



Sensory Evaluation Of Turkish Coffee With Coconut Oil

Hindistan Cevizi Yağı İlaveli Türk Kahvesinin Duyusal Değerlendirilmesi

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ÖZET

Bu çalışmada, hindistan cevizi yağı ilavesi ile yenilikçi bir formülasyonla Türk kahvesine farklı bir bakış açısı getirilmesi amaçlanmıştır. Klasik Türk kahvesi dışında insanlar için yeni ve arzu edilen bir lezzetin duyusal analizlerle yakalanması ve pazarlanabilir bir ürün oluşturulması önemlidir. Bu amaçla, Türk kahvesi standart formülde hazırlandıktan sonra içine iki farklı oranda (ağırlıkça, %0,2 ve 0,4) hindistan cevizi yağı ilave edilmiştir. Hazırlanan hindistan cevizi yağı ilaveli Türk kahveleri duyusal değerlendirme amacıyla 22 eğitimsiz paneliste sunulmuştur. Panelistlere ayrıca ürün hakkındaki görüşleri de sorulmuştur. Panelistlerin çoğu, Türk kahvesine kıyasla Hindistan cevizi yağı ilaveli Türk kahvesi örneklerinin hoş bir aroması olduğunu ve ağızda yumuşak bir etki bıraktığını ifade etmişler; buna ilaveten, formülde şeker kullanılmadığı halde şekerli bir tat algıladıklarını kaydetmişlerdir. Panelin genel değerlendirmesinde, hindistan cevizi yağı ilaveli Türk kahvesi örneklerinin beğenildiği; ancak, iki farklı oranda hazırlanan örneklerin birinin diğerine istatistiksel olarak anlamlı olacak şekilde tercih edilmediği sonucuna varılmıştır ($p<0.05$).

Anahtar kelimeler: Türk kahvesi, duyusal analiz, hindistan cevizi yağı, aromalı kahve

ABSTRACT

In this study, bringing a different perspective to Turkish coffee through an innovative formulation with coconut oil addition was aimed. It is important to create a new and desired taste and a marketable product other than the classical Turkish coffee, by sensorial analysis. For this purpose, after Turkish coffee was prepared in the standard formula, two different percentages of coconut oil (0.2 and 0.4%, by weight) were added to it. Turkish coffees prepared with the addition of coconut oil were presented to 22 untrained panelists for sensory evaluation. The panelists were also asked about their opinions on the product. Compared to Turkish coffee, most panelists noted that Turkish coffee samples with the addition of coconut oil had a pleasant aroma and left a smooth feel in the mouth. In addition, although sugar was not used in the preparation of Turkish coffee samples, most of the panelists mentioned that Turkish coffee samples with coconut oil have a sweeter taste compared to standard Turkish coffee. As a general evaluation of the panel, it was concluded that Turkish coffee samples with the addition of coconut oil were liked; the sample with one percentage was not preferred over the other percentage of coconut oil in formulation, significantly ($p<0.05$).

Keywords: Turkish coffee, sensory analysis, coconut oil, flavored coffee

1. INTRODUCTION

Coffee is an important commercial product, ranking 2nd after oil in the world. The biggest producer of coffee is Brazil. Turkey's climatic conditions are not suitable for coffee cultivation. Therefore, the coffee need in our country is met through imports. Turkey remains quite backward compared to Europe in coffee consumption. Annual coffee consumption per capita in Europe is 5-6 kg. In Turkey, the per capita coffee consumption amount is 250 grams per year (Kıvançlı, 2011). In addition to tea and water, coffee is one of the most frequently drink beverages (Küçükkömürlü & Özgen, 2009). Turkish coffee is famous worldwide for its unique cooking method and drinking

style (Yıldırım, 2015). The components of Turkish coffee are coffee, foam, and grounds. Turkish coffee is a type of coffee that has the oldest method of cooking coffee in the world. The only type of coffee served with its grounds (telve) is Turkish coffee. Turkish coffee is more viscous, soft, and aromatic than other types of coffee (Şahin Cebeci, 2013). Aroma is an important zest factor, in Turkish coffee as well as in other beverages. In addition to the fact that many coffees have a unique aroma, recently there are coffees made using different aromas in the market. Examples of flavored Turkish coffee available in the market are; Turkish coffee flavored with hazelnut, strawberry, wild strawberry, blackberry, pomegranate, and mastic. In this context, the combination of a different aroma and Turkish coffee will bring a new perspective to Turkish coffee.

