

T.C.
YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

**Evaluation of The Effect of Food Presentation Style on
Taste Perception**

MASTER OF SCIENCE THESIS

İREM ERHAN

Istanbul-2021

T.C.
YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS

**Evaluation of The Effect of Food Presentation Style on
Taste Perception**

MASTER OF SCIENCE THESIS

İREM ERHAN

SUPERVISOR

Dr. Öğr. Üyesi Binnur Okan BAKIR

Istanbul-2021

THESIS APPROVAL FORM

Institute : Yeditepe University Institute of Health Sciences
Programme : Nutrition and dietetics
Title of the Thesis : Evaluation of The Effect of Food Presentation Style on Taste Perception
Owner of the Thesis : İrem Erhan
Examination Date : 23.11.2021

This study have approved as a Master Thesis in regard to content and quality by the Jury.

	Title, Name-Surname (Institution)
Chair of the Jury:	Prof. Dr. Murat BAŞ Acıbadem University
Supervisor:	Assist. Prof. Binnur OKAN BAKIR Yeditepe University
Member/Examiner:	Assist. Prof. İrem KAYA CEBİOĞLU Yeditepe University

APPROVAL

This thesis has been deemed by the jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examinations Regulation and has been approved by Administrative Board of Institute with decision dated 09.12.2021 and numbered 2021-12-07

Prof. Dr. Bayram YILMAZ
Director of Health Sciences Institute

DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, I have cited all the information and comments that were not obtained through the thesis study, and that I have included these sources in the sources list, and that I have not acted in violation of patent and copyright rights during the thesis study and writing.

15.12.2021

İrem ERHAN

ACKNOWLEDGEMENTS

I would like to thank my dear teacher Dr. Binnur Okan Bakır for her continuous support throughout every single step of my thesis, the planning, development and the production, with her constructive advice and guidance. Being her student and completing this process under his guidance is very valuable to me. I would also like to thank my dear friend Ece Aybike Ala-Pettersen for her inspiration for my thesis, my lifelong support friend Doruk Ünal, my father Güven Erhan and my mother Arzu Modanlıoğlu.

TABLE OF CONTENTS

THESIS APPROVAL FORM	ii
DECLARATION	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURE	viii
ABSTRACT	ix
ABSTRACT (Turkish)	x
1.INTRODUCTION	1
2. GENERAL INFORMATION	4
2.1 Adequate and Balanced Nutrition	4
2.1.1. Turkey-specific Healthy Meal Plate	6
2.1.2. Turkey-specific Healthy Eating and Physical Activity Pyramid	7
2.1.3. Mediterranean Diet	8
2.1.4. DASH Diet	9
2.1.5. Dietary Recommendations for Americans	10
2.1.6. MyPlate Model	11
2.2.Vegetable and Fruit Consumption	12
2.3.What is Influential in Individuals' Food Preferences?	14
2.3.1. Sensory Effects on Food Preferences	15
2.3.2. The Effect of Visual Presentation of Foods on Food Preferences	16
3. MATERIALS AND METHODS	19
3.1. Time of Study and Sample Selection	19
3.2. Data Collection and Evaluation	19
3.3. Statistical Evaluation of Data	20
4.RESULTS	21
5.DISCUSSION	29

5.1. Conclusion	34
6.REFERENCE	35
7.APPENDICES	39
7.1. Appendice 1. Survey Used in Research	39
7.2. Appendice 2. Rectorship Approval Form	43
7.3. Appendice 3. Ethics Committee Approval Form	44

LIST OF TABLES

Table 4.1. Distribution of Participants by Sex	21
Table 4.2. Distribution of Participants by BMI	21
Table 4.3. Distribution of Participants by Age	21
Table 4.4. Hunger - Full General Test Fruits	22
Table 4.5. Hunger - Full General Test Vegetables	22
Table 4.6. The Effect of Shapes on Fruits in Different Age Groups	23
Table 4.7. The Effect of Shapes on Vegetables in Different Age Groups	24
Table 4.8. The Effect of Shapes on Fruits in Different BMI	25
Table 4.9. The Effect of Shapes on Vegetables in Different BMI	26
Table 4.10. The Effect of Shapes on Fruits in Different Sex	27
Table 4.11. The Effect of Shapes on Vegetables in Different Sex	28

LIST OF FIGURE

Figure 2.1. TR Ministry of Health. Turkey Dietary Guidelines 2015 Healthy Meal Plate (16)	7
Figure 2.2. TR Ministry of Health. Turkey Dietary Guidelines 2015 Healthy Food and Physical Activity Pyramid: Healthy eating and physical activity pyramid by food groups (16)	8
Figure 2.3. The United States Department of Agriculture (USDA) Dietary Recommendation for Americans 2020 - 2025 (31)	11
Figure 2.4. Adapted from the United States Department of Agriculture, C.f.P.a. and Promotion., Development of 2010 Dietary Guidelines for Americans The MyPlate (6) 12	
Figure 2.5. USDA Food Patterns: food groups and subgroups (33)	13

ABSTRACT

Erhan, İ. (2021). Evaluation of The Effect of Food Presentation Style on Taste Perception. Yeditepe University, Institute of Health Science, Department of Nutrition and Dietetics, ABD, Master Tezi, İstanbul.

Taste and palatability of foods are important factors in food intake, but in most cases the first sensory contact with food occurs through sight. It is thought that visual cues can be used to increase the consumption of vegetables and fruits in community nutrition. The aim of this study is to examine the effects of shapes, which are a visual factor, on sweet taste.

The study was conducted with 30 volunteers from a foundation university. In order to understand the effect of different shapes on taste perception, angular (square, star) and oval (round) shapes created by using standard patterns were used in three different fruits and vegetables. Participants were asked to evaluate the food they tasted after each tasting while hungry and full.

The feeling of hunger and fullness did not cause a significant difference in sweet taste level ($p \leq 0.05$). A significant difference was seen only in the star-shaped watermelon, and the star shape was recorded as sweeter when hungry. According to gender, while women and men were affected by different shaped fruits at varying rates ($p < 0.05$), it was seen that women were also affected by vegetables ($p < 0.05$), but no significant difference was found for men ($p > 0.05$). When evaluated according to the age group, the perceived sweet taste in both fruits and vegetables was affected differently in the younger age group ($p \leq 0.05$). While there was no significant difference in the taste scores of overweight individuals ($p > 0.05$), the subjects with normal body mass index were affected in different ways ($p \leq 0.05$). More studies are recommended on the presentation of vegetables and fruits in interventions for public health. In this way, the consumption of fruits and vegetables offered in different presentation styles can be increased.

Key words: consumption of vegetables and fruits, presentation style, taste perception

ABSTRACT (Turkish)

Erhan, İ. (2021). Besin Sunum Şeklinin Tat Algısına Etkisinin Değerlendirilmesi. Yeditepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Beslenme ve Diyetetik ABD, Master Tezi, İstanbul.

Besinlerin tadı ve lezzeti gıda alımında önemli birer faktör olmasına karşın çoğu durumda gıda ile ilk duyuşsal temas görme aracılığıyla gerçekleşmektedir. Toplum beslenmesinde sebze ve meyve tüketimini arttırmak için görsel ipuçlarının kullanılabileceğı düşünölmektedir. Bu çalışmanın amacı, bir görsel faktör olan şekillerin tatlı tat üzerindeki etkilerini incelemektir.

Çalışma bir vakıf üniversitesi çalışanlarından olan 30 gönüllü ile yapılmıştır. Farklı şekillerin tat algısına etkisinin anlaşılması için standart kalıplar kullanılarak oluşturulan köşeli (kare, yıldız) ve oval (yuvarlak) şekiller üçer farklı meyve ve sebzede kullanılmıştır. Katılımcılardan açken ve tokken her tadımın ardından tattıkları besini değerlendirmesi istenmiştir.

Açlık ve tokluk hissi tatlı tat seviyesinde anlamlı farka neden olmamıştır ($p \leq 0.05$). Yalnızca yıldız şeklindeki karpuzda anlamlı bir fark görölmüş ve yıldız şekli açken daha tatlı kaydedilmiştir. Cinsiyete göre bakıldığında, kadınlar ve erkekler farklı şekillerdeki meyvelerden değişen oranlarda etkilenirken ($p < 0.05$) kadınların sebzeler için de etkilendiğı ($p < 0.05$) ama erkekler için anlamlı bir fark bulunamadığı görölmüştür ($p > 0.05$). Yaş grubuna göre değerlendirildiğinde daha küçük yaş grubunda olan katılımcılarda hem meyve hem sebzelerde algılanan tatlı tat farklı şekillerden etkilenmiştir ($p \leq 0.05$). Hafif kilolu bireylerin tat puanlarında anlamlı fark yokken ($p > 0.05$) normal beden kütle indeksindeki gönüller farklı şekillerden değişen oranlarda etkilenmiştir ($p \leq 0.05$). Toplum sağlığına yönelik yapılacak müdahalelerde, sebze ve meyvelerin sunum şekli konusunda daha fazla çalışma önerilmektedir. Bu şekilde farklı sunum şekilleriyle sunulan meyve ve sebzeleri tüketimi arttırılabilir.

Anahtar kelimeler: sebze ve meyve tüketimi, sunum şekli, tat algısı

1.INTRODUCTION

The use of nutrients to sustain life, protect and improve health is defined as “nutrition” (1).

In every period from the prenatal period to the last stage of life; Adequate and balanced nutrition is the basis for growth and development, protection and improvement of health, meeting vital needs, and organ activity and has a high importance (2).

Inadequate and unbalanced nutrition is defined as the inability to meet the nutritional elements and energy needed by the human body in sufficient quantities and in a balanced ratio. This situation causes physical and mental development to be negatively affected (3). Depending on the duration and process of inadequate and unbalanced nutrition, different levels of infections and symptoms may occur (4).

Inadequate and unbalanced nutrition in community nutrition can cause many diseases that can harm the individual and society financially, morally and socially. In this context, it can lead to a decrease in life expectancy and quality. According to the data of the Turkish Statistical Institute, there are many health problems that occur depending on the diet in Turkey (1). Protein-energy malnutrition, various vitamin and mineral deficiencies, related skin and organ diseases, obesity and chronic inflammatory diseases are common (2). The way of nutrition is directly related to the mental, physiological and social well-being of individuals (5).

