

Novel Aspects in Developing a Cultural Cuisine Integration between Paneer from India and Molasses from Turkey

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Abstract

Fusion cuisine, known as combining the elements from different countries, regions, or cultures, is the focus of the research. In the study, two common food items, cheeses, and molasses originated in Turkey, and Indian cuisine was combined, and innovative dishes were served in the study. As it is known, the combination of sweet and sour is a perfect match. The combination and cooking of Keş, Mengen, and paneer cheeses with molasses provided the good blending of the flavors harmoniously. Grape and mulberry molasses were found to improve the acceptability of paneer in terms of sweetness, taste and appearance parameters with respect to others. The innovative approach for fusion cuisine of Turkish and Indian culture has already existed, hopefully, the globalized future will cause similar appreciation for people who move across borders.

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INTRODUCTION

Turkish cuisine was reported to have a wide variety of dishes, originating from the Mesopotamian culture in ancient Iraq and the Byzantine Empire (the Eastern Roman Empire) culture blended with the Seljuk and Ottoman Empire's food culture (Güler, 2010). It is claimed to be a synthesis and fusion culture, involving different contributions of the dynamic exchange of migrants. Animal breeding, already present in ancient Turkish tribes of Central Asia, had played a chief role in the consumption of meat and dairy products of the ruminants. Milk had been not only consumed independently, but also yogurt, butter, kefir, kajmak, koumiss, and a variety of cheeses had been made for consumption (Yılmaz, 2004).

Cheese is defined as a fermented milk product, made by coagulation of the raw milk by rennet and subsequently removing the whey from the coagulated portion, in different hardness and fat composition. More than 200 traditional cheese varieties are known in Turkey, and the most prominent include Beyaz (White cheese), Kashar (Kaşar), and Tulum, produced at a rate of 50%, 15%, and 15%, respectively (Gallardo-Escamilla et al., 2005; Hayaloğlu, 2008).

The traditional cheeses that are unique to the region are generally limited to that precincts. Mengen and Keş cheeses are traditional cheeses in Bolu province where the study was carried out and are not taken place in the national market. However, both have high trade potential in terms of being possessed of their attributes. Dried ground keş cheese can be an alternative for the parmesan cheese in terms of usage alternatives, and fresh keş cheese can be used by frying like halloumi cheese. Besides, Mengen cheese is almost identical to halloumi. When the alternatives of keş and Mengen cheeses are considered in practice, such kind of fusion cuisine studies will provide the recognition of products and increasing the demand to these traditional cheeses.

Mengen cheese is one of the traditional varieties belong to the Bolu province of Turkey and produced by raw milk obtained from cows or a mixture of cow and sheep milk by coagulation with calf abomasum. It can be consumed as fresh, ripened, or grilled; the most preferred one is the fried form (Sarı, 2016). The traditional Mengen cheese production starts by the preparation of abomasum (the fourth stomach of the calf). The abomasum was cleaned, salted and dried. Afterwards, an approximate amount of 100-150 g salt and whey was mixed to form a brine with abomasum, following a subsequent treatment at room temperature for five days, then filtered and kept at (+4°C) for one week for further use. In about 35 mL of this mixture was transferred to 100 mL water and rennet was prepared. Then after, approximately 10 L of raw milk was heated up to 35°C and the rennet prepared was added onto it followed by 1.5 hours of waiting time for syneresis. Following the curd formation, the structure was cut into big squares (4cm x 4cm) and waited for further 1-2 minutes, during which additional 50-60 g salt is added to speed up the syneresis and waited for 10 minutes more. Curd started to heat until 45-50°C and, it was manually stirred and put together to form the cheese mass. The cheese mass was then removed from the hot whey and placed in bottom-perforated containers, the pressure was applied, and treated surface dry salting (Sarı, 2016).