The coconut, which is a fruit, grows on the coconut tree. The word coco, which means monkey face, is the word that gives coconut its original name (Padua, 2015). The coconut tree, which is among the healthiest and most beneficial palm trees in the world, has many benefits. Coconut meets many basic requirements of humanity such as shelter, decoration, furniture, food, beverage, and so on. Coconut, which appears to be a potential raw material for everything, is known as the tree of life by society due to its benefits to humanity (Delmo, 2012). Coconut oil is extensively used for nutritional and industrial aims. This coconut oil is richer than medium-chain fatty acids (Shahidi, 2006). Coconut oil constitutes 3% of the total oil production in the world. A total of 66% of coconut oil production is provided by Indonesia and the Philippines countries. Coconut oil exists in solid form in temperate climates and liquid in hot climates (Shahidi, 2006).

Coconut oil is unique in its slightly sweet taste, pleasant odor, high resistance to spoilage, easy digestibility, and absorbability (Marina, Che Man, Hamid & Amin, 2009).

In this project, bringing a new perspective to Turkish coffee through an innovative formulation with coconut oil addition to coffee was aimed. It is desired to catch a different and desired taste for people other than classical Turkish coffee by sensorial analysis and to create a marketable product.

The importance of this project is to raise awareness of people about Turkish coffee. In addition to the classical Turkish coffee consumed in general, it is of special importance for this project that people try and appreciate a different flavored Turkish coffee.

2. TURKISH COFFEE

As of today, the coffee with the highest trade volume after oil is one of the rare products that is not produced but whose name is mentioned with the Turks in Turkey. The type of coffee commonly used in making Turkish coffee is Arabica. Arabica-type coffee is imported from Brazil. Turkish coffee is the boiling of very finely crushed and roasted coffee seeds in a coffee pot by adding the optional sugar. Turkish coffee is served in a cup after it is prepared. The fact that the grounds of the prepared Turkish coffee settle to the bottom means that this coffee is ready to drink (Gürsoy, 2005).

2.1. History

Certain methods are used in the preparation of Turkish coffee. Turkish coffee consumption is quite common in some regions such as the Middle East and Balkan countries. It is believed that the place where the preparation method of Turkish coffee was found was in Damascus and the period when the use of this coffee became widespread was the Ottoman period. The reason why coffee culture is highly developed in the Balkans is that the preparation method of this kind of coffee is more common in the Balkans. Turkish coffee is a type of coffee prepared with the oldest known coffee preparation method. Turkish coffee consists of three parts; coffee, grounds, and foam. It is a type of coffee that leaves a unique taste on people's palates due to its unique bitterish taste and abundant foam. Due to its intense and delicious coffee aroma, it takes its place as a lasting taste in memory. Turkish coffee is softer, consistent, and more aromatic compared to other types of coffee in terms of

hardness, consistency, and flavor. The reason why it is easy to distinguish from other types of coffee is it has a unique taste, abundant foam, and grounds. It is the only type of ground coffee used to tell the future by telling fortune-telling.

The fact that the grounds of the Turkish coffee settle at the bottom of the cup after it is cooked means that the grounds of this coffee do not need to be filtered. Sugar is added to many types of coffee after preparation, but the process of adding sugar to Turkish coffee takes place during the cooking phase of the coffee. The fact that the grounds remaining at the bottom of the cup are not consumed is proof that it is a type of coffee that is beneficial for human health (Küçükkömürler & Karakuş, 2009).

2.2. Production

Arabica-type coffee, which is commonly used in the preparation of Turkish coffee, is imported from Brazil (Gürsoy, 2005). Turkish coffee with an excellent aroma is made from freshly roasted coffee seeds. The use of medium roasted coffee is sufficient to give Turkish coffee a strong aroma and taste. The grinding of coffee seeds is done in two different ways. The first way is to grind the coffee seeds in a mortar and the second way is to grind the coffee seeds in a mill. Nowadays, the second way is used more widely and fine coffee powders are obtained as a result of this grinding. For the coffee used in making Turkish coffee to be in fine powder form, Arabica-type coffee seeds must be ground very well. The cold water used in making Turkish coffee positively affects the taste of the coffee. If sugar is to be used in the preparation of Turkish coffee, the sugar must have an easily dissolvable form (www.mehmetefendi.com/eng/turkish-coffee/definition-and-history, 2018).

