A Comprehensive Review on Beyşehir Tarhana, A Turkish Traditional Food

Mehmet Başlar [1,*] Gökçe Nur Özçelik [1] and Hacer Çalışkan [1]

[1] *İstanbul Arel University, Faculty of Fine Arts, Department of Gastronomy and Culinary Arts, 34537 Büyükçekmece, İstanbul, Turkey*

Abstract

Tarhana, hold an important place in Turkish culture, has a gastronomic value that stands out in different geographies, especially in Turkey, with its diversity. Although many comprehensive studies exist in the literature regarding the types of tarhana, very limited literature information is available on Beyşehir tarhana, which has many unique features and is mentioned in some historical events. The present study aims to create the necessary background in scientifically defining Beyşehir tarhana in a better way and enabling it to be the subject of various research. In the frame of this aim, a comprehensive literature search was performed on Beyşehir tarhana and the information was compiled using a systematic method. In the study, firstly Beyşehir tarhana was examined in comparison with other tarhana types, and its characteristic features were discussed in a conceptual framework. Second, the production steps of Beyşehir tarhana, which has a unique and simple making process with the use of yogurt, yarma wheat and salt, was explained in detail, and consumption habits in the region were revealed. And lastly, the nutritional values of Beyşehir tarhana were evaluated based on the quantitative data present in the literature. Beyşehir tarhana has a remarkable feature to be able to be considered as the ancestor of other tarhanas due to the ingredients used in its production and its name being referred in some historical events. In conclusion, it can be stated that multidimensional and more comprehensive quantitative and qualitative scientific studies should be conducted on Beyşehir tarhana.

Keywords: Beyşehir Tarhana, Gastronomy, Snack, Tarhana, Traditional food.

Review Article / *Received: 30 May 2022, Accepted: 30 June 2022, Published Online: 7 July 2022.*

1. Introduction

Human beings have concentrated on consuming the most appropriate foods for themselves with the influence of age, geography and culture in which they are in, and have identified such foods with their own identity over time. Although some of these foods have been forgotten in the course of time, many have managed to reach the present day. These “traditional foods” reaching the present day are important in terms of containing many clues regarding the identity, habits and lifestyles of that society. As a matter of fact, the Turks, coming out of Central Asia and spread to different continents of the world, have succeeded in conveying many traditional products to the present day by enriching their traditional culture and foods with various cultures they migrated and settled, one of those is the tarhana culture.

Tarhana is considered to be one of the most important traditional foods in Turkey. However, it is seen that there are also many products similar to tarhana in various countries (İbişoğlu & İbişoğlu, 1999; Coşkun, 2003). The standard published by the Turkish Standards Institute in 2004 defines tarhana, which has many different types, as a highly nutritious food product obtained by mixing and kneading wheat flour/yarma, semolina or their mixture with yogurt, pepper, tomato, onion, salt, and various flavoring plant products, drying, grinding and sifting after fermentation (TSE, 2004; Köten et al., 2019). Tarhana is a food considerably rich in protein, carbohydrates, minerals and vitamins (Erbaş et al., 2005; Çekal & Aslan, 2017). With its rich nutritional value, tarhana has diversified under the influence of local cultures, has acknowledged its unique flavor in each region and has become to be called local names.

Tarhana, of which about twenty types are available in Turkey, not only differs in its production methods, ingredients and physical properties, but also has different consumption patterns (Coşkun, 2003).

* Corresponding Author: Mehmet Başlar
Email: mehmetbaslar@gmail.com
https://doi.org/10.56479/ayed.2022.07071

Among the most important reasons why tarhana, which reflects the rich culture of Turkish cuisine, has been conveyed as an important cultural value through centuries, can be associated with its long shelf life, practical use and nutritious characteristic, that is, based on a real benefit. Tarhana is a product usually consumed as soup. In addition to the place and diversity of soups in Turkish culture, the high variety of tarhana has made tarhana soup a significant gastronomic value.

