

The effect of taste perception of locally processed foods on consumer attitudes

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ABSTRACT

Keywords:

Gastronomy,
Local product,
Chocolate,
Product development,
Sensory analysis.

In recent years, with the increase in awareness of healthy product consumption, it has been observed that consumers have developed a purchasing intention for local food products. Food businesses are trying to turn their origin, provenance or regionally registered products into an advantage and use it as a means of persuading consumers who are conscious of this. In this context, an experimental design was preferred in the study, and three different chocolate varieties with fillings developed using local products from Mersin province were tasted by 162 participants. Data from the participants were obtained using a questionnaire technique with a scale designed to measure their sensory analysis after the experiment, and then the analysis results obtained using statistical software were interpreted. The differences between local products were examined in the analyses, and independent two-variable t-tests and paired sample t-tests were used to determine the purchasing and recommending intentions of gender. According to the results of the research, the registered origin name (local product) had a positive effect on the purchasing and recommending intentions of the chocolates, and significant differences were found between the chocolates in sensory criteria.

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1. Introduction

In today's business environment, enterprises are faced with the imperative of constantly investing to keep pace with the rapid advancement of technological innovations. Particularly in recent years, the widespread adoption of technologies such as digitization, artificial intelligence, and cloud computing in the manufacturing sector has increased the strategic importance for businesses to invest in these areas and stay current. Factors such as the shortening product life cycle, increasing customer expectations, and variability in desired product features contribute to the complexity businesses face. This situation necessitates a flexible adaptation and the ability to adjust production according to changing demands for manufacturing enterprises. In the current consumer landscape, there is a growing demand for healthy, nutritious, and natural foods. In the food industry, the product development process involves creating products using healthier and natural ingredients. For businesses, this process includes meticulous planning and implementation of activities such as market research, product design, prototype creation, testing, and production to produce high-quality products that meet customer needs. Throughout this process, the performance and quality of the product are evaluated based on criteria such as appearance, taste, texture, and aroma.


The evaluation of results is an integral part of the product development process and is used to measure the success of the product. One of the most commonly used methods for this evaluation is sensory analysis. Sensory analysis is a scientific discipline used, especially in the food and beverage industry, to assess the characteristics of products through sight, smell, taste, touch, and hearing (Sidel & Stone, 2006). These analyses are widely applied in the food and beverage industry to assess the quality, acceptability, and consistency of products. Additionally, sensory analysis is used for purposes such as quality control, understanding consumer reactions to sensory characteristics of products, comparing product features, sensory mapping, and product matching (Gacula, 1997). The primary goal of sensory analysis is to provide objective and reliable information reflecting the sensory attributes of the evaluated product.

The starting point of this study aims to promote the use of regional products carrying the geographical indication label of Mersin province (Anamur Banana, Silifke Strawberry, and Erdemli Lamas Lemon). Regional products with geographical indication labels are those produced in a specific region and protected under specific rules and standards, preserving their regional characteristics (TPE, 2022). These products are produced based on specific production techniques and the knowledge and experience of the local population, resulting in region-

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specific tastes, smells, appearances, and other characteristics (SMK, 2016). The use of these products in new product planning not only significantly contributes to the lifestyle and culture of the local population but also has positive effects on regional tourism and non-tourism income.

The main objective of this study is to develop new products in the form of filled chocolates by processing the globally demanded flavor of chocolate with the regionally labeled products of Anamur Banana, Erdemli Lamas Lemon, and Silifke Strawberry from Mersin province. The study also aims to measure the tendency of consumers to purchase and recommend these newly developed products. It is important to clarify the main problem of the research, why the study is conducted, and how it contributes to the literature. While literature review revealed studies related to new product development under the framework of sensory analysis (Mutlu & Çilginoğlu, 2022; Şimşek et al., 2020; Ercan & Katlav Özgül, 2021; Bakan, 2021; Duman et al., 2021; Usta, 2022; Canikli, 2019) and local product purchase intention (Gracia & Magistris, 2007; Chen & Lobo, 2012; Singh & Verma, 2017; Chen et al., 2011; Gundala & Singh 2021; Lee et al., 2020; Saleki et al., 2012; Xie, 2015; Ali et al., 2001), a review of national and international literature did not reveal a multidisciplinary study using sensory analysis techniques for the basic design and new product development by combining chocolate-based products with a region's local products. In this context, it is believed that this study will make a significant contribution to the literature and the regional economy, and therefore, the study has been conducted.

In this context, the regionally labeled products of Anamur Banana, Erdemli Lamas Lemon, and Silifke Strawberry were used as filling materials in chocolates. These chocolates, developed with these regional products, were tested in Mersin city center using sensory analysis method, comparing them with standard (plain) chocolates and essence-containing chocolates with the same weight and shapes from September 19 to November 8, 2022. The data obtained from the test results were collected through survey forms filled out by the participants themselves. The statistical analysis of the data was conducted using independent two-sample t-tests to determine whether there were significant differences in the purchase and recommendation intentions between chocolates developed with regional products and control groups based on gender,

along with the frequency analysis of demographic characteristics.

2. Method

In this study, the aim is to develop new products within the scope of filled chocolates, by processing the globally popular taste of chocolate with regional products, and to measure consumer purchasing and recommending tendencies for the newly developed products using the sensory analysis method.

For this purpose, the geographical indication-labeled regional products of Mersin province, namely Anamur Banana, Erdemli Lamas Lemon, and Silifke Strawberry, were used as filling materials in the chocolates developed. The filled chocolates developed with these three regional products, each in its own class, were tested on a consumer panel of 162 participants using the sensory analysis method, alongside standard (plain) chocolates with the same weight and shapes and chocolates made from the essence of these fruits.

As part of the research, data were collected from consumers in pastry shops located in central districts of Mersin between September 19 and November 8, 2022, using the sensory analysis method through a paper-and-pencil type data collection form (survey) filled out by the participants themselves. The survey prepared within the scope of sensory analysis consists of three parts.

The first part includes demographic characteristics. In the second part, a 9-point hedonic scale (excellent, very good, good, below average, above average, fair, below fair, poor, very poor, extremely poor) was used to inquire about the taste, aroma, texture, aftertaste, and overall acceptability level of the product. The third part measured the concepts of taste in terms of purchasing and recommending intentions using a 5-point Likert-type rating scale.