The amount of water to be used in the preparation of Turkish coffee is determined with the help of a cup. First, water should be added to the coffee pot, then coffee and sugar should be added to the water. One or two teaspoons of coffee are used for a cup of Turkish coffee. In Turkey, Turkish coffee prepared according to the sugar content is done in three different ways. These are plain, medium sugar, and sweetened Turkish coffee. Turkish coffee and desired amount of sugar are mixed in a coffee pot until the sugar dissolves and the coffee sinks. After the mixing process is completed, the cooking stage is started and the coffee pot is taken to the cooker and set on fire. Mixing the coffee during the cooking phase will cause the foam to disappear, so the coffee should not be mixed at this stage. When the Turkish coffee begins boiling, the coffee pot is removed from the stove and poured into cups (www.mehmetefendi.com/eng/turkish-coffee/definition-and-history, 2018).

2.3. Turkish Coffee in Literature

Studies on Turkish coffee have been examined in the literature, and as a result of this examination, theses and researches in journals have been reached. The thesis and researches deemed necessary are given below.

In a study which was made by Yüksel et al. (2020), some optimizations have been made for Turkish coffee. For Turkish coffee, in their study; optimizations were made on subjects such as the optimum roasting method, the effects of different milling methods, the effects of first brewing warmth and water stiffness, the optimal brewing technique, and the optimal storage circumstances. According to the results of optimization made by them; the optimum roasting method was obtained from coffee beans roasted in the microwave. The best foam amount and stability in Turkish coffee were seen when faucet water and the copper coffee pot were used. The study which was made by Yüksel et al. (2020), showed that Turkish coffee should be stored in the refrigerator and consumed in a short time (Yüksel, Barut & Bayram, 2020).

In a study which was made by Kıvançlı (2011), emphasized volatile components that make up the characteristic flavor of Turkish coffee. In her study, Arabica coffee beans were ground. The coffee beans used by her, have been obtained by grinding light, medium, and dark roasted Arabica coffee beans. In her study, Turkish coffee made from coffees obtained by grinding was used. In her study, she used objective and sensory analysis methods to determine the volatile components that make up the characteristic flavor of Turkish coffee. In her study, she determined 50, 59, and 64 volatile components, respectively, as a result of GC/MS analysis in Turkish coffee samples (Kıvançlı, 2011).

In a study which was made by Hancı et al. (2013), the caffeine levels of some beverages have been measured. The types of beverages used by Mustafa Hancı and his friends, were Turkish coffee and different brands and different forms of coffees, teas, diet drinks, and energy drinks. Three samples have been taken, each from the type of beverage. In the preparation of beverages after provided standardization, the amount of caffeine in the beverages has been analyzed by the HPLC method. Mustafa Hancı and his friends measured the caffeine levels of the beverages and they found that the beverage containing the highest amount of caffeine was Turkish coffee (Hancı, Bakırcı, Bayram, Karahan & Kaya, 2013).

2.4. Flavoured Turkish Coffee

Aroma is the most important zest element of coffee. Besides the salty, bitter, sweet, and sour flavors perceived with the tongue, the aroma of coffee is responsible for all tastes. Therefore, the aroma is the most important feature of coffee (www.food-info.net/tr/products/coffee/aroma.htm, 2017). Turkish coffee, which has been consumed for centuries in Turkish culture, is the classical plain Turkish coffee. But today, people are looking for new flavors other than classical plain Turkish coffee.

In this context, many different Turkish coffees can be prepared and presented to the taste of people by adding not only coconut oil but also many different flavoring substances such as banana, strawberry, mastic, caramel, milk, vanilla, chocolate into the classical Turkish coffee.

In this study, it is expected that a new taste obtained by adding coconut oil to classical plain Turkish coffee will guide people in their search for new tastes with the results obtained through sensory analysis.