Although Tarhanas are mostly consumed as soup, they are also commonly eaten as a snack in some regions of Turkey. However, despite not being common, some tarhana types produced with the addition of molasses or grape must are consumed as a dessert (Yönel et al., 2018; Coşkun, 2003; Çekal & Aslan, 2017; Sormaz et al., 2019). Tarhanas can be classified as ground and unground ones based on their physical properties. Ground tarhanas that are subjected to a grinding process after being produced and dried are mostly used to make soup. Examples of ground tarhanas include Göce tarhana, Flour tarhana, Gediz tarhana, Mixed tarhana and semolina tarhana. Nevertheless, many different tarhana types with their own unique physical properties are available, those of which are not subjected to grinding. The ones eaten as a snack are usually thin with a round shape. These tarhanas can also be consumed as soup by boiling with water if desired. Tarhanas consumed as a dessert are either round or rectangular in shape and not appropriate to be consumed as a soup due to their composition and taste. Beyşehir tarhana, Tokat tarhana and Maraş tarhana can be given as examples of unground tarhana types.

Although there are many different tarhana types produced in Turkey and numerous studies have been conducted on certain tarhana types, the knowledge on Beyşehir tarhana is limited and repetitive in nature in the literature. The aim of this study, by comparatively evaluating the characteristics, ingredients and processes of Beyşehir tarhana, an important tarhana type in terms of cultural features and nutritional values, is to help better understanding of tarhana, which is a significant element of Turkish gastronomic culture, and to contribute to the literature. In the preparation of the present review study, all relevant sources, scientific or non-scientific, published until December 2021 were searched with a comprehensive strategy and sorted out according to a systematic method. This review paper is an attempt to reveal an extensive and objective evaluation of Beyşehir tarhana based on literature search and personal experiences.

2. Beyşehir Tarhana and conceptual framework

Tarhana is a fermented product based on cereal and yogurt (Atar, 2019). There are about twenty types of tarhana shaped according to the taste and gastronomic culture of different regions in Turkey, and the most well-known of which are Maraş tarhana, Aegean tarhana, Göce tarhana, Grape tarhana, Gummy tarhana and Beyşehir tarhana (Coşkun, 2003).

Beyşehir, a district of Konya Province (Turkey), is located right on the shore of Lake Beyşehir, the third largest lake in Turkey (Population: 71,370 people; altitude: 1205 m; surface area: 2,121 km^2). It is a long-established and historical city that accommodates historical sites dating back to the 8000s BC and belonging to the Neolithic Age, which has been the capital of the Eşrefoğulları Principality. In addition, it is home to works belonging to the Hittites built in the 2000s BC and many other historical and touristic elements. Some of these historical sites are listed on the UNESCO World Heritage Tentative List. Beyşehir tarhana, a type of tarhana that is still intensively produced in Beyşehir city of Konya and many small towns and villages around it, takes its name from the city's name. It is expressed as "Tarna" in the local dialect (The Ministry of Culture and Tourism of Republic of Turkey, 2022).

Beyşehir tarhana (Figure 1), which has its own unique production process and even differs from the tarhana definition made by Turkish Standards Institute (TSE, 2004) with certain features, is the plain type containing only yarma wheat (also called dövme wheat), yogurt and salt in its composition. Again, unlike other tarhana types, Beyşehir tarhana is produced without a fermentation process and grinding-sifting steps. Beyşehir tarhana, which is also used to make soup, is mostly consumed as a snack culturally. When Beyşehir tarhana is characterized in the scope of its physical properties, it is seen that it has a round shape with a ~15 cm diameter and ~2 mm thickness and weighs about ~30 g, depending on the production process and manufacturers' preferences. The fact that many types of tarhana are available in Turkey and their different properties are used interchangeably makes new subtypes of tarhana emerge. Beyşehir tarhana also takes its share of this cultural diversity. Although pepper, poppy seeds, tomato, onion, and aromatic herbs are not used in the traditional production of Beyşehir tarhana, it was determined that it can also be produced in many different types in the Beyşehir region in recent years.

Figure 1. Appearance of Beyşehir Tarhana (Photographed by Mehmet Başlar)

For example, in addition to the novel Beyşehir tarhanas produced using different ingredients such as tomato paste, hot pepper and thyme, it is also seen that tarhanas with the thickness of chips, as in Maraş tarhana, are manufactured.

As can be consumed plain, Beyşehir tarhana can also be eaten in different forms after being baked in oven, on a wood fire or fried in deep oil (Figure 1-b, c, d). Its most common consumption culture involves baking it before consumption.