Research Model and Hypotheses

In line with the research objective, a correlational survey model has been employed in this study, drawing inspiration from Carter's (2009) work. The purpose of utilizing the correlational survey model is to investigate whether there is a simultaneous variation among multiple variables and, if so, to determine the degree of this variation (Karasar, 2007, pp: 81).

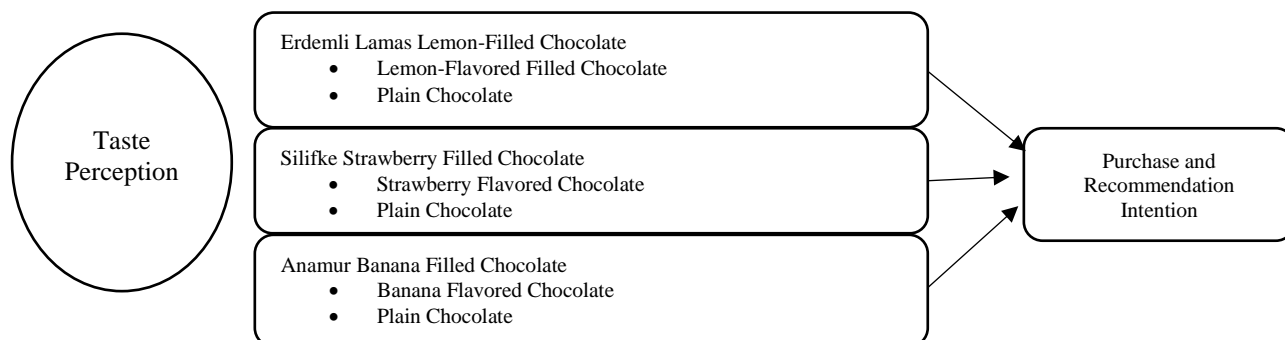


Figure 1. Relational screening model developed to test the hypotheses.

The relational model developed based on the objectives of the study is presented in Figure 1. Hypotheses regarding the relationships between variables in the model are formulated with a focus on taste concept and intentions to purchase and recommend regional products, drawing inspiration from studies in the literature.

When examining studies in the literature on the influence of demographic characteristics on the perception of taste and its impact on intentions, it is evident that gender plays a significant role in the perception of sour and bitter tastes (Hyde & Feller, 1981). Additionally, research indicates that men are more sensitive to sweet, salty, and sour tastes, while women are more sensitive to the taste of bitterness (Miişoğlu & Hayoğlu, 2005). A study by James and Laing in 1995 found that girls were more sensitive than boys to tastes other than sour. This study also highlighted the importance of gender in the perception of sour and bitter tastes (Hyde & Feller, 1981). A study conducted in Mexico found that women are more sensitive to sweet taste compared to men (Martinez et al., 2015).

According to Miişoğlu and Hayoğlu's study (2004), there are differences between men and women in the perception, recognition, and rating of the four basic tastes (sour, sweet, salty, bitter). Generally, men are more sensitive to sweet, salty, and sour tastes compared to women, but women are more sensitive to bitter taste compared to men. Studies suggest that the gender factor creates differences in taste perceptions, and genetically, women are considered better taste receptors (Kveton & Bartoshuk, 2001).

In studies on the purchase and recommendation intentions of regional products (Gracia & Magistris, 2007; Chen & Lobo, 2012; Singh & Verma, 2017; Chen et al., 2011; Gundala & Singh, 2021; Lee et al., 2020; Saleki et al., 2012; Xie, 2015), it has been found that regional products have a positive impact on purchasing. Moreover, consumer interest in local products increases with more frequent visits to village/farmer markets. The expectations of consumers regarding quality, price, and freshness are found to influence their purchasing decisions on these products (Kadanalı and Dağdemir, 2016).

In another study, 71.67% of consumers perceived the geographical indication label as an indicator of quality. Of these consumers, 68.33% expressed their willingness to pay extra for such products (Kan et al., 2021). Furthermore, the expectations of consumers regarding quality, price, and freshness play a significant role in their purchasing decisions for regional products. Based on this perspective, research hypotheses are formulated within the scope of the literature.

H1: There is a significant difference in sensory criteria for taste perception of Erdemli Lamas Lemon-filled chocolate based on the gender variable.

H2: There is a significant difference in sensory criteria for taste perception of Silifke Strawberry-filled chocolate based on the gender variable.

H3: There is a significant difference in sensory criteria for taste perception of Anamur Banana-filled chocolate based on the gender variable.

H4: There is a significant difference in purchasing and recommending intentions for Erdemli Lamas Lemon-filled chocolate based on the gender variable.

H5: There is a significant difference in purchasing and recommending intentions for Silifke Strawberry-filled chocolate based on the gender variable.

H6: There is a significant difference in purchasing and recommending intentions for Anamur Banana-filled chocolate based on the gender variable.

Population and Sample

The sensory evaluation of the products was conducted on consumers. The population consisted of all consumers aged 18 and over in Türkiye. As Karasar (2014, pp:110) expresses, this is the general population. The general population is easy to define but challenging, and often nearly impossible to reach (Karasar, 2014, pp: 110). In cases where the population is very broad or inaccessible, researchers can use sampling methods to make the best use of limited resources. These methods involve selecting a small sample group that represents all the characteristics of the population, making the data collection and analysis process more efficient.

In research where there are limitations such as time, budget, etc., a portion that represents the population is selected. This selected portion, where the data will be collected, is referred to as the sample (Daşdemir, 2016, pp 70). In this regard, individuals constituting the sample were determined using the convenience sampling method, and the developed product along with control groups in well-known pastry shops in the central districts of Mersin were tested on a sensory analysis by a consumer panel group of 162.

Data Collection Tool and Analysis Techniques

After conducting a review of the relevant literature in this study, data were collected from panelists using a 9-point Likert scale within the scope of sensory analysis. The seating arrangement and samples were prepared according to the criteria of sensory analysis, as depicted in Photograph 1.



Photograph 1. Sensory analysis seating arrangement

To investigate the impact of the flavor perception of filled chocolates processed with regional products on consumer attitudes in new product development, scales with demonstrated reliability and validity from previous studies in these areas were compiled and applied appropriately. The data obtained from sensory evaluation are analyzed using various statistical methods. When determining the sample size, statistical analyses applied under the primary analysis method of the research, which is the Sensory Analysis Technique, were taken into account. The number of evaluators depends on specific sensory methods used (Meilgaard et al., 1999).