In order to provide the most appropriate variation of adequate and balanced nutrition for the individual, a daily combination of nutrients and energy specific to the individual and his/her health condition is required (6).

One of the models used to provide adequate and balanced nutrition is the MyPlate model prepared by USDA. This model is designed to motivate individuals to provide a healthy diet by squeezing sample daily menus (7). In the model, a table with a plate and glass divided into 5 food groups was prepared. While preparing the model, the

recommendations of Dietary Guidelines for Americans were used. Myplate is designed as a plate that is divided into four sections, consisting of 40% vegetables, 30% cereal group, 10% fruit, 20% protein, with average values, as well as a glass representing the milk group (milk, yoghurt, etc.) (8, 9). Similarly, the World Health Organization recommends daily consumption of at least 400 g of vegetables and fruits (10). The main reason for these recommendations is that fruits and vegetables are rich in fiber and vitamins and minerals that the human body needs. Thanks to this feature, adequate consumption of vegetables and fruits reduces the risk of many chronic diseases such as cancer, cardiovascular diseases, gastrointestinal system diseases, strengthens the immune system, and prevents the development of inflammatory diseases due to the increase in oxidative stress in the body (11).

According to the Turkey Nutrition and Health Survey (TBSA) conducted by the Turkish Ministry of Health, the rate of those aged 15 and over in Turkey who never consume green leafy vegetables is 4.5%, the rate of those who never consume other fresh vegetables is 12.3%, the rate of those who never consume citrus fruits 4.1%, the rate of those who do not consume other fresh fruits is 3.7%. In general, in Turkey, consuming no vegetables at all is 0.6%, consuming once a week is 7%; consuming no fruit is 1.1%, consuming once a week is 7.1% (2).

Food preferences form the basis of balanced and adequate nutrition of individuals. Food preferences of individuals develop depending on many factors, including cognitive, sensory and environmental. For example, the individual's past experiences, sensory perception and current needs are evaluated consciously or unconsciously by the individual, and food selection is made as a result of this evaluation (12).

Sensory factors affecting food preferences; the taste, appearance, smell, texture, temperature and flavor of the food. Although the taste and flavor of foods are the most important characteristics of individuals; The first contact with food takes place by sight (13). The shape of the food, portion size, color and volume cause the first impression of

the food, and this first impression affects the food preferences of the person and the portion consumed (14). In this direction, visual cues can be used to increase the consumption of vegetables and fruits in adults.

The shape of the food is to determine the visual factors associated with the food and their effects on food acceptance, portioning and consumption. Consumption of vegetables and fruits can be increased by arranging the way of serving. It is thought that the round form of the foods to be consumed may create a preliminary signal that the person will perceive a sweet taste at first sight, and that they will perceive more bitter and sour tastes if they are in angular forms such as square (13) Therefore, visual cues are suggested to be used to increase the consumption of vegetables and fruits. The aim of this study is; to increase the consumption of vegetables and fruits in the society by using the sense of sight, which is one of the factors affecting the food choices of individuals.

2. GENERAL INFORMATION

2.1 Adequate and Balanced Nutrition

According to the definition made by the World Health Organization (WHO) in 1948, health is “not just the absence of a physical disease. It is a state of complete physical, mental and social well-being” (15).

Throughout the history of humanity, the importance of adequate and balanced nutrition in growth and development, as well as in the prevention of diseases or the progression of existing diseases, reducing symptoms, ensuring and maintaining a healthy state, has been known, and studies on adequate and balanced nutrition of societies are being developed (2). Adequate and balanced nutrition has taken its place among preventive health studies in all societies from past to present.

Nutrition is one of the environmental factors that affect the health of individuals and society (16). General health, physical activity, productivity, psychology, social behavior of the individual; In summary, there is a bidirectional interaction between the physical and behavioral state of the individual in the life process and the way of nutrition (17).

Adequate and balanced nutrition maintains its importance in the life of the individual from the prenatal period to death (17). The main purpose of adequate and balanced nutrition for the individual is to provide the macro and micro nutrients and energy needed in order to fulfill the vital needs of the body, to protect and develop health, and to maximize the quality of life of the individual (18,19). In this case, nutrition is defined as “the use of nutrients for the maintenance of life, protection and development of health”(1).

The point where the concepts of healthy nutrition and balanced nutrition differ from each other is as follows; “healthy eating” covers the preparation stages of foods. It is about the processes that the food goes through during the production, storage and

cooking stages. A “balanced diet” is about the content of the food rather than the preparation. It is checked whether the content of the consumed foods meets the energy, micro and macro nutrient needs of the person (20).

Lack of adequate and balanced nutrition of individuals in the society is the main cause of chronic inflammatory diseases, obesity, cardiovascular diseases, diabetes, cancer, etc. increases its incidence. In this context, adequate and balanced nutrition of individuals is a protective factor for public health (16) According to the WHO report published in 2006; In developing countries, one out of every 3 people is prone to infections, birth defects, physical and intellectual growth retardation due to micronutrient deficiency. According to the report, the main deficiencies are vitamin A, zinc, iron, iodine, vitamin D, vitamin B12 (1). In this context, there are dietary models developed to protect societies from possible micronutrient deficiencies by providing adequate and balanced nutrition. To have knowledge and awareness about one or more of these diet models; associated with adequate and balanced nutrition quality (21). Some of these diet models are Mediterranean diet, DASH diet, Dietary Recommendation for Americans, Healthy Eating Plate (MyPlate). The recommended nutrition models specific to Turkey are the Healthy Meal Plate and the Healthy Eating and Physical Activity Pyramid. These diet models include recommendations for individuals to consume sufficient and balanced daily or weekly fruit, vegetables, milk and dairy products, meat and meat products, plant-based oil and grains. Some models also include recommended portions for foods that are recommended to be consumed less frequently, such as added sugar and alcohol. The approach of the models benefits public health in the prevention of cardiovascular diseases, cancer, type 2 diabetes and obesity or in reducing complaints (22).

Commonly recommended diet patterns for adults:

2.1.1. Turkey-specific Healthy Meal Plate

Within the scope of Turkey's Nutrition Guidelines, "Plate Model by Food Groups" was created in order to increase the level of adequate and balanced nutrition knowledge and awareness of individuals and society. While preparing the model, the basic principle was to be easy to understand. The plate model is designed based on one of the most important recommendations of adequate and balanced nutrition, that is, in order to provide nutritional diversity. When the plate model is viewed clockwise; milk and dairy products group, meat and meat products, chicken, fish, eggs, legumes and oil seeds group, fresh vegetables group, fresh fruits group, bread and cereals group. While choosing food between the groups, attention should be paid to the color variety, the structural characteristics of the food, the individual's specific disease status, age, gender, and physical activity level; It has been emphasized that it is important to make choices by paying attention to the fiber, fat, salt and added sugar contents of the foods in order to provide an adequate and balanced diet. It is suggested that the individual consumes at least one variety from all the food groups on the plate at each meal. In terms of the complementarity of healthy life, the daily water consumption of the person, including olive oil in his diet, and active living are highlighted, apart from the plate model (16).



Figure 2.1. TR Ministry of Health. Turkey Dietary Guidelines 2015 Healthy Meal Plate (16)

2.1.2. Turkey-specific Healthy Eating and Physical Activity Pyramid

In the pyramid model, physical activity recommendations were added in addition to nutritional recommendations. In the pyramid model, which is based on the principle of providing diversity in order to ensure adequate and balanced nutrition, unlike the plate model, the recommendations include the recommended portions to be consumed daily, not for a single meal. In addition, it highlights the food groups whose consumption should be increased or decreased. It has been added to the side of the pyramid in order to emphasize the daily fluid consumption along with all food groups. At the base of the pyramid, the cereal group, which constitutes the majority of the daily energy intake, has been added to the fruit and vegetables, as well as olive oil, which has an important place in the Mediterranean diet. Then, milk, yoghurt, cheese, meat derivatives, eggs and legumes were included as the protein group, while foods containing added sugar and high fat, which are recommended to be limited, were added to the top box. In addition to the nutritional recommendations given in each line, suggestions about physical activity levels are from basic to low; daily activities, endurance exercises, strength-flexibility-balance exercises and sedentary life (16).



Figure 2.2. TR Ministry of Health. Turkey Dietary Guidelines 2015 Healthy Food and Physical Activity Pyramid: Healthy eating and physical activity pyramid by food groups (16)

2.1.3. Mediterranean Diet

The history of this diet model dates back to the diet of Mediterranean countries such as Italy and Greece in 1960. Based on the Mediterranean diet; It's not just a diet, it's a lifestyle. According to the model, it is recommended that the person prefer local products, pay attention to cooking techniques, and keep the physical activity level at least moderate. Accordingly, the Mediterranean diet focuses not only on the health of the individual and society, but also on ecology. This model, which can be considered a cultural heritage apart from being a diet model; recommends eating as much fresh, local, seasonal food as possible (23). When we look at the records of the WHO between 1960 and 1990, it is seen that the death rates are lower in Mediterranean-type countries. On top of that, studies on Mediterranean diet prove that this diet model is a model that supports survival, prevention and treatment from diseases. In the model, olive oil consumption and high consumption of vegetables and fruits come to the fore. The high antioxidant content in these foods explains why the diet model is protective against

inflammatory diseases (24). According to the Mediterranean diet model, individuals should consume at least 5 servings of different kinds of vegetables and fruits per day. Starchy foods such as potatoes, rice and bread should form the basis of meals, and if possible, these food choices should be made from whole grain sources. 2 portions of oily fish should be consumed per week, and protein sources such as red meat and legumes should be included on other days. Low-fat dairy products should be preferred. 6-8 glasses of fluid should be taken daily. Foods high in fat, salt and sugar should be included less frequently in the diet. According to the model, not every meal may be suitable for this model, but it is recommended that the general diet should be suitable for this on a daily or weekly basis (25).