Another cheese that can be consumed by frying is Keş cheese. It is originally produced by salting and drying yogurt (Özer, 2006) and known as keşk, kesük, kiş, kurut, sürk and çökelek in different regions of Turkey (Ünsal, 1997, Coşkun et al., 2008). For its production, the fatty milk obtained from a local milk production plant was heated up to 65°C and waited for 30 minutes. Subsequently, it was quickly cooled down to 45°C and 2% of yogurt culture (YC-350, Chr. Hansen) was added into it. After 3 hours of incubation, yogurt was ready and put into straining bags and waited overnight. It was dried between 25-30°C for 10 hours at a fan speed of 1 m/s and 1% salt was added after

straining. The keş is available for frying when it is produced with high-fat content. If low-fat milk is used for the keş production, a further process is necessary for its use in pasta. The frying process allows the formation of different aroma and taste compounds (Dervişoğlu et al., 2009; Emirmustafaoğlu & Coşkun, 2017).

Molasses is one of the traditional foods of Turkish cuisine and produced from various fruits, of all the most common is the grape (Batu, 2006). The others are made from fig, mulberry, carob, juniper tree, etc. (Karababa & Develi-Işıklı, 2005). Juniper molasses is a kind of syrup-marmalade like substance produced from boiling of the mature conifers of a type of trees, grown in the Taurus mountains of Southern Anatolia (Birer, 1983). It is a rich source of calcium, iron, potassium, and magnesium and recommended to pregnant women, patients with tuberculosis, and the recovery period of most disorders (Üzüm hakkında, n.d.).

Indian cuisine is composed of various local and traditional sub-groups, differing according to the diversities of soil type, climate, culture, ethnicity, and different jobs, by using local spices, herbs, vegetables, and fruits (Dias, 1996). The cultural and religious issues play a significant role in Indian cuisine. With one of the biggest and successful dairy development programs in the world, known as Operation Flood Program, India became the biggest producer of the world's total production by 15%, corresponding to 104.8 million metric tons (NDDDB, n.d.).

Paneer is a type of soft cheese commonly consumed in India and other regions of Southern Asia, as well. It was formed by the curdling of milk by acidification. No fermentation is required and melting is not observed. Its crude form was popular in consumption and commonly consumed by the vegetarians with high protein content with a biological value of 80-86 (Shrivastava & Goyal, 2007). A qualified paneer was characterized by marble-white color, sweet, light acidified taste, nutty aroma, spongy texture, as well as a tight and smooth structure. Paneer was made up from sour milk obtained from cow or buffalo or their combination, precipitated by lactic acid or citric acid. Large scale and upgraded production of paneer is reported to be in progress in India (Bhattacharya et al., 1971). According to the Bureau of Indian Standards (BIS, 1983), paneer should contain a dry matter of maximum 60% humidity and no less than 50 % fat.

The term fusion cuisine goes back to 1960s, where the first trials were carried out by French chefs inspired from Japanese cuisine (Spence & Piqueras-Fiszman, 2014). Today the fusion food concept tends to grow intensively. Fusion is based to form a style of cooking, which combines ingredients and techniques from distinctive foodsppheres (Stano, 2014). According to researchers, the food that we consume is regarded as a fusion of ingredients, flavours, components, recipes, styles, and/or food philosophies and in future this trend will increase towards a contemporary manner (Spence, 2018). It takes time and brainstorming is essential. The revealing of novel fusion dishes by keeping their original consumption alternatives and effective consuming methods will probably reinforce building bridges between different cultures.

The objective of the study was to provide novel approaches to fusion cuisine by using Turkish and Indian cuisine cheeses and molasses, also main sauces from other countries, and to bring a new breath to Turkish cuisine by combining foreign origin food items. The practices of matching cheese and molasses, and frying them by serving have created the focus of the study and dishes presentations with various sauces from around the world will provide contribution to the aim of the study. Besides, the main idea regarding the food safety of the products is, heat treated products will generate the improved taste and flavor by means of Maillard reaction and will keep the safety of foods microbiologically.

