A Comprehensive Review on Simit, A Turkish Traditional Food

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Abstract

Simit has an important place in the Turkish gastronomic culture. Simit, whose roots in Anatolia go back to the 14th century, strongly maintains its existence even in the smallest of places today. Contrary to many traditional foods that are on the verge of disappearance due to advancing technology and intertwined multicultural lives, simit is a noteworthy traditional product that gradually consolidates its existence both domestically and internationally. This study aims to comprehensively review and collate existing studies on simit, a topic that has received inadequate attention in the literature, and to provide a framework for future research. In this context, the definition, recipe and general specifications of simit were first explained, then. Thereafter, its historical significance was determined through the examination of historical documents pertaining to simit. The production process of simit was examined in-depth, and existing literature on various simit types was compiled. The study further explores the role of simit, which holds a prominent place in Turkish society's consumption habits, in nutrition and addresses its impact on community health based on existing data. However, owing to the limited availability of scientific documents on simit in the literature, some information was gathered from nonscientific open sources, which posed a significant limitation. The study concluded that there is a need for comprehensive scientific investigations that encompass an analytical examination of the production process of simit, its standardization, the implications of its consumption habits on nutrition and health, and an exploration of various simit types.

Keywords: Simit, Turkish traditional food, Bagel, Gevrek.

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1. Introduction

Simit is a Turkish traditional food product characterized by its crispy texture, is made of wheat flour, potable water, salt, and baker's yeast. It has a characteristic ring shape and its surface is covered with sesame seeds (Figure 1).

Excluding sesame and molasses in simit's formulation, both simit dough and bread dough (consisting of flour, water, salt, and yeast) share similar characteristics. However, due to its thinner shape compared to bread, simit attains a crispy texture during the baking process. Another factor contributing that simit is more delicious than bread is sesame seeds on its surface. The sesame seeds on simit's surface, which are closely associated with its identity, significantly enhance its distinct flavor. Additionally, simit dough dipped into a molasses-water mixture acquires a richer aromatic flavor compared to bread. This effect is a result of non-enzymatic browning reactions that take place when simit is baked at high temperatures in the oven. Despite varying according to the type, simit with an average weight of 100 gr significantly differs from bread with its specific shape, size and weight. Apart from having unique sensory and physical properties, the cultural meaning of simit is considerably different from bread as well, which is evident in both its purpose of consumption and the social customs associated with it.

As per the Turkish Standard Institute (TSI) Simit Standard (TS 7097), simit should possess distinct sensory characteristics in terms of taste-smell, color-appearance and interior structure. The standard specifies that simit should have a maximum moisture content of 26% (m/m), a maximum salt content of 2% (m/m), a maximum insoluble ash content (in dry matter) in 10% HCl of 0.7 (m/m), and a maximum

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Figure 1. Traditional Turkish Simit
[Source: PNGWING, 2023]

acidity level (measured by the volume, in mL, of 1 M NaOH needed to neutralize the acidity of 100 g simit) of 6 mL. It also permits a maximum yeast and mold content of 3 logs in simit. Additionally, the standard dictates that simit should be of a size that can be comfortably held in hand, with a minimum width of 5 cm (TSI, 2006).

Simit was derived from the Arabic word samīd/semid, meaning "quality white flour" (Wehr 1976: 431; cited by Dikkaya, 2011). In traditional production, wheat flour is obtained by milling wheat grains.The resultant flour-bran mixture undergoes various sieving methods to eliminate the bran, yielding a whiter and higher-quality baking flour. Nonetheless, this sieving process is an additional step that increases the cost of the flour. In the 15th century narh (fixed price) records of the Ottoman Empire (Sahillioğlu, 1967, 40), flour is categorized into three groups based on the extent of bran removal: alâ, evsat and ednâ (first, second and third quality flour, respectively). Alâ (first quality) flour is used in simit production. Given the etymology of the word simit, and its context in the Ottoman Culture, it can be said that simit was "a special bread type made with white flour", however, it has evolved and acquired distinct characteristic over time.

Although the exact time and place of simit's first appearance are uncertain, Kaygusuz Abdal, a Turkish poet who lived in Anatolia (region currently within the borders of Turkey) in 14th century, mentioned simit in his poems (Table 1) (Ünsal, 2010). A kitchen notebook written in 1651 reveals that Istanbul Simit, made with

Table 1. Lines of Turkish Poet Kaygusuz Abdal who lived in 14th century, about simit (Ünsal, 2010)

Original (Turkish)	*English Translation*
"...	"...
Gaziler helvasından	With gazi halva,
Cihan dopdolu olsa	Wish the world is filled.
Zülbiye halkası ile	With together the zülbiye halka,
Simidi hem coğ olsa	Wish there is more simit.
..."	..."

white flour, has been produced since the time of Beyazit II (lived between 1447 and 1512) (Şeker, 2018, 394-395; cited by Bayram, 2020, 18). The inclusion of simit in the narh records of the Ottoman Empire in 1525 indicates its popularity as a food during that period. Because, the narh records hold significance as they display ceiling prices of staple food products at the time. It is documented that simit was included in the narh records of Istanbul in 1593 (Ünsal, 2010, p.45) and Manisa in 1599 (Gökmen, 2013, 89-90). Additionally, a kitchen accounting notebook of the Ottoman Palace dating back to 1554-1555 mentions the existence of a simit oven (Emecen, 1996, 168). Based on the knowledge and information gathered from various sources, it can be stated that simit has been consumed by Turkish society since the 14th century and has been a popular food known by both the general population and the palace since at least that period.