2.5. Flavoured Turkish Coffee in The Literature

Another issue that should be mentioned is the studies on flavored Turkish coffee in the literature. A literature review has been made on flavored Turkish coffee, but no subject or topic title matching this topic has been found. However, there are a few articles and theses in the literature that do not match the completely flavored Turkish coffee title but are close to this title and these are given below

In a study, which was made by Karahan and Keklik (2018), a cold coffee beverage that differs in aroma from products presently on the market has been improved and its shelf life has been decided according to consumer anticipations. For these purposes, they prepared cold coffee drinks containing orange juice and ground coconut extract. 100 panelists participated in their consumer preference test. As a result of their consumer preference test, a coffee drink containing coconut extract was compared to a drink containing orange juice, and they found that a coffee drink containing coconut extract was preferred over the beverage containing orange juice (Karahan & Keklik, 2018).

A study, which was made by Vimercati et al. (2020), is about the newly developed coffee-flavored kefir. The purpose of their study is to improve and discriminate the physical chemistry, rheological, microbiological, and sensory features of coffee aromatized kefir. They used UHT milk, skimmed

milk powder, and instant coffee in their study. Generally, the higher supplementation of powdered milk contributed to formulations made. Instant coffee has ensured extra nutritional advantages. As a result, they determined that the highest coffee added formulation be the most likely in terms of desirability (Vimercati, Araújo, Macedo, Fonseca, Guimarães, Abreu & Pinto, 2020).

3. COCONUT as FLAVOURING MATERIAL

The flavor is the cognitive effect of food or other materials and is designated firstly by the chemical senses of the taste and smell system (Small & Green, 2012). In addition to the unique tastes of food and beverages, recently, flavored foods and beverages are produced in the market. Strawberry, blackberry, coconut, orange, and mastic aromas, are examples of flavor types used in flavored foods and beverages produced in the market. Coconut flavor is an important flavor type used in the food industry. Coconut flavor is used to strengthen or improve the smell and taste of foods and it is created from ingredients that have odor and flavoring properties.

3.1. Coconut Fruit

Coconut is a type of fruit that grows on a tree that bears its name. The word coco, meaning monkey face, is the word that gives the coconut its original name (Padua, 2015). Coconut is a monocot regarding the genus *Arecaceae*, subgenus *Cocoideae* and is the single type of the breed *Cocos* (Perera, 2012). Coconut is an important type of crop grown in more than 93 countries around the world, mainly Indonesia and India (Perera, 2012).

3.2. Coconut Oil

Coconut oil is extracted from dried coconut kernels or coconut fruit. Coconut oil includes a high rate of saturated fatty acids. The chemical combination of coconut oil, enables it to be used for a wide variety of edible or nonedible goals. Coconut oil has many unique properties, such as light and delightful taste, a wonderful fragrance, high capacitance to rancidity, and is easy to digest (Che Man & Marina, 2006).

Coconut oil is widely used in many industries such as food, cosmetics, and pharmaceutical due to its benefits for human health. The main reason why coconut oil is used in many industries is that it is rich in saturated fatty acids. It contains over 90% saturated fatty acids in its composition, and because of this coconut oil is more resistant to oxidation and polymerization. Also, coconut oil presents polyphenols and a higher amount of vitamin E. The use of coconut oil as a cooking oil should not be encouraged, since polycyclic aromatic hydrocarbons and aromatic amines are produced when the oil is used in continuous deep-frying (Lima & Block, 2019).

3.2.1. Production Method

Coconut oil is usually manufactured by a diluent extraction process. The coconut endosperm is removed and dried to produce the dried coconut fruit, also known as copra, and, solvents are implemented to maximize oil extractability. Solvents are pricey to use and carry safety hazard and environmental concerns; nevertheless, it reaches higher oil yield than the water-based extraction procedures (Knoerzer, Juliano & Smithers, 2016).

Nevertheless, aqueous extraction ensures the occasion to entirely utilize food and nonfood ingredients in the coconut toward the manufacturing of worth-added biological products. The full utilization and transformation of this substance into valuable products will not only ensure bigger returns but also minimize contamination due to biological and solvent ruins (Knoerzer, Juliano & Smithers, 2016).

Figure 1 shows an example of an aqua-based extraction process. Coconut milk is produced by subtracting the coconut fruit from the coconut peel. Coconut fruit is then placed in a corrosive tank with hot water at 60°C to expedite the extricate of oil bodies, followed by pressing to decrease

particle dimension and form an emulsion (Hagenmaier, Cater, & Mattil, 2006). Sequential filters and centrifuges may be used to get the coconut milk. Performing a third centrifuge, to get coconut oil and skim coconut milk, separates the coconut oil from the milk (Knoerzer, Juliano & Smithers, 2016).