The data obtained from evaluators are tested based on factors such as the test type, panel type, the number of panelists, and the number of samples (Altuğ & Elmacı, 2019). In this context, in the experimental stage, a scale developed by Pergam and Pilgrim in 1957, which has been used in various studies and tested for reliability and validity, was tested in the consumer group. This test assesses the preference or liking/disliking situations of (hedonic) panelists. Trained panel groups should not be used in this scale. Since trained panel groups have knowledge about certain characteristics, responses will be marked without taking preference situations into account, and the desired goal will not be achieved. The use of untrained panel groups is desired in this scale (Altuğ & Elmacı, 2019, pp: 66).

The purchasing and recommendation scale used in the study was developed by Valarie et al. in 1996, and it has been used in various studies and tested for reliability and validity. This scale was employed to test the intention to purchase and recommend chocolates filled with regional products. In the research, after providing the necessary environment within the scope of the sensory analysis method, data were collected using the seating arrangement in photo 2.



Photograph 2. Sensory testing phase of panelists

Care has been taken to ensure that the panelist groups providing sensory data are not under 18 years of age. Individuals with illnesses that may affect the sensory test (such as flu, etc.) were not preferred as panelists. Additionally, if there were smokers among the panelists, they were informed before the tasting test, and they were asked not to smoke for one hour, or those who did not smoke for one hour were included in the panelist group. The individuals constituting this sample were determined through the convenience sampling method. In this context, research was conducted in well-known patisseries located in the central districts of Mersin.

The sample size to represent the population of the study was determined as 80+ (Atuğ & Elmacı 2019). Within the time and budget constraints of the research, 168 participants were reached through the convenience sampling method. However, due to 6 incorrectly or incompletely filled surveys, the sample of the study consists of 162 participants. Within this scope, sensory analyses were conducted with 162 consumer groups, and data were collected through surveys. Taking into account that each participating consumer would taste 9 different chocolates, the sample size was determined as 162 people. When calculated, this results in a data pool of 1458 units, where 162 individuals provide data for 9 different chocolates each.

Reliability Analysis of the Scales Used in Research

The concept of reliability is defined as the purification of statistically collected data from sampling error within the scope of the research. The research is conducted to ensure that the results are consistent when the study is conducted by different groups within the same time period or different periods. Ultimately, at least one application of the scale is carried out, and the reliability of the scale is determined. The reliability statistic commonly used in this context is the Alpha coefficient, which demonstrates internal consistency. The generally accepted threshold for the Alpha coefficient is often 0.70. However, in some exploratory research, this ratio is accepted as 0.60 (Erkmen & Yüksel, 2008).

In this study, the Alpha Coefficient method was used to determine the reliability of the scales. Sometimes, removing a single question from a scale results in an

increase in the Cronbach Alpha value. In such cases, it is a more accurate approach to eliminate those questions from that scale (Erkmen & Yüksel, 2008). The analysis results show that removing each item did not result in a decrease in the Cronbach Alpha (internal consistency coefficient) value. Examining the reliability analysis results of the hedonic liking scale that emerged from the application of the scale to 162 individuals; the Cronbach Alpha coefficient of the 9-item Likert 5-question scale was determined as 0.87 for Erdemli Lamas Lemon-filled chocolate. According to experts, if the alpha coefficient is between 0.80 and 1, the scale ($0.87 > 0.80$) is considered to have high reliability (Tavşancıl, 2014; Alpar, 2001; Büyüköztürk, 2014). In this case, the reliability of the developed scale is considered to be high. As these values are greater than the threshold value of 0.70, they are considered statistically reliable.

Table 1. Sensory Analysis Hedonic Liking Lemon-Filled Chocolate Scale Reliability Analysis

Cronbach's Alpha	Number of Variables
0,87	5

Examining the reliability analysis results of the hedonic liking scale that emerged from the application of the scale to 162 individuals, the Cronbach Alpha coefficient of the 9-item Likert 5-question scale was determined as 0.89 for Silifke Strawberry-filled chocolate. According to experts, if the alpha coefficient is between 0.80 and 1, the scale ($0.89 > 0.80$) is considered to have high reliability (Tavşancıl, 2014; Alpar, 2001; Büyüköztürk, 2014). In this case, the reliability of the developed scale is considered to be high. As these values are greater than the threshold value of 0.70, they are considered statistically reliable.

Table 2. Sensory Analysis Hedonic Taste Strawberry Filled Chocolate Scale Reliability Analysis

Cronbach's Alpha	Number of Variables
0,89	5

Upon examining the reliability analysis results of the hedonic liking scale that was applied to 162 individuals, the Cronbach Alpha coefficient of the 9-item Likert 5-question scale was determined as 0.89 for Anamur Banana-filled chocolate. According to experts, if the alpha coefficient is between 0.80 and 1, the scale ($0.89 > 0.80$) is considered to have high reliability (Tavşancıl, 2014; Alpar, 2001; Büyüköztürk, 2014). In this case, the reliability of the developed scale is considered to be high. As these values are greater than the threshold value of 0.70, they are considered statistically reliable.

Table 3. Sensory Analysis of Hedonic Preference Banana-Filled Chocolate Scale Reliability Analysis.

Cronbach's Alpha	Number of Variables
0,89	5

Table 4, 5, and 6 present the Cronbach Alpha values indicating the reliability of the purchase and recommendation scales. In Table 4, the Cronbach Alpha value for the lemon-filled chocolate samples was found to

be 0.91. Since this value is greater than the generally accepted threshold of 0.70, the purchase and recommendation scale is considered reliable ($0.91 > 0.70$). Additionally, since the alpha coefficient is between 0.80 and 1, the purchase and recommendation scales are also deemed to have high reliability (Tavşancıl, 2014; Alpar, 2001; Büyüköztürk, 2014).

Table 4. Reliability Analysis of the Purchase and Recommendation Scale for Lemon Chocolate

Cronbach's Alpha	Number of Variables
0,91	5

In Table 5, the Cronbach Alpha value for strawberry-filled chocolate samples was found to be 0.94. Since this value exceeds the generally accepted threshold of 0.70, the purchase and recommendation scale is considered reliable ($0.94 > 0.70$). Moreover, with the alpha coefficient falling between 0.80 and 1, the purchase and recommendation scales demonstrate high reliability (Tavşancıl, 2014; Alpar, 2001; Büyüköztürk, 2014).