It has been reported that simit was initially referred to as "simid-i halka" (simit in the shape of a ring), but later it became commonly known as "simit" only (Dikkaya, 2011, 74). A review of historical documents reveals that the size of simit has also evolved over time. In the early days, simit was large, resembling a wheel, and weighed approximately 432 g (135 dirhem). Subsequently, it began to be produced and sold in both large and small sizes (Dikkaya, 2011, 73-74). From the 17th century onwards, simit started being presented for sale in the size we recognize today in Istanbul (Dikkaya, 2011, 74). Ottoman records indicate that simit was produced in various forms, including İstanbul Simidi (Istanbul Simit), Saraylı Yağlı Simit (Palace-Style Buttery Simit), Saraylı and Katmer Simit (Palace-Style Layered Simit), Hurde Halka Simit (Small Ring Simit), Hurde Halka Simit Yağlı (Buttery Small Ring Simit), Yağlı Simit (Buttery Simit), and Simid-i Kandil Çörek (Kandil Simit or Kandil Simit Ban) (Gökmen, 2013, 74). In fact, today it is possible to encounter numerous types of simit across different cities.

In his travel book, Evliya Çelebi, who lived in the 17th century and was the most famous traveler of the Ottoman Empire, noted that simit was made in Balkan

Geography apart from Istanbul, this simit was called "gevrek (crispy)" (Dikkaya, 2011, 76). Simit still maintains its existence in Balkan countries today, and it is referred to by "gevrek" or words derived from gevrek. It is named as Gevrek in Bulgaria, Gjevrek in Macedonia, Devrek in Bosnia-Herzegovina, Djevrek in Serbia, and both physical appearance and production process of these simits are very similar to today's Istanbul simits. However, only in Greece, simit is called "Koulouri", distinctly from gevrek. All these said Balkan countries were within the borders of Ottoman Empire in Evliya Çelebi's time (17th century). The facts that the origin of simit in Turkish culture dates back to the 14th century and in most of the Balkan countries, simit is called with a name derived from the Turkish word "gevrek", which has meanings such as "fresh" or "crisp", may be due to that the simit culture in Balkan countries is of Turkish culture origin. The presence of dozens of simit types with unique appearances and tastes in different cities indicates that simit is a very suitable food to be produced in different formulations. Thus, it is not unreasonable that these products, which are called as "koulouri" in Greece, "sesame kaak" in Lebanon, "bokhegh" in Ermenia and "covrig" in Romania and are very similar to simit, are also of simit origin.

Sesame seeds are extensively used in the surface of the traditional Turkish simit. If it is just called "simit" without any addition to its name, "simit with sesame" is referred and it is understood as such by everyone. On the other hand, there are also some local cultures in Anatolia where sesame free simit is produced. These simits are popular in cities such as Rize, Giresun and Kastamonu. Although it is a common characteristic that simits produced in those cities are sesame-free, the simit type produced in each city has different production process and flavor, some even have geographical indications belonged to their own regions. Sesame-free simits in these regions are named as Kel Simit (Bald Simit), Kuru Simit (Dry Simit), Kabak Simit (Bare Simit) or Sade Simit (Plain Simit).

In addition to being different from other simit types by not including sesame seeds, sesame-free simits differ from others in terms of dough firmness, the way wick shaped dough is bound, shiny and sesame-free surface and rigid structure (Çelik-Yeşil and Akkuş, 2022). The absence of sesame seeds in sesame-free simits makes them less expensive compared to other simits (Başaran, 2017).

The aim of the present study is to evaluate general properties, history and cultural characteristics, types, production process and place in nutrition of simit, an important Turkish traditional food. In the preparation of this review study, all types of sources, scientific or nonscientific, were thoroughly scanned and sorted using a systematic method. This review article is an attempt to reveal an extensive and objective evaluation of simit based on literature search and personal experiences.

2. Simit Production

2.1. Ingredients

The main ingredients used in the production of simit are simit dough made of flour, water, salt and yeast as well as molasses and sesame on its surface. The most essential component in the production of simit is its dough. Therefore, simit dough is a significant factor affecting the quality, taste and textural structure of simit, and its formulation may vary among simit types. The variety of wheat from which the flour used in simit dough is obtained, protein content and quality of flour and its ash content substantially affect simit dough. Low ash content in flour is crucial as it reflects the tradition of using white flour for simit production from past to present and enhances the functional properties of the dough. Bread wheat flour should be used to create desired simit dough. The drinking water included in simit formulation should be of medium hardness, and salt content should be limited to a maximum of 2% in the final product. Baker's yeast is usually used for leavening of simit dough, however in certain simit types, chickpea yeast (Manisa simit, Nevşehir simit), even carbonate (Osmaniye simit) can be utilized as exceptions.

Molasses, another key ingredient in simit production, is a Turkish traditional food product obtained from sugary fruits. In the production of molasses, fruits are broken down; their sugary juice is extracted and concentrated. The flavor and properties of molasses can vary based on the raw material they are produced from. In the production of each different simit, different molasses obtained from regional sources is used. Grape molasses is the most commonly used in simit production, but molasses from mulberry, apple, or pear are also used in different regions.

Sesame seeds on the surface of the simit significantly influence its flavor. The properties, quality and quantity of sesame seeds used are important in the formation of distinctive features of the simit type. Sesame seeds, which are usually high in fat, are typically used after being roasted. However, as mentioned earlier, sesame-free simit types are also available.

In addition to these ingredients mentioned, (as an exception) oil, butter or sugar can be incorporated to simit dough and black cumin, poppy seeds, sunflower

seeds etc. can be sprinkled on its surface, apart from sesame seeds.

2.2. Production process

Simit production process is presented in Figure 2.