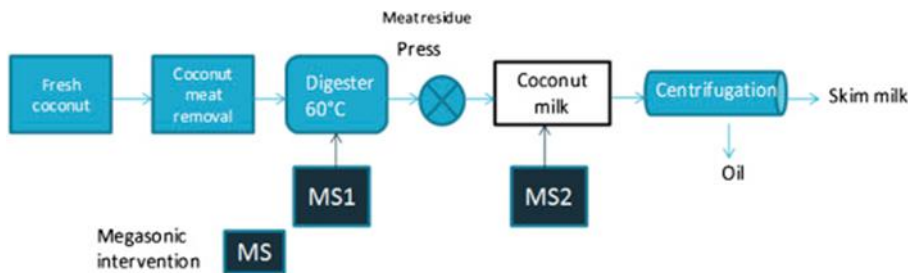


Figure 1. Megasonic Intervention (Knoerzer, Juliano & Smithers, 2016).

3.2.2. Area of Use

Coconut oil is one of the most popular products of recent times. Coconut oil, which adds health to dessert, coffee, and food, has many different uses. These areas of use: It is a frequently used product in the beauty industry and is included in shampoos, creams, and care oils. It also has an important place in the healthcare industry and is used to heal skin rashes, burns, and open wounds.

3.2.3. Studies in The Literature on The Use of Coconut Oil in The Food Industry

The literature review on the use of coconut oil in the food industry has been done and several studies have been found. These studies are given below.

A study, which was made by Ghinea et al. (2019), focuses on the physicochemical and sensory analysis of muffins obtained with almond flour and coconut oil. They have combined almond flour and coconut oil with the muffin, to produce a muffin with high nutritional value and acceptable sensory properties. They encountered a high amount of polyphenols and the highest antioxidant activity in the muffins they prepared with almond flour. They have seen almond flour muffin samples had higher lipid and vitamin C content than wheat flour samples. As a result, persons participating in sensory analysis liked the muffins prepared with almond flour and stated that they will consume them from now on (Ghinea, Leahu, Prisacaru, Cojocaru & Ladariu, 2019).

Another study, which was made by Aussanasuwannakul et al. (2020), focuses on the development of a healthy beverage for the elderly. In this context, they decided that kefir made from coconut milk, a healthy drink, would be an alternative beverage. They added coconut oil to change the texture and mouthfeel of the final product. They also defined the optimum amount of coconut oil that provides stability to the product. They have seen that coconut oil improves the texture and mouthfeel of this plant-based fermented beverage. They calculated the optimum coconut oil level as 10% by viscosity and body characteristics. Meanwhile, they concluded that the coconut oil specific to low viscosity fermented beverages would help improve the senses (Aussanasuwannakul, Puntaburt & Treesuwan, 2020).

The main purpose of another study which was made by Ozvural and Celen (2020), is to prevent lipid oxidation by using orange peel essential oil and coconut oil emulsions. In this context, they have added the mixture prepared by mixing orange peel essential oil and coconut oil emulsions to peanut butter to prevent lipid oxidation. By the way, sodium caseinate was used as an emulsifier and ultrasonication was used for homogenization. The main ingredients they used in their study were orange peel essential oil, coconut essential oil, and peanut butter. As a result, they found the highest phenolic content in emulsions containing orange peel oil. They also found that emulsions

containing orange peel oil have a higher antioxidant capacity than emulsions containing coconut oil (Ozvural & Celen, 2020).

A study which was made by Macit et al. (2017), focuses on changes that occur during the storage of ice creams produced by the use of essential oils with different flavors and amounts. They used four different spice essential oils in two different proportions in their research. These two different rates are 0.2% and 0.4%. The four different types of essential oils they used were coconut, lemon bark, clove, and cinnamon. The findings obtained by them, have shown that although the addition of essential oil did not significantly affect the physical and chemical properties of ice cream samples, the melting rates have been found to increase during storage. In their sensory evaluations, the sample containing 0.2% coconut essential oil was the most admired sample, while the sample containing 0.4% clove essential oil was the least admired example. In general, they have noticed that the samples with 0.4% essential oil were less appreciated than samples with 0.2%. Meanwhile, thanks to their study, they decided that some essential oils can be used as a natural flavoring agent in ice cream production (Macit, Çağlar & Bakırcı, 2017).