The tarhanas have been cooked in a wood fire for a long time, but a company first started to produce industrially and distribute them nationwide in 2021. Depending on the cultural changes that have occurred recently, frying tarhana with a microwave or toaster can also be considered among the cultural innovations. The consumption rituals of Beyşehir tarhana shows that it is traditionally consumed along with walnut, and sometimes with peanut. Nevertheless, it is found to have been recently started to be consumed together with ketchup and mayonnaise in places. Although frying Beyşehir tarhana, which is consumed as a snack, with various techniques makes it more delicious; the health risks of the new compounds to be formed during frying process have yet to be comprehensively evaluated.

3. Production of Beyşehir Tarhana

3.1. Ingredients

The main ingredients of the traditional Beyşehir tarhana are ayran, yarma wheat and salt. Nevertheless, it is common that some black cumin and/or butter can be optionally added to the formulation.

Tuluk yogurt (A type of drained yogurt): yogurt, the main component of tarhana ("Tuluk yogurt" is traditionally used), is a type of strained yogurt that is matured by being kept in tuluks made of local cloth for months. It has salty, solid and aromatic properties and contains low water content. In traditional production, yogurt is made with plenty of milk obtained from livestock, and then this yogurt is processed into Tuluk yogurt. This procedure, which includes maturing of the product for months with a special process specific to Tuluk yogurt, is a method used to preserve milk and transform it into new products. While some of the obtained Tuluk yogurt is used as kurut (locally called katık) and widely consumed at breakfast, some of it is converted into ayran and utilized in the production of yogurt butter. Tarhana production, which was traditionally a by-product utilization method for fat-free ayran, has changed its dimension with the fact that commercial butter production become widespread today. Tarhana production is no longer a by-product utilization method in the present day and tarhana has become a product made by almost everyone in Beyşehir city and all surrounding towns. It is seen that Beyşehir tarhana is produced with full-fat ayran today; even it has become a product in which butter is added. Beyşehir tarhana, which has been traditionally produced for years, is recently started to be industrially produced, and sold in various platforms. Since the production of Tuluk yogurt is a very long and laborious process, normal strained yogurt is widely used in tarhana production today. The first condition to obtain a high-quality tarhana starts with procuring a full-fat and delicious strained yogurt. After making strained yogurt ready, it is processed into ayran when tarhana production is begun.

Yarma wheat: Yarma wheat used in making tarhana is obtained by partially breaking the medium-hard wheat that has not been subjected to any heat treatment and reducing its size. The processes to obtain yarma wheat and bulgur wheat (cracked wheat) are similar, the only difference however is that wheat is subjected to heat treatment in bulgur wheat production, whereas it is only dried without cooking after being sorted and washed in yarma wheat production. Since tarhana is not desired to be dark in

color, it is preferred to produce yarma wheat from light-colored wheat as much as possible.

Salt: Salt is used in tarhana production both to give flavor to tarhana and to contribute to its long shelf life. Considering that some tarhana varieties in Turkey are sweet because they are made with the addition of molasses, the salt in Beyşehir tarhana provides a characteristic attribute to the product.

3.2. Production Process

The most commonly used formulation in the production of traditional Beyşehir tarhana contains 16 kg yarma wheat, 20 kg strained yogurt and a sufficient amount of salt (approximately 350 grams). In addition to this, it is also likely to come across numerous different formulations. For 16 kg of yarma wheat, the maximum and minimum amounts of strained yogurt are calculated as 20 kg and 10 kg, respectively. In case of using less amount of yogurt, some butter can be added into the formulation. Excessive use of strained yogurt in tarhana production is a factor which accelerates the deterioration process of tarhana, whereas an insufficient amount of yogurt in the formulation causes the product to be bland adversely affecting its eating quality. The optional use of black cumin in the traditional production of tarhana is a common practice. The production steps of Beyşehir tarhana are illustrated in Figure 2.

Ayran Production*:* Ayran used in the traditional tarhana is produced from a strained yogurt (Tuluk yogurt) specific to Beyşehir vicinity. Ayran is desired to have a medium consistency and the ones with high water content is not preferred. On the other hand, ayran with high consistency is not also preferred since it makes tarhana production in a boiler difficult. Milk fat, the main component of butter, is rather important in terms of taste and flavor of tarhana, and tarhana produced from full-fat ayran is of higher quality. It is even seen that in some regions, butter is added to the tarhana dough for higher quality tarhana production. Tarhanas obtained from non-fat ayran are usually hard and bland. Since ayran is a product that deteriorates faster than strained yogurt, it is obtained immediately before beginning tarhana production.