2.2.1. Preparation of simit dough

The initial step in simit production involves the preparation of the simit dough. Specific quantities of flour, water, salt and yeast are mixed to form the dough. The proportions of these ingredients can vary depending on the type of simit, but simit dough is generally firmer than bread dough. The simit dough is formed after a process of kneading and fermentation. Unlike bread dough, less yeast is used in simit dough, and the fermentation process is shorter. An overuse of yeast in simit dough can lead to a product that is soft rather than crispy, which is not a desired characteristic for simits.

2.2.2. Shaping

The firm simit dough is first divided into lumps, and then rounded and given a cylindrical shape, known as "wick" (fitil), in a thickness that is usually close to that of a rolling pin. In the next step, the characteristic shape of simit is acquired by binding the edges of dough in the form of a ring. The ring shape can be achieved with a single wick or by spiraling a double wick together.

2.2.3. Preparation of molasses solution

Molasses solution is a mixture created by mixing molasses and water in specific proportions. Grape molasses are commonly used in the preparation of molasses solution, however, in certain regions, different molasses are also seen to be employed. The preparation of the molasses bath can be based on brix values or mixing proportions. In some regions, no water is added to molasses; instead, it is mixed with sesame seeds and applied to simit dough with a brush. Recently, there exists a secondary method for creating molasses solution. This method involves caramelizing sugar at high temperatures, followed by dilution. In addition to being more cost-effective, this technique is crucial for creating a crispier surface on the simit. Recently, this method has been employed as an alternative in many simit varieties.

2.2.4. Molasses application

The shaped dough is subjected to molasses application. This process involves immersing the simit dough in a molasses solution or covering it with the mixture. In some simit production methods, instead of molasses solution, pure molasses is directly used (by applying with a brush) or mixed with sesame seeds. The temperature during the molasses application process is a critical factor. Molasses application can be conducted in three

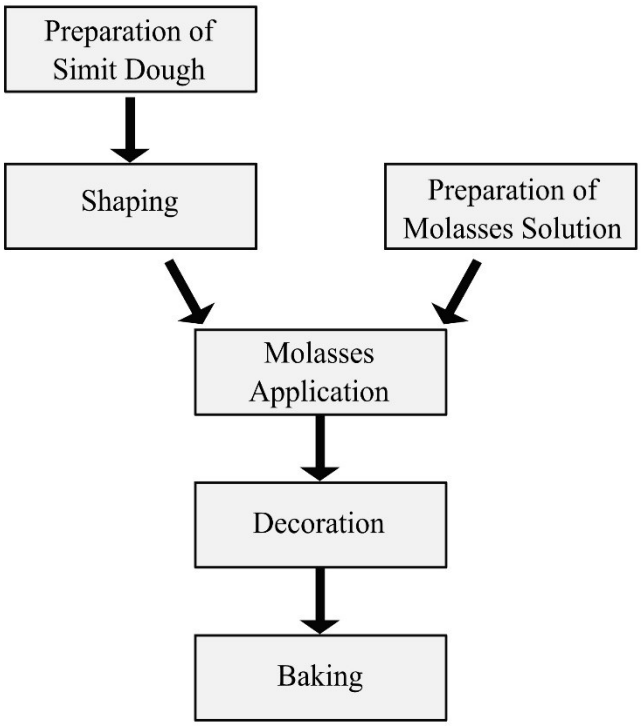

Figure 2. Simit Production Process

different ways: hot (or boiled), warm or cold. For example, simit dough is dipped into hot molasses solution in Izmir simit (hot molasses application), it is dipped into warm mixture in Ankara simit (warm molasses application) and cold mixture in Istanbul simit (cold molasses application). Hot molasses application also serves a pre-cooking process.

2.2.5. Decoration

When simit is mentioned, the first thing that comes to mind is sesame seeds on its surface. Unless specified otherwise, simits' surfaces should be covered with sesame seeds. After molasses application, the surface of simit becomes capable of holding sesame seeds. In the decoration step, according to the production process of simit, it is ensured that the surface of the dough is covered with sesame seeds. On the other hand, if different condiments (black cumin seed, poppy seed, etc.) are used in place of sesame seeds, they should be added in this step. In the production of Kel Simit (simit without sesame seeds), simit doughs are placed in simit tray without the addition of sesame seeds.

2.2.6. Baking

After placing simit dough in simit tray (simit tavası), the final step is baking. In the baking process, the type of oven, oven temperature and baking time vary based on the type of simit. In the case of hot molasses application, since simit dough is partially boiled, the oven baking

time is reduced. Additionally, the type, thickness and size of simit also play a role in determining the appropriate baking method.

2.3. Fundamental differences in the production of different simit types

Since simit is produced in different regions of Türkiye with the use of different ingredients and different production processes, simits come in very distinct flavor. The multiple distinctive characteristics of different simit types can be attributed to the following differences in the process and ingredients:

Dough composition: Flour, water, salt and yeast are generally used in simit dough as in bread dough. The properties of the flour preferred, the type of yeast and the amount of water added may substantially change simit dough properties. Moreover, the inclusion of butter or vegetable oils, sugar addition or no addition of salt considerably affect simit dough properties.

Fermentation: The most significant factors influencing the fermentation of simit dough are the fermentation method, type and quantity of yeast, processing time, temperature and dough properties. In the production, only small amount of yeast is used in some simit types (as in Samsun simit), whereas chickpea yeast (as in Manisa simit) and carbonate (as in Osmaniye Simit) can be used in others. Furthermore, the fermentation time is short in the production of some simit types (Samsun simit). The properties of simit may also change in a considerable extent based on the fermentation process.

Physical shape of simit: Simits possess various physical forms such as thick/thin, flat/round, single wick/double wick, heavy/light and small/large. Although simit dough is similar to bread dough, its thin and crispy texture is one of its most important features that make simit distinctive.

Preparation of molasses solution: Molasses obtained from different fruits can be used in simit production. Besides, mixtures with varying proportions of molasses and water are utilized. Sometimes, various sugars in place of molasses can be utilized for this purpose as well.