4. MATERIAL and METHOD

4.1. Material

Food grade coconut oil (*Cocos Nucifera*, Arifoglu branded), Turkish coffee (Kurukahveci Mehmet Efendi branded), and drinking water were purchased from a local market for sensory evaluation of Turkish coffee with coconut oil.

4.2. Method

4.2.1. Determining The Amount of Coconut Oil to be Added to Turkish Coffee

Two different amounts of coconut oil have been added to Turkish coffee. These amounts were determined by the optimization made in a study in the literature and by the examination of a study on the use of essential oils in ice cream production in the literature (Karahan and Keklik, 2018; Macit et al., 2017). In the literature, in the study about the possibilities of using some spice essential oils in ice cream production, coconut oil was used at the rates of 0.2 and 0.4 percent (g coconut oil/g ice cream*100) for ice cream production. This information was accepted as valid for the sample of our study, and in this context, the necessary calculations have been made based on these rates in the preparation of Turkish coffees with coconut oil. According to this; the weight of a cup of Turkish coffee has been measured as 75 grams. If there are 0.2 grams of coconut oil in 100 grams of Turkish coffee to be drunk, it is calculated how many grams of coconut oil should be in 75 grams, that is, a cup of Turkish coffee. According to the calculation, the coconut oil to be used for a cup of Turkish coffee is 0.15 grams ($75 \times 0.2 \div 100$). Since two different amounts of coconut oil will be added to Turkish coffee, the amount of the second coconut oil to be added was calculated as follows; $75 \times 0.4 \div 100 = 0.30$ grams.

4.2.2. Preparation of Turkish Coffee

Turkish coffee machine was used in the preparation of Turkish coffees (Schafer Kahvecim Inox Turkish Coffee Machine, Germany). The Turkish coffee machine is capable of preparing 4 cups of Turkish coffee in 3 minutes. A total of 44 cups of Turkish coffee were prepared for 22 untrained panelists. In addition, Turkish coffees were prepared by making use of the machine's slow-cooking (embers) feature. Due to the pandemic, Turkish coffee samples could not be presented to 22 untrained panelists at the same time. Turkish coffees prepared by adding both 0.15 grams and 0.30 grams of coconut oil to each one were presented on different days and hours by forming a group of 2 and 3 from among the panelists. The panelists were given a sensory evaluation form and asked to express their views on Turkish coffees containing two different amounts of coconut oil.

4.2.3. Sensory Evaluation

Sensory evaluation is a scientific method generally used to measure, analyze and interpret responses to products perceived by the senses of sight, smell, touch, taste, and hearing (Minutes of Division Business Meeting, 1975). Usually, panels are organized for sensory evaluations. Sensory evaluation tests with different characteristics are applied to the panelists in the organized panels. In this study, the paired preference test, which is one of the sensory evaluation tests, was used. In addition, studies related to paired preference tests in the literature were examined.

Preference tests are selections that involve comparisons between two or several products. If the preference test is done between only two products, it is called the paired preference test. In general, the paired preference test has been included in the studies on which of the two different products is preferred by the consumers. It is the simplest and most popular type of test that looks at whether products are appealing to consumers. The paired preference test is one of the oldest sensory testing methods (Garnatz, 1952).

A study, which was made by Lockett et al. (2020), has been served as a guide to those looking to further quantify paired preference data. Cola-flavored sodas and cold brew coffee were used among the beverages. For the cola-flavored sodas, panelists were asked to attend three sessions. For cold brew coffee, panelists were asked to complete three pairs of preference tests after evaluating samples sequentially. As a result, according to the paired preference tests, it was observed that the cold brew coffee beverage was preferred over the cola-flavored sodas beverage (Lockett, Burns & Jenkinson, 2020).

In a study, which was made by Hasegawa et al. (2019), how potential biases associated with paired preference tests might differ between Japanese and American cultures were explored. The main material used for sensory analysis was grapefruit juice with pulp. Grapefruit juice with pulp has been used in three different ways (normal, diluted, and low pulp). As a result, American consumers used the no preference option more than Japanese consumers. In addition, the bias was found to be fixed within a culture (Hasegawa, Ishii, Kyutoku, Dan & Rousseau, 2019).