Cooking: Beyşehir tarhana is traditionally cooked on the wood fire. Special "tarhana boilers" as well as "tarhana paddles", which ensure that these boilers are sufficiently stirred, should be available in the production of tarhana. It is necessary to roughly adjust the saltiness of ayran placed in the boiler before cooking. Some amount of black cumin can be optionally added in this step. When ayran starts to be

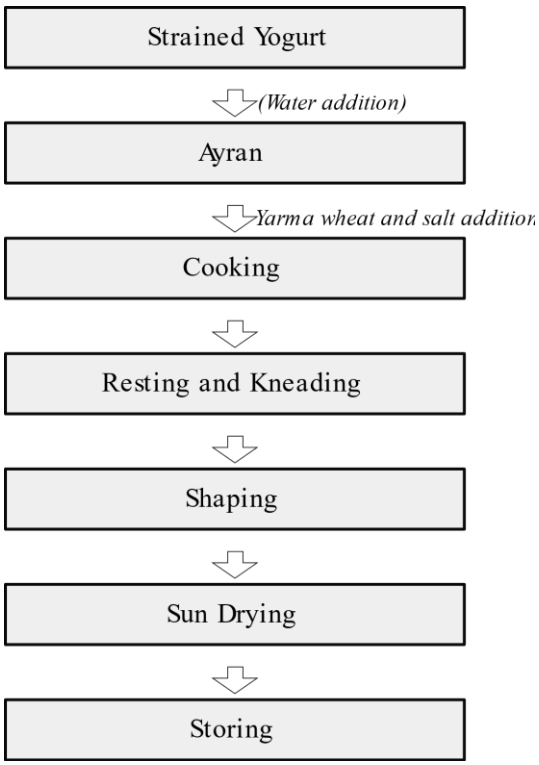

Figure 2. Production steps of Beyşehir Tarhana

heated on light-wood fire, some yarma wheat is added immediately. After ayran becomes lukewarm and evaporation starts from the surface, the remaining part of yarma wheat is added slowly. Since ayran, a fermented product, has high acidity, it is quite important to add yarma wheat and stir it on low heat before the milk proteins are denatured and precipitated. It is important to stir the tarhana throughout the cooking process, but stirring is especially important in the final stages of cooking (Figure 3). In addition, the heating of the dough and the addition of yarma wheat make the stirring process more difficult but just as important. After making sure that all parts of the tarhana dough are boiling, it is removed from the fire and left to cool.

Resting and Kneading: The cooked tarhana dough is first left to cool. It is important that tarhana, which is traditionally boiled in the afternoon (about 5 pm), is rested about 12 hours until the first light of the morning (about 5 am). However, in some regions, the resting period can be limited to only a few hours. The resting process plays an important role in through maturation of the components intermixed with each other as a result of boiling. After resting and cooling, the tarhana dough is well kneaded. In this step, if needed, ayran can be added to adjust the consistency or salt can be added to adjust the saltiness of the product. After kneading,

Figure 3. Beyşehir tarhana traditionally cooks on the wood fire (Photographed by Adem Murat Başlar from İmrenler Village in the Beyşehir Region)

the tarhana dough is made into large (25-30 cm diameter) tarhana dough balls.

Shaping: After the resting step, the weight adjustment is done. For this purpose, for each tarhana, small balls of tarhana dough are prepared. If the size of tarhana is desired to be large, the weight is slightly increased, if it is desired to be small, the weight is decreased. Small balls of tarhana dough whose weight is adjusted become ready to be given shape. Traditionally, tarhanas are gradually given a round shape with great care and effort, with the skill of partly wetted hands, however, this shaping method is no longer practised today. Small balls of tarhana dough in the present day are easily shaped with the help of simple tarhana shaping tools that have been in use for the last 10 years. These "tarhana shaping tools" consist of two moving plates attached to each other by a hinge. In order to prevent tarhanas from sticking to plates, the dough ball is placed between two plastic bags and compressed with plates to obtain the round shape of Beyşehir tarhana (Figure 1a). However, although it has begun to be forgotten today, Beyşehir tarhana produced only for soup making in the past is known to be made by a method that is similar to that of Göce tarhana.

