean	SD	Min.	Max.
Normal weight	54	2.930	1.399	1	6
Overweight	61	3.000	1.493	1	6
Obesity class I	23	2.830	1.193	1	5
Obesity class II	5	2.200	1.095	1	4
Obesity class III	8	4.130	1.553	2	6
	5.4 To eat slices of apples/pears/quince etc. turning brown when exposed to air				
	n	Mean	SD	Min.	Max.
Normal weight	54	3.660	1.628	1	6
Overweight	61	3.650	1.427	1	6
Obesity class I	23	4.000	1.446	2	6
Obesity class II	5	3.600	2.074	1	6
Obesity class III	8	4.380	1.302	2	6

	6. Fish				
	6.1 To serve the fish with its head				
	n	Mean	SD	Min.	Max.
Normal weight	54	2.870	1.812	1	6
Overweight	61	3.060	1.754	1	6
Obesity class I	23	3.450	1.896	1	6
Obesity class II	5	2.200	1.095	1	4
Obesity class III	8	3.630	2.066	1	6
	6.2 To eat foods prepared with raw fish, such as sushi				
	n	Mean	SD	Min.	Max.
Normal weight	54	3.930	1.902	1	6
Overweight	61	3.770	1.787	1	6
Obesity class I	23	4.300	1.845	1	6
Obesity class II	5	4.200	1.483	2	6
Obesity class III	8	4.750	2.315	1	6
	6.3 The smell of raw fish in fishmongers or markets				
	n	Mean	SD	Min.	Max.
Normal weight	54	3.910	1.483	1	6
Overweight	61	4.130	1.509	1	6
Obesity class I	23	4.350	1.434	1	6
Obesity class II	5	3.800	1.095	2	5
Obesity class III	8	4.250	1.909	1	6
	6.4 The texture/feel of some fish species in the mouth				
	n	Mean	SD	Min.	Max.
Normal weight	54	3.700	1.462	1	6
Overweight	61	3.890	1.404	1	6
Obesity class I	23	4.170	1.072	2	6
Obesity class II	5	3.800	1.095	2	5
Obesity class III	8	4.000	2.070	1	6
	7. Decaying vegetables				
	7.1 To eat the overripe brown avocado pulp				
	n	Mean	SD	Min.	Max.
Normal weight	54	3.760	1.440	1	6
Overweight	61	4.380	1.128	1	6
Obesity class I	23	3.910	1.311	1	6
Obesity class II	5	4.500	0.577	4	5
Obesity class III	8	4.880	0.991	4	6
	7.2 To eat an overripe cucumber that can already bend				
	n	Mean	SD	Min.	Max.
Normal weight	54	4.130	4.13	1	6
Overweight	61	4.310	4.31	1	6
Obesity class I	23	4.520	4.52	2	6
Obesity class II	5	4.600	4.60	4	6
Obesity class III	8	4.250	4.25	2	6
	7.3 To eat radishes having lost their firmness and plumpness				
	n	Mean	SD	Min.	Max.
Normal weight	54	4.260	0.165	1	6
Overweight	61	4.080	0.182	1	6
Obesity class I	23	4.350	0.240	2	6
Obesity class II	5	4.200	0.200	4	5
Obesity class III	8	4.250	0.559	1	6
	7.4 To eat a non-crunchy salad				
	n	Mean	SD	Min.	Max.
Normal weight	54	3.630	1.322	1	6

Overweight	61	3.630	1.405	1	6
Obesity class I	23	4.000	1.128	2	6
Obesity class II	5	3.600	0.894	2	4
Obesity class III	8	3.750	1.282	2	6
	8. Living contaminants				
	8.1There were maggots in the cherry I wanted to eat				
	n	**Mean**	**SD**	**Min.**	**Max.**
Normal weight	54	4.870	1.287	1	6
Overweight	61	4.850	1.524	1	6
Obesity class I	23	5.170	1.154	2	6
Obesity class II	5	4.800	1.643	2	6
Obesity class III	8	5.250	1.488	2	6
	8.2 To have a little snail in my salad				
	n	**Mean**	**SD**	**Min.**	**Max.**
Normal weight	54	5.740	0.556	4	6
Overweight	61	5.680	0.536	4	6
Obesity class I	23	5.830	0.491	4	6
Obesity class II	5	5.800	0.447	5	6
Obesity class III	8	5.750	0.707	4	6
	8.3 To have a maggot in my apple				
	n	**Mean**	**SD**	**Min.**	**Max.**
Normal weight	54	4.670	1.427	1	6
Overweight	61	4.890	1.483	1	6
Obesity class I	23	5.170	0.984	4	6
Obesity class II	5	4.400	1.673	2	6
Obesity class III	8	5.500	0.926	4	6

1: It's not disgusting at all; 2: Not disgusting; 3: Not partly disgusting; 4: Partly disgusting; 5: Disgusting
6: Pretty disgusting, Max.: Maximum, Min.: Minimum, SD: Standard deviation

Human-caused contamination

There is no statistically significant difference between BMI classification and Food Disgusting Score in Human-caused contamination (Table 2) (Table 3). Inappropriate food sharing with people; Drinking from the same glass, eating by biting from the same place, and touching food with your hands are only partially disgusting.

Mold

There is no statistically significant difference between BMI classification and Food Disgusting Score about Mold (Table 2) (Table 3). Participants found moldy bread quite disgusting and inconsumable. In addition, they found items that could be preferred for breakfast, such as cheese, marmalade, and tomatoes, to be partially disgusting and declared that they could consume them.