2.1.4. DASH Diet

The Dietary Approaches to Stop Hypertension (DASH) diet is recommended by the National Institutes of Health. There is strong evidence that this approach lowers blood pressure and improves risk factors for cardiovascular disease. In addition, it is important for blood sugar control in type 2 diabetes, prevention of type 2 diabetes and obesity. With all these features, the DASH diet model stands out as a therapeutic and preventive diet model (26). According to the model, 52-55% of the daily energy consumed by the individual should come from carbohydrates, 16-18% from proteins and 30% from fats. Fruit, vegetables, whole grain sources and low-fat dairy products are included in the daily diet. Sources of saturated fats, cholesterol, refined sugar and refined grains are limited. In addition, the model limits daily sodium consumption to 2400mg/day (22). The sodium recommendation for risky groups drops to 1500mg/day. The diet gives its recommendations through a sample menu that is fed with 2000 calories per day. Accordingly, the individual fed a 2000 calorie diet 6-8 servings of whole grain products, 4-5 servings of fruit, 2-3 servings of milk and dairy products, 6 or less servings of meat products, 2-3 servings of fat, and 4-5 servings of fat per week. portion of oilseeds and legumes should be consumed. Sugar consumption should be 5 servings or less per week. Alcohol should be 1 or less per week for women and 2 or less

per week for men. The model suggests that caffeine may temporarily increase blood pressure, and accordingly, individuals should be cautious about their caffeine intake (27,28)

2.1.5. Dietary Recommendations for Americans

The Dietary Recommendation for Americans is updated every 5 years so that new information on adequate and balanced nutrition can be updated as it emerges (29). The most recently published recommendations are to cover the years 2020 - 2025. The guide gives recommendations by grouping them according to daily energy needs. The daily recommended food groups are listed separately for individuals whose daily energy needs are 1600, 1800, 2000, 2200, 2400, 2600, 2800 or 3000kcal. Foods are divided into groups as vegetables, fruits, cereals, dairy products, protein group, fats and others that can be consumed limitedly. While the daily recommended amount is specified for all food groups except the foods recommended for limited consumption; it is expressed in calorie units as the maximum amount of energy from this group for foods that are recommended for limited consumption. As it can be understood, the Dietary Recommendation for Americans consumption is out of the recommended food groups; it also includes foods that are not recommended for routine consumption or that can be consumed in a limited way. In addition, the guide also divides the vegetable group, cereal group and protein group into sub-titles. Dark-green leafy vegetables, red-orange vegetables, legumes, starchy vegetables and other vegetables are recommended to be consumed weekly in the vegetable group; refined and whole grains recommended to be consumed daily in the grain group: In the protein group, portions of meat, chicken, eggs, seafood and oilseeds recommended to be consumed weekly are listed (30)

CALORIE LEVEL OF PATTERN ^a	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000
FOOD GROUP OR SUBGROUP ^b	Daily Amount of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)							
Vegetables (cup eq/day)	2	2 ½	2 ½	3	3	3 ½	3 ½	4
	Vegetable Subgroups in Weekly Amounts							
Dark-Green Vegetables (cup eq/wk)	1 ½	1 ½	1 ½	2	2	2 ½	2 ½	2 ½
Red & Orange Vegetables (cup eq/wk)	4	5 ½	5 ½	6	6	7	7	7 ½
Beans, Peas, Lentils (cup eq/wk)	1	1 ½	1 ½	2	2	2 ½	2 ½	3
Starchy Vegetables (cup eq/wk)	4	5	5	6	6	7	7	8
Other Vegetables (cup eq/wk)	3 ½	4	4	5	5	5 ½	5 ½	7
Fruits (cup eq/day)	1 ½	1 ½	2	2	2	2	2 ½	2 ½
Grains (ounce eq/day)	5	6	6	7	8	9	10	10
Whole Grains (ounce eq/day)	3	3	3	3 ½	4	4 ½	5	5
Refined Grains (ounce eq/day)	2	3	3	3 ½	4	4 ½	5	5
Dairy (cup eq/day)	3	3	3	3	3	3	3	3
Protein Foods (ounce eq/day)	5	5	5 ½	6	6 ½	6 ½	7	7
	Protein Foods Subgroups in Weekly Amounts							
Meats, Poultry, Eggs (ounce eq/wk)	23	23	26	28	31	31	33	33
Seafood (ounce eq/wk)	8	8	8	9	10	10	10	10
Nuts, Seeds, Soy Products (ounce eq/wk)	4	4	5	5	5	5	6	6
Oils (grams/day)	22	24	27	29	31	34	36	44
Limit on Calories for Other Uses (kcal/day) ^c	100	140	240	250	320	350	370	440
Limit on Calories for Other Uses (%/day)	6%	8%	12%	11%	13%	13%	13%	15%

Figure 2.3. The United States Department of Agriculture (USDA) Dietary Recommendation for Americans 2020 - 2025 (31)

2.1.6. MyPlate Model

One of the recommended diet forms to ensure a balanced diet is the current MyPlate model prepared by the USDA. This model is designed to motivate individuals to provide a healthy diet by presenting sample daily menus (7). In the model, as seen in figure 1, a visual with a plate and glass divided into 5 food groups was prepared. While preparing the model, the recommendations of Dietary Guidelines for Americans were used. Myplate is designed as a plate divided into four sections with average values consisting of 40% vegetable, 30% cereal group, 10% fruit, 20% protein, as well as a glass representing the milk group (milk, yoghurt, etc.). The Directive emphasizes the concepts of balance and portion control while enjoying food; recommends reducing sodium and simple sugar intake (6, 8).

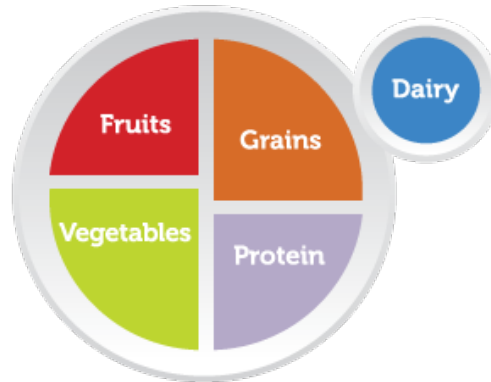


Figure 2.4. Adapted From the United States Department of Agriculture, C.f.P.a. And Promotion., Development of 2010 Dietary Guidelines for Americans The MyPlate (6)

2.2.Vegetable and Fruit Consumption

In the World Health Organization report published in 2006, a statement was made that one out of every 3 people in developing countries is affected by vitamin and mineral deficiency, which increases the susceptibility to infections, birth defects, physical and intellectual growth retardation (1).Vegetables and fruits, which are the primary source of micronutrients, come to the fore in the prevention of diseases that can be caused by nutritional disorders such as weakened immune system, birth defects, mental and physical retardation, and especially triggered by micronutrient deficiencies (32).The primary source for meeting the daily vitamin and mineral needs of individuals is fruits and vegetables. Many nutritional deficiencies are caused by the individual's insufficient daily consumption of vegetables and fruits or the low level of knowledge of the individual on this subject (33). This is the reason why, in many diet models that stand out in the world, half of an individual's plate or the majority of his daily diet consists of vegetables and fruits. The energy and micronutrient content of fruits and vegetables also varies among each other (34). Another reason why fruit and vegetable consumption is important is that they are high fiber sources. The Institute of Medicine

(IOM) announced that a fiber diet at the rate of 14g/1000kcal/day will reduce the risk of coronary heart disease and obesity and prevent the formation of new diseases (35). Daily fiber intake is an important factor for the health of the individual, and vegetables and fruits can support the prevention of diseases with the amount of fiber they contain. Apart from this, fruits and vegetables; are good sources of antioxidants, phytoestrogens and anti-inflammatory agents (34).

In many diet models, fruits and vegetables are grouped by colors.

Food Group	Classification and examples
Vegetables	Dark green leafy vegetables: broccoli, spinach, lettuce, collard greens, turnips, etc.
	Red and orange vegetables: tomatoes, paprika, carrots, sweet potatoes, winter squash, pumpkin
	Starchy vegetables: white potatoes, corn, green peas
	Legumes: kidney beans, lentils, chickpeas and kidney beans
	Other vegetables: lettuce, green beans, onions
Fruits	Oranges and orange juice, apples and cider, bananas, grapes, melons, strawberries and raisins

Figure 2.5. USDA Food Patterns: Food Groups and Subgroups (33)

Although categorizing into color categories makes menu planning easier, nutrient content may not match between groups. For example, orange vegetables are rich in carotenoids, but spinach, which is a dark green leafy vegetable, is also rich in carotenoids.(34).

The fruits are rich in pectin, which is fermented in the large intestines. Pectin is fermented in the large intestines, plays a role on short-chain fatty acid (SCFA) and supports the prevention of constipation (34)

Increasing the consumption of fruits and vegetables provides longer and better quality of life and reduces mortality (36). In addition, it helps to regulate cognitive functions (37), reduce the risk of cardiovascular diseases (38), have a minimal effect for reducing the risks of some cancers (39) and prevent obesity (40).

In addition, fruits and vegetables gain extra importance for individuals with bone and joint disorders as they are rich in potassium, an essential mineral for bone and joint health. In order to provide and maintain optimum health, fruits and vegetables are important with their energy, micronutrients and photochemical contents (41).

2.3.What is Influential in Individuals' Food Preferences?

An individual consumes at least 60,000 meals with an average calculation during his lifetime. The frequency of these meals, the portion and the choice of the food consumed in the meal directly affect the quality of life, health and survival time of the individual (42). It is thought that an individual makes an average of 200 food choice decisions in 24 hours. Decisions made vary from individual to individual, influenced by internal and external factors (43). Although individuals prioritize health when choosing food, health is not the only factor affecting choices (44). Factors determining food choice can basically be divided into two main headings as environmental and individual (45).