Sun Drying: Beyşehir tarhana is traditionally sun-dried. For this purpose, a special flooring for drying called "Tarhanalık Çığ" is used, which is obtained by stringing reeds (sometimes sunflower stalks) side by side. With the use of this drying method, tarhana is laid on the streets or large balconies of Beyşehir villages and towns in the summer, which adds a characteristic atmosphere to the region (Figure 4). The sun-drying process takes approximately 2-3 days.

Storing: Though the climate in Beyşehir vicinity is sufficiently dry and cold, Beyşehir tarhana, which is transported to humid regions, should be stored air-tightly. Beyşehir tarhana, which is a dry product, can be stored for a couple of years in a dry and cool environment. In the region, tarhanas produced in the previous year are dried under the sun for a day and stored again. Tamer et al. (2007) reported that tarhanas possess a shelf-life of 2-3 years without deterioration due to the fact that they usually have low pH value (3.8-4.4) and low moisture content (6-9%) and are poor in terms of spoilage microorganisms (Salama, 1992). Although Beyşehir tarhana can be stored for a long time for similar reasons, it has been stated that the product starts to deteriorate by uptaking moisture within a year in regions with high humidity.

4. Nutritional Value of Beyşehir Tarhana

Tarhana is appetizing, regulating intestinal flora, facilitating digestion and highly delicious food, as well as a food product that stands out with its high nutritional value (Coşkun, 2003). Nevertheless, the composition of tarhana differs to a very considerable extent depending on the type and production process. Thus, to be able to speak of the nutritional value of tarhanas, their composition and the production method should be taken into account.

Beyşehir tarhana includes two main ingredients: yarma wheat and yogurt. While different ingredients other than cereal and yogurt are used in the production of other tarhana types, there are no other ingredients but yarma wheat and yogurt (except for salt) in Beyşehir tarhana. However, it can be said that Beyşehir

Figure 4. Sun drying (Photographed by Havva Başpınar from İmrenler Village in the Beyşehir Region)

tarhana is more nutritious compared to other tarhana types, thanks to its high yogurt content. It is accepted that combining cereals with milk-based foods, as in tarhana, creates a nutritionally beneficial diet (Tamer et al., 2007). Because each food group has some significant advantages and disadvantages. Combining different food groups in this way is of a special importance in terms proportionally reducing the risky compounds (starch, cholesterol, etc.) for human health present in foods and providing diversity in nutritional value (vitamin, fatty acid or amino acid profile, etc.). In other words, the protein quality of cereals, which are plant-based, is usually low, whereas yogurt with an animal origin has a higher-quality protein content. When tarhana is evaluated in terms of protein quality, it can be stated that including yogurt and cereal together in the formulation enriches the amino acid profile of tarhana compared to cereals, ensuring that it has a relatively broader amino acid profile. Likewise, Beyşehir tarhana is anticipated to have a richer fatty acid profile due to the different origins of ingredients.

When the composition of tarhanas is evaluated in general terms, it can be stated that they are rich in vitamins and minerals (Erbaş et al., 2005; Çekal and Aslan, 2017). Tarhana, which is rich in the content and variety of vitamins, contains many different vitamins such as A, B1, B2, B6, C, D, E and K. Similarly, tarhana can have a rich variety of minerals including copper, zinc, iron, calcium, magnesium, manganese, potassium and sodium (Yönel et al., 2018; Dağlıoğlu, 2000; Özdemir et al., 2007). In some tarhana types, the use of various spices and vegetables comes to the fore, while in others, the use of grain varieties comes to the fore. The variety of ingredients used in its production greatly influences the mineral and vitamin profile of tarhana. Therefore, while mentioning the vitamin and mineral contents of tarhana, a traditional fermented food product, it is necessary to take into consideration that the composition is a quite significant factor.

Yoghurt, in addition to playing an important role in terms of strengthening the immune system and bones with its rich content of B vitamins and calcium, is also a significant food source for human health with its high-quality amino acid and fatty acid profile. Yarma wheat, on the other hand, contributes to human nutrition with its high content of dietary fiber, vitamin A and B group vitamins and amino acids (Coşkun, 2003; Yörükoğlu & Dayısoylu, 2016; Slavin et al., 2009; Altundağ et al., 2020). Beyşehir Tarhana, which contains yoghurt and yarma wheat as the main ingredients, is an important and healthy snack that makes positive contributions to human health with its high nutritional value.