Decaying fruit

There is no statistically significant difference between BMI classification and Food Disgusting Score about Decaying fruit (Table 2) (Table 3). Some of the participants found it partly disgusting to consume fruits that had lost their form or were sliced but kept waiting for consumption. In addition, the participants found the fruits that had not yet lost their shape but slightly changed their shape to be consumable and declared that they were not disgusting.

Fish

There is no statistically significant difference between BMI classification and Food Disgusting Score for Fish (Table 2) (Table 3). While some of the participants stated that they were highly disgusted with foods prepared with raw fish, some of them stated that the smell of raw fish and the taste it left in the mouth after cooking in some species were partially disgusting.

Decaying vegetables

There is no statistically significant difference between BMI classification and Food Disgusting Score about Decaying vegetables (Table 2) (Table 3). All of the participants declared that they found consuming overripe not fresh vegetables partly disgusting.

Living contaminants

There is no statistically significant difference between BMI classification and Food Disgusting Score about Living contaminants (Table 2) (Table 3). All participants rated the presence of living organisms in their food as highly disgusting

Discussion

Disgust; It is an important defense system that triggers avoidance attitudes and behaviors to protect against potential infections and diseases (18). Just as the taste, smell, appearance, and texture of food can trigger disgust, sometimes the hygiene of that food and the person serving the food or the way it is presented can trigger disgust (19,20). When looking at the obesity class III food disgust profile, participants in this group found animal meat such as lamb, goat, etc. displayed as a whole at sales points to be statistically significantly disgusting compared to other BMI categories. However, seeing raw meat, preferring less cooked/ bloody meat, or having bone fragments in their mouth while eating did not create any significance regarding disgust.

In the study conducted by Scott et al. in 2018, people with high food disgust sensitivity found that organisms with gene technology added a gene or synthesized foods, such as cultured meat, were perceived as less natural (21). In the study conducted by Egolf et al. in 2019, it was found that consumers were more likely

to perceive foods with advanced food technologies as less natural. It has been reported that it stimulates higher levels of disgust (22). According to the results of the multinational research published by Siegrist and his colleagues in 2020; ıt has been stated that many societies, except China, perceive animal pathogens and microbes in the foods they consume as risks and define them as disgusting stimuli (23).

One of the striking details in the data of our study is that an unprocessed product of animal origin is a disgust stimulus. The product has two distinct features: it comes from livestock and is unprocessed. Although it is capable of meeting the consumer's demand for natural products, a strong disgust has emerged due to possible pathogens and microbes of animal origin. Another important detail is that this situation is encountered only in the obesity class III category. (Table 2) (Table 3) However, disgust is a universal and very basic state of protection (24,25).

In 2018, Joshua and colleagues investigated why people differ in their disgust. In less pathogen-rich ecology, individuals who are more sensitive to disgust have 7% weekly contact with pathogens, while individuals less sensitive to disgust have 30% weekly contact with pathogens. Here the benefits of higher disgust sensitivity are clear. In a more pathogen-rich ecology, the weekly pathogen contact rate of individuals more sensitive to disgust was 97%, while it was found to be 99% for individuals less sensitive to disgust (26). Another study combining the process with clinical parameters reported that the Tsimane, a population living in the pathogen-rich lowlands of Bolivia, showed higher levels of antipathogen physiological signatures in a range of immunoglobulins, leukocytes, and other inflammatory markers (27). These research findings indicate that individuals have increased disgust sensitivity to increased environmental pathogen load/risk. In people who fall into the obesity class III category, in addition to the pathogen/pest load coming through food, there is also a strong biochemical stimulus effect regarding the excessive production of pro-inflammatory cytokines due to their physiopathology (28,29).

The disgust stimulus created by the body in the presence of a pathogen and the stimulus created in the presence of a toxin are different from each other. While an increase in toxins causes increased sweating, vomiting, and water consumption, an increase in the presence of pathogens increases immune system components (30).

In the findings of our study, there was no difference between the groups regarding water consumption and the food disgust scale; mold and/or worms, etc. on vegetables/fruits. In such cases, the lack of significant differences between groups coincides with the results of our study. Being disgusted by the raw meat on display and not being affected by pieces of raw meat can only be interpreted as the reduction of the pathogen load that can be taken at once.

In this case, the increase in environmental pathogen load and the option of choosing food that does not have a high pathogen load may have activated a similar avoidance/defense system as in the presence of internal pathogens. Even though this effect was triggered in all participants, it may have become statistically significant due to the pro-inflammatory process that already existed in the obesity class III group.

For this reason, the findings of our study suggest that obesity class III pathophysiology plays a role in disgust sensitivity.

The limitation of the study is that we could not reach enough male clients in the collected client pool to include them in statistical evaluations and that gender comparisons could not be made. Conclusion

According to the findings of our study, it is possible to say that obesity class III diagnosis affects disgust sensitivity in terms of food type and presentation. The stages of preparing and consuming food with red meat should be separated from each other. This situation will affect people's food acceptance and daily nutritional diversity, and in the later stages, preventable diseases due to protein malnutrition will be added to their clinical inventory.

In the first step, it would be meaningful to develop food preservation methods that are ready for consumption and whose naturalness/content/nutritional value is intact, to create special stands in chain markets and other sales points and to provide information, for the health of the individual and subsequently for the health of the public. Clinicians and dietitians should take this finding into account in their evaluations, protein sources to be added and/or recipes to be recommended and treatment success should be optimized.

Conflict of interest

The authors declare that there is no conflict of interest.

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