Name:		Date:
There are samples of Turkish coffee with two different amounts of coconut oil added, in front of you. Please taste starting from the sample on the left. Circle the sample that you prefer. You must make a choice. If you wish, you can comment on your preference in the comment section. Thank you for your participation.		
Sample Codes		Comment
123	456	
The information you provide in the sensory analysis form will not be used out of purpose and will not be shared or transferred to third parties in the country or abroad.		

Figure 2. Sensory Evaluation Form

5. RESULTS&DISCUSSION

In this study, Turkish coffees were prepared by adding coconut oil at two different percentages. Two cups of Turkish coffee were prepared for each panelist. A total of 22 panelists participated in the sensory evaluation of Turkish coffee with coconut oil. 13 out of 22 panelists preferred the Turkish coffee sample containing 0.4% coconut oil. 9 panelists preferred the Turkish coffee sample containing 0.2% coconut oil (Table 1). In addition, the views of the panelists participating in the panel were given in Table 1.

Table 1. The comments of the panelists.

Panelist	Preference	Comment
1	0.2%	The panelist stated that she liked plain Turkish coffee more in daily life. In this context, she stated that in the sample with 0.4% coconut oil, she could not get the taste of Turkish coffee, at all, she only tasted the coconut oil, but in the sample with 0.2% coconut oil, she got the taste of Turkish coffee more. As a result, she preferred the sample with 0.2% coconut oil.
2	0.4%	The panelist stated that he rarely consumes Turkish coffee and does not like its taste. In this context, he said that in the sample containing 0.4% coconut oil, he felt and liked the taste of coconut oil more than the taste of Turkish coffee. As a result, he preferred the sample containing 0.4% coconut oil.
3	0.2%	The panelist said he didn't really like either sample because of the coconut oil added to the coffees. However, the panelist stated that he preferred the sample containing 0.2% coconut oil, as he had to make a choice.
4	0.4%	The panelist stated that he liked both samples and the samples left a slippery feel and pleasant taste in the mouth. The panelist said the aroma of the sample containing 0.4% coconut oil was stronger. As a result, the panelist opted for the Turkish coffee sample containing 0.4% coconut oil.
5	0.4%	The panelist stated that although no sugar is added to Turkish coffees, the sample with 0.4% coconut oil is sweeter than the sample with 0.2% coconut oil. The panelist said that the sample with 0.4% coconut oil had both a more pleasant aroma and a better consistency. In this connection, the panelist preferred the sample with 0.4% coconut oil.
6	0.4%	The panelist stated that she usually consumes sweetened Turkish coffee in daily life. In this connection, she stated that

		the sample with 0.4% coconut oil was sweeter than the sample with 0.2% coconut oil. She also argued that the combination of the amount of Turkish coffee and coconut oil used in the sample containing 0.4% coconut oil was much better. Consequently, the panelist preferred the sample with 0.4% coconut oil.
7	0.2%	The panelist stated that he consumes cigarettes and plain Turkish coffee together in daily life. In this context, he stated that the sample with 0.4% coconut oil did not taste like Turkish coffee. He stated that he felt the taste of Turkish coffee more in the sample with 0.2% coconut oil. As a result, he preferred the sample with 0.2% coconut oil.
8	0.4%	The panelist stated that she preferred the sample with 0.4% coconut oil.
9	0.4%	The panelist stated that he preferred the sample with 0.4% coconut oil.
10	0.4%	The panelist stated that he preferred the sample with 0.4% coconut oil.
11	0.2%	The panelist stated that the aroma of Turkish coffee, which contains 0.4% coconut oil, is very intense and that he does not like it. As a result, the panelist preferred the sample containing 0.2% coconut oil.
12	0.4%	The panelist preferred the Turkish coffee sample containing 0.4% coconut oil, as she had to make a selection without any comment.
13	0.2%	The panelist said that the sample, which contains 0.2% coconut oil, has a taste closer to that of classical Turkish coffee. He also stated that Turkish coffee containing 0.2% coconut oil was foamier. As a result, he preferred the sample containing 0.2% coconut oil.
14	0.2%	The panelist said that the sample containing 0.2% coconut oil had a more texture and harder (bitter) flavor, so she preferred the sample containing 0.2% coconut oil.
15	0.4%	The panelist stated that he liked the aroma of Turkish coffee containing 0.4% coconut oil, in addition, he liked the taste of the grounds more. As a result, the panelist stated that he preferred the sample containing 0.4% coconut oil.
16	0.2%	The panelist stated that he has diabetes and does not