Molasses application (molasses solution dipping): The temperature during the step where simit dough is dipped into the molasses solution significantly influences the final product. In certain production types such as Izmir and Samsun simits, the dough is dipped into boiling molasses solution. This step, which is denoted as a pre-cooking, imparts a distinctive characteristic to these types of simit, distinguishing them from others. In molasses application, in addition to process temperature, the source of molasses, brix of molasses solution and process time are other factors affecting the properties of simit.

Condiment type: Sesame seeds are used as condiment on the surface of simit in the production of simit. On the other hand, sesame-free simits, which are called Kel Simit, are produced in some regions, and the absence of sesame seeds significantly impacts their taste. In some specific simit types, black cumin seed and poppy seed are used instead of sesame seeds.

Baking method: Simits are typically baked in the oven. The properties of simit may vary based on the oven type, baking temperature and baking time. Furhermore, the use of hot molasses application as a pre-cooking treatment also significantly influences the baking process and becomes a factor effective on the flavor of simit.

3. Simit Types

As simit has a significant place in Turkish culture, its production and consumption are prevalent even in the smallest towns throughout Anatolia. In this extensive supply-demand network, simit makers produces unique simit types according to their own taste; there are, therefore, dozens of different simit types in the country. As a result of this diversity, clearly classifying all the types of simit produced in Turkey can be quite challenging. However, in Turkey, simits are typically differentiated based on several main criteria. These encompass the baking method used in its production, the place where it is sold, and the city where it is produced.

According to the baking method, simits are classified into three types: Taban Simit (Flat Simit), Tava Simit (Tray Simit) and Kazan Simit (Boiler Simit) (İlerigiden et al., 2020). In the production of Taban Simit, the product that is thrown by a baker's peel into the oven heated with wood, much like bread, is baked on the hot oven floor. This simit is baked directly on the floor of a stone oven. Simits baked in trays are called "Tava Simit". Simits are placed on trays that are known as tray, and baked in ovens with 4 or 6 shelves equipped with natural gas or electric steam blowing system. The production of Kazan Simit, on the other hand, is based on the method in which before baking, shaped simit doughs are dipped into boiling molasses solution and slightly precooked in a boiler.

According to the location of sale, simit can be categorized into two types: Street Simit (Sokak Simidi) and Patisserie Simit (Pastahane Simidi). Street Simit are recognized for their unique preparation in stone ovens,

typically powered by wood fire, and their distinctive crispy texture. The dough of street simit typically consists of weak flour (1kg), water (0.5L), salt (30g), and yeast (10g), and they are commonly baked in a stone oven. In contrast, Patisserie Simit are baked in electric ovens. The dough for the patisserie simit is comprised of flour (1kg), olive oil (100 g), sugar (80 g), salt (30g), yeast (15 g), and water (350 g). Due to their dough composition, patisserie simit tend to be softer than their street counterparts.

In the most commonly used classification method, simits are named according to the city where they are produced. Since simits produced in different cities have different properties, which city's production method is used in the production, simits are called with the name of that city. The most important reason why the city where simit is produced is so effective in the name of the product can be explained by the fact that people in each region prefer their own simit and seek this taste. In addition, many cities have gone beyond calling their own simit with its characteristic name, they supported this situation by receiving geographical indication for their product. According to the Turkish Patent Institute (TPI)'s data, simits with geographical indication are Samsun Simit (2013), Ankara Simit (2017); Manisa Taban Simit (2018), Rize Simit (2019), Kastamonu Simit (2019), İzmit Simit (2019), Nevşehir Simit (2020), gevrek (İzmir simit) (2021) and Eskişehir Simit (2022). Istanbul simit, which is the most widely produced simit in Turkey, does not have a geographical indication. The best-known regional simits are Ankara simit, Izmir simit (Gevrek), Istanbul simit, Manisa simit, Kastamonu simit, Rize simit, Samsun simit, Devrek simit, Antakya simit and Osmaniye simididir. The best-known regional simits in Türkiye are Ankara simit, Izmir simit (Gevrek), Istanbul simit, Manisa simit, Kastamonu simit, Rize simit, Samsun simit, Devrek simit, Antakya simit and Osmaniye simit.

3.1. Ankara Simit

Ankara Simit is known to be a simit type that is thinner, smaller, richer in molasses and darker compared to other simit types produced in Türkiye. Molasses-water mixture used in the molasses application is prepared by mixing grape molasses with water, and its brix value is adjusted to 50-60 °B. The ring shaped simit dough is dipped into warm molasses-water mixture (45-50°C). Ankara simit has quite crispy properties due to the fact that there is no oil in its dough and it is cooked thoroughly at 250-270°C. The final weight of Ankara simit is about 60 g. In the production of Ankara simit, wheat flour + water (87%), baker's yeast (*Saccharomyces cerevisiae*) (1.7%), salt (NaCl) (maximum 1.50% in dry matter), grape molasses (0.60%) and roasted sesame seeds (9.20%) (Geographical Indication: December 05, 2017). In a study by Şenol (2004, p. 96), Ankara simit was reported to have the external diameter of 12.4 cm, the internal diameter of 7.6 cm, the thickness of 2.4 cm, the height of 2.1 cm and the baking loss of 12.3%; and L, a and b color values were determined as 62.0, 6.2 and 8.1, respectively. Ankara simit is darker in color compared to other simit types. This can be associated with both the dark color of molasses and the browning of reducing sugar in molasses during baking depending on the high molasses content of the surface of simit. On the other hand, in one of the districts of Ankara, Beypazarı, another simit type called as Beypazarı simit, which has its own specific properties, is produced. This simit resembles to Antakya simit rather than Ankara simit.