One of the factors that determine food choice is availability. The fact that the food can be found in the markets in the surrounding area, that it is easy to prepare, that it is easy to cook, that the preparation-cooking-serving stages do not take time affect the preferences of the individual (44). In addition, social transmission; whether the individual is suitable for his religious views, whether he is familiar with food, whether it is produced in the conditions of the region or close environment affects the food preference (44). Individual factors affecting food choice include sensory preferences, gender, hunger-satiety level, health and weight effects. The appearance, taste, smell and

texture of food affect the individual's food preference. The hunger and satiety level of the individual affects the food preference and amount (34). Whether the food contains additives and artificial sweeteners, and how much energy value it contains are factors that affect food preference (44). According to a study conducted with 393 individuals aged 18 and over, 207 women and 186 men in Turkey in 2016, women are more affected by all these factors than men (44).

In a study conducted in 2006 by dividing 24 men and women undergraduate students into two groups, it is examined whether the level of hunger and satiety has an effect on the perception of taste. According to the results of this study, while sensitivity to taste varies according to the hormone level of the individual, hunger is not significantly affected by the level of satiety (46). Similarly, in a study conducted with 11,456 men and women participants, no relationship was found between individuals' hunger levels and sweet taste perception levels (47). In a different study conducted with 16 men undergraduate students in 2004, a significant relationship was found between hunger, satiety level and sweet and salty taste, while it was associated with taste sensitivity: There was no relationship between bitter taste perception level and hunger, satiety level (48)

2.3.1. Sensory Effects on Food Preferences

Various sensory and visual cues such as the appearance, taste, smell, texture, temperature and flavor of foods are effective on the individual's food intake level (49). As well as the other factors affecting the food intake of the individual, the expectations of the food before going to bed also affect the food intake, amount, type and frequency (50). The appearance of the food (presentation style), the materials used for presentation, the smell, texture and temperature of the food affect the expectation from the food. For example, when a study conducted with 53 volunteers, 34 of whom were women, between the ages of 20-59, are examined by asking the person to he/she likes the food, the taste intensity and the sweet taste effect of the plate color: When the same

food is served with black and white plates, the white plate scores were significantly higher: It was noted that it was perceived as more intense and sweet (50). In colored solutions, odor is perceived more clearly than in colorless solutions (51). In addition, the color and color intensity of the food also affect the taste perceived by the individual. For example, red color is perceived as sweeter than green and colorless foods. This situation is shown by many studies in the literature. Studies conducted with 10 volunteers, men and women between the ages of 22-50 (52) and children between the ages of 5-14 (53) showed parallel results. In a study conducted with adults and the elderly, it was shown that the color of the food affects the perception of sweet taste, the acceptability of the food and the pleasantness of the individual at young adults while the color affects the perception of taste and desirability, especially in beverages, in the elderly (54). One of the factors affecting food preferences is the ambiance of the environment and the presence of individuals accompanying the meal. For example, as a result of the observations made in restaurants and cafes, it has been determined that there is a positive relationship between group size and meal time, as the number of individuals in the group increases, the meal duration and the consumed portions increase (55). In a study conducted with women and men university students, ice cream consumption portions of individuals alone, in groups of three and in groups of four were compared and it was observed that the portion consumed increased when eaten as a group (56).

2.3.2. The Effect of Visual Presentation of Foods on Food Preferences

It is thought that visual cues can be used to increase the consumption of vegetables and fruits in community nutrition (49).

In a study of 30 children, they were asked to count their favorite fruits, and three of the most frequently mentioned fruits (grapes, apples, strawberries) were chosen. These fruits were presented to the participants in two different ways: In one presentation, three fruits were decorated with flagged toothpicks and presented in a

visually appealing way, while in another they were served on a plain white plate. Children were asked to rate whether they wanted to consume it and to rate the taste after eating. At the end of the study, it was noted that the visually appealing presentation was consumed more and found sweeter (57).

According to a study conducted with volunteers between the ages of 20-50, it is thought that the round form of the foods to be consumed may create a preliminary signal that the person will perceive a sweet taste at first sight, and that they will perceive more bitter and sour tastes if they are in square, angular forms (49).

The visual presentation of foods also affects their perceived volume. For example, as a result of the study, in which round and square pizza with equal content and volume were presented to the students, more than 70% of the volunteers stated that the square pizza was more than the round pizza (58).

The visual presentation of foods also affects the liking of the food. For example, in a study conducted with children aged 9-12 in 2021, when three vegetables (carrot, cucumber, red pepper) were presented in two different sizes, small and large, with four different visual presentation styles as star, ring, strip and whole, they liked photos of vegetables cut into star shapes more than photos of vegetables cut into strips (59).

In an online study with 131 eligible participants on understanding the relationship between basic tastes and visual cues; the participants were asked to rate their sweet, sour, bitter and salty tastes with a Likert scale by showing food animations in different colors and shapes. In the study, sweet taste and red color were paired with round shape: It has been noted that the sour taste and green color were matched (60).

It is thought that the round form of the foods to be consumed may create a preliminary signal that the person will perceive a sweet taste at first sight, and that they will perceive more bitter and sour tastes if they are in angular forms such as square (13).

In another study, in order to examine the effect of shapes on taste perception, participants were asked to rate the differences between sweetness, bitterness, and creamy feeling with a Likert scale by only tasting dark chocolate with different shapes (square and round) and identical contents. In addition, the expectations for each chocolate were asked to be rated before tasting, and the post-taste thought and pre-taste expectations were compared. As a result of the study, it was concluded that the expectation and post-tasting thought were parallel, and the shape of the chocolate significantly affected the tasting. The round ones were found to be less sweet, more bitter, less creamy, and the square ones were found to be sweeter and creamier than the round ones (61).

In another study, in order to examine the effect of shapes on taste perception, participants were given identical dark chocolates with different shapes (square and round). They were asked to number their sweetness, bitterness, and creamy tastes on a Likert scale. In addition, the expectations for each chocolate were asked to be rated before tasting, and the post-taste thought and pre-taste expectations were compared. As a result of the study, it was concluded that the expectation and post-tasting thought were parallel, and the shape of the chocolate significantly affected the tasting. The round ones were found to be less sweet, more bitter, less creamy, and the square ones were more sweet and creamy than the round ones (62).

Among the studies between the years 1941-2020, one of which is a compilation, are discussed. These studies were conducted with children aged 4-12 (226 children) and 354 adults aged 17-74. When the results obtained are considered contradictory to each other; they found in data of a study with 102 adults, that angular shapes were found to be creamier, less bitter and sweeter, while oval shapes were found to taste sweeter. However, according to the results of other studies with adults and children, foods in oval form were recorded as sweeter than foods in angular form.

3. MATERIALS AND METHODS

3.1. Time of Study and Sample Selection

This research was conducted in June 2021 with 30 voluntary individuals in the Yeditepe University works in an affiliated academic or administrative staff. The ages of the participants ranged from 26 to 61. Inclusion criteria was being between 18 and 65 years of age, not having trauma after intraoral surgery that may affect the sense of taste, not having neuropathy due to diabetes, not using antiparkinsonian drugs, not smoking, not having kidney failure, not having a diagnosis of malnutrition, not receiving radiotherapy or chemotherapy treatment. Exclusion criteria from the study was as follows; being younger than 18 years of age or older than 65 years, having trauma after intraoral surgery that may affect the sense of taste, having neuropathy due to diabetes, using antiparkinsonian medication, smoking, kidney failure, malnutrition diagnosis, radiotherapy or chemotherapy treatment, not working in the academic or administrative staff of Yeditepe University. Participants were classified according to their body mass index (63). For this research, the Ethics Committee approval was obtained by the Research Ethics Committee of Yeditepe University with the decision number 1394 dated 03/03/2021 as the research project number 2080.

3.2. Data Collection and Evaluation

In order for the shapes of fruits and vegetables to be identical, the same square, round and star cookie cutters were used in the cutting process. Pieces taken from the same fruit and vegetables were given to the same participant on numbered plates so that different vegetables or fruits would not come in the hunger and satiety test. For the fasting test, the participants were accepted to be fasting for at least 8 hours before breakfast. For the satiety test, the test was repeated immediately after the catering service. Between the catering service and the taste test, the participants were asked to drink water until it was stated that there was no distinct taste on the palate. The data

were collected using a face to face questionnaire. Questionnaires were conducted one-to-one in a laboratory environment immediately after the taste test. The Questionnaire Form was applied 2 times: when the participants were hungry and full. A Likert scale was used for the different shapes of each fruit in each section, with a score of 1 to 5 for the sweet taste level (1 - very tasteless, 2 - tasteless, 3 - medium, 4 - sweet, 5 - very sweet). Additionally sex, age, body weight and height were collected via self reports.

3.3. Statistical Evaluation of Data

Shapiro-Wilk normality test was applied to examine the distribution of the scores obtained in the data collection form within the scope of the research. The results obtained showed that the scale scores did not have a normal distribution. Considering this result, it was decided to use non-parametric analysis techniques.

Research data were non-normal distribution data. The Kruskal Wallis test was performed to determine whether different shapes have an effect on taste perception in different vegetables and fruits in the whole population. Then, the Friedman test was performed separately according to age, body mass index (BMI) and gender to see if there was a change in the results for different variables. Confidence interval was determined as 95%, $p < 0.05$ values were considered statistically significant. Analyses were performed using SPSS 25.0 statistical package program.

The Friedman test was performed to examine the relationships between the perception of hungry and satiating sweet taste of different shapes of vegetables and fruits, and age, body mass index (BMI), and gender. Confidence interval was determined as 95%, $p < 0.05$ values were considered statistically significant. Analyses were performed using SPSS 25.0 statistical package program.

4.RESULTS

Table 4.1. Distribution of Participants by Sex

Sex	n	%
Women	22	73,3
Men	8	26,7
Missing	2	
Total	30	100

Table 4.2. Distribution of Participants by BMI

BMI	n	%
Underweight	1	3,3
Normal weight	11	36,7
Overweight	15	50
Obesity	1	3,3
Missing	2	
Total	30	100

Table 4.3. Distribution of Participants by Age

Age	f	%
Young adult (26 - 35)	14	46,7
Adult (36 - 61)	14	46,7
Missing	2	
Total	30	100

73.3% of the participants were women, 26.7% were man; 46.7% were young adult (26-36 years old), 46.7% adult (36-61 years old); 3.3% of them were slightly underweight, 36.7% of them were normal, 50% of them were slightly overweight, and 3.3% of them were obese.