Table 5. Reliability Analysis of the Purchase and Recommendation Scale for Strawberry Chocolate

Cronbach's Alpha	Number of Variables
0,94	5

In Table 6, the Cronbach Alpha value for banana-filled chocolate samples was found to be 0.92. Since this value exceeds the generally accepted threshold of 0.70, the purchase and recommendation scale is considered reliable ($0.92 > 0.70$). Moreover, with the alpha coefficient falling between 0.80 and 1, the purchase and recommendation scales demonstrate high reliability (Tavşancıl, 2014; Alpar, 2001; Büyüköztürk, 2014). This indicates that the developed scales for the three products are highly reliable.

Table 6. Reliability Analysis of the Purchase and Recommendation Scale for Banana Chocolate

Cronbach's Alpha	Number of Variables
0,92	5

Analysis of Skewness and Kurtosis Values for the Scales Used in the Research

Below is the table of skewness and kurtosis values for the Erdemli Lamas Lemon-Filled Chocolate Hedonic Liking scale. According to the analysis, it was determined that the values for all statements are between (+)2 and (-)2.

3. Findings and Comments on the Research

The Findings and Interpretations Section of the study encompasses the results of comparing three distinct chocolates with their respective control groups. The data obtained at this stage has undergone a meticulous analysis, leading to various significant findings. Each type of chocolate has been tested on consumers using sensory analysis scales, and the resulting scores have been assessed. Among the primary findings of the study are the performances of chocolates in terms of flavor, aroma, texture, aftertaste, and overall acceptability level. The results provide valuable insights into how consumers

evaluate the three different chocolates. Furthermore, the reliability and validity of the scales and methods employed in the research have been addressed. The statistical significance of the findings has been evaluated using various analytical methods, and in this context, the methodological challenges and limitations of the study have been discussed.

In conclusion, it is believed that the obtained findings could make substantial contributions to industry practices and future research in the field. These findings may serve as a valuable reference for industry professionals, researchers,

and academics aiming to develop effective strategies for chocolate production and consumption.

Erdemli Lamas Lemon Filled, Flavored and Plain Chocolate

When developing Erdemli Lamas Lemon filled chocolate, it was produced in the same size and weight as the existing flavored and plain chocolates in the market and tested by the panelists. The filled chocolate, flavored and plain chocolate were designed to be 10 grams in weight (filled chocolate with 7.5 grams of chocolate and 2.5 grams of filling) as shown in photos 4, 5, and 6.



Photo 4. Filled Chocolate



Photo 5. Flavored Chocolate



Photo 6. Plain Chocolate



Photo 7. Reverse Coding



Photo 8. Reverse Coding Photo



9. Reverse Coding

The products were tasted by the panelists with reverse coding, as shown in photos 7, 8, and 9, to ensure the high reliability of the data obtained from the panelists.

As seen in Table 13, 48.8% of the participants in the study are female and 51.2% are male. 3.1% of the participants are in the 20 and under age range, 57.4% are in the 21-30 age range, 19.8% are in the 31-40 age range, 15.4% are in the 41-50 age range, 3.1% are in the 51-60 age range, and 1.2% are 61 years old or older. 77.8% of the participants are single and 22.2% are married. In terms of education level, 0.6% are primary school graduates, 21% are high school graduates, 13% are associate degree graduates, 61.1% are bachelor's degree graduates, and 4.3% are master's degree graduates.

Table 13. Frequency Analysis Findings of Participants' Distribution by Socio-Demographic Characteristics

Characteristic	N (162)	%
Gender		
Female	79	48,8
Male	83	51,2
Marital Status		
Single	126	77,8
Married	36	22,2
Age		
20 and under	5	3,1
21-30	93	57,4
31-40	32	19,8
41-50	25	15,4
51-60	5	3,1
61 and over	2	1,2
Education Level		
Primary School	1	0,6
High School	34	21,0
Associate Degree	21	13,0
Bachelor's Degree	99	61,1
Graduate Degree	7	4,3

Source: Authors own elaboration

According to the Frequency Analysis results presented in Table 14, Erdemli Lamas Lemon-filled chocolate demonstrated significantly higher scores in sensory criteria compared to lemon-flavored chocolate and plain chocolate. Specifically, Erdemli Lamas Lemon-filled chocolate scored 7.84 for flavor, 7.84 for aroma, 7.82 for texture, 7.79 for aftertaste, and 7.85 for overall acceptability. In contrast, lemon-flavored chocolate scored 4.45 for flavor, 4.38 for aroma, 6.20 for texture, 4.38 for aftertaste, and 4.43 for overall acceptability. Plain chocolate scored 4.51 for flavor, 4.41 for aroma, 6.24 for texture, 4.40 for aftertaste, and 4.43 for overall acceptability.

Erdemli Lamas Lemon-filled chocolate received values ranging from a minimum of 6 to a maximum of 9 points, while lemon-flavored chocolate ranged from a minimum of 1 to a maximum of 8 points, and plain chocolate ranged from a minimum of 1 to a maximum of 8 points. Additionally, the sensory criteria analysis in Table 14 indicates that Erdemli Lamas Lemon-filled chocolate, developed under the new product name, received significantly higher average ratings compared to the other two groups (flavored and plain), suggesting strong preference for the new product.

Table 14. Sensory Criteria Frequency Analysis Results of Lemon Filled Chocolate and Control Groups (n=162)

	Mean	Standard Deviation	Minimum	Maximum
501 (Lemon Filled Chocolate)				
Taste	7,84	0,81	5	9
Aroma	7,84	0,83	6	9
Texture	7,82	0,80	5	9
Aftertaste	7,79	0,80	5	9
Overall Acceptability	7,85	0,81	5	9
602 (Lemon Flavored Chocolate)				
Taste	4,45	1,21	2	8
Aroma	4,38	1,18	2	7
Texture	6,20	1,48	2	9
Aftertaste	4,38	1,19	2	8
Overall Acceptability	4,43	1,31	1	8
703 (Plain Couverture Chocolate)				
Taste	4,51	1,24	1	8
Aroma	4,41	1,34	2	7
Texture	6,24	1,43	2	9
Aftertaste	4,40	1,28	1	8
Overall Acceptability	4,43	1,31	1	8

Source: Authors own elaboration

According to Table 15, significant differences in sensory criteria analysis findings for Erdemli Lamas Lemon-filled chocolate are observed based on gender. According to the independent two-sample t-test results in sensory evaluations, significant differences were found in all 5 sensory criteria for Erdemli Lamas Lemon-filled chocolate

between males and females. This difference was attributed to the higher liking averages of the male panelist group compared to the female panelists.