3.2. İzmir Simit (Gevrek)

İzmir Simit, Gevrek, is one of the simit types that received geographical indication registration. Simit, which is produced with different taste and methods in different places in Türkiye, is named as "Gevrek" in Izmir. "Gevrek" is a Turkish word and is expressed in the dictionary of Turkish Language Association as "(the thing that is) easily broken and crumbled" and "a type of pastry that is prepared to disintegrate easily in the mouth" (TDK, 2023). In many regions, simit sellers are asked whether "their simits are crispy (gevrek)" to make sure the freshness and crispness of simit, and simit is identified with its crispy property. After all, we are in the opinion that the word "gevrek" is in fact an adjective and turned into a name afterwards. Yildiz (2020) asserted that Izmir Gevrek is of Balkan origin considering the large number of Balkan immigrants living in Izmir and the fact that simits are called as "gevrek", "gjevrek" or "djevrek" in many Balkan countries; however, we disagree with this view, and in the light of historical facts, we believe that the naming in the Balkans is of Turkish origin.

In the preparation of Izmir simit dough, 100 kg wheat flour, 40-50 L drinking water, 600-700 g salt and 1-1.5 kg baker's yeast (*Saccharomyces cerevisiae*) are used. Molasses solution is prepared by mixing one liter molasses in 6.57 L drinking water. Ring shaped simits are dipped into boiling molasses solution and held for 0.5-1 minute, and then they are baked at 280-300°C for 12-15 min. The weight of the finished product is about 100 g (Geographical Indication: September 28, 2021)

3.3. İstanbul Simit

İstanbul Simit is a simit type without a definite standard and does not have a geographical indication registration.

The dough that is prepared by mixing flour, water, salt and yeast is rolled to thin and double twisted wicks and given a ring shape. In Istanbul simit, cold molasses application is used, then doughs are taken to the vat filled with sesame seeds, covered abundantly with sesame seeds on all sides and left to rest for a while. At the final step of the production, simits are baked in a stone oven at high temperature after correcting their shapes for the last time.

The features that distinguishes Istanbul simit from other simit types are the application of cold molasses, abundant sesame seeds on the surface, twisted double wick shape and the baking in hornbeam wood fired stone ovens. The aim in cold molasses application may be related to the desire to bake the product in the oven, rather than in the boiling step. Indeed, one of the factors providing the taste of Istanbul simit is the fact that it is baked in stone ovens.

3.4. Manisa Simit

Manisa Simit (Manisa Taban Simidi), one of the simit types that have received geographical indication registration, is a simit type specific to Manisa. It is produced and consumed in Manisa, some districts of Izmir and surrounding cities. In these regions, this simit is also called as Taban Gevrek (Taban Gevreği). While it used to be widely consumed in Izmir, the neighboring city of Manisa, its popularity has decreased in the city center of Izmir in recent years (Yentürk, 2018).

Manisa Simit is thicker with narrower middle space than traditional Turkish simit. In addition, Manisa Simit has a flat structure flat structure. As per the geographical indication standard published by TPI, Manisa simit must have the width of 18-23.5 cm, the side height of 2-4 cm and the middle space of 5-7 cm. Although, TPI simit standard (2006) specifies the maximum moisture content of simit to be 26%, the moisture content of Manisa simit varies between 38% and 42%. Manisa simit can be likened to the "bagel", famous in the USA and Canada, with both its appearance and high moisture content.

Chickpea yeast is the most decisive factor in its production and provides the characteristic taste of Manisa Simit. Small chickpeas are usually used in the preparation of the yeast mixture, whose composition includes milled chickpea (50-60%), sufficient amount of water (30-40%) and salt (3-5%). Milled chickpeas and salt are added into boiling water; the mixture is cooled down to 35-45 °C, and chickpea yeast is obtained after six hours of fermentation at that temperature (Geographical Indication: May 07, 2018).

Unlike traditional simits, Manisa Simit is produced with the use of flour (40-60%), water (30-40%) and chickpea yeast (8-10%). Since salt is used in the preparation of chickpea yeast, no additional salt is needed in dough making. Due to chickpea yeast in its composition, it has a little sweeter taste and whiter internal structure than other simits. After the dough is given ring shape, it is boiled in boiling water for a short time (5-10 s). The boiled simit doughs are laid on the tray containing previously prepared sesame seeds with molasses and it is ensured that sesame with molasses adheres to one surface of simit. Molasses is important for both sticking of sesame seeds to simit and giving color to its shell. In the final step of the production, simit is baked at 180-200 °C for 10-15 min (Geographical Indication: May 07, 2018).

3.5. Kastamonu Simit

Kastamonu Simit was registered as geographically indicated product by Kastamonu Municipality in 2019. The dough of this simit, which is prepared by mixing 100 kg wheat flour, 55-60 kg water, 1-1.5 kg salt and 1 kg baker's yeast is firmer than bread dough. After being kneaded, the dough is rested for 20-25 min, shaped, sweetened in boiling molasses-water mixture produced with the use of apple or grape molasses and baked in the oven. Since Kastamonu simit is sesame-free, it is also called as Kel Simit (Bald Simit), Sesame-Free Simit or Sade Simit (Plain Simit). One of the features that distinguishes Kastamonu Simit from other simit types is its sesame-free and shiny appearance (Çelik-Yeşil & Akkuş, 2022).