Table 4.4. Hunger - Full General Test Fruits

Fruits	Mean (Hunger)	Mean (Full)	p
Apple square	1.97	2.00	0.868
Apple round	2.17	1.98	0.251
Apple star	1.87	1.02	1.000
Melon square	2.20	2.07	0.723
Melon round	1.93	1.90	0.543
Melon star	1.87	2.03	0.125
Watermelon square	1.93	2.12	0.947
Watermelon round	1.80	1.93	0.724
Watermelon star	2.27	1.95	0.031*

*p<0.05

Wilcoxon test was applied. While there is no significant difference in the measurement of hunger and satiety sweet taste levels of apple and melon in different shapes ($p>0.05$), there is no difference in the square and round shape of watermelon ($p>0.05$), there is a statistically significant difference between the hungry and full sweet taste test when presented as a star ($p<0.05$). Star-shaped watermelon was sweeter when hungry ($p=0.031$, $p<0.05$).

Table 4.5. Hunger - Full General Test Vegetables

Vegetables	Mean (Hunger)	Mean (Full)	p
Green squash square	2.02	1.97	0.804
Green squash round	2.17	2.05	0.685
Green squash star	1.82	1.98	0.414
Pepper square	2.12	2.13	0.707
Pepper round	1.88	1.95	0.660
Pepper star	2.00	1.92	0.796
Cucumber square	2.20	1.97	0.294
Cucumber round	1.88	1.92	0.701
Cucumber star	1.92	2.12	0.400

Wilcoxon test was applied. There was no statistically significant difference between the hunger and satiety levels of different vegetables in different ways ($p>0.05$).

Table 4.6. The Effect of Shapes on Fruits in Different Age Groups

Age	Fruits	Shape	Hunger		Full	
			Mean	p	Mean	p
Young adult (26 - 35)	Apple	square	3.04	<0.001*	2.86	<0.001*
		round	3.07		3.18	
		star	2.89		2.96	
Adult (36 - 61)	Apple	square	2.96	<0.001*	3.11	<0.001*
		round	3.07		2.71	
		star	2.71		2.96	
Young adult (26 - 35)	Melon	square	3.21	<0.001*	3.25	<0.001*
		round	3.00		2.75	
		star	2.75		2.96	
Adult (36 - 61)	Melon	square	3.18	<0.001*	2.89	<0.001*
		round	2.64		3.04	
		star	2.96		2.93	
Young adult (26 - 35)	Watermelon	square	2.93	<0.001*	3.14	<0.001*
		round	2.86		2.86	
		star	3.14		2.89	
Adult (36 - 61)	Watermelon	square	2.96	<0.001*	2.96	0.017**
		round	2.46		2.79	
		star	2.43		2.54	

*p<0.01

**p<0.05

Freidman test was applied. In the presentation of different fruits in different shapes, there was a significant difference between hungry and satiated repeated sweet taste level measurements in both young adult and adult groups ($p<0.05$). In young adults and adults, apples were found to be sweeter in the form of round ($p<0.001$, $p<0.01$) both when hungry and full. In young adults, the melon was found to be sweeter in the form of square ($p<0.001$, $p<0.01$) both when hungry and full. In adults, the melon was sweeter in the form of square ($p<0.001$, $p<0.01$) when hungry, and round when full ($p<0.001$, $p<0.01$). In young adults, watermelon was sweeter when hungry ($p<0.001$, $p<0.01$) and as a square when full ($p<0.001$, $p<0.01$). In adults, the watermelon was found to be the sweetest when it was hungry ($p<0.001$, $p<0.01$) and when it was full ($p<0.001$, $p<0.05$).

Table 4.7. The Effect of Shapes on Vegetables in Different Age Groups

Age	Vegetables	Shape	Hunger		Full	
			Mean	p	Mean	p
Young adult (26 - 35)	Cucumber					
		square	2.79	0.004**	2.64	0.008**
		round	2.61		2.75	
		star	2.82		2.82	
Adult (36 - 61)	Cucumber	square	3.04	0.098	2.39	0.649
		round	2.21		2.29	
		star	2.18		2.71	
Young adult (26 - 35)	Green squash	square	2.89	<0.001*	2.79	<0.001*
		round	3.29		3.00	
		star	2.36		2.82	
Adult (36 - 61)	Green squash	square	2.36	0.773	2.29	0.698
		round	2.36		2.46	
		star	2.64		2.50	
Young adult (26 - 35)	Pepper	square	3.00	0.001**	3.14	<0.001*
		round	2.75		2.79	
		star	2.68		2.64	
Adult (36 - 61)	Pepper	square	2.64	0.355	2.50	0.998
		round	2.11		2.54	
		star	2.75		2.46	

*p<0.01

**p<0.05

Freidman test was applied. According to the test performed with different age groups, there was a statistically significant difference in the sweetness level measurements of cucumber, zucchini and peppers with different shapes in different shapes ($p<0.05$), while there was no significant difference in the sweet taste level in the measurement of different vegetables and different shapes in the hungry - full in adults. ($p>0.05$). In young adults, cucumbers were sweeter both when they were hungry ($p=0.004$, $p<0.05$) and when they were full ($p=0.008$, $p<0.05$). In young adults, zucchini was sweeter both when it was hungry and when it was full ($p<0.001$, $p<0.01$). In young adults, the pepper was found to be the sweetest both when it was hungry ($p=0.001$, $p<0.01$) and when it was full ($p<0.001$, $p<0.01$).

Table 4.8. The Effect of Shapes on Fruits in Different BMI

BMI	Fruits	Shape	Hunger		Full	
			Mean	p	Mean	p
Normal weight	Apple	square	3.08	<0.001*	3.27	<0.001*
		round	3.18		3.00	
		star	2.68		2.68	
Overweight	Apple	square	2.90	<0.001*	2.70	<0.001*
		round	3.07		3.00	
		star	2.80		3.17	
Normal weight	Melon	square	3.23	<0.001*	3.23	<0.001*
		round	2.95		2.95	
		star	2.82		2.77	
Overweight	Melon	square	3.07	<0.001*	2.90	<0.001*
		round	2.83		2.83	
		star	2.83		3.03	
Normal weight	Watermelon	square	2.95	<0.001*	3.32	<0.001*
		round	2.55		2.82	
		star	3.45		2.55	
Overweight	Watermelon	square	2.90	<0.001*	2.77	0.001**
		round	2.70		2.87	
		star	3.10		2.93	

*p<0.01

Freidman test was applied. For each participant from body mass index, there is a statistically significant difference according to the sweet taste level in the hungry-full measurements of different shaped fruits ($p<0.01$). In normal BMI, apples were found to be sweeter in the form of round ($p<0.001$, <0.01) when hungry, and sweeter in the form of square ($p<0.001$, <0.01) when full. Apples were sweeter when hungry, in the form of round ($p<0.001$, <0.01), and star-shaped when full ($p<0.001$, <0.01) in light weight subjects. In normal BMI, the sweetest melon was found to be square when hungry and full ($p<0.001$, <0.01). Melon was sweeter in the form of a square ($p<0.001$, <0.01) when hungry, and as a star when full ($p<0.001$, <0.01) in light weight subjects. In normal BMI, watermelon was sweeter when hungry ($p<0.001$, <0.01) and as a square when full ($p<0.001$, <0.01). The sweetest watermelon was found to be star ($p<0.001$, <0.01) in light weight subjects, whether hungry or full.

Table 4.9. The Effect of Shapes on Vegetables in Different BMI

BMI	Vegetables	Shape	Hunger		Full	
			Mean	p	Mean	p
Normal weight	Cucumber					
		square	3.09	0.001*	2.64	0.035*
		round	2.59		2.68	
		star	2.59		2.82	
Overweight	Cucumber	square	2.83	0.150	2.17	0.166
		round	2.07		2.37	
		star	2.30		2.57	
Normal weight	Green squash	square	2.95	0.002*	2.82	0.017*
		round	2.91		2.68	
		star	2.68		2.68	
Overweight	Green squash	square	2.40	0.359	2.20	0.345
		round	2.80		2.83	
		star	2.13		2.53	
Normal weight	Pepper	square	2.86	0.009*	2.68	0.011*
		round	2.55		2.86	
		star	2.95		2.73	
Overweight	Pepper	square	2.77	0.686	2.80	0.504
		round	2.33		2.50	
		star	2.43		2.33	

*p<0.05

Freidman test was applied. Since 1 of the participants was found to be below normal body mass index and 1 of them was obese, they were not included in the statistical comparative analysis. In participants with normal body mass index, there was a statistically significant difference in sweetness levels between the repeated measurements of cucumber, zucchini and pepper in different shaped versions ($p < 0.05$), while there was no significant difference in light weight individuals ($p > 0.05$). In normal BMI, cucumbers were found to be sweeter in the form of a square ($p = 0.001$, < 0.05) when hungry, and as a star when full ($p = 0.035$, < 0.05). In normal BMI, zucchini was sweeter when it was hungry ($p = 0.002$, < 0.05) and when it was full ($p = 0.017$, < 0.05). In normal BMI, the pepper was found to be sweeter when it was star ($p = 0.009$, < 0.05), while it was sweeter when it was full ($p = 0.011$, < 0.05).

Table 4.10. The Effect of Shapes on Fruits in Different Sex

Sex	Fruits	Shape	Hunger		Full	
			Mean	p	Mean	p
Women	Apple					
		square	2.91	<0.001*	3.02	<0.001*
		round	3.16		3.02	
		star	2.91		2.93	
Men	Apple	square	3.13	<0.001*	2.88	0.002**
		round	3.13		2.94	
		star	2.69		3.06	
Women	Melon	square	3.20	<0.001*	3.07	<0.001*
		round	3.00		2.86	
		star	2.80		3.02	
Men	Melon	square	3.13	0.012	3.00	0.001**
		round	2.63		2.81	
		star	2.88		3.00	
Women	Watermelon	square	2.84	<0.001*	3.16	<0.001*
		round	2.80		2.75	
		star	3.32		2.84	
Men	Watermelon	square	3.13	0.001**	2.75	<0.001*
		round	2.69		3.13	
		star	3.06		3.00	

*p<0.01

**p<0.05

Freidman test was applied. There was a statistically significant difference in sweetness levels in both men and women as a result of the hungry - full taste tests in which apple, melon and watermelon were presented in different forms ($p<0.01$). Apples were found to be sweeter when they were hungry ($p<0.001$, <0.01), and as round and square ($p<0.001$, <0.01) when full. In men, apples were found to be sweeter when hungry ($p<0.001$, <0.01), and star-shaped when full ($p=0.002$, <0.05). Melon in women both were found to be sweeter in satiated square shape ($p<0.001$, <0.01). Stars and squares ($p=0.001$, <0.05) were sweeter when the melon was full. In women, the watermelon was sweeter when it was presented as a star when hungry and when it was presented as a square when full ($p<0.001$, <0.01). In men, watermelon was found to be

sweeter when it was full ($p=0.001$, <0.05), and in the round shape when hungry ($p<0.001$, <0.01).