Materials and Methods

Materials

Mengen and Keş cheeses were traditionally produced in Gökçesu Town of Mengen County, Bolu Province, Turkey, purchased from a local vendor and immediately transported to the practice kitchen and kept at +4° C and subsequently taken for the frying process. The juniper syrup, mulberry, and grape molasses were bought from a local vendor (Bolu, Turkey). The paneer was produced from raw milk (obtained from Karaköy village next to Bolu Abant İzzet Baysal University, Gököy Campus) by the traditional method reported in the literature (Shrivastava & Goyal, 2007). Besides, the salt and lemon were purchased from a local vendor in Bolu province. The study was carried out between January 2019-January 2020.

Methods

Paneer Production

Raw milk was pasteurized at 82°C for 5 minutes. Then 25 mL lemon juice was added and just after five minutes, when the curd was started to remove from the whey, it was strained by a cheesecloth. After removing of much water 2% salt were added to curd. In order to filter remain liquid, it was awaited some time by putting approximately 20 kg weight on it.

Molasses Treatment

Mengen cheese, Keş cheese and Paneer produced in the laboratory were divided into five equal pieces that, each composed of 25 grams and dipped into 100 mL of grape and mulberry molasses and juniper syrup for 10 seconds (Table 1).

Table 1. The treatment groups

Codes	Treatment
P1	25 g Paneer (Control)
P2	25 g Paneer + Frying
P3	25 g Paneer + 100 mL grape molasses + Frying
P4	25 g Paneer + 100 mL mulberry molasses + Frying
P5	25 g Paneer + 100 mL juniper syrup + Frying
M1	25 g Mengen cheese (Control)
M2	25 g Mengen cheese + Frying
M3	25 g Mengen cheese + 100 mL grape molasses + Frying
M4	25 g Mengen cheese + 100 mL mulberry molasses + Frying
M5	25 g Mengen cheese + 100 mL juniper syrup + Frying
K1	25 g Keş cheese (Control)
K2	25 g Keş cheese + Frying
K3	25 g Keş cheese + 100 mL grape molasses + Frying
K4	25 g Keş cheese + 100 mL mulberry molasses + Frying
K5	25 g Keş cheese + 100 mL juniper syrup + Frying

Frying Treatment

The cheese samples removed from grape, mulberry and juniper syrup dipped in 10 seconds, were fried until brownish color. The small amount of butter is used in frying, especially in order to prevent molasses products from sticking to the pan.

Sensory Analysis

Total 20 participants (Stone and Sidel, 1985) from Bolu Abant İzzet Baysal University were evaluated the prepared dishes. The evaluation of Paneer, Mengen and Keş cheeses and their combinations were done by a hedonic scale including five different categories (color, smell, appearance, taste, and overall) according to a scale of 1= extremely dislike, 3=dislike, 5= neither like nor dislike, 7= like, 9=extremely like (score selection for better discrimination in the graph). All were informed about the parameters before testing and water was served in order to cleanse the palate.

Statistical analysis

The data was given as mean±SD and analyzed by the SPSS program (IBM SPSS Statistics, version 22.0, 2013). Kruskal-Wallis test was applied to find the significant differences among all groups, and the Mann-Whitney U test was performed to determine the significance between two non-parametric groups in $p < 0.05$ confidence intervals.

Results and Discussion

As it is known, sweet and sour tastes are in perfect harmony. The taste and acceptability of these flavor harmonies in cheese and molasses combinations were investigated in the study. At the same time, it will contribute to fusion cuisine studies by including Indian-origin paneer cheese in the certain of cheese. In the study, the compatibility of three different kinds of cheese and three different molasses found in the market was studied. The sensory evaluations of products were made by application of both fried and plain applications, and the following results were obtained. In addition to the sensory studies, alternative plate suggestions were presented to present the application in restaurants.

To actualize the sensory evaluations a total of 20 participants has attended the sensory evaluation of the cheese samples. Demographically, the age of the participants was found to be between 20-50 years old, including 70% males and 30% females. Half of the participants mentioned that they smoke. According to Karakuş (2013), smoking negatively affects the taste threshold.