Being a cereal and milk-based product, tarhana is at the same time a food with a low glycemic index (Yıldırım & Güzeller, 2016). Due to the fact that the production of yarma wheat does not involve any

significant food processes that will change the nutritional value of wheat, it provides an important fiber support to tarhana. Dietary fibers tarhana contains is anticipated to help keeping the blood cholesterol level balanced and reducing the risk of colon cancer (Erbaş, 2003; Özçelik & Özdoğan, 2007).

Many tarhana types, which are generally subjected to fermentation process, are regarded as a beneficial food for health, by means of bacterial flora originating from yogurt and numerous phytochemicals that are formed during the fermentation process (Özçelik ve Özdoğan, 2007; Coşkun, 2003). In addition to this, some claims exist in the literature that tarhanas are probiotic foods, however, there are question marks about ensuring the conditions required for probiotic microorganisms and preserving them until they reach the consumer. On the other hand, it is not possible to say that Beyşehir tarhana is a probiotic product. Because while many types of tarhana are subjected to fermentation during production process, Beyşehir tarhana is not additionally fermented after the ingredients are intermixed. In this sense, due to this reason, it is poorer than other tarhana types in terms of bioactive compounds provided by fermentation. Besides, an application of heat treatment at high temperatures is performed during the production of Beyşehir tarhana. This heat treatment kills spoilage microorganisms, meanwhile it will also cause the bacteria originating from yogurt to be substantially inactivated. Even though the production process of Beyşehir tarhana lacks fermentation, fermentation products originating from yogurt increase the nutritional value of Beyşehir tarhana and present a positive contribution to human nutrition.

A study conducted by Atar (2019) reveals the nutritional value and composition of Beyşehir tarhana (Table 1). As seen from the table, the energy value of Beyşehir tarhana has been determined as 423.13 kcal/100g. As a matter of fact, when compared to Sivas tarhana having an energy value of 365 kcal/100g (Gürdaş 2002), it is seen that Beyşehir tarhana has higher energy content. This high energy value of tarhana can be explained by its high carbohydrate content and the fact that it is a dry food. Its notably high energy-giving nature of Beyşehir tarhana allows it to be used as an easy and delicious food source in difficult conditions such as mountaineering, nature sports, war conditions and long journeys. In relation to that, in a story narrated about the period of Yavuz Sultan Selim, Beyşehir tarhana has been stated to be used in harsh desert conditions due to its durable and nutritious aspects (Milliyet, 2017; Doymuş, 2022).

Table 1. Nutritional value of Beyşehir tarhana

Nutritional Characteristic	*Value*
Moisture content (%)	7.94
Carbohydrate (%)	61.90
Protein (%)	16.91
Fat (%)	1.98
Mineral matter (%)	2.75
Salt (%)	1.65
pH value	4.94
Acidity (%)	16.43
Energy (kcal/100g)	423.13

*The table was prepared using the data presented in the study by Atar (2019).

Since cereals have a high starch content, tarhana, one of the main ingredients of which is cereal, is a product rich in carbohydrates. Milk fat present in yogurt used in tarhana making relatively increases the quality fat content of tarhana and enriches the low fat content of the cereal. Accordingly, tarhana with high starch and fat content has also a quite rich profile in terms of energy content.

The mean nutritional contents of 134 tarhana samples collected from different regions of Turkey have been determined (Siyamoğlu, 1961), and the dry matter content of 10.2%, the protein content of 16%, the carbohydrate content of 60.9%, the fat content of 5.4%, the salt content of 3.8% and the ash content of 6.2% have been reported (Coşkun, 2003). The comparison of the nutritional value of Beyşehir tarhana presented in Table 1 with the average nutritional values of tarhanas produced in Turkey, it is seen that Beyşehir tarhana has high energy and fat contents, similar carbohydrate and protein contents and lower salt and mineral content. The fact that Beyşehir tarhana has a high yogurt content (even the addition of butter is sometimes seen) is assessed to cause Beyşehir tarhana to contain high fat content and accordingly high energy value.