In Table 16, the results of independent two-sample t-tests are presented to determine the statistical differences in responses to purchase and recommendation intention

Table 15. Independent Two-Sample T-Test Results for Sensory Evaluation of Erdemli Lamas Lemon Filled Chocolates by Gender Perception of Flavor (N=162)

Sensory Criteria	Gender	N	\bar{X}	Standard Deviation	Std. Er.	t	p
501 Taste	Female	79	7,59	0,84	0,094	-3,974	0,000
	Male	83	8,08	0,71	0,078		
501 Aroma	Female	79	7,54	0,84	0,094	-4,754	0,000
	Male	83	8,13	0,72	0,079		
501 Texture	Female	79	7,54	0,79	0,089	-4,662	0,000
	Male	83	8,09	0,70	0,077		
501 Aftertaste	Female	79	7,51	0,82	0,093	-4,510	0,000
	Male	83	8,06	0,68	0,075		
501 Overall Acceptability	Female	79	7,55	0,82	0,093	-4,781	0,000
	Male	83	8,13	0,69	0,076		

Source: Authors own elaboration

Table 16. Independent Two-Sample T-Test Results by Gender for Purchase and Recommendation Intentions in Flavor Perception of Erdemli Lamas Lemon-Filled Chocolates (n=162)

	Gender	N	\bar{X}	S.D	t	p
501 I liked the filled chocolate in terms of taste.	Female	79	4,10	0,59	-4,324	0,000
	Male	83	4,48	0,52		
501 I would prefer filled chocolate as a gift.	Female	79	3,97	1,67	-5,500	0,000
	Male	83	4,57	0,57		
501 The taste of the filled chocolate is recommendable for chocolate lovers.	Female	79	3,84	0,81	-5,708	0,000
	Male	83	4,49	0,61		
501 I recommend the filled chocolate for those who will buy it as a gift from a taste perspective.	Female	79	3,83	0,88	-5,633	0,000
	Male	83	4,54	0,64		
501 Filled chocolate is a suitable option as a regional gift in terms of taste.	Female	79	3,87	0,88	-5,512	0,000
	Male	83	4,54	0,64		
General average according to purchase and recommendation intention in terms of taste.	Female	79	3,92	0,65	-6,396	0,000
	Male	83	4,51	0,49		

Source: Authors own elaboration

statements based on the gender variable. The statements include "I liked it," "I would prefer it as a gift," "I would recommend it to chocolate lovers," "I would recommend it to those buying gifts," and "It is a suitable option as a regional gift."

The analysis reveals statistically significant differences in responses to all purchase and recommendation intention statements ($p < 0.05$). Upon examining the means, it is evident that in all recommendation statements for Erdemli Lamas Lemon-filled chocolate, male participants had higher averages than female participants. The overall average for purchase and recommendation intention was 3.92 for female participants and 4.51 for male participants.

Silifke Strawberry-Filled, Flavored, and Plain Chocolate

When developing Silifke Strawberry-filled chocolate, it was produced in the same size as the existing flavored and plain chocolates available in the market today. The chocolates were processed to have similar appearances and weights. The filled chocolate, flavored chocolate, and plain chocolate each weigh 10 grams (with the filling accounting for 7.5 grams and the chocolate covering 2.5 grams), and their designs are depicted in photos 10, 11, and 12.



Photo 10. Strawberry-filled chocolate

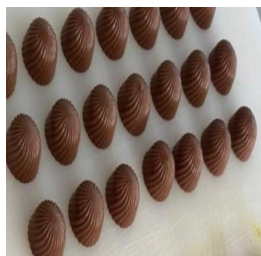


Photo 11. Flavored chocolate

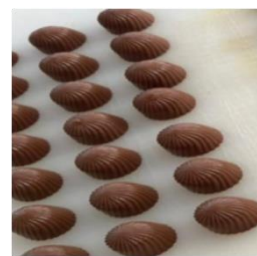


Photo 12. Plain chocolate

To enhance the reliability of the data obtained from the panelists, a reverse coding method was employed during the evaluation of the products. In this context, participants were presented with the products using the plate arrangement depicted in photos 13, 14, and 15 for the

testing phase. This method was chosen to ensure that participants could provide unbiased and accurate evaluations. Reverse coding aims to reduce conscious or unconscious biases, thereby rendering the collected data more reliable and valid.



Photo 13. Reverse Coding



Photo 14. Reverse Coding



Photo 15. Reverse Coding

Table 17. Sensory Criteria Frequency Analysis Results of Strawberry-Filled Chocolate and Control Groups (n=162 people)

	Mean	Standard Deviation	Minimum	Maximum
404 (Strawberry-Filled Chocolate)				
Taste	8,41	0,91	5	9
Aroma	8,38	0,90	5	9
Texture	8,41	0,79	6	9
Aftertaste	8,40	0,81	5	9
Overall Acceptability	8,50	0,79	5	9
407 (Strawberry-Flavored Chocolate)				
Taste	5,03	1,34	2	9
Aroma	5,06	1,24	2	8
Texture	6,69	1,14	2	9
Aftertaste	5,01	1,21	2	8
Overall Acceptability	4,98	1,18	2	8
410 (Plain Couverture Chocolate)				
Taste	4,91	1,36	2	8
Aroma	4,85	1,29	2	7
Texture	6,51	1,15	2	8
Aftertaste	4,83	1,37	2	8
Overall Acceptability	4,88	1,34	2	8

Source: Authors own elaboration

Table 17 presents the frequency table results for sensory criteria regarding Silifke Strawberry-filled chocolate. In terms of flavor (8.41), aroma (8.38), texture (8.42), aftertaste (8.40), and overall acceptability (8.50), Silifke Strawberry-filled chocolate displayed significantly more positive outcomes compared to strawberry-flavored chocolate and plain chocolate. Strawberry-flavored chocolate scored lower in flavor (5.03), aroma (5.06), texture (6.69), aftertaste (5.01), and overall acceptability (4.98). Plain chocolate also had lower scores in flavor (4.91), aroma (4.85), texture (6.24), aftertaste (4.83), and overall acceptability (4.88) in comparison.