The general sensory evaluation of cheeses has presented in Table 2. According to Kruskal-Wallis H results, the differences in sensory parameters for each treatment in cheeses were found to be significant ($p < 0.05$). It means that frying and molasses treatments applied to cheese samples provided remarkable changes in terms of taste, odor, sweetness, bitterness, saltiness, appearance in cheese. The changes in sensory parameters affected by frying and molasses applications for each cheese were tried to be explained in the following.

When panelists evaluated the paneer (P1) and its combinations based on the color, paneer without cooking and molasses treatment received the highest score. However, it was considered as the least according to sweetness, sourness, bitterness, saltiness, odor, appearance, taste, and overall properties in terms of means (Figure 1). The fried paneer without molasses (P2) got higher scores in odor and taste attributes, and grape molasses fried paneer (P3) and mulberry molasses fried paneer (P4) had an acceptable higher score for sweetness, appearance, and taste parameters. As seen that, mulberry and grape molasses contributed a positive effect to the paneer products, and the best overall acceptance was obtained by grape molasses treatment. Paneer has sour taste so the combination with grape created more desired flavor. Other molasses has more sour taste, and the combination of these two molasses resulted in high souring bitter taste. The saltiness taste caused by addition of haigh salt concentration.

Table 2. Comparison of the sensory evaluations of Paneer, Mengen, and Kes Cheese samples by Kruskal-Wallis analysis.

Sensory Parameters	Paneer		Mengen Cheese		Keş cheese	
	Kruskal-Wallis H	p	Kruskal-Wallis H	p	Kruskal-Wallis H	p
Color	12,77	0,012	12,97	0,011	12,9	0,012
Sweetness	12,52	0,014	13,5	0,009	13,5	0,009
Sourness	13,66	0,008	13,5	0,009	13,5	0,009
Bitterness	12,99	0,011	13,5	0,009	13,5	0,009
Saltiness	14	0,007	13,5	0,009	13,5	0,009
Odor	13,6	0,009	12,9	0,012	13,5	0,009
Appearance	12,77	0,012	12,89	0,012	13,5	0,009
Taste	12,89	0,012	13,23	0,01	13,23	0,01
Overall	12,77	0,012	12,9	0,012	12,9	0,012

df: degree of freedom (4 for each groups), p: significance level

Fried Mengen cheese (M2), known as an alternative to halloumi cheese (Sarı, 2016), had the highest score in color, appearance, taste, and in particular overall acceptance parameters among the parameters investigated. According to Mengen cheese molasses combination evaluations, treatment molasses with Mengen cheese were not desired much more. It was observed that the typical fried flavor of Mengen cheese was enjoyed more, and appearance and overall acceptance has desired more when compared to molasses practices. Besides, it can be said that grape molasses created a positive effect compared to other molasses. All Mengen cheese samples with and without molasses showed sourness and bitterness taste for the participants. But generally Mengen cheese has not sour taste, probably the consumption of cheese samples at the same time affected participants about the perception of taste.

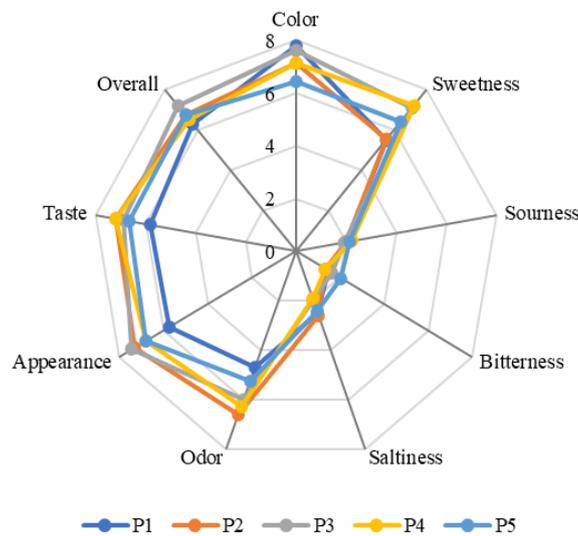


Figure 1. The spider web diagram related to the descriptive sensory evaluation of paneer and its combinations in average.