Table 4.11. The Effect of Shapes on Vegetables in Different Sex

Sex	Vegetables	Shape	Hunger		Full	
			Mean	p	Mean	p
Women	Cucumber					
		square	3.02	<0.001*	2.75	<0.001*
		round	2.66		2.73	
		star	2.55		2.89	
Men	Cucumber	square	2.56	0.682	2.25	0.172
		round	2.19		2.06	
		star	2.81		2.75	
Women	Green squash	square	2.89	<0.001*	2.77	<0.001*
		round	3.09		2.93	
		star	2.57		2.77	
Men	Green squash	square	2.25	0.591	2.50	0.921
		round	2.38		2.31	
		star	2.44		2.56	
Women	Pepper	square	3.00	<0.001*	2.95	<0.001*
		round	2.61		2.91	
		star	2.87		2.66	
Men	Pepper	square	2.56	0.958	2.88	0.315
		round	2.44		2.13	
		star	2.63		2.75	

* $p<0.01$

** $p<0.05$

Freidman test was applied. While there was a statistically significant difference between the tasting tests for cucumber, zucchini and pepper in different ways in women ($p<0.01$), there was no statistically significant difference between the measurements made with different vegetables, different shapes and fasting in men ($p>0.05$). In women, cucumber was found to be sweeter in a square shape ($p<0.001$, <0.01) when hungry, and sweeter in a star shape when full ($p<0.001$, <0.01). In women, zucchini was sweeter in round shape ($p<0.001$, <0.01) in both fasting and satiety states. When looking at the pepper in women, square pepper was found to be sweeter in both fasting and satiety conditions ($p<0.001$, <0.01).

5.DISCUSSION

Nutrition is a psychological factor as well as physiological for human. The first phase of digestion and the individual's first relationship with food is known as cephalic phase. It starts with thinking, seeing, and sniffing (64). Various sensory cues such as appearance, taste, smell, texture, temperature, and flavor are effective at the individual's food intake level (49). Although the taste of foods is important factor that regulate food intake, in most cases, the first sensory contact with food occurs through seeing (60). There are few studies examining the effects of the appearance of food during service on food acceptance and consumption. It is thought that visual cues can be used to increase the consumption of vegetables and fruits in community nutrition. It was planned to work with the hypothesis that the way the food is served affects the sweet taste perception perceived by the person. The aim of this study was to determine food-related visual factors such as shape and color and their effects on food acceptance, portioning and consumption. The consumption of vegetables and fruits can be increased by arranging the serving style. It was thought that the round form of the foods to be consumed could create a preliminary signal that the person would perceive a sweet taste at first sight, and that they would perceive more bitter and sour tastes with angular forms such as square (49). Therefore, visual cues can be used to increase the consumption of vegetables and fruits.

In previous studies, different results were obtained regarding the effect of food shape, and each study was conducted with different groups and different foods. For example, according to a study conducted with volunteers between the ages of 20-50, it is thought that the round shape of the foods to be consumed may create a preliminary signal that the person will perceive a sweet taste at first sight, and that they will perceive more bitter and sour tastes if they are in square, angular forms (49). It is thought that the round form of the foods to be consumed may be a preliminary signal that the person will perceive a sweet taste at first sight, and that they will perceive more bitter and sour tastes if they are in square forms. round) different, identical dark chocolates were tasted and asked to enumerate the differences between sweetness, bitterness, and creamy feel

with a Likert scale. In addition, the expectations for each chocolate were asked to be rated before tasting, and the post-taste thought and pre-taste expectations were compared. As a result of the study, it was concluded that the expectation and post-tasting thought were parallel, and the shape of the chocolate significantly affected the tasting. The round ones were found to be less sweet, more bitter, less creamy, and the square ones were found to be sweeter and creamier than the round ones (61).

In our study, 30 participants, 22 women and 8 men, were asked to give a score between 1 and 5 for the level of sweet taste after tasting identical vegetables and fruits in star, round and square shapes, as they were hungry and full. Participants were between the ages of 26 and 61 and had different body mass indexes: 1 slightly underweight, 1 obese, 11 normal weight, 15 slightly overweight, and 2 missing data. Missing data belong to individuals who could not be measured due to the current pandemic process. Missing data can be prevented in future studies.

When we look at the effects of the variables separately, we first examined the statistics of the shapes on the perception of sweet taste in terms of hunger and satiety. While there was no statistically significant difference in vegetables and apples and melons according to hunger and satiety status in different ways, watermelon gave different results. Star-shaped watermelon was found to be sweeter when hungry. No difference was observed in square and round watermelon according to hunger and satiety status. According to the study of Slavin et al., hunger and feeling of fullness affect food preferences (34). According to our study, individuals were more sensitive to sweet taste perception in case of hunger. The research of Khobragade et al. also supports this result (65) The reason the difference is only in star-shaped watermelon and not in other fruits may be that watermelon has a more juicy and melt-in-the-mouth texture than others. In a study conducted with chocolates in different shapes and with the same formula, the fact that angular chocolates were found to be sweeter confirms this result.

Then, to understand whether there is a difference in the perception of sweet taste according to sex, the scores given to the sweet taste levels of vegetables and fruits in different shapes were examined separately for men and women. While there was no statistically significant difference in the sweet taste level of the shapes in the general population, the sweet taste level was affected by different shapes when analyzed regarding sex. Various results have been obtained for different shapes of fruit in both men and women. However, when looking at vegetables, there was a difference in women while there was no difference in men. The main reason why men do not differ in the sweet taste of different shapes of vegetables may be the resistance of men participants to vegetable consumption. In the laboratory environment, men participants did not want to taste the vegetables and had to taste them to complete the study. The dislike they felt towards vegetables may have also affected their perceived taste. Looking at the statistics, it is seen that men already give low scores to every form of every vegetable. In public health nutrition, the vegetable consumption of men in Turkey should be investigated and this issue should be given importance in future studies. This prejudice of men against vegetables should be known when intervention in the consumption of vegetables and fruits in society. In women, more significant differences were seen in the fasting state, where taste sensitivity was higher for vegetables except cucumber. Cucumber and pepper were perceived as sweeter in square form and zucchini in round form when hungry. This may be because cucumbers and peppers are more crunchy, firm, and chewy, while zucchini is softer. Only cucumber gave significant results in satiety in women. Star-shaped was perceived as sweeter. In this case, it may be suggested that cucumber is perceived as sweeter in angular shapes when hungry or full, but soft foods such as zucchini are perceived as sweeter in round shapes, and women are more sensitive to vegetable taste than men.

In order to understand the effect of age groups on the perception of sweet taste in different ways, the participants were divided into two groups. Young adults aged 26 to 35 were classified as adults aged 36 to 61. There was no statistically significant difference in the sweet taste level of different presentations of vegetables in both hunger

and fullness states in adults. In young adults, different shapes stood out in different vegetables and fruits. This may be due to a decrease in taste sensitivity with age. In a study published by Fukunaga et al in 2005, the change in the threshold and capacity of sweet, salty, sour and bitter taste perceptions was investigated with 30 healthy young and adult volunteers (66). In this study, as in our study, it was observed that especially sweet taste perception was significantly lower in older adults. The reason for this is suggested to be the decrease in sweet taste sensitivity with advancing age. The perception of salty, bitter and sour taste did not change as significantly as sweet taste. In young adults, cucumber star-shaped, squash round-shaped, pepper square-shaped were recorded as sweeter. While there was no difference in adults in vegetables, a difference was observed in fruits. This may be because vegetables have a lower sweet taste than fruits. This difference may have been seen because the sweet taste level of the fruits was more dominant. Apples were found to be sweeter in round shape in both adults and young adults when they were hungry and full, while the shapes of melon and watermelon varied. Young adults found square melon sweeter when hungry and full, while older adults found square melon sweeter when hungry, and round melon when full. Young adults found the watermelon sweeter when starved and square when full, while adults found the square watermelon sweeter. When the fruits in every age group are examined in general, it is seen that the square shape comes to the fore. According to the results of our study, especially in melons and watermelons, the square shape of the fruit with a softer structure caused the fruit to be perceived as sweeter.

Finally, we looked at the variation of the results according to the body mass index. Overweight participants did not report a difference in sweet taste levels in the different shapes of vegetables. Looking at the literature, this result is confirmed; there is a negative correlation between the increase in body mass index and sweet taste sensitivity (67). In normal weighted people, cucumbers are square when they are hungry, while they are full star; zucchini was perceived as sweeter when it is both hungry and full, as star when pepper is hungry, and as round when full. Accordingly, in the same way as other variables, soft and mouth-watering vegetables, cucumber and

zucchini were perceived as more square-shaped sweet. When looking at fruits, variable results were seen in individuals with both normal and slightly overweight body mass indexes. In both groups, apples were found to be sweeter in round shape when hungry. Apples were found to be square in normal weight and sweet in the form of stars in light weights. Melon was found to be square when both hungry and full in normal weight, square when hungry, and star-shaped sweet when full. Watermelon was perceived as sweeter in normal and light weight, star when hungry, star when full, light weight, and square in normal weight.