Silifke Strawberry-filled chocolate received scores ranging from a minimum of 5 to a maximum of 9, while strawberry-flavored chocolate ranged from a minimum of 2 to a maximum of 8, and plain chocolate ranged from a minimum of 2 to a maximum of 8. Additionally, the analysis results in Table 17 demonstrate that Silifke

Strawberry-filled chocolate, developed under the new product name, received significantly higher average ratings in sensory criteria compared to the other two groups (flavored and plain).

Table 18 indicates a noteworthy gender-based distinction in the sensory criteria analysis findings for Silifke Strawberry-filled chocolate. As per the outcomes of an independent two-sample t-test conducted for sensory assessments, a significant discrepancy was observed between women and men across all five sensory criteria for Silifke Strawberry-filled chocolate. This implies that the sensory perceptions of women towards Silifke Strawberry-filled chocolate diverged significantly from those of men across various attributes such as flavor, aroma, texture, aftertaste, and overall acceptability. This gender-related variation suggests a nuanced response to the sensory characteristics of the product, warranting further exploration into potential influencing factors.

Table 18. Independent Two-Sample t-test Results for Sensory Evaluation of Silifke Strawberry-Filled Chocolates by Gender in Taste Perception (N=162)

Sensory Criteria	Gender	N	\bar{X}	Standard Deviation	Std. Er.	t	p
404 Taste	Female	79	8,72	0,47	0,053	4,337	0,000
	Male	83	8,13	1,112	0,122		
404 Aroma	Female	79	8,64	0,64	0,072	3,645	0,000
	Male	83	8,14	1,049	0,115		
404 Texture	Female	79	8,67	0,52	0,058	4,118	0,000
	Male	83	8,18	0,92	0,101		
404 Aftertaste	Female	79	8,69	0,53	0,060	4,791	0,000
	Male	83	8,12	0,92	0,101		
404 Overall Acceptability	Female	79	8,77	0,47	0,053	4,479	0,000
	Male	83	8,24	0,94	0,103		

Source: Authors own elaboration

Table 19 presents the results of the independent two-sample t-test conducted to determine the statistically significant differences between responses given for purchase and recommendation intentions (liked it, would prefer as a gift, would recommend to chocolate lovers, would recommend as a gift, and is a suitable option as a regional gift) in terms of gender. The analysis showed that there were significant differences in all responses related

to purchase and recommendation intentions ($p < 0.05$). When examining the means, it was observed that female participants had higher means than male participants in all responses related to Silifke Strawberry-filled chocolate. In terms of purchase and recommendation intentions on a 5-point Likert-type scale, the overall mean score was 4.89 for female participants and 4.37 for male participants.

5.3. Anamur Banana Filled, Flavored and Plain Chocolate

Anamur Banana-filled chocolate was developed by producing it in the same size as the existing flavored and

plain chocolates available in the market today. The filled chocolate, flavored chocolate, and plain chocolate each weigh 10 grams (with the filling accounting for 7.5 grams and the chocolate covering 2.5 grams) and were designed as depicted in photos 16, 17, and 18.

Table 19. Independent Samples t-test Results for Purchase and Recommendation Intentions for Taste Perception by Gender Variable (N=162 People)

	Gender	N	\bar{X}	S.D	t	p
404 I liked the filled chocolate in terms of taste.	Female	79	4,87	0,39	4,480	0,000
	Male	83	4,48	0,39		
404 I liked the filled chocolate in terms of taste.	Female	79	4,89	0,50	5,757	0,000
	Male	83	4,39	0,50		
404 The taste of the filled chocolate is recommendable for chocolate lovers.	Female	79	4,88	0,62	6,670	0,000
	Male	83	4,26	0,62		
404 I recommend the filled chocolate for those who will buy it as a gift from a taste perspective.	Female	79	4,91	0,54	6,049	0,000
	Male	83	4,36	0,54		
404 Filled chocolate is a suitable option as a regional gift in terms of taste.	Female	79	4,89	0,53	5,865	0,000
	Male	83	4,36	0,53		
General average according to purchase and recommendation intention in terms of taste.	Female	79	4,89	0,28	6,443	0,000
	Male	83	4,37	0,66		

Source: Author's own elaboration



Photo 16: Filled chocolate



Photo 17: Flavored Chocolate

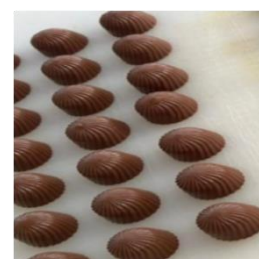


Photo 18: Plain Chocolate

In order to maximize the reliability of the data obtained from the panelists, product evaluations were conducted using the reverse coding method. In this context, the products were presented to the panelists with a reverse coding technique, employing the plate arrangement shown in photos 19, 20, and 21. This approach aimed to allow

panelists to assess the products from a neutral perspective, reducing potential biases. By employing reverse coding, the method contributes to enhancing the reliability of the collected data and facilitates an objective evaluation of the products.



Photo 19: Reverse Coding



Photo 20: Reverse Coding



Photo 21: Reverse Coding

According to the frequency table results in Table 20, Anamur Banana-filled chocolate demonstrated notably more favorable outcomes in sensory criteria compared to banana-flavored chocolate and plain chocolate. In terms of flavor (8.32), aroma (8.29), texture (8.43), aftertaste (8.31), and overall acceptability (8.41), Anamur Banana-filled chocolate outperformed banana-flavored chocolate with flavor (5.03), aroma (5.00), texture (6.60), aftertaste (5.01), and overall acceptability (4.96), as well as plain chocolate

with flavor (4.90), aroma (4.90), texture (6.51), aftertaste (4.92), and overall acceptability (4.92).

Anamur Banana-filled chocolate received scores ranging from a minimum of 5 to a maximum of 9, while banana-flavored chocolate ranged from a minimum of 1 to a maximum of 8, and plain chocolate ranged from a minimum of 2 to a maximum of 8. The analysis results in Table 20 indicate that Anamur Banana-filled chocolate, developed under the new product name, received

significantly higher average ratings in sensory criteria for both women and men compared to the other two groups (flavored and plain).

Table 20. Sensory Criteria Frequency Analysis Results of Banana Stuffed Chocolate and Control Groups (n=162 people)

	Mean	Standard Deviation	Minimum	Maximum
303 (Chocolate Filled With Banana)				
Taste	8,32	0,70	5	9
Aroma	8,29	0,77	5	9
Texture	8,43	0,59	7	9
Aftertaste	8,31	0,77	5	9
Overall Acceptability	8,41	0,68	5	9
202 (Banana Flavored Chocolate)				
Taste	5,03	1,35	2	8
Aroma	5,00	1,40	1	8
Texture	6,60	1,12	2	8
Aftertaste	5,01	1,33	2	9
Overall Acceptability	4,96	1,33	1	8
101 (Plain Couverture Chocolate)				
Taste	4,90	1,38	2	8
Aroma	4,90	1,32	2	8
Texture	6,51	1,05	3	8
Aftertaste	4,92	1,39	2	8
Overall Acceptability	4,92	1,35	2	8

Source: Authors own elaboration

According to the findings from the sensory criteria analysis presented in Table 21, there is no statistically significant difference observed based on gender for Anamur Banana-filled chocolate. The independent two-sample t-test results indicate that there is no significant difference between women and men across the five sensory criteria for

Anamur Banana-filled chocolate. This suggests that the sensory perceptions of women and men did not differ significantly when evaluating flavor, aroma, texture, aftertaste, and overall acceptability of Anamur Banana-filled chocolate.

Table 21. Independent Samples t-Test Results for Sensory Evaluation of Anamur Banana Stuffed Chocolates by Gender (N=162)

	Gender	N	\bar{X}	Standard D.	Std. Er.	t	p
303 Taste	Female	79	8,35	0,716	0,053	0,480	0,632
	Male	83	8,30	0,693	0,122		
303 Aroma	Female	79	8,29	0,834	0,072	-0,083	0,934
	Male	83	8,30	0,711	0,115		
303 Texture	Female	79	8,39	0,648	0,058	-0,081	0,414
	Male	83	8,46	0,548	0,101		
303 Aftertaste	Female	79	8,29	0,786	0,060	-0,037	0,706
	Male	83	8,33	0,769	0,101		
303 Overall Acceptability	Female	79	8,36	0,47	0,754	-0,950	0,344
	Male	83	8,46	0,94	0,611		

Source: Authors own elaboration

In Table 22, the results of an independent two-sample t-test are provided to statistically determine the differences in responses to purchase and recommendation intention statements based on the gender variable. The statements include "I liked it," "I would prefer it as a gift," "I would recommend it to chocolate lovers," "I would recommend it to those buying gifts," and "It is a suitable option as a regional gift."

The analysis results indicate that there is no statistically significant difference between female and male participants in their responses to all purchase and recommendation intention statements ($p < 0.05$) for Anamur Banana-filled chocolate. In the 5-point Likert-type scale for purchase and recommendation intention, the overall average was 4.70 for female participants and 4.71 for male participants.

Table 22. Independent Two-Sample T-Test Results for Purchase and Recommendation Intentions in Taste Perception by Gender Variable (N=162 Participants)

	Gender	N	\bar{X}	S.D	t	p
303 I liked the filled chocolate in terms of taste.	Female	79	4,73	0,47	-,010	0,992
	Male	83	4,73	0,47		
303 I liked the filled chocolate in terms of taste.	Female	79	4,69	0,51	-,032	0,974
	Male	83	4,70	0,51		
303 The taste of the filled chocolate is recommendable for chocolate lovers.	Female	79	4,69	0,51	-,187	0,852
	Male	83	4,71	0,48		
303 I recommend the filled chocolate for those who will buy it as a gift from a taste perspective.	Female	79	4,68	0,56	-,468	0,641
	Male	83	4,72	0,50		
303 Filled chocolate is a suitable option as a regional gift in terms of taste.	Female	79	4,69	0,56	-,178	0,859
	Male	83	4,71	0,48		
General average according to purchase and recommendation intention in terms of taste.	Female	79	4,70	0,47	-,204	0,838
	male	83	4,71	0,41		

Source: Authors own elaboration

Table 23 provides a comprehensive assessment of the research hypotheses, concluding the findings with either acceptance or rejection. Following a thorough analysis of the data, it has been determined that all research hypotheses were accepted. This implies that the observed results align with the formulated hypotheses, contributing to the

confirmation of the expected relationships or patterns outlined in the research study. The comprehensive evaluation in Table 23 serves as a pivotal summary of the research's hypothesis testing outcomes, consolidating the findings and their alignment with the initially proposed hypotheses.

Table 23. Evaluations regarding the research hypotheses

Hypotheses	Acceptation	Ret
H1: There is a significant difference in sensory criteria in terms of taste perception of Erdemli Lamas Lemon filled chocolate according to the gender variable.	✓	
H2: There is a significant difference in sensory criteria in terms of taste perception of Silifke Strawberry filled chocolate according to the gender variable.	✓	
H3: There is a significant difference in sensory criteria in terms of taste perception of Anamur Banana filled chocolate according to the gender variable.	✓	
H4: There is a significant difference in purchase and recommendation intention according to the gender variable in terms of taste perception of Erdemli Lamas Lemon filled chocolate.	✓	
H5: There is a significant difference in purchase and recommendation intention according to the gender variable in terms of taste perception of Silifke Strawberry filled chocolate.	✓	
H6: There is a significant difference in purchase and recommendation intention according to the gender variable in terms of taste perception of Anamur Banana filled chocolate.	✓	

Source: Authors own elaboration

4. Conclusion and Recommendations

Sensory analysis techniques used for the acceptability of products by consumers are generally used as a tool to guide product development and ensure that the final product meets the desired sensory characteristics. During product development, it is used to determine the fundamental sensory characteristics that are important to consumers and to evaluate how these characteristics change when the product is modified. In general, the purpose of sensory analysis in product development is to help create a product that meets the desired sensory characteristics and is accepted and preferred by consumers. Being able to make accurate new product decisions in food businesses can be an important indicator in measuring the effectiveness of marketing efforts. Although new product development is seen as an important step for sustainability in the market, it is also an important step in rescuing consumers from saturation reactions to marketing activities.

Therefore, research on new product development is emerging as an area that receives more attention every year, with an increasing number of theoretical and applied

studies. Despite the growth in new product development, it is not possible to say that using geographical indication products on existing products is sufficient in terms of quality and quantity. However, using local products by food businesses in new product development can be positively perceived by consumers. This can contribute to the overall success of businesses by increasing the chance of success for new products. This study focuses on the applicability of new product development research using geographical indication products within the discipline of gastronomy. Thus, it is believed that this study will contribute to the literature and provide benefits to practitioners both methodologically and theoretically.