Keş cheese sensory evaluations showed similar results with Mengen and paneer cheese results in terms of application procedure. Dry yogurt products are generally high acidic products, so the sourness scores of keş cheese samples were low level. Among the molasses, grape provided better acceptable properties to the keş cheese samples.

Even though the keş samples with molasses had a low score in sensory evaluations, grape molasses could help to increase the feeling of taste, appearance, and odor characteristics positively (Figure 3). Among these three cheese types, keş cheese has more sour taste, but when it was fried it was given highest score. These changes probably arise from the losing of some acidity by heating. The combination with molasses had moderate flavor or acceptability.

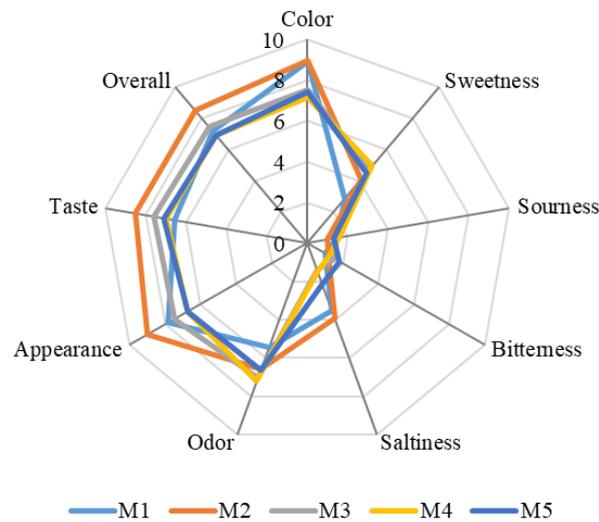


Figure 1. The spider web diagram related to the descriptive sensory evaluation of Mungen cheese and its combinations in average.

Generally, saltiness was chosen with the highest average values due to the removal of moisture by evaporation, so dry matter was increased in the fried samples. The salty taste of cheese samples with molasses and fried, may be suppressed with their sugar content and cause it to be lower in salinity descriptor averages and higher in sweetness criteria than code 1 and 2. Among the reasons for the only fried samples (code 2) to have the highest score among the flavor and odor descriptors may be the Maillard reaction, which is responsible for the flavor and odor components resulting from a series of non-enzymatic reactions. Juniper molasses contain certain bitter compounds such as juniperin (Yıldız et al., 2010); therefore, the samples with juniper molasses had the worst score in terms of bitterness. The consumer attitude is said to be important from sensory analysis point of view, that is in line with a thought ending up, leading to ‘con-fusion’, mostly if the consumer doesn’t know how to ‘read’ the new culinary items (Spence, 2018) but the paneer-grape molasses combination was liked by the panellists.

As seen from the results of sensory evaluations, some cheese and molasses combinations were desired by participants and had high scores in terms of the taste profile and overall acceptance. There are already traditional products such as cheese halva, which is made by adding sugar to cheese. In this study, the acceptability of developing similar products, and at the same time, the harmony of flavors from different cultures were observed positively.

The aim was to generate new products by combination of traditional cheeses in the region, which are suitable for fried cheese in Turkish cuisine, with molasses. Thought that they may find a place in Indian dishes by using such products in studies on Paneer, enabling them to get to know the ingredients in Turkish cuisine closely. The combination of molasses with Turkish and Indian cheeses were practiced, and the dishes have been evaluated within the scope of fusion cuisine. The plate presentations were presented in Figures 4-6. Various dishes can be made by the paneer and its combinations with molasses as shown in Figure 4. These new plate presentations will support our findings as innovation is regarded as one of the main components of fusion food and means not only the ordinary

mixture of ingredients (Erdem et al.,2012; Spence, 2018). Up to now British inspiration is observed in India since they have been ruled by them up to their independence, so the impact of other cultures is up to a limited extent. This study will promote such kind of cultural integration as well (Banerjee-Dube, 2018).