The application of high temperatures in the processing of foods (roasting, baking or deep-fat frying) can lead to the formation of certain toxic compounds. Such heat treatments applied to foods with high carbohydrate content such as cereal, in particular, can result in the development of color, taste and flavor through a series of chemical pathways named Maillard reactions (Yıldız et al., 2010; Tyl & Crump, 2003; Karagöz, 2009).

In the region, Beyşehir tarhana is widely consumed by frying (in the oven, in deep-fat or on an ember). These delicious consumption patterns of tarhana may also bring some health risks due to compounds formed during frying of the product. As can be discerned in Figure 1, a level of browning that can be noticed by eye occurs in tarhana during the heat treatment. The most

important reason for this browning is considered to be the non-enzymatic Maillard reaction that causes color and flavor formation in foods. As it is known, there may be losses in some important compounds (amino acids, fatty acids, etc.) after the Maillard reaction, as well as it is likely that certain compounds are formed, especially acrylamide and HMF. It has been shown in the literature that exposure to these compounds at a high level adversely affects human health, thus detailed assessment and reporting of the health risks in fried tarhanas is a significant issue for the public health of local people in the region.

5. Conclusion

Tarhana, which is known by almost everyone in Turkey and has important gastronomical value, is commonly consumed as soup. In spite of differing from each other in terms of composition and production processes, different tarhana types have many characteristics in common. Although there is limited information in the literature regarding when and where tarhanas has been first manufactured, Beyşehir tarhana attracts attention with the fact that its name has been referred in some historical events and its plain composition. Some types of tarhanas in Turkey have come a long way in the industrialization process, however, the industrialization of Beyşehir tarhana has just started recently. In this respect, it is of importance to determine drying processes of Beyşehir tarhana and investigate alternative drying methods. The consumption of Beyşehir tarhana is expected to ever increase with industrialization. Tarhana is a healthy snack; however despite the fact that fried ones are more delicious, frying them with various methods is likely to bring certain health risks, hence the comprehensive investigation of new compounds forming in the frying process is of great significance.

Declaration of Competing Interest

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

Author Contributions

M. Başlar (0000-0002-8369-0769): Definition, Conceptualization, Methodology, Writing, Editing, Supervision.
G. N. Özçelik (0000-0002-1135-2365): Investigation, Data Collection, Data Analysis, Writing.
H. Çalışkan (0000-0002-6861-8021): Investigation, Data Collection, Data Analysis, Writing.

Acknowledgement

The study was dedicated to Keziban Başlar, who is the mother of the corresponding author, from the Beyşehir Region (Konya/Turkey); so much that the professor, learned the production process from his mother. In addition, the authors would like to thank Raziye Başlar for her support in the writing of the article.

References

Altundağ, Ö. Ö., Kenger, E. B., & Ulu, E. K. (2020) Farklı tarhana türlerinin sağlık yönünden değerlendirilmesine yönelik bir çalışma. Sağlık Akademisi Kastamonu, 5(2), 143-157.

Atar, Ş. (2019). Haşhaş tohumu ilavesi ile yapılan geleneksel Beyşehir tarhanasının bazı özelliklerinin belirlenmesi (Master's thesis). Kahramanmaraş Sütçü İmam University, Kahramanmaraş, Turkey.

Çekal, N., & Aslan, B. (2017). Gastronomik bir değer olarak tarhana ve coğrafi işaretlemede tarhananın yeri ve önemi. Güncel Turizm Araştırmaları Dergisi, 1(2), 124-135.

Coşkun, F. (2003). Tarhana ve beslenme yönünden önemi. Gıda ve Yem Bilimi Teknolojisi Dergisi, 3, 46-49

Dağlıoğlu, O. (2000). Tarhana as a Traditional Turkish Fermented Cereal Food. Its Recipe, Production and Composition. Molecular Nutrition Food Research, 44 (2), 85-88.

Doymuş, C. (2022). Karlıoğlu Sinan Bey (Beyşehir Sancak Beyi) ve Tarna Hikayesi. Retrieved February 2, 2022, from: http://www.beyhuder.org/content/karlioglu-sinan-bey-ve-tarhana

Erbaş, M. (2003). Yaş tarhananın üretim ve farklı saklama koşullarında bileşimindeki değişmeler. (PhD Thesis). Akdeniz University, Antalya, Turkey.

Erbaş, M., Certel, M., & Uslu, M. K. (2005). Microbiological and chemical properties of Tarhana during fermentation and storage as wet-sensorial properties of Tarhana soup. LWT-Food Science and Technology, 38(4), 409-416.