Previously, participants could be asked about their expectation of sweet taste when they saw different shapes of vegetables and fruits and the result could be compared with the expectation before tasting and after tasting. When we look at the literature on this subject, in the study conducted by Devina Wadhera et al. in 2014, it was made with volunteers between the ages of 20-50 and the round shape of the foods indicates that the person will perceive a sweet taste at first sight, and that they will perceive more bitter and sour tastes if they are in square-like angular forms. created was recorded (49). In another study on understanding the relationship between basic tastes and visual cues, in an online study with 131 eligible participants; Participants were asked to rate their sweet, sour, bitter and salty tastes on a Likert scale by showing food animations in different colors and shapes. In the study, sweet taste and red color were paired with round shape; It has been noted that the sour taste and green color are matched. However, in this study, the post-tasting evaluation was also incomplete 60. In this case, while the pre-tasting expectation was lacking in our study, the post-tasting evaluation was missing in most of the similar studies in the literature. This may be taken into account in future studies.

5.1. Conclusion

When looking at the general population, different presentation styles do not affect the perception of sweet taste. But when examined according to special groups; young adults are more sensitive to sweet taste perception than older adults, therefore they are affected by the way they are presented; it is seen that women are affected more than men, and those with normal bmi are more affected than those who are slightly overweight. Accordingly, changes in different groups can be examined in future studies.

6.REFERENCE

1. Baysal A. *Beslenme*. Ankara: Hatiboğlu; 2015.
2. Bakanlıđı TS, Üniversitesi H. Türkiye beslenme ve sađlık arařtırması 2010. Beslenme Durumu ve Alıřkanlıklarının Deđerlendirilmesi Sonu Raporu SB Sađlık Arařtırmaları Genel Mdrlđ, Hacettepe Üniversitesi Sađlık Bilimleri Fakltesi Beslenme ve Diyetetik Blm, Ankara Numune Eđitim ve Arařtırma Hastanesi.
3. Selma B, Ardahan M. Yařlılarda malntrisyon ve hemřirelik yaklařımları. *Balıkesir Sađlık Bilimleri Dergisi*. 5(3):147-153.
4. Toprak İ, řentrk ř, Yksel B, zer H, akır B, Bideci E. Toplumun Beslenmede Bilinlendirilmesi. Saha Personeli İin Toplum Beslenmesi Programı Eđitim Materyali, TC Sađlık Bakanlıđı, Temel Sađlık Hizmetleri Genel Mdrlđ TC Ankara: Hacettepe Üniversitesi Beslenme ve Diyetetik Blm. 2002:56-121.
5. Sabbađ , MS S. İlkđretim đrencilerine verilen beslenme eđitiminin beslenme tutum ve davranıřlarına etkisinin deđerlendirilmesi. *Gıda Teknolojileri Elektronik Dergisi*. 2011;6(3):1-13.
6. Post RC, Maniscalco S, Herrup M, Chang S. What's new on MyPlate? A new message, redesigned web site, and SuperTracker debut. *J Acad Nutr Diet*. Jan 2012;112(1):18-22. doi:10.1016/j.jand.2011.11.008
7. Fern EB, Watzke H, Barclay DV, Roulin A, Drewnowski A. The Nutrient Balance Concept: A New Quality Metric for Composite Meals and Diets. *PLoS One*. 2015;10(7):e0130491. doi:10.1371/journal.pone.0130491
8. Good-bye pyramid, hello food plate. USDA scraps food pyramid in favor of easier model. *Johns Hopkins Med Lett Health After 50*. Dec 2011;23(10):3.
9. Ruggiero L, Seltzer ED, Dufelmeier D, McGee Montoya A, Chebli P. MyPlate Picks: Development and Initial Evaluation of Feasibility, Acceptability, and Impact of an Educational Exergame to Help Promote Healthy Eating and Physical Activity in Children. *Games Health J*. Jun 2020;9(3):197-207. doi:10.1089/g4h.2019.0056
10. Organization WH. Diet, nutrition, and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation. vol 916. World Health Organization; 2003.
11. SEZGİN AC. Meyve, sebze ve sađlımız (Fruit, vegetable and our health). *About This Journal*. 2014;46:46.
12. Franchi M. Food choice: beyond the chemical content. *International Journal of Food Sciences and Nutrition*. 2012;63(sup1):17-28.
13. Wadhera D, Capaldi-Phillips ED. A review of visual cues associated with food on food acceptance and consumption. *Eat Behav*. Jan 2014;15(1):132-43. doi:10.1016/j.eatbeh.2013.11.003
14. Huisman G, Bruijnes M, Heylen D. A Moving Feast: Effects of Color, Shape and Animation on Taste Associations and Taste Perceptions. 2016:1-12.
15. Organization WH. A state of complete physical mental and social well-being and not merely the absence of disease or infirmity. 2013.
16. Pekcan AG, řanlıer N, Bař M, Bařođlu S, Acar Tek N. Türkiye beslenme rehberi (TBER) 2015. *TC Sađlık Bakanlıđı Yayın*. 2016;(1031)
17. zelik A. Sađlık personelinin beslenme alıřkanlıkları zerinde bir arařtırma. *Gıda*. 2000;25(2)

18. Yücel B. Sağlık çalışanlarının beslenme alışkanlıkları ve beslenme bilgi düzeylerinin incelenmesi. Başkent Üniversitesi Sağlık Bilimleri Enstitüsü; 2015.
19. Yetkin F. Konya İl Merkezinde Özel Hastanelere Başvuran 18-60 Yaş Grubu Kadınların Obezite Prevalansı ve Bunu Etkileyen Etmenler Üzerine Bir Araştırma Yayınlanmamış Yüksek Lisans Tezi. *Konya s.* 2008;66
20. Alphan ET. Hastalıklarda Beslenme Tedavisi. Hatipoğlu Yayınları; 2013.
21. Dickson-Spillmann M, Siegrist M. Consumers' knowledge of healthy diets and its correlation with dietary behaviour. *Journal of Human Nutrition and Dietetics.* 2011;24(1):54-60.
22. Locke A, Schneiderhan J, Zick SM. Diets for Health: Goals and Guidelines. *Am Fam Physician.* Jun 1 2018;97(11):721-728.
23. Iglesias MT. Mediterranean diet. *Journal of Nutrition.* 2015;
24. Trichopoulou A, Vasilopoulou E. Mediterranean diet and longevity. *British Journal of Nutrition.* 2000;84(S2):S205-S209.
25. Martinez-Lacoba R, Pardo-Garcia I, Amo-Saus E, Escribano-Sotos F. Mediterranean diet and health outcomes: a systematic meta-review. *European journal of public health.* 2018;28(5):955-961.
26. Salehi-Abargouei A, Maghsoudi Z, Shirani F, Azadbakht L. Effects of Dietary Approaches to Stop Hypertension (DASH)-style diet on fatal or nonfatal cardiovascular diseases—incidence: a systematic review and meta-analysis on observational prospective studies. *Nutrition.* 2013;29(4):611-618.
27. Campbell AP. DASH eating plan: an eating pattern for diabetes management. *Diabetes Spectrum.* 2017;30(2):76-81.
28. Padma V. DASH Diet in Preventing Hypertension. *Advances in Biological Research.* 2014;8(2):94-96.
29. Krebs-Smith SM, Pannucci TE, Subar AF, et al. Update of the healthy eating index: HEI-2015. *Journal of the Academy of Nutrition and Dietetics.* 2018;118(9):1591-1602.
30. Services USDoAaUSDoHaH. Dietary Guidelines for Americans, 2020-2025. 9 ed. 2020.
31. Dewey KG, Pannucci T, Casavale KO, et al. Development of Food Pattern Recommendations for Infants and Toddlers 6–24 Months of Age to Support the Dietary Guidelines for Americans, 2020–2025. *The Journal of Nutrition.* 2021;151(10):3113-3124.
32. FAO. Increasing fruit and vegetable consumption becomes a global priority. FAO.
33. Amao I. Health Benefits of Fruits and Vegetables: Review. 2018.
34. Slavin JL, Lloyd B. Health benefits of fruits and vegetables. *Adv Nutr.* Jul 1 2012;3(4):506-16. doi:10.3945/an.112.002154
35. Kranz S, Brauchla M, Slavin JL, Miller KB. What do we know about dietary fiber intake in children and health? The effects of fiber intake on constipation, obesity, and diabetes in children. *Advances in nutrition.* 2012;3(1):47-53.

36. Bellavia A, Larsson SC, Bottai M, Wolk A, Orsini N. Fruit and vegetable consumption and all-cause mortality: a dose-response analysis. *The American journal of clinical nutrition*. 2013;98(2):454-459.
37. Conner S, Brookie L. C. Carr N, Mainvil AL, Vissers CMM Let them eat fruit! The effect of fruit and vegetable consumption on psychological well-being in young adults: A randomized controlled trial. *Journal PlosOne*. 2017;
38. Oyeboode O, Gordon-Dseagu V, Walker A, Mindell JS. Fruit and vegetable consumption and all-cause, cancer and CVD mortality: analysis of Health Survey for England data. *J Epidemiol Community Health*. 2014;68(9):856-862.
39. Boffetta P, Couto E, Wichmann J, et al. Fruit and vegetable intake and overall cancer risk in the European Prospective Investigation into Cancer and Nutrition (EPIC). *Journal of the National Cancer Institute*. 2010;102(8):529-537.
40. Rolls BJ, Ello-Martin JA, Tohill BC. What can intervention studies tell us about the relationship between fruit and vegetable consumption and weight management? *Nutrition reviews*. 2004;62(1):1-17.
41. Amao I. Health Benefits of Fruits and Vegetables: Review from Sub-Saharan Africa. 2018.
42. Kyutoku Y, Minami Y, Koizumi T, Okamoto M, Kusakabe Y, Dan I. Conceptualization of food choice motives and consumption among Japanese in light of meal, gender, and age effects. *Food quality and preference*. 2012;24(1):213-217.
43. Manan HA. The hierarchical influence of personal values on attitudes toward food and food choices. *Procedia Economics and Finance*. 2016;37:439-446.
44. Girgin GK, Karakaş B. Türklerin Gıda Tercihlerinde Etkili Olan Motivasyonların Belirlenmesi. *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*. 2017;20(38):425-448.
45. TOSYALI S. Besin seçimi ve belirleyicileri: Lise öğrencilerinde nitel bir çalışma / Food choice and determinants: A qualitative study in high school students. Selçuk Üniversitesi; 2019.
46. Pasquet P, Monneuse M-O, Simmen B, Marez A, Hladik C-M. Relationship between taste thresholds and hunger under debate. *Appetite*. 2006;46(1):63-66.
47. PANGBORN RM. Influence of Hunger on Sweetness Preferences and Taste Thresholds. *The American Journal of Clinical Nutrition*. 1959;7(3):280-287. doi:10.1093/ajcn/7.3.280
48. Zverev YP. Effects of caloric deprivation and satiety on sensitivity of the gustatory system. *BMC Neuroscience*. 2004/02/23 2004;5(1):5. doi:10.1186/1471-2202-5-5
49. Wadhera D, Capaldi-Phillips ED. A review of visual cues associated with food on food acceptance and consumption. *Eating behaviors*. 2014;15(1):132-143.
50. Piqueras-Fiszman B, Alcaide J, Roura E, Spence C. Is it the plate or is it the food? Assessing the influence of the color (black or white) and shape of the plate on the perception of the food placed on it. *Food Quality and Preference*. 2012/04/01/ 2012;24(1):205-208. doi:https://doi.org/10.1016/j.foodqual.2011.08.011