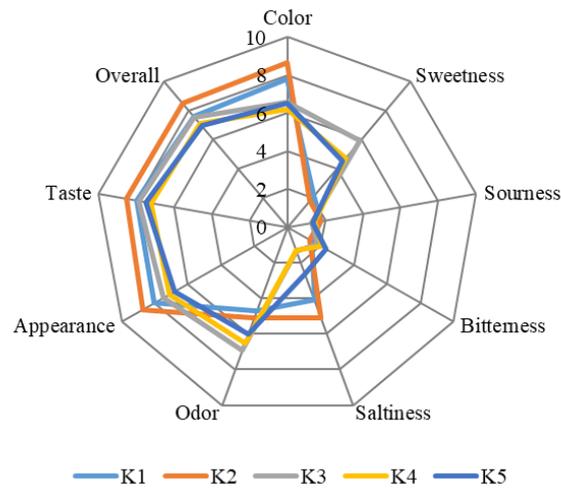


Figure 3: The spider web diagram related to the descriptive sensory evaluation of Keş cheese and its combinations in average.

(A) Paneer egg: The egg yolk was immersed into a mixture of 3:5 salt/sugar and removed after keeping 2 hours inside the fridge (+4° C). It was placed into a water-containing bowl to discard its salt and sugar. Rice noodle was kept at 180° C oven for 15 minutes and fried until desired color was observed. Paneer was grounded until its powdered form, mixed with cream and filtered through a strainer, and paneer aroma containing cream was transferred to siphon tubes, after a subsequent injection of liquid nitrogen, gas/liquid emulsion was formed, kept at +4° C for a while and get ready to serve.

(B) The paneer with molasses- The cheeses which were dipped into grape molasses will be served by red-veined sorrel (*Rumex sanguineus*), roasted sliced marrow squash, grilled cocktail tomatoes, paneer crumble.

(C) Salad sauce containing beetroot is going to get foamy by thoroughly whisking fried paneer-egg white inside and, molasses were added to this combination and mixed as not to fade out. Mini horseradish, essential oil of basil, and beetroot juice was added.

(D) Breaded Paneer- Circular-moulded Paneer was subsequently dipped into flour, eggs and bread crumbs(panko) and subjected to deep fat frying. Honey was added to the foam produced from egg white, therefore a mixture of honey-foam was formed by mixing in order not to defoam it. It was served by sprinkling turmeric powder.

(E) Molasses-sauced spongy paneer: At the beginning cream, yogurt and paneer was homogenized until a dense consistency was observed. Flour, sugar and baking powder was added and heated for one minute in a microwave. The spongy Paneer was cooled down and transferred to plate and paneer foam, which was ready in siphon tube was sprayed. It was served by orange and grape molasses.

(F) Paneer bowl- Fried paneer which was previously dipped into grape molasses, pesto sauced zoodle, brown rice noodle, sauteed kale leaves, fried beetroot and boiled cauliflower were all put into a bowl and served.

Various dishes can be made by the Turkish Mengen cheese and its combinations with Indian spices. Among them there are famous ones from Indian cuisine (Figure 5).



Figure 4. Sample dishes prepared by paneer (A) Paneer egg, (B) The paneer with molasses, (C) Paneer with salad sauce containing beetroot, (D) Breaded paneer. (E) Molasses-sauced spongy paneer, (F) Paneer bowl.

(A) Tikka masala with Mengen cheese-: 25 g tomato paste was mixed with 25 g condensed yogurt, following a subsequent addition of 1 L coconut milk. For bleaching purpose, 150 g tikka masala spice was added and mixed until it became smoothly consistent. The mixture was transferred to a pan for heating and thereafter boiled yellow split lentil was added. Consequently, grilled Mengen cheese and parsley were put on it.