3.6. Rize Simit

In the production of Rize simit, one of the simit types registered with geographical indication, the dough obtained by flour, water, salt and yeast is cut in pieces weighing about 65 g, rolled into a flat wick and given its unique shape. Afterwards, simit doughs are boiled in boiling water for 1-2 min and rested on benches called "pasa" for 5 min. They are then dipped into a container with cold molasses-water mixture to make them sweetened. After removal from the container, the doughs are laid on benches, rested for a while and baked. Rize simit is a traditional food product widely sold in bakery shops, grocery stores and peddlers. It has a firmer structure than other simits. Despite its similarities with other Kel Simits (Bald Simits), it is marketed in the name of "Rize Simit" in e-commerce sites in which traditional products specific to Rize are sold (Başaran, 2017; Apak, 2022; Geographical Indication: November 15, 2017).

3.7. Samsun Simit

"Samsun simit" is a type of simit that has been granted geographical indication by the TPI. For the preparation of its dough, 100 kg flour, 60 L water, 1.4 kg salt and 1 kg yeast are used. The dough is stiff and firm. Samsun simit is a simit type that contains less yeast and has short fermentation time. Following the kneading process, the dough should be rested for 15-20 min. Wicks (50-80 g) in the thickness of 2.5 cm are given simit shape. Molasses-water mixture made by grape, mulberry, apple and pear molasses is prepared for the hot molasses application. Simit doughs are immersed in the molasses-water mixture boiling at 100 °C and boiled for 1-2 min. Afterwards, they are removed from the boiler and placed to a perforated container (ilistir). Following the procedure to cover the doughs with sesame seeds, they are baked at 270°C about 6 minutes. The fact that Samsun simit contains much more sesame seeds than other simit types constitutes its characteristic feature. For 100 kg flour, approximately 6 kg molasses and 20 kg sesame seeds are used (Geographical Indication: September 09, 2013).

3.8. Devrek Simit

Devrek simit is made in Devrek District of Zonguldak and genuine to that region. Its dough includes sugar and sunflower oil in addition to flour, water, salt and yeast. After simit doughs are shaped, they are boiled in boiling mulberry molasses, placed on trays and covered with sesame seeds and baked in the oven at 200 °C. The most prominent feature of these simits is that they are lighter in color and thicker than regular simits. An oven built in 1911 played a very important role in making Devrek simit famous. However, the history of Devrek simit goes back much further (Devrek Newspaper, 2021).

3.9. Antakya Simit

Antakya simit stands out with its large size (about 20cm) compared to traditional simits. Its dough is prepared with flour (100 kg), yeast (1 kg) and sufficient amount of water, however, no salt is added. The firm dough obtained is divided into wicks weighing about 80 g that are given the shape of simit. Afterwards, they are dipped in molasses-water mixture, covered with sesame seeds and baked in the stone oven. Since it is a salt-free simit, it is sold with cumin-salt mixture in small pouches. Antakya simit is traditionally consumed by dunking cumin-salt mixture along with ayran (Hatay Province Culture and Tourism Directorate, 2023).

3.10. Osmaniye Simit

The dough of Osmaniye simit is prepared with flour, water, salt and carbonate. After resting for a while, the dough is shaped and covered with sesame seeds and sugar in a tray. Afterwards molasses-water mixture (in half shares) is applied with the help of a brush and baked in the oven until brown. The use of table sugar in the production of Osmaniye simit ensures that its surface turns red and its taste becomes sweeter. Regionally, Osmaniye simit is consumed with turnip juice. For people living in the region, simit and turnip juice are integral duo (Osmaniye Governorship, 2023). The use of sugar and carbonate in the preparation of Osmaniye simit is a distinct feature that differentiates it from traditional simit.

3.11. İzmit Simit

"Izmit Simit" is a type of simit that has been granted geographical indication by the TPI. The dough for this simit is prepared using 100 kg of flour, 44 L of water, 1.8 kg of salt, and 0.8 kg of baker's yeast yeast. The dough is then divided into 120-gram portions. From each portion, two 30 cm long wick, each weighing 60g, are created. These wick are first twisted around each other to form a spiral, then their ends are joined to create a ring. Molasses solution is prepared by mixing grape molasses (comprising 60-70% of the mixture) and water (30-40%). After the simit undergoes a cold molasses application, it is coated on all sides with sesame seeds. Following a resting period of 20 minutes, the simit dough is baked in a stone oven at 275°C for 7-8 minutes. The distinctive characteristics of the Izmit simit include its double spiral structure, cold molasses treatment, abundant sesame seeds, and a texture that is crispy on the outside while remaining soft on the inside (Geographical Indication, September 10, 2018).

3.12. Eskisehir Simit

Eskisehir Simit is a type of bagel that has been granted geographical indication by the TPI. The dough for this simit is prepared using 100 kg of flour, 40-50 L of water, 1.5 kg of salt, and 1.5-2 kg of baker's yeast yeast. The dough is kneaded for 15-30 minutes, then allowed to ferment for an additional 15-30 minutes before being divided into 110-120-gram portions. From each portion, two wick, each 30 cm long, are created. These wick are twisted around each other to form a spiral, with their ends then being joined to create a ring. A molasses solution is prepared by mixing fig molasses (1.8L) with water (30L). Eskisehir bagel is known for its abundant sesame seeds, with local craftsmen believing that the fig molasses helps to better adhere the seeds to the bagel. The bagel dough is boiled in the molasses water at a temperature of 80-100°C for 15-60 seconds, resulting in the so-called 'hot molasses' process. Afterward, 10-15 grams of sesame seeds are added to each bagel. The bagel

is then baked in a stone oven, heated with oak wood, at 260-270°C for 10-15 minutes. The baked Eskisehir simit weighs approximately 100 g. The defining characteristics of the Eskisehir simit include its double-twisted structure, the abundance of sesame seeds on its exterior, and its texture, which is crispy on the outside and sufficiently firm on the inside (Temizkan et al., 2021; Geographical Indication, 2022, 4 April).