		consume sugar. In this context, he said that the sample containing 0.4% coconut oil tasted sweet and therefore would not consume this sample in normal life. As a result, the panelist preferred the sample containing 0.2% coconut oil.
17	0.2%	The panelist stated that he liked the taste of the sample containing 0.2% coconut oil more than the sample containing 0.4% coconut oil. In this regard, the panelist preferred the sample containing 0.2% coconut oil.
18	0.4%	The panelist stated that he preferred the sample containing 0.4% coconut oil.
19	0.4%	The panelist noted that the sample containing 0.4% coconut oil left a noticeable nice aroma in the mouth. In this context, the panelist preferred the sample containing 0.4% coconut oil.
20	0.2%	The panelist stated that he would not consume both samples in daily life, therefore he did not like either of them. But as the panelist had to make a choice, the panelist said he preferred the sample containing 0.2% coconut oil.
21	0.4%	The panelist preferred the sample containing 0.4% coconut oil.
22	0.4%	The panelist said that the sample containing 0.4% coconut oil was nicer in terms of taste and aroma. As a result, the panelist opted for the sample containing 0.4% coconut oil.

Table 2. Minimum numbers of correct judgments to establish significance at probability levels of 5 and 1% for paired preference test (two-tailed, $p = 1/2$) (Lawless & Heymann, 2010).

Note: n is the total number of consumers and p is the probability levels.

Trials (n)	$p < 0.05$	$p < 0.01$	Trials (n)	0.05	0.01
7	7	7	45	30	32
8	8	8	46	31	33
9	8	9	47	31	33
10	9	10	48	32	34
11	10	11	49	32	34

12	10	11	50	33	35
13	11	12	60	39	41
14	12	13	70	44	47
15	12	13	80	50	52
16	13	14	90	55	58
17	13	15	100	61	64
18	14	15	110	66	69
19	15	16	120	72	75
20	15	17	130	77	81
21	16	17	140	83	86
<u>22</u>	<u>17</u>	18	150	88	92
23	17	19	160	93	97
24	18	19	170	99	103
25	18	20	180	104	108
26	19	20	190	109	114
27	20	21	200	115	119
28	22	22	250	141	146
29	21	22	300	168	173
30	21	23	350	194	200
31	22	24	400	221	227
32	23	24	450	247	253
33	23	25	500	273	280
34	24	25	550	299	306
35	24	26	600	325	332
36	25	27	650	351	359
37	25	27	700	377	385

38	26	28	750	403	411
39	27	28	800	429	437
40	27	29	850	455	463
41	28	30	900	480	490
42	28	30	950	506	516
43	29	31	1,000	532	542
44	29	31			

6. CONCLUSION

In this study, Turkish coffees containing two different proportions of coconut oil (0.2% and 0.4%) were prepared and presented to 22 untrained panelists for sensory analysis. The paired preference test method was used in sensory analysis. Statistical analysis of the results showed that one sample of Turkish coffee with coconut oil was not preferred over the other sample ($p < 0.05$), although the higher percentage value was preferred more. According to panelists' evaluation, the sample containing 0.4% coconut oil, is noticeable in the mouth and has left a more pleasant aroma. The reason for the preference of the panelists who preferred the sample containing 0.2% coconut oil is that this sample is more similar to the classical Turkish coffee. The panelists who preferred the sample containing 0.2% coconut oil also stated that they consume classical (plain) Turkish coffee in their daily lives. Based on the panelists' comments and their preferences based on these comments, the addition of coconut oil has brought a new dimension to Turkish coffee in terms of aroma and taste. In this context, Turkish coffee with coconut oil has the potential to be a new taste next to classical Turkish coffee and even to be developed and sold as a new product in the future. It can be concluded that Turkish coffee with coconut oil added could be a new taste for consumers, and since no difference between tested percentages existed, addition at the lower percentage (0.2%) can be taken during its preparation.

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