(B) Teriyaki sauced Mengen Tempura-: Mineral water, carbonate and flour was mixed and lime zest was added. Mengen cheese was dipped into this filling and grilled. For the preparation of Teriyaki sauce, soy sauce, balsamic vinegar, garlic, turmeric and granulated sugar was mixed until boiling. The sauce linked with starch was mixed with fried Mengen cheese and served by sesame, cumin seed and fresh onion.

(C) Winter salad with Mengen cheese-: Cowpea, mung bean(*Vigna radiata*), quinoa and wheat available for Ashura were boiled. Dill, parsley, mint, fresh onion and pomegranate was added to this mixture. Green apple slices were added and olive oil was mixed with lemon sauce and served with fried Mengen cheese.

(D) Tikka masala spicy grilled Mengen cheese-: Mengen cheeses, chopped in cube form was mixed with Tikka masala spice and grilled in plate grill. It was served with basil oil, baby horseradish and foamy molasses.

Various dishes can be made by the Turkish Keş cheese and its combinations with Indian spices. Figure 6 shows some of the famous ones from Indian cuisine.



Figure 5: Sample dishes prepared by Mengen cheese, (A) Tikka masala with Mengen cheese, (B) Teriyaki sauced Mengen Tempura, (C) Winter salad with Mengen cheese, (D) Tikka masala spicy grilled Mengen cheese.

(A) Tikka masala spicy keş shish kebab-: Keş cheeses, cut in cube form were covered with Tikka masala spice and put on wooden sticks. Cheeses fried in plate grill were transferred to a plate and served with lemon.

(B) Noodle with Keş and walnut-: Noodles were boiled and strained. Butter was heated in a pan. Noodles were added and mixed with butter until it gets homogenized. It was served with walnut and grilled keş.

(C) Sliced keş cheese was fried in a pan and served in balsamic glaze medium by scattering walnut and parsley on it.

(D) Taco bread was deep fat fried. Designed in three folds; each fold was subsequently composed of turmeric, beetroot and plain keş. Avocado, jalapeno, salt, lime, olive oil and black pepper were blended by a robot (KitchenAid Inc., Antwerp, Belgium) and added as a sauce. It was served by putting tacos with keş cheese.

The transfer of refined cuisine to Avangard kitchen let the release of “fusion cuisine” concept, so the main idea of our study was based on the serving of dishes at one plate, belonging to different countries (i.e., Turkish and Indian cuisines) by using different cooking techniques due to the development of transportation possibilities and technology. It was considered to be important to show the diversity of the cuisine of the countries studied in here by preparing joint meals with different cooking techniques using Turkish cheeses and molasses together with Indian “paneer”.



Figure 6: Sample dishes prepared by Keş cheeses. (A) Tikka masala spicy keş shish kebab, (B) Noodle with Keş and walnut, (C) Sliced fried keş cheese, (D) Taco bread was deep fat fried

Conclusion

The studies exhibiting the Turkish kitchen and its food varieties, underlining the fact that Turkish kitchen is one of the richest cuisine in the world.

Fusion cuisine has spread in the world and increased its popularity due to globalization and moving people all around the world. The blending of different culinary cultures created innovative and attractive dishes, such as taco and pizza. Today, we can easily find fusion food regarding the combination of European and Asian foods. Synthesis of the different cooking techniques and foods sometimes results in astonishing dishes. In this context this study presents the combination of traditional Turkish molasses and Indian paneer for creating new tastes. Furthermore Indian herbs and spices can be studied for further research. Turkish traditional cheeses and molasses were substantiated under this perspective. According to the literature survey, it is the first instance to present such a fusion trial between Turkish and Indian cuisine. As a result, depending on the participant's preferences the acceptance of the innovative dishes was enjoyed and these dishes had moderate scores from sensory evaluations. The new dishes prepared with different main sauces in the world could gain novel breath to the fusion cuisine culture, since fusion cuisine is one of the crucial parts of gastronomy in terms of innovation.

Disclosure

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