Gürdaş, S. (2002). Sivas yöresine özgü ev tarhanalarının besin değeri ve kimyasal içerik açısından incelenmesi. (Master's Thesis). Cumhuriyet Üniversitesi, Sivas, Turkey.

İbanoğlu, Ş., & İbanoğlu, E. (1999). Rheological properties of cooked tarhana, a cereal-based soup. Food Research International, 32, 29-33.

Karagöz, A. (2009). Akrilamid ve gıdalarda bulunuşu. TAF Preventive Medicine Bulletin, 8(2), 187-192.

Köten, M., Karahan, A. M., Karahan, L. E., & Yazman, M. M. (2019). Tarhananın besinsel önemi ve fonksiyonel bileşenlerce zenginleştirilmesi. Harran Üniversitesi Mühendislik Dergisi, 4(3), 120-129.

Milliyet (Nov 9, 2017). Beyşehir'deki Tarhana Geleneği, Festivalle Dünyaya Tanıtılacak. Retrieved February 01, 2022, from: https://www.milliyet.com.tr/yerel-haberler/konya/beysehirdeki-tarhana-gelenegi-festivalle-dunyaya-tanitilacak-12391315

Özçelik, A. Ö., & Özdoğan, Y. (2007). Tarhananın Türk

beslenme kültüründeki yeri ve önemi. Uluslararası Asya ve Kuzey Afrika Çalışmaları Kongresi (ICANAS 38), 10-15.

Özdemir, S., Göçmen, D. & Kumral, A.Y. (2007). A Traditional Turkish Fermented Cereal Food: Tarhana. Food Reviews International, 23 (2), 107-121.

Salama, A.A., Damır, A.A. & Mohamed, M.S. (1992). Effect of cooking on nutrients, microbial and sensory properties of skimmed milk and rayeb kishk. Acta Alimentalogica, 21, 67-76.

Siyamoğlu, B. (1961). Türk Tarhanalarının Yapılışı ve Terkibi Üzerine Bir Araştırma. İzmir: Ege Üniversitesi Ziraat Fakültesi Yayınları.

Slavin, J. L., Savarino, V., Parades-Diaz, A. & Fotopoulos, G. (2009). A Review of the Role of Soluble Fiber in Health with Specific Reference to Wheat Dextrin. The Journal of International Medical Research, 37,1-17

Sormaz, Ü., Onur N., Güneş, H. F., & Nizamlıoğlu, H. F. (2019). Türk mutfağı geleneksel ürünlerinde yöresel farklılıklar: Tarhana örneği. Aydın Gastronomy, 3(1), 1-9.

Tamer, C. E., Kumral, A., Aşan, M., & Şahin, İ. (2007). Chemical compositions of traditional tarhana having different formulations. Journal of food processing and preservation, 31(1), 116-126.

The Ministry of Culture and Tourism of Republic of Turkey (2022). Beyşehir. Retrieved February 2, 2022, from: https://www.konyakultur.gov.tr/index.php?route=modules/towns&town_id=16

TSE [Turkish Standards Institute] (2004). Tarhana. Standard No: 2282. Ankara.

Tyl, R., & Crump K. (2003). Acrylamide in food. Food Standards Agency 5: 215-222.

Yıldırım, Ç., & Güzeler, N. (2016). Tarhana cipsi. Nevşehir Bilim ve Teknoloji Dergisi 1-8

Yıldız, O., Şahin, H., Kara M., Aliyazıcıoğlu, R., Tarhan, Ö., & Kolaylı, S. (2010). Maillard reaksiyonları ve reaksiyon ürünlerinin gıdalardaki önemi. Akademik Gıda, 8(6), 44-51.

Yönel, D., Karagöz, Ş., & Güllü, M. (2018). Tarhana Üretimi ve Çeşitleri. IWACT 2018 Internatıonal West Asıa Congress of Tourısm Research 27 Sept – 30 Sept 2018 Van- Turkey.

Yörükoğlu, T. & Dayısoylu, K.S. (2016). Yöresel Maraş Tarhanasının Fonksiyonel ve Kimyasal Bazı Özellikleri. Atatürk Üniversitesi Ziraat Fakültesi Dergisi. 47 (1),53-63.