51. Spence C, Levitan CA, Shankar MU, Zampini M. Does Food Color Influence Taste and Flavor Perception in Humans? *Chemosensory Perception*. 2010/03/01 2010;3(1):68-84. doi:10.1007/s12078-010-9067-z
52. JOHNSON JL, DZENDOLET E, DAMON R, SAWYER M, CLYDESDALE FM. Psychophysical Relationships Between Perceived Sweetness and Color in Cherry-Flavored Beverages. *Journal of Food Protection*. 1982;45(7):601-606. doi:10.4315/0362-028x-45.7.601
53. Lavin JG, Lawless HT. Effects of color and odor on judgments of sweetness among children and adults. *Food Quality and Preference*. 1998/07/01/ 1998;9(4):283-289. doi:https://doi.org/10.1016/S0950-3293(98)00009-3
54. Clydesdale FM. Color as a factor in food choice. *Critical Reviews in Food Science and Nutrition*. 1993/01/01 1993;33(1):83-101. doi:10.1080/10408399309527614
55. Sommer R, Steele J. Social effects on duration in restaurants. *Appetite*. 1997;29(1):25-30.
56. Berry SL, Beatty WW, Klesges RC. Sensory and social influences on ice cream consumption by males and females in a laboratory setting. *Appetite*. 1985;6(1):41-45.
57. Jansen E, Mulken S, Jansen A. How to promote fruit consumption in children. Visual appeal versus restriction. *Appetite*. 2010/06/01/ 2010;54(3):599-602. doi:https://doi.org/10.1016/j.appet.2010.02.012
58. Raghubir P, Krishna A. Vital dimensions in volume perception: Can the eye fool the stomach? *Journal of Marketing research*. 1999;36(3):313-326.
59. Olsen A, Ritz C, Kramer L, Møller P. Serving styles of raw snack vegetables. What do children want? *Appetite*. 2012/10/01/ 2012;59(2):556-562. doi:https://doi.org/10.1016/j.appet.2012.07.002
60. Huisman G, Bruijnes M, Heylen DK. A moving feast: effects of color, shape and animation on taste associations and taste perceptions. 2016:1-12.
61. Wang QJ, Carvalho FR, Persoone D, Spence C. Assessing the effect of shape on the evaluation of expected and actual chocolate flavour. *Flavour*. 2017;6(1):1-6.
62. Lenfant F, Hartmann C, Watzke B, Breton O, Loret C, Martin N. Impact of the shape on sensory properties of individual dark chocolate pieces. *LWT-Food Science and Technology*. 2013;51(2):545-552.
63. Centers for Disease Control and Prevention.
64. Özenoğlu A, Hatemi H. Obez Kadınlarda Tatlı Tad Duyusu Uyarısına Sefalik Faz İnsülin Cevabı. *Beslenme ve Diyet Dergisi*. 2001;30(1):4-11.
65. Khobragade RS, Wakode SL, Wakode NS. Effect of fasting and satiety state on taste perception among healthy male adults.
66. Fukunaga A, Uematsu H, Sugimoto K. Influences of Aging on Taste Perception and Oral Somatic Sensation. *The Journals of Gerontology: Series A*. 2005;60(1):109-113. doi:10.1093/gerona/60.1.109
67. Beyhan Y, Bozkurt N. Zayıf, Normal ve Şişman Bireylerin Tat Duyularının Araştırılması. *Beslenme ve Diyet Dergisi*. 1994;23(2):191-196.

7.APPENDICES

7.1. Appendice 1. Survey Used in Research

Veri Toplama Formu

AÇ

- 1.Katılımcı No:
- 2.Cinsiyet:
- 3.Yaş:
- 4.Boy uzunluğu:
- 5.Vücut ağırlığı:

Tadılan Besinler: Meyve 1 (Elma)
Derecelendirme



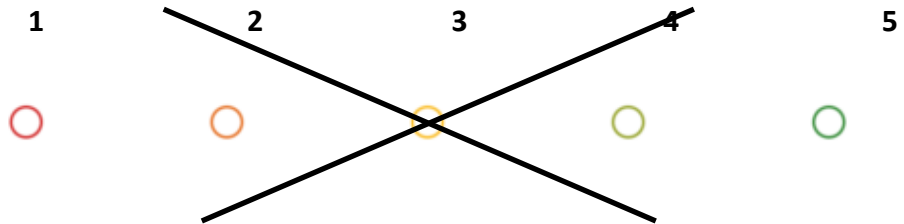
Tadılan Besinler: Meyve 2 (Kavun)
Derecelendirme



Tadılan Besinler: Meyve 3 (Karpuz)
Derecelendirme



Tadılan Besinler: Meyve 4
Derecelendirme



Tadılan Besinler: Sebze 1 (Kabak)
Derecelendirme



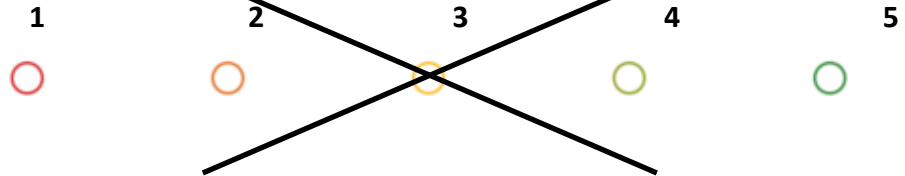
Tadılan Besinler: Sebze 2 (Biber)
Derecelendirme



Tadılan Besinler: Sebze 3 (Salatalık)
Derecelendirme



Tadılan Besinler: Sebze 4
Derecelendirme



Veri Toplama Formu

TOK

- 1.Katılımcı No:
- 2.Cinsiyet:
- 3.Yaş:
- 4.Boy uzunluğu:
- 5.Vücut ağırlığı:

Tadılan Besinler: Meyve 1 (Elma)
Derecelendirme



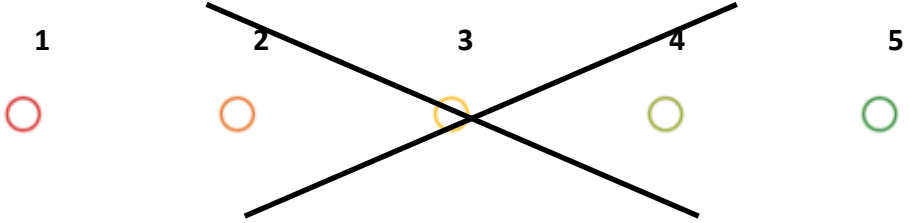
Tadılan Besinler: Meyve 2 (Kavun)
Derecelendirme



Tadılan Besinler: Meyve 3 (Karpuz)
Derecelendirme



Tadılan Besinler: Meyve 4
Derecelendirme



Tadılan Besinler: Sebze 1 (Kabak)
Derecelendirme



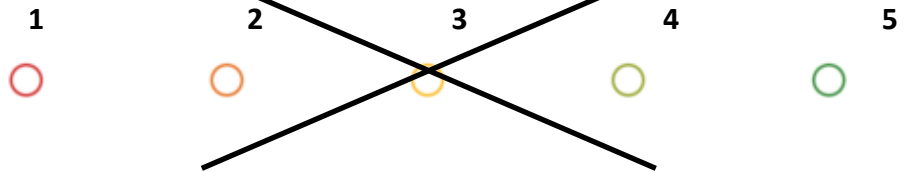
Tadılan Besinler: Sebze 2 (Biber)
Derecelendirme



Tadılan Besinler: Sebze 3 (Salatalık)
Derecelendirme



Tadılan Besinler: Sebze 4
Derecelendirme



7.2. Appendice 2. Rectorship Approval Form

Tez Arařtırma İzni Hk.

Gelen Kutusu x





Ufuk Kılıçaslan <ufuk.kilicaslan@yeditepe.edu.tr>

Alici: ben, Hasan ▾

11 Ocak Pzt 10:47 

İrem Hanım merhaba,

Yapmış olduğunuz tez araştırma **izni** başvurusu rektörlük tarafından kabul edilmiş, uygun görülmüştür.

İyi günler

Ufuk KILIÇASLAN
Sağlık Bilimleri Enstitüsü

7.3. Appendice 3. Ethics Committee Approval Form



Sayı : 37068608-6100-15- 2108
Konu: Klinik Araştırmalar
Etik Kurul Başvurusu hk.

04/03/2021

İlgili Makama (İrem Erhan)

Yeditepe Üniversitesi Tıp Fakültesi Beslenme ve Diyetetik Bölümü Dr. Öğr. Üyesi Binnur Okan Bakır'ın sorumlu araştırmacı olduğu **“Besin Sunum Şeklinin Tat Algısına Etkisinin Değerlendirilmesi”** isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (2080) kayıtlı Numaralı KAEK Başvuru Dosyası, Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından 03.03.2021 tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isim belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (KAEK Karar No: 1394)



Prof. Dr. Turgay Çelik

Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurul Başkanı