3.13. Other simit types

In different regions and cities, there may be minor and major differences in the ingredients used in simit and/or its production process. These differences have allowed the production of numerous simits with varying flavors, and the development of new simit types is still ongoing. For example, softer and more aromatic Tereyağlı Simit (Buttery Simit) can be obtained by adding butter into simit dough. As simit is widely consumed with cheese, Kaşarlı Simit (Simit with Kashar Cheese) has been developed. Moreover, different food ingredients are added into simit to create new types and its shape can also be altered to facilitate its production.

Simits with unique flavors are widely produced by sprinkling various alternative condiments such as black cumin seeds, poppy seeds and sunflower kernels on the surface of the product, other than sesame seeds. However, in the case where any condiment other than sesame seeds is used in simit, the ingredient used should be specified in its name. For example, simits covered with black cumin are named as "simit with black cumin", and those with poppy seeds are called "simit with poppy seed". If there are no sesame seeds or any other covering materials on simits' surface, these simits are called "Sesame-Free Simit" or "Kel Simit (Bald Simit)". The fact that simits with no covering material are defined as "sesame-free" is indeed a significant indicator of the importance of sesame seeds for simit.

Even though the word "simit" is present in the name of "Nevşehir simit", which received geographical indication registration in December 07, 2020, it carries very different properties from traditional simits in terms of both appearance and taste. Nevşehir simit is produced in a shape close to rectangular with rounded edges, unlike the shape of simits produced in other regions of Türkiye. Furthermore, chickpea yeast is employed in dough fermentation. This chickpea yeast is prepared with a method similar to the production of chickpea yeast used in Manisa simit, without the addition of salt. Simit dough is made with wheat flour, water and chickpea yeast. The shaping of the product is performed on a marble bench. A mixture known as "simit yüz suyu (simit surface water)" is utilized instead of molasses-water mixture. This mixture is prepared by blending 20-30 g flour, sufficient amount of water and one egg or a table spoon of grape molasses, boiling for 10 min and diluting with water. "Simit yüz suyu" is applied to the surface of simit dough before they are baked in the wood-fired oven at 180-200 °C for about 10 min. The shelf life of Nevşehir simit varies 7-10 days. The taste of Nevşehir simit, which is known as "bensimet" and "besimet" in the region, is more akin to bread than to simit (Geographical Indication: 2020, December 07; Ahiler Kalkınma Ajansı, 2020: 55)

Another traditional simit type is "Kandil Simit" that is made specific to kandil nights, which are religious rituals in Türkiye, and sold in the shape of small rings in boxes. Although its name and shape (the size of kandil simit is much smaller than regular ones) resemble simit, kandil simit is in fact a type of pastry. As a tradition emanating from the Ottoman period, kandil simit is brought as a present to houses or family elders visited on kandil nights. Kandil simits are produced and consumed in two types: those topped with sesame seeds and those with black cumin seeds. Their shelf life is longer due to the fact that they are crunchier and drier.

4. Simit and Nutrition

Simit has a special place in Turkish gastronomic culture. It can be enjoyed individually or paired with a variety of foods such as cheese, jam, honey, and chocolate spread during breakfast, teatime, or while travelling. Having an important place especially at breakfast in Turkish cuisine, simit can also be consumed at other meals, or as an intermediate snack. Traditionally regarded as a street food, simit has recently gained popularity in coffee shops.

The consumption of simit quite prevalent in Turkish society. According to the report published by the Ministry of Health of Türkiye (2019, 101), among the countyr's residents, 5.1% consume simit everyday, 46.4% at least once a week, 64.7% at least once a month, whereas the proportion of the population who never consume simit is 20% (Table 2).

Table 2. Bread and simit consumption habits of people in Türkiye (The Ministry of Health, 2019; p. 101)

Consumption frequency	*Simit (%)*	*Bread (%)*
6-7 times per week	5.1	72.1
4-5 times per week	3.7	3.9
2-3 times per week	16.8	5.7
Once a week	21.0	3.5
1-3 times per month	20.4	2.5
Less than once in a month	15.3	2.6
Never	20.0	9.5

The nutritional composition of simit, a food rich in carbohydrates is presented in Table 3. Although simit mainly contains carbohydrates like bread, sesame seeds on its surface change its nutritional composition and energy content, because sesame seeds includes high quantity of fat (55%), protein and cellulose (Kalita et al., 2014). As such, the inclusion of sesame seeds significantly contributes to the increase in the fat, energy, and dietary fiber content of simit.

Table 3 also illustrates the nutritional composition of bagel, a staple food widely consumed in the USA and Canada, alongside that of the simit. However, it is crucial to note that there are numerous simit and bagel types. One of the most discerning factors in comparing simit and bagel is that the moisture content of simit is substantially lower than that of bagel. Moreover, simit, which has a high sesame content, is also quite high in energy, fat and dietary fiber contents compared to bagel. The protein and ash contents in both products have been reported to be roughly similar. A medium size simit, which we often consume in our daily life, weighs about 100 g and contains approximately 342 kcal of energy. In this regard, simit can be regarded as an energy-dense food.

While simit can be enjoyed at any mealtime, it is predominantly favored at breakfast. For Turkish people, simit-tea, simit-ayran and simit-cheese-tea combinations are relished and serve as alternate breakfast options. Although simit is often chosen as a standalone breakfast substitute in Turkish dietary culture, it is clear that this consumption is insufficient for a balanced and adequate diet. Furthermore, it should be noted that substituting breakfast foods with only simit, a carbohydrate-laden food, results in a protein-deficient breakfast option. However, when paired with the right breakfast food choices, consuming simit as the central component of breakfast could contribute to a balanced diet.