As a result of the structure of this study, the results of the research were obtained by evaluating the data obtained through surveys using sensory analysis techniques in a statistical package program.

Conclusions and Recommendations for Producers

Based on the findings of the study, the following items are thought to be beneficial for producers.

- Natural regional product-filled chocolates are perceived as more delicious than flavored or plain ones. Due to the taste superiority perceived by consumers, producers should prefer to fill chocolate with regional products.
 - Consumers do not perceive any taste difference between fruit-flavored chocolates and plain chocolates. Therefore, adding essence to chocolate is an unnecessary cost element for producers since it does not create a taste difference perception for the consumer.
 - In this study, all three different regional products tested as chocolate filling are highly purchasable and recommendable. Producers can use Silifke Strawberry, Anamur Banana, and Erdemli Lemon as regional souvenirs for Mersin, relying on their taste.
 - Silifke Strawberry-filled chocolates are at the top in terms of taste perception of women. Producers should design the packaging of Silifke Strawberry-filled chocolates considering the female target audience's taste perception. Sales representatives can confidently recommend Silifke Strawberry-filled chocolates to those trying to choose chocolates as gifts for women.
 - Men preferred Anamur Banana-filled chocolates the most. Sales representatives can recommend Anamur Banana-filled chocolates, especially to those trying to choose gifts for men.
 - Although Erdemli Lemon-filled chocolates reached a high level of appreciation, they remained behind strawberry and banana. Additionally, men perceived Erdemli Lemon-filled chocolates as more delicious than women did. In this sense, mixed chocolate packages with banana and lemon fillings may receive more demand with a theme specific to men.
 - There are many advantages to making chocolate with regional products. Firstly, regional products are generally healthier and more natural products. This helps chocolate become healthier compared to the use of essences, etc. Additionally, since regional products are generally more delicious and special, they can help your chocolate become more delicious and special.
 - Another advantage is that by making chocolate with regional products, you can support regional producers. Regional producers are generally small-scale producers, and by using these types of products, you can support their production and thus contribute to the regional economy. Finally, by making chocolate with regional products, you can preserve its uniqueness and special identity. This can increase the number of customers and make your chocolate a special brand.
- Creating differentiation in food products developed under the name of new products is seen as crucial for sustainability.
 - Developing products based on gender is considered important for diversity in food businesses.
 - Local materials and resources tend to be cheaper than imported ones as they are not exposed to transport and customs costs.
 - Since local materials and resources are produced in the same environment where the final product will be used, they can be of higher quality.
 - Developing new products with local materials and resources can support the local economy by creating employment and promoting economic growth.
 - Companies that use local materials and resources in their products can be perceived as more socially and environmentally responsible, which can increase their reputation and attract more customers.
 - Working with local materials and resources can also encourage innovation and the development of new technologies and processes (Murphy and Smith, 2009; Ortiz, 2010; Schwartz, 2011; Sharma, Moon & Strohbahn, 2014; Strohbahn and Gregoire, 2003).

Recommendations and Implications for Researchers

- #### Recommendations for Food Businesses
- Developing new products based on existing products rather than producing new products from scratch is seen as a more suitable marketing approach for businesses as producing a product from scratch involves a highly costly and risky process. It is more cost-effective to make innovations in an already accepted product and introduce the new product to the consumers.

- There are relatively few studies conducted in this field. To ensure consistency of the data, more studies using similar methods should be conducted. Additionally, it is considered important to increase the number of studies using sensory analysis techniques in the gastronomy field, both for businesses and for the field itself.
- According to the research design, participant groups tasted real fruit-filled, flavored, and plain chocolates in a single session. With this design, three different data groups were obtained for tasting plain chocolates of the same quality by the participants. The analyses show that the perception of taste for plain chocolate is shaped according to the filled chocolate tasted in that group. For example, the plain chocolate tasted after the strawberry-filled chocolate, which reached a very high perception of taste average, was perceived as more delicious compared to the plain chocolate tasted after the lemon-filled chocolate, which showed a relatively lower perception of taste average. Therefore, a product that is perceived as delicious supports the taste perception of the products offered with it. It is recommended to conduct more comprehensive research on this subject.
- This research was carried out with the aim of contributing to local development through product development, and in its current form, the preferences of different target groups, women and men, were examined in detail. The reasons why taste perception differs between women and men can also be investigated.

As data collection continued in the research, the analyses were applied cumulatively to 34 participants, then to 50 participants, and finally to 162 participants. It was observed that the analysis results did not change with these

three different sample sizes. If researchers pay attention to the data collection process, it is possible to reach valid and reliable findings with small samples.

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INFO PAGE

The effect of taste perception of locally processed foods on consumer attitudes

Abstract

In recent years, with the increase in awareness of healthy product consumption, it has been observed that consumers have developed a purchasing intention for local food products. Food businesses are trying to turn their origin, provenance or regionally registered products into an advantage and use it as a means of persuading consumers who are conscious of this. In this context, an experimental design was preferred in the study, and three different chocolate varieties with fillings developed using local products from Mersin province were tasted by 162 participants. Data from the participants were obtained using a questionnaire technique with a scale designed to measure their sensory analysis after the experiment, and then the analysis results obtained using statistical software were interpreted. The differences between local products were examined in the analyses, and independent two-variable t-tests and paired sample t-tests were used to determine the purchasing and recommending intentions of gender. According to the results of the research, the registered origin name (local product) had a positive effect on the purchasing and recommending intentions of the chocolates, and significant differences were found between the chocolates in sensory criteria.

Keywords: Gastronomy, Local product, Chocolate, Product development, Sensory analysis.

Authors

Full Name	Author contribution roles	Contribution rate
Cevat Ercik:	Conceptualism, Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing - Original Draft	50%
Ömer Çoban:	Conceptualism, Methodology, Validation, Writing - Review & Editing, Supervision	50%

Author statement: Author(s) declare(s) that All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. **Declaration of Conflicting Interests:** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

Ethics Committee Satatement: Ethics committee report is available for this research and it has been documented to the journal

Ethics committee: Nevşehir HBV University Scientific Research And Publication
Ethics Committee

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