Studies investigating nutritional habits of students indicate that simit is widely used as a breakfast substitute. Simit provides a practical and cost-effective alternative for students to have breakfast or any other meal. In studies conducted on this subject, it was found that simit is prevalently consumed by both primary education students (Şimşek et al., 2009) and university students (Sıtkı et al., 2006) with one out of every 3-5 students opting for simit instead of a traditional breakfast. Ünlüsoy (2017) reported that half of university students consume simit as an alternative to breakfast at least 1-2 times per week. Individuals who spend significant portions of their day away from home are observed to have a higher tendency to consume simit.

Table 3. Nutritional Composition of Simit and Bagel

Nutritional element	*Nutritional composition**	
	Simit (%)	*Bagel (%)*
Moisture (%)	19.6	33.8
Total lipid (fat) (%)	8.8	1.2
Protein (%)	10.1	10.6
Carbohydrate (%)	59.4	52.4
Dietary Fiber (%)	3.7	1.6
Ash (%)	2.1	2.0
Energy (kcal)	342**	264

* Nutritional compositions of simit and bagel were respectively reported by (Ergun, 2014: 39) and USDA (2023) for bagel. **Energy content of simit was calculated based on its nutritional composition by BeBiS software.

On the other hand, it iss critical to remember that solely consuming simit would not suffice to meet the needs of an adequate and balanced diet, particularly for students in the developmental age.

One key factor that contributes to simit's appealing taste is its browned surface. Considering its production process, the reducing sugar content on simit's surface is substantially increased due to the application of a molasses-water mixture before baking. The sugars derived from the molasses on simit's surface result in product browning under high oven temperature conditions. The characteristic color and aroma that develop on simit's surface during this browning process are largely attributed to the non-enzymatic Maillard reaction. After the Maillard reaction, there may be losses in certain components such as amino acids and fatty acids, whereas some compounds including hydroxymethylfurfural and acrylamide (Başlar et al., 2022). Consequently, it is crucial to thoroughly evaluate the health implications of simit production.

5. Conclusion

Renowned and widely consumed in Turkish culture, simit has been a staple food product in Anatolian geography for centuries. Despite being enjoyed by a significant portion of the population, there is a limited body of scientific research concerning simit in the literature. However, simit is not a mere commercial food, it is also a cultural symbol. Although there have been attempts to standardize simit production through geographical indications over the past decade, it was determined that the current documentation is still insufficient. Furthermore, simit, boasting substantial commercial potential and entrenched as a societal habit over centuries, warrants thorough exploration in both the social and natural sciences. Concurrently, it is

thought that conducting comprehensive research on both the production process of simit, which is consumed so widely by the society, and its effect on nutrition habits would also bear significance for public health.

Declaration of Competing Interest

The authors declare that they have no financial or non-financial competing interests.

Author's Contributions

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E. Kızıltepe (0009-0008-7481-234X): Investigation, Data Collection, Writing.

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The Some Physicochemical, Microbiological and Sensory Properties of Butters Treated by Different Plant Hydrosol

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Abstract

This study evaluated the physicochemical and microbiological properties of butter subjected to different hydrosols treatment were evaluated. For this purpose, butters were washed with 3 different types of hydrosols (rosemary, black cumin, thyme), vacuum packed and stored at 4°C for 30 days. At 0th, 10th, 20th and 30th days, microbiological, peroxide, free fatty acidity, sensory analysis and color measurements were carried out. Peroxide values were undetectable for the butter samples, but the free fatty acidity values were reached 1.76-2.14 KOH / gram butter at the end of the 30th day. Sensory analysis revealed that control samples were more appreciated by the panelists. The total mesophilic aerobic bacteria (TMAB) number of hydrosol washed samples were < 2 log cfu/g and for the control sample it was found to be 3.15 log cfu/g at the end of the 30th day when microbiological analysis was investigated. At the end of storage, the highest yeast-mold number was found in the control sample (6.26 log cfu/g), and the lowest one was in the black cumin hydrosol washed sample. In conclusion, it was observed that hydrosol washed samples were not preferred from a sensorial point of view whereas color parameters did not change and microorganism levels were decreased.

Keywords: Butter, Hydrosol, Antimicrobial, Antioxidant.

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1. Introduction

Butter is an animal foodstuff obtained by churning the milk of animals such as sheep and cows. The raw material of butter is milk fat. Butter is composed of 84% fat, 0.8% protein, 0.5% carbohydrate, 0.2% ash and 15-16% water. It is particularly rich in vitamins A and D. It serves as an indispensable and challenging-to-replace raw material for the food industry and the food and beverage sector (MEGEP, 2013). It is an ingredient that enhances all kinds of dishes from roast meat to special sauces and gives a distinct flavor to the dishes. Butter is an indispensable food product that we spread on bread at breakfast, add to bakery products, and that imparts a distinct aroma to our meals.

Efforts to transform milk fat into a more durable product and offer it for consumption as butter date back to ancient times. Although there are records of butter in 3000 BC in Western sources, it was also found in the records of the Urartu, who lived in Eastern Anatolia in 8000 BC. Butter production started to be established towards the middle of the 19th century relying on the principle of creaming milk in containers. The first churns were made using wooden materials. However, instead of these materials, new methods and technologies started to be used in production as a result of the rapid progress of technological development, superseding traditional ways of production and enabling faster and standardized production has been possible. The production of quality and standard butter in enterprises producing milk and dairy products is crucial to protect consumer health and to produce products in accordance with legal regulations and standards (Oğuz, 1976).

A major problem in our country is that butter is not a sufficiently durable food product. Most of the time, butter cannot be stored for more than a few weeks and many sensory defects occur during storage. Attempts are made to increase its durability by converting it into clarified butter by salting or melting. This practice makes it difficult to use butter as a breakfast product. Oxidation of the fat in butter is one of the main causes of food spoilage and can cause significant economic losses for the food industry. This is because oxidation causes the formation of various off-flavors in